

Education Innovation

Tzu-Bin Lin
Victor Chen
Ching Sing Chai *Editors*

New Media and Learning in the 21st Century

A Socio-Cultural Perspective

 Springer

Springer Education Innovation Book Series

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Education holds the key to unlock human resources that a society needs to survive and flourish. This is particularly salient in a borderless knowledge economy. For the past decades, the sterling performance of economies such as Hong Kong, Finland, Japan, Singapore and Taiwan in international studies (e.g. TIMSS, PIRLS and PISA) has channeled much attention away from the traditional centers of education research in America and Western Europe. Researchers, policy makers and practitioners all over the world wish to understand how education innovations propel the emerging systems from good to great to excellent, and how different their trajectories were compared to the systems in America and Western Europe.

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The audience of the edited volumes and monographs published in this series includes researchers, policy makers, practitioners and students in the fields of education and teacher education, and public policies related to learning and human resources.

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Office of Education Research

National Institute of Education

Nanyang Technological University

Singapore

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Editors

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Editors

Tzu-Bin Lin
Department of Education
National Taiwan Normal University
Taiwan

Victor Chen
National Institute of Education
Nanyang Technological University
Singapore

Ching Sing Chai
National Institute of Education
Nanyang Technological University
Singapore

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Series Editors' Foreword

We are pleased to present *New Media and Learning in the 21st Century* co-edited by Tzu-Bin Lin, Ching Sing Chai and Victor Chen, as the seventh volume of the Springer Series on Education Innovation. In this volume, the editors and authors investigate issues related to how new media can be integrated into learning and how it may have a bearing on our classroom practice. We use the term “integration” carefully because the traditional view of technology is in how it is integrated into the curriculum. However, this volume questions this assumption of a prescribed and existing curriculum. Perhaps new media radically requires a different curriculum – one which overhauls traditional conceptions of schooling to one that is expansive to the authentic real-world contexts, seamlessly integrating formal and informal learning.

Existing education has been institutionalized as a core that is very much in-grained in current schooling practices. On the other hand, our new generation of students has become digital natives and has been engaged in activities in the new media space beyond our imagination. However, we cannot also assume that the power of enculturation into conventional schools and society has waned much. Perhaps there is a role for both conventional and new media, and a hybridization might occur over time and space. We see aspects of this in incremental reform efforts. Such examples include Edmodo (a Facebook like interface as a learning management system) and the Flipped Classroom with the view of acknowledging the learning orientations of digital natives.

This book deals with issues in the intersection of new media and education. It confronts this issue not with a fashionable perspective in the support of new media outlooks and the digital native, but delves into the tensions – the pushes and the pulls – the old and the new. We are proud to introduce this volume which begins the conversation on this new media literacy and the theorization of education and learning.

National Institute of Education
Nanyang Technological University
Nanyang, Singapore

Wing On Lee
David Wei Loong Hung
Laik Woon Teh

Preface

Editing this volume represents our common interest in the field of new media and learning. We would like to thank all the contributors for having worked together patiently with us on getting this meaningful volume published. Also, we appreciate the hard work on editing and publishing offered by Lawrence Liu in Springer and staff in the Office of Education Research in the National Institute of Education. We believe that this volume can provide a broad understanding in the entangled relation between new media and learning. In the process of editing this volume, we increased our understanding of this field. It is a fruitful journey to all of us. We expect the readers of this volume to enjoy reading it. The horizon of academic works in this field keeps expanding and this volume may trigger more dialogues and research.

Taiwan
Singapore
Singapore

Tzu-Bin Lin
Victor Chen
Ching Sing Chai

Contents

1	Emerging Practices and Issues of New Media and Learning	1
	Tzu-Bin Lin, Victor Chen, and Ching Sing Chai	
2	Do We Really Need Media Education 2.0? Teaching Media in the Age of Participatory Culture	9
	David Buckingham	
3	Learning, Becoming, Embodying: A Review of Embodiment in an Era of Learning with Contemporary Media ...	23
	Azilawati Jamaludin	
4	Games-to-Teach or Games-to-Learn: Addressing the Learning Needs of Twenty-First Century Education Through Performance	37
	Yam San Chee	
5	Issues and Challenges of Enacting Game-Based Learning in Schools	67
	Mingfong Jan, Ek Ming Tan, and Victor Chen	
6	The Digital Textbook in South Korea: Opportunities and Challenges	77
	Hyeonseon Jeong and Amie Kim	
7	The Construction of Media in Education Policies: A Comparative Study of Singapore and Taiwan	93
	Tzu-Bin Lin and William Choy	
8	Forecast the Scarcity of Game Generation: Digital Game Literacy ..	109
	Tsung-Yen Chuang and Chia-Min Tsai	
9	Effects of Digital Gaming Among Children and Adolescents in Singapore: A Summary of Research Findings	129
	Angeline Khoo, Vivian Hsueh-Hua Chen, and Choo Hyekyung	

10	Is It Still <i>King Lear</i>? English Teachers and the E-reader Phenomenon	145
	Andy Goodwyn	
11	Towards a Web 2.0 TPACK Lesson Design Framework: Applications of a Web 2.0 TPACK Survey of Singapore Preservice Teachers	161
	Joyce Hwee Ling Koh and Ching Sing Chai	
12	Learning by Doing in the Digital Media Age	181
	Lynde Tan and Beaumie Kim	
13	Singapore Youth’s Digital Culture of Informal Learning	199
	Rose Yee Hing Liang and Li-Yi Wang	
	Index	213

Contributors

David Buckingham Department of Social Sciences, Loughborough University, Loughborough, UK

Ching Sing Chai National Institute of Education, Nanyang Technological University, Singapore

Yam San Chee National Institute of Education, Nanyang Technological University, Singapore

Victor Chen National Institute of Education, Nanyang Technological University, Singapore

Vivian Hsueh-Hua Chen Nanyang Technological University, Singapore

William Choy National Institute of Education, Nanyang Technological University, Singapore

Tsung-Yen Chuang Department of Information and Learning Technology, National University of Tainan, Tainan, Taiwan

Andy Goodwyn Institute of Education, University of Reading, Reading, UK

Choo Hyekyung Department of Social Work, National University of Singapore, Singapore

Azilawati Jamaludin National Institute of Education, Nanyang Technological University, Singapore

Mingfong Jan Graduate Institute of Learning and Instruction, National Central University, Taoyuan City, Taiwan

Hyeonseon Jeong Department of Korean Education, Gyeongin National University of Education, Anyang, South Korea

Angeline Khoo National Institute of Education, Nanyang Technological University, Singapore

Amie Kim BK21Plus Institute of Future Education Design, Seoul National University, Seoul, South Korea

Beaumie Kim Werklund School of Education, University of Calgary, Calgary, AB, Canada

Joyce Hwee Ling Koh Learning Sciences and Technologies Academic Group, National Institute of Education, Nanyang Technological University, Singapore

Rose Yee Hing Liang Department of Sociology, Faculty of Arts & Social Science, National University of Singapore, Singapore

Tzu-Bin Lin Department of Education, National Taiwan Normal University, Taiwan

Li-Yi Wang National Institute of Education, Nanyang Technological University, Singapore

Ek Ming Tan English Language Institute of Singapore, Singapore

Lynde Tan School of Education, University of Western Sydney, Australia

Chia-Min Tsai Department of Information and Learning Technology, National University of Tainan, Tainan, Taiwan

Chapter 1

Emerging Practices and Issues of New Media and Learning

Tzu-Bin Lin, Victor Chen, and Ching Sing Chai

Keywords New media • Learning • Participatory culture

The advent of new media has drastically changed the mode of communication and information dissemination among people. Communication and information are two key elements that constitute learning, regardless of whether one views learning as knowledge acquisition, meaningful participation within a community, or knowledge creation (Paavola et al. 2004). Consequently, many educators are advocating revolutionary changes in teaching and learning supported by new media and emerging technologies. For example, the TE21 report that illustrates a twenty-first-century model of teacher education as articulated by the National Institute of Education (NIE) Singapore emphasizes much on the impact of new media on learning and teacher education (NIE 2009). Thomas and Brown's (2011) depiction of the new culture of learning that emerged from self-motivated teenagers afforded by new media also creates challenges to the traditional notion of education that emphasizes structured curriculum to be delivered to students. In short, current and emerging technologies are creating new learning spaces that defy many assumptions of the traditional education practices.

However, what is new about “new media”? What are the unique affordances of new media? As new media continues to morph with technological advancements, its definition and delimitation is unlikely to be cast in stone. Nonetheless, it can be argued that there is a trend of media convergence taking place at this moment. There are some features that can be applied to draw the distinction between conventional and new media. In this volume, new media is defined by the following characteristics: digitality, interactivity, hypertextuality, dispersal, and

T.-B. Lin (✉)
Department of Education, National Taiwan Normal University, Taiwan
e-mail: tzubin_lin@ntnu.edu.tw

V. Chen • C.S. Chai
National Institute of Education, Nanyang Technological University, Singapore
e-mail: Victor.chen@nie.edu.sg; chingsing.chai@nie.edu.sg

virtuality (Lister et al. 2003). To put it simply, new media is usually created in digital form (digitality) and mostly spread through the Internet (virtuality). In terms of the presentation of messages, it is usually in hypertext or hypermedia format. That is, the information is chunked into small segments and linked with hyperlinks (hypertextuality). Unlike traditional media, which mainly affords information consumption, new media affords easy creation of multimodal message which promotes interactions and communications (interactivity) among participants. In this regard, new media can be deemed as social media. Given the ease of creation of media messages coupled with heightened interactivity facilitated by the Internet, the term new media no longer implicitly refers to its associated technology or created messages. It usually implies the social space it creates online and the emergence of a new culture. Advocates propose that new media can engender various cultural changes. One of the prominent notions in the cultural consequences of new media on learning is the advent of “participatory culture” (Jenkins et al. 2009) which illustrates the new cultural practices in the twenty-first century. Another important notion that has surfaced is the “networked publics” (Varnelis 2008) where inhabitants of the online new media space seemingly share similar practices and values that transcend conventional national and cultural boundaries. These emerging forms of cultural practices have also begun to shape how and what people learn.

However, attempts of bringing new media into classroom without careful consideration of school environment and classroom ecology would not contribute much to learning for media-savvy students in the twenty-first-century schools (Buckingham 2007a; Cuban 2001). It is crucial for educators to deliberate over the cultural elements of new media in order to develop feasible and adventurous pedagogy for the younger generations.

While scholars such as David Buckingham (2007b) and Henry Jenkins (2008) and research group such as the New London group (Cope and Kalantzis 2000) have deliberated on the affordances of new media and profiled the emergence of new culture, their studies to date are arguably based on a culturally neutral or implicitly Western perspective. Whether or not the networked publics and participatory culture are really independent of local cultures requires further investigation. For example, educators have called for a concerted effort in preparing the future generation with sufficient new literacies since the early 1990s through the redesigning of existing pedagogies (New London Group 1996) without much consideration about the traditional cultural outlooks. Given the fundamental differences in cultural outlook between the East and the West (e.g., Nisbett 2003) and the consequent differences in their respective classrooms, research of new media could be potentially enriched through more studies that are contextualized in the Asian classrooms. A recent study of the differences in self-regulated learning actions of Chinese, Canadian (Caucasian), and mixed Chinese-Canadian student dyads in the context of collaborative learning reveals important cultural influences on whether the students exhibit individualistic/socially oriented actions. Chinese dyads were influenced by the cultural norm of social harmony and exhibited significantly less individualistic-oriented self-regulated learning actions as compared to the Canadian dyads. The mixed dyads’ actions indicate that the Chinese student was influenced

by the Canadian's individualistic orientation and exhibited less socially oriented self-regulation actions. The study suggests that cultural influences cannot be ignored in the study of education-related phenomenon.

In the context of twenty-first-century networked society underpinned by the participatory culture, it has been pointed out that consuming and prosuming (producing and consuming) are both important (Chen et al. 2011; Lin et al. 2013). Among various competences in new media ecology, creation, for example, refers to a kind of dialectical relation: we reshape what we created in response to critical feedback from others in an ongoing process of innovation and refinement. This dialectical relation implies a collective intelligence. The Wikipedia is a significant example. As a result, learning takes place in a very different format. However, how the cultural heritage of the East and West manifests itself given this general description of new media direction of advancement is yet to be studied. It has been pointed out that people from the East focus more on the social and moral dimensions of creativity. The Westerners, on the other hand, emphasize more on individualistic dimension of creativity such as humor and aesthetic tastes (Niu and Sternberg 2002). Major and perhaps subtle differences could expectedly be revealed among users and learners from different cultural origins.

In this volume, we brought together conceptualizations and empirical studies that explore the sociocultural dimension of new media and its implications on learning in the twenty-first-century classroom. We first invited experts to articulate their ideas about, and vision of, new media-enhanced learning at a global level. These high-level notions are then reexamined through different degrees of contextualization and localization, for example, how a specific form of new media (e-reader) changes the cultural practices of specific activities. In addition, studies anchored in Singapore classrooms provide insights as to how the high-level notions are being transformed and enacted by a co-constructive effort of researchers, teachers, and students. Singapore classrooms offer a unique lens to study the theory-practice nexus in that they are high achieving, implicitly grounded in the Eastern cultural values and well resourced with ICT infrastructure. While these studies serve as examples that synergize sociocultural and technological affordances of the current learning environments, they also serve as improvable ideas/practices for further innovations. Together, the interplay between theory and practice would lend support to the reciprocal improvements for both. We hope that the publication of this volume would contribute to the continuous debate in the field, leading to better understanding of the complex interactions between the current socio-technological environments and the emerging pedagogical responses from educators.

Specifically, as shown in the table of contents, there are 12 chapters plus one introductory chapter in the beginning of this book. In the introductory chapter, the authors attempt to identify some emerging practices and issues within the field of new media and learning and offer an overview of this volume. The rest of the 12 chapters are divided into two parts: in the first part, theories, emerging issues, and policies related to new media and learning are explored by authors in six chapters; the second part offers various empirical studies in various cultural contexts.

Part I. New Media and Learning: Theories, Issues, and Policies

Part I is our attempt to theorize new media and learning in the twenty-first century through introducing the notion of new media education and the impact of social media on education and learning. The second chapter is from world leading theorist, David Buckingham, in the field of new media and learning. He offer insights on the agenda of “participatory culture” (Jenkins et al. 2009) in the new media ecology as well as the application and limitation of social media in contemporary education setting. The second chapter discusses the notion of embodiment which could be used as a framework to unpack the new media participatory culture.

In Chap. 2, the link between participatory culture and teaching and learning in the Web2.0/Media 2.0 era is elaborated by David Buckingham. Following his critical review of the “revolutionary” claim from advocates of Web 2.0 (Buckingham 2007a), he tries to demystify the construction of a binary opposition between Web 1.0 and Web 2.0. Using the UK as an example, he argues that school as a public educational institute plays a crucial role in the various dimensions of teaching about the new media ecology such as bridging the digital divides. His claim resonates with Jenkins’ argument on participatory culture (Jenkins et al. 2009). This chapter brings the notion of participatory culture into the context of schooling. Against the binary opposition, Buckingham provides a new way of looking at the role of school and teaching in Web 2.0 era.

On the contrary, the Web 2.0 is reliant on a minority of productive users, while the majority continue to consume rather than presume. In short, social media remains largely social rather than educational. There are inherent conflicts in the purpose and mechanism undergirding social media and education that cannot be ignored.

To bring the notion of participatory culture closer to individual learners, Jamaludin offers her attempt to theorize how the notion of embodiment can be construed in the new media ecology in Chap. 3. Adopting a historical analysis, she traces the development of the concept of embodiment into situated embodiment, natural embodiment, naturalistic embodiment, social embodiment, mechanistic embodiment, phenomenal embodiment, simple embodiment, radical embodiment, organismic embodiment, and organismoid embodiment (Barsalou et al. 2003; Clark 1999; Sharkey and Ziemke 2001; Zlatev 1997, 2001). These various categories of embodiment can be applied as analytical lenses to understand the interaction between new media and users as well as learners and the learning environments.

With the backdrop of theorizing new media broadly as participatory culture, other authors in Part I offer insights on identifying key themes, issues, and policies including the transparency problem in the era of social media, “production turn,” and gaming, anticipating learning via various means such as digital textbook. These chapters reveal the complexities involve when educators integrate new media into formal classroom teaching and learning and they collectively indicate that much more pedagogical sense making and design work are needed for new media to be used productively in the classroom.

The immersive nature of digital gaming and the complexities involved in today's online games have prompted a number of researchers to postulate that gaming could be potentially important to the notion of twenty-first-century skills as Yam San Chee argues in Chap. 4. In this volume, there are four chapters that dwell specifically on digital game and its potentials in learning from different perspectives. However, due to their various aims and focus, two out of the four chapters are in Part I, while the other two in Part II.

Chapter 4 is the first on addressing game-based learning by a leading researcher. The author questions the prevalent view of using game to engage learners for enjoyable learning within the traditional school setting. By comparing two approaches of game-based learning (games to teach and games to learn), the author clearly demarcates the two approaches and argues that the games-to-learn approach is more conducive for twenty-first-century learning. However, the dire reality is that the industrial model of schooling along with the assessment requires deep changes. The author illustrates what games to learn would look like through the narration of how students make meaning in *Statecraft X*, an immersive environment that engages students in resolving sociopolitical issues. In essence, the claim that games can help develop deep learning is only applicable to games that are pedagogically designed to facilitate engaging inquiry among students.

Chapter 5 examines the idea of game-based learning critically in the context of re-situating the *Mad City Mystery* for school-based learning. The authors provide insightful accounts about the necessary facilitating conditions to be in place in order for the game to be successfully integrated into classroom learning. The facilitating conditions or barriers can be categorized into two levels: one of which can be resolved with fiscal provision, technological advancements, and research, while the other involves deeper issues which are essentially social and curricular in nature. The study reflects the need for additional reform effort beyond what a classroom teacher could resolve.

In the Asian schooling context, a review on the digital textbook project in Korea is presented in Chap. 6. Through a critical review of a number of empirical studies conducted in South Korea, both authors reflect on the digital textbook initiative as part of the "Smart Education" and address the opportunities and challenges of applying digital textbook in Korean schools. The experience of South Korea could offer insights to those countries that attempt to embark on a similar journey.

The last chapter in Part I is a comparative study on how two Asian countries, Taiwan and Singapore, construct new media in their respective education policies. In 2002, Taiwan is the first Asian country to issue a white paper on media literacy education that includes the aspect of media and learning in formal school system (Lin 2009). Singapore is another example in this region to have official documents and a Media Literacy Council (MLC) (Media Development Authority of Singapore n.d.). Through the comparative study of policy discourse, both authors deconstruct the policy discourses in these two countries and identify the similarities and differences in the assumptions on the relation between (new) media and learning.

Part II. New Media and Learning: Lessons from Research

While gaming in immersive environment has the potential to build twenty-first-century competencies, it is also associated with sex, violence, and addiction. These concerns were researched by two groups of researchers. In Chap. 8, taking game-based learning even further, the authors investigate parents' and children's digital game literacy through a large-scale survey in Taiwan. Important differences between parents' and children's digital game literacy were discovered. Based on these differences, the authors argue that parents should assume active role in helping children to select appropriate digital games and also to participate in the children games.

Khoo and her colleagues in Chap. 9 conducted massive survey among Singaporean teenagers over 3 years about their gaming habits and how they may be associated with students' well-being such as social adjustment, attention in classroom, and pathological gaming addiction. Some risk factors and protective factors were identified. The study could inform educators who wish to use games for teaching and learning about what to look out for to prevent pathological gaming.

Beyond digital games, other emerging forms of new media such as e-reader are increasingly playing a significant role. Riding on the conceptualization of literacy to a multimodal context in new media, in Chap. 10, Andy Goodwyn explores the learning potential of the e-reader. This is a rather new area which is much under explored among academics and the teaching professionals. He identified the pervasiveness of e-book and new media devices and reviewed issues related to this new media phenomenon and learning in and out of the school contexts. English language teachers in England, who are book lovers, are gradually accepting the e-reader as a good device, and they believe that e-reader offers some affordances to help learners in reading. However, challenges arise from access to technology, the need to reconstruct pedagogy, and the quality of the curriculum materials. The findings seem to echo many reform efforts through educational technology in that a constant need to reconstruct the relationships between technology, pedagogy, and content learning (see Chai et al. 2014).

It is obvious that for new media to be employed in a pedagogically sound manner, teachers need to be equipped with the necessary knowledge and they also need to be able to create the specific lessons for their students. Chapter 11 reports and discusses the result from a survey with Singaporean preservice teachers' efficacies about Web 2.0, social networking, teaching without Web 2.0, teaching with Web 2.0, and Cyberwellness. The study unpacks what teachers need to know in order to make pedagogical use of Web 2.0 and provides a planning framework that could facilitate their instructional planning.

From teachers' perception to practice, in Chap. 12, the effectiveness of social networking media in teaching and learning is explored in details. The authors are leading researchers in this field in Singapore whose papers have been frequently

cited. In this chapter, they clearly articulate the effectiveness and potential of applying social networking media on learning. Furthermore, she offers some useful strategies that can be put into daily practices in classrooms. From the classroom practice, we direct readers' attention specifically to literacy practice.

Chapter 13, the last chapter, presents some findings from an ethnography study on youth's new media participation. The authors apply a symbolic interactionist perspective to examine the data collected from youths who use new media inside and outside school where the informal learning takes place. Findings could shed lights on formal learning in schools. That is to inform educators in school settings on how to make good use of students' digital culture in pedagogical practices. These four chapters all provide valuable insights in the learning and new media and how the theory can be put into real-world practices.

Conclusion

In this introduction, the editors offer an overview of the contribution of all other chapters in this book. The themes that emerged in the chapters both from global and contextualized perspectives are compared and contrasted to identify the common understanding about affordances of new media, necessary and sufficient conditions for new media to transform literacy practices, research and outcomes to date, tensions between new media and schooling, and challenges and future directions of new media and learning. Like all forms of educational technologies or technologies that could be educational that have emerged in the past decades, the common theme is that all forms of new media need substantial design effort from educators to integrate the new media technology. There are obvious affordances that new media offers for more student-centered pedagogies to foster students' use of technology for collaborative, intentional knowledge construction. However, the distance between schools as formal institutions that carry the burden of certifying students and the Internet and new media as fertile ground that showcase students' ingenuity and self-directed learning/knowledge creation should not be underestimated. A critical stance toward new media is desirable for educators who wish to push education with new media. Chai et al.'s (2014) proposal of multilevel design effort in creating the necessary technological pedagogical content knowledge from different stakeholders could offer some insights. One pertinent question that educators may ask is how long will any new pedagogical design last? Our stance is that we need to foster educators' design capacity and each attempt to make sense of emerging technology pedagogically would hopefully enhance the design repertoire of the educators involved. The alternative would be to perhaps sit through the changes, with the danger of being left behind. There are of course other possibilities in considering other pedagogical responses to the emerging new media. Whatever may be one's responses, constant sense making is inevitable.

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Chapter 2

Do We Really Need Media Education 2.0? Teaching Media in the Age of Participatory Culture

David Buckingham

Keywords Media education • Digital media • Media 2.0 • Pedagogy • Critical analysis • Creative practice

The advent of digital media has been seen by many commentators to require new paradigms, in scholarship, in creative practice and in pedagogy. ‘New’ media are, according to some, so fundamentally different from ‘old’ media that they require different methods of analysis, different theoretical and conceptual frameworks and different forms of intellectual and political engagement. In relation to education, the interactive, participatory possibilities of digital media are believed to transcend the limitations of hierarchical, top-down ‘mass’ media and hence to undermine what are seen as the authoritarian ‘knowledge politics’ of traditional pedagogy. The potential they offer for learners to become creators of knowledge – rather than merely ‘consumers’ – has been seen by some as little short of revolutionary (for examples of such arguments, see Knobel and Lankshear (2007) and for a critical review, Buckingham (2007, Chapters 2 and 3)).

In this article, I seek to interrogate some of these claims and assess their implications for educational practice. My specific concern is with the practice of media education: I am interested in what and how we should teach about media, rather than in the use of media as teaching materials or teaching aids (i.e. educational media). My focus is primarily on teaching in schools, although the argument has implications for the practice of media education in universities as well. However, I would suggest that some of these arguments are applicable more broadly: teaching about media is a cross-disciplinary concern, which is not confined to specialist courses of Media Studies.

D. Buckingham (✉)

Department of Social Sciences, Loughborough University, Loughborough, UK
e-mail: d.buckingham@lboro.ac.uk

In the UK, media education has a long history, going back over 70 years. We have specialist examined courses in Media Studies, which students in most schools can follow from the age of 14; and media education is a dimension of mother tongue language teaching ('subject English') throughout the secondary school. While there has been less coherent provision in primary schools, there is now a growing recognition among policy makers that all children should be taught about media as a core element of literacy education in particular (see Buckingham 2003; Burn and Durran 2007). As such, I speak from a context where there is already a well-established body of educational practice: media education in the UK is guided by a fairly coherent conceptual framework, and there is a good sense of 'what works' in classroom terms. Crucially, in relation to claims about 'participatory culture', it should be emphasised that media education in UK schools has always been about creativity as well as critique: it is about making media as well as analysing media.

Of course, this is not to say that there are no debates to be had or no areas in need of development. Indeed, there is a growing body of research that is addressing some of the contradictions and limitations of established practice in media education¹. Much of the debate here hinges on fundamental questions about knowledge and learning: what do we imagine young people already know about media, what do they need to know, and how might they learn it? The advent of digital media has some interesting implications in respect of these questions. As we shall see, some have claimed that contemporary changes in the wider media environment require us to rethink the fundamental aims and methods of media education – not just the content of the curriculum but also our pedagogy and our teaching methods. But are such changes really as fundamental as their advocates suggest? And is it necessarily the case that the age of 'Media 2.0' also requires 'Media Education 2.0'?

Media Studies 2.0 and the Complete Reinvention of Everything

In early 2007, there was a brief but intense debate on the UK academic Media Studies message boards focusing on the notion of 'Media Studies 2.0'. The debate seems to have been initiated by William Merrin, of the University of Wales in Swansea, and was quickly taken up by David Gauntlett, of the University of Westminster. It was subsequently joined by various named and anonymous participants and was also commented upon in online groups of Media Studies teachers in schools and further education colleges.² This debate was primarily about

¹Reviews of some of this work may be found in Buckingham (2003) and Buckingham et al. (2005). More recent examples are contained in special editions of *Learning, Media and Technology* (2007); and *Media International Australia* (2006).

²Some of this debate is archived at <http://twopointzeroforum.blogspot.com/>; Merrin's ongoing blog can be found at <http://mediastudies2point0.blogspot.com/>; while Gauntlett's work is at <http://www.>

the academic discipline of Media Studies as it is taught in universities, rather than schools; but it did raise some serious issues that are, if anything, even more acute for those teaching young people at this level.

Many contemporary teenagers are now growing up with the ensemble of participatory media collectively known as ‘Web 2.0’ – social networking, photo- and video-sharing, blogging, podcasting, remixing and mashups, wikis, machinima, user-generated content, online games and social worlds, and so on. These new media have not replaced older media: at least in the UK, children and young people still spend much more time watching television than they spend online (Ofcom 2008); and many of them even obstinately continue to read books. Nevertheless, if we base our teaching on forms of media that are, if not completely outmoded, then at least only part of the environment that young people are now experiencing, there is clearly a danger that it may become irrelevant to their lives. This is not, I would argue, simply a question of curriculum content – of teaching students how to analyse websites as well as television ads, for example. Rather, enthusiasts for new media typically claim that they entail a distinctively different orientation towards information, a different phenomenology of use, a different politics of knowledge and a different mode of learning. If this is the case, it has potentially far-reaching implications for pedagogy – not just for what we teach but also for how we teach.

For William Merrin (2008), these new media represent a fundamental challenge to our right to teach:

Our fear of technology often extends to our own personal use of it. Whereas in the broadcast-era we broadly understood the basic technical principles of the dominant media and we understood their use – sharing that use with our students – today lecturers are being left behind in their knowledge of what technologies are out there, of their technical possibilities, of how they even work, of how to use them and of what they are being used for. Again, we no longer share a common culture with our students. Unless we can keep up with these changing technologies and uses and unless they become as integral a part of our lives as they are to our students then we will lose both the ability and even the right to teach them. In an era in which we watched and studied TV we had a right to teach it: in the future, unless we’re downloading, sharing, ripping, burning, messaging, networking, playing, building and producing then we’ll lose that right. (Merrin 2008: n.p.)

Questions could certainly be raised about the historical narrative that is offered here – the notion that at some unspecified time in the past, there used to be a ‘common culture’, a shared experience of media between teachers (or ‘lecturers’) and students, that has now been lost. However, the more challenging question is about the ‘right to teach’ – in effect, about the legitimacy of teaching media in the age of Media 2.0.

theory.org.uk. (Sites last accessed March 2009.) More extended pieces by these authors, along with some critical responses, have recently been published (after this article was written) in *Interactions: Studies in Communications and Culture* 1(1), <http://www.atypon-link.com/INT/loi/fiscs>.

Table 2.1 A comparison between Media 1.0 and Media 2.0

Media 1.0	Media 2.0
Old (analogue) media	New (digital) media
Consumption	Production/participation
Hierarchy	Popular democracy
Media Studies 1.0	Media Studies 2.0
The media canon	Diversification of tastes
Western media	Global media
Textual analysis and political economy	Audience research
Conventional research methods	Qualitative/creative research methods
Expert readers	Ordinary audience members
People need to be taught to be critical	People are already critical

The arguments developed by Merrin and Gauntlett across their various contributions hinge on a (rather old-fashioned, structuralist-style) binary opposition between ‘1.0’ and ‘2.0’. A summary of this, drawing principally on Gauntlett (2007), would look roughly as in Table 2.1.

Like many such binary models, this one suffers from the tendency to deal in absolute oppositions and to conflate quite different issues. For example, the distinction between Western media and global media does not simply map onto the distinction between ‘old’ and ‘new’ media – particularly in a situation where the majority of the population of the global South does not even have access to electricity, let alone broadband Internet. There are other debates to be had about research methods and about the merits of the so-called ‘creative’ approaches to audience research (which I have pursued elsewhere: Buckingham 2009). To some extent, Gauntlett is also replaying an old debate in academic Media Studies between political economy and ‘active audience’ research – a debate which, as Lawrence Grossberg (1995) and others have suggested, is itself unhelpfully polarised.

Even so, there are interesting pedagogical issues here, which go back to the point about the legitimacy of teaching (Merrin’s ‘right to teach’). We might characterise this position as a kind of pedagogical populism. For example, Gauntlett is very dismissive of textual analysis. One key characteristic of Media Studies 1.0, he says, is ‘a tendency to fetishise “experts”, whose readings of popular culture are seen as more significant than those of other audience members (with corresponding faith in faux-expert non-procedures such as semiotics)’. By contrast, in Media Studies 2.0, this approach is ‘replaced with a focus on the everyday meanings produced by the diverse array of audience members’ (Gauntlett 2007: 3). Likewise, Media Studies 1.0 is characterised by ‘a belief that students should be taught how to “read” the media in an appropriate “critical” style’. In Media Studies 2.0, this is no longer necessary: ‘The patronising belief that students should be taught how to “read” the media is replaced by the recognition that media audiences in general are already extremely capable interpreters of media content, with a critical eye and an understanding of contemporary media techniques, thanks in large part to the large

amount of coverage of this in popular media itself' (Gauntlett 2007: 3). Obviously, there is an element of deliberate provocation here; but there are also interesting questions about learning. If ordinary people are already creating their own diverse meanings, participating and producing their own media, in the extremely capable and critical way Gauntlett is suggesting, then what do they need to learn, and what do we have to teach them?

The Limits of Media 2.0

These advocates of Media Studies 2.0 are clearly subscribers to what Richard Barbrook and Andy Cameron (1996) many years ago called 'the Californian ideology' – a kind of populist cyber-libertarianism which claims that ordinary people will somehow be empowered by technology and that digital media are inherently liberating and countercultural. This approach is certainly apparent in the celebration of 'creativity' and 'participation' for their own sake and in the valorising of 'ordinary people' as opposed to what Gauntlett and Merrin see as the spurious critical procedures and patronising attitudes of self-declared 'experts'.

The broader problems with this approach have been widely rehearsed (see, e.g. Robins and Webster 1999). It rests on a form of technological determinism – a view of technology as somehow autonomously producing social change. In this context, and in discussions of education more broadly, it is also implicated with the notion of the 'digital generation' – the idea that technology has brought about fundamental and absolute generational change and that young people today are somehow automatically technologically savvy or media literate. As several critics have argued, this approach embodies a kind of essentialism, an 'exoticising' of youth, which ignores the diversity and the inequalities in young people's experiences and the continuities across generations (Buckingham 2006; Herring 2008).

A full critique of the rhetoric of 'Media 2.0' is beyond the scope of this article, although it is important to raise some key critical questions. Claims about the potential of new media in terms of democratisation and empowerment are by no means new. One can look back to the arguments being made about cable TV in the 1970s (Streeter 1987) or about portable video in the 1980s (Buckingham et al. 2007) – although in fact most new media technologies have arrived amid claims about their inherently radical potential (Marvin 1988; Winston 1998). All of these media were apparently going to bring power to the people, undermine the control of knowledge by elites, enable ordinary people to express themselves and have their voices heard, and create new forms of collaboration, in precisely the revolutionary ways that are now being seen as characteristic of digital media. And in each case, the ultimate effects were much more complex and equivocal than their advocates proclaimed.

One reason for this has been the uneven and indeed unequal diffusion of technological innovations. In the case of 'Web 2.0', statistics on patterns of use are not wholly reliable; but it would seem that relatively few users of such services

are active creators of content. For example, figures from the market research agency Hitwise suggest that among users of YouTube – the most accessible online video-sharing site – only 0.16 % actually upload material; and much of what they upload is of course pirated clips from commercial media (Auchard 2007). Jean Burgess (2006) has rightly criticised the participatory media enthusiasts for focusing on the more artistic avant-garde or postmodern manifestations of ‘cool’ – fan-produced mashups or countercultural political critique – while neglecting the relatively banal domestic practices of the majority. Our research suggests that most amateur video-making, for example, continues to be dominated by what Richard Chalfen (1987) calls the ‘home mode’ – home movies of family life, children’s birthday parties or holidays on the beach. While home video serves particular functions in terms of memory and family relationships, people rarely see it as having anything to do with what they watch in the mainstream media; and while it is certainly worthy of study in its own right, it is a long way from the radical democratisation of mediated communication proclaimed by some enthusiasts (Buckingham and Willett 2009; Buckingham et al. 2011).

Research also suggests that there are some striking social differences in levels of participation here. For example, studies by Lenhart et al. (2007) or Hargittai and Walejko (2008) point to significant ‘digital divides’ in people’s uses of these participatory media. These inequalities are clearly related to wider forms of social inequality; and they largely coincide with other differences, for example, in how families from different social classes use the educational dimensions of the Internet or participate in creative or arts-related activities offline. To a large extent, the most active participants in the creative world of Web 2.0 are the ‘usual suspects’ – that is, those who are already privileged in terms of economic or educational capital. Indeed, if online participation is as socially, culturally and politically important as the enthusiasts suggest, it seems likely that, far from liquidating social inequality, it might actually accentuate it.

Finally, there is the question of the commercial interests that are at stake in these developments. One of the paradoxical characteristics of the Californian ideology is its appeal both to libertarian political radicals and to contemporary business gurus – not least Rupert Murdoch (2006), whose proclamations about ordinary people ‘taking control’ of the media have been widely reported. The political economy of Web 2.0 is still evolving; yet it is clear that the Internet is an exceptionally efficient medium for niche marketing, not least because of its potential for the targeting and surveillance of individual consumers. Indeed, much of this marketing is itself ‘user generated’ and ‘interactive’ (as in the case of viral advertising).

Clearly, there are debates to be had about the wider social and political ramifications of Media 2.0. Such debates are beyond the scope of this article: but it could be argued that, far from precipitating a democratic revolution in communications, these new media are merely part of much broader moves towards individualisation, self-surveillance and self-promotion that are characteristic of how identities are formed and lived out in neo-liberal consumer societies. While there is certainly a democratic promise here, the realisation of that promise will require more than technology alone.

The Limits of Celebration

With this rather more sceptical view of the contemporary media environment, how might we assess the implications for education – and specifically for media education? Here again, I want to caution against some of the more celebratory accounts that typically circulate here. The Californian ideology has its own manifestations in education, where technology is widely believed to be transforming learning, changing the power relationships of classrooms and creating autonomous, liberated learners. This form of educational cyber-utopianism is typically aligned with a range of fashionable but ill-defined concepts – of which ‘creativity’, ‘informal learning’ and (most recently) ‘personalisation’ are among the most prominent. This rhetoric is strongly promoted by commercial technology companies, but it is also espoused by governments seeking to identify a ‘technological fix’ for what are seen as the problems of public education. In such discussions, it is often difficult to tell the difference between the overexcited claims of policy makers (and some academics) and the sales pitches of the computer companies (for further discussion, see Buckingham 2007, Chapter 2).

For some apparently ‘progressive’ educational thinkers, the technology-driven classroom is somehow the vindication of the child-centred learning theories of the 1960s and 1970s, although there are others who argue that digital technology has rendered the institution of the school redundant and that the real learning is now taking place in children’s ‘informal’ engagements with games or online social worlds. This celebratory argument typically entails a wholly positive, uncritical stance towards popular uses of technology. For example, those who extol the benefits of computer games for learning tend to ignore the commercial dimensions of games and avoid awkward questions about their values and ideologies (e.g. Gee 2003). They also engage in a rather ill-defined valorisation of ‘informal learning’, in which formal learning is seen as something inherently bad (for further discussion, see Buckingham 2007, Chapter 6).

Another mode of celebration that is particularly apparent in relation to media education is that of vocationalism. In the UK over the past several decades, the curriculum for 14–19-year-olds has been the focus of a seemingly endless series of innovations apparently designed to address the problem of employment in a post-industrial ‘knowledge economy’. In the case of media, there has always been the hope that young people from economically disadvantaged backgrounds would somehow be able to ‘cash in’ their cultural capital – to use vocational media courses as a way of turning their expertise with media and popular culture into something that can be accredited, and hence lead to employment (Cohen 1990). In the UK, the latest of these innovations is a series of new diplomas, qualifications that purport to cross the academic/vocational divide and to prepare students for new kinds of working situations. The courses I have seen thus far are very much aligned with ‘Media 2.0’: students are making websites, staging events in Second Life and creating photoblogs and machinima. Such courses offer these young people a promise of employment – a seductive fantasy of ‘cool’ jobs in the technology and

cultural industries of the kind that are in fact often profoundly exploitative (see Ross 2003). Furthermore, like previous 'vocational' qualifications, such courses appear to be perceived as alternative routes for those who are defined as 'low achievers': they will not replace the existing high-status examinations that will continue to be sought after by the elite universities.

Addressing Digital Divides

Rather than reducing schooling to a mere irrelevance, or indeed to a training ground for the new 'digital economy', I would argue that the advent of digital technology points to a need to extend the traditional mission of the school as a public institution. In the context of continuing digital divides, schools should play a key role in attempting to ameliorate inequalities in participation. As Henry Jenkins and others (2006) have argued, schools have to address the 'participation gap' – 'the unequal access to the opportunities, experiences, skills and knowledge that will prepare youth for full participation in the world of tomorrow' (2006: 3). Like Jenkins, I would see this as being about much more than access to equipment: it is about cultural competencies, social skills and knowledge. Jenkins offers an extensive list here, which includes skills to do with play, experimentation and problem-solving; skills in handling different media sources and modes of communication and navigating across and between them; skills in networking and collaborating, locating information and interacting with others; and skills to do with judgement and critical evaluation.

While some of the skills that Jenkins and others identify are certainly new, others are decidedly traditional. This has been confirmed by the research I am currently conducting with colleagues on the role of the Internet in promoting civic participation (see www.civicweb.eu). While some have looked to the Internet as a means of re-engaging young people who are currently disaffected from civic and political organisations, we have found that such opportunities are again largely taken up by the 'usual suspects': those who already have an established interest in social/political issues, and the skills and motivation to engage in political debate, are more likely to participate than those who do not. If disaffected and disadvantaged young people are to be enabled to participate, they need to develop relatively traditional skills in locating and evaluating information, constructing arguments and thinking critically; and these things depend in turn on fairly advanced forms of traditional literacy.

This is not to imply that nothing is changing – the Internet may be fostering new forms and styles of civic engagement that are at least potentially more inclusive. But participation, in this area as in many others, also requires relatively traditional forms of cultural and educational capital. Addressing the 'participation gap' therefore depends upon addressing broader inequalities: it will not disappear simply as a result of widening access to technology.

The Place of Critique

The kinds of learning that are typically celebrated in discussions of digital technology in education tend to allow little space for critical reflection or the explicit development of critical skills. There seems to be an assumption that participation or creative production is a good thing in itself and that it either stands in for or automatically generates critical understanding in its own right. Indeed, as we have seen, Gauntlett (2007) expresses a strong suspicion of critique, as though it necessarily represented a ‘patronising’ imposition of pedagogic authority. Media audiences, he argues, are ‘already extremely capable interpreters of media content’: they do not need to be taught to be critical.

As I have argued elsewhere (e.g. Buckingham 2003), there is some justification in this suspicion of critique. ‘Critical’ itself is very much an ‘us and them’ term: people who are critical are often simply people who happen to agree with us, whereas those whom we disagree with are by definition uncritical. There is also a danger that ‘being critical’ becomes one of the standardised routines or language games of the media classroom – a game in which students simply give back to the teacher the forms of critical discourse they have been fed. The emphasis on critical analysis can sanction a rather superficial, rationalistic approach to media – even a form of superficial cynicism – that belies the complex (and not least emotional) ways in which we actually relate to media.

However, none of this is to imply that audiences are always and already ‘extremely’ capable and critical – that they already know everything they need to know. Nor does it mean that we can throw out the critical tools and perspectives that we use to analyse media. We can accept that audiences can be active, discriminating and indeed ‘critical’ while also recognising that there are things which they generally do not know about media and indeed that they need to learn. There is a body of knowledge in academic Media Studies – about how the media work, about the media industries, about the history of media and about the uses and effects of media within the society. It is a changing and contested body of knowledge, to be sure, but it is nevertheless a body of knowledge with some shared criteria for determining what counts as truth. The danger here is in assuming that a focus on critique necessarily implies a negative effects model – that somehow criticism is about an illegitimate imposition of authority – or that it necessarily implies that ‘ordinary people’ are stupid or deluded. This seems in turn to imply a rather old-fashioned, narrow sense of criticism as necessarily negative, or at least a notion of criticism as merely a form of defence or inoculation against influence.

Again, Jenkins and his colleagues (2006) are correct to identify another ‘gap’ here, to do with critique. As they suggest, we need to enable young people to become active participants in media culture, but participation or creativity for its own sake is not enough. We also need them to be critical participants and to develop a broader understanding of the economic, social and cultural dimensions of media. Such critical understanding does not follow automatically from the experience of creative production. As Carmen Luke (2000) argues in relation to literacy, learners

do not develop critical literacy just through the experience of reading and writing: they have to step back from immediate experience, in order to reflect and to analyse.

This leads to the complex and time-honoured question of how we integrate theory (critical analysis) and practice (creative production) in media education. How does learning transfer from the domain of 'reading' media to the domain of 'writing', and vice versa? How do we promote meaningful, rather than superficial, critical reflection on what students do as participants or creators of media? How do we help them to understand those experiences in the broader social and cultural context?

In fact, I believe that digital technology is offering us new ways of addressing this issue and of bringing theory closer to practice. For example, in the case of digital editing and image manipulation, the technology can help to make explicit the processes of choice, selection, construction and manipulation that often seem to be 'locked away' with analogue forms. As students drag and drop shots onto the timeline in a digital editing program, the experience of drafting and redrafting a sequence, and debating as they go along, makes a significant difference to the nature of the learning: the experience of editing is not just easier, but also more explicit, than was the case with older analogue technology (Buckingham et al. 1999).

My colleague Andrew Burn (2000; Burn and Durran 2006) has analysed how teachers can use the 'remixing' potential of digital media to bring theory closer to practice. Quite well-established activities in media teaching, like making a trailer to market an existing movie to a new audience (Psycho and Romeo + Juliet are two of Burn's examples), have become much more feasible and controllable than used to be the case with analogue technology. This process also provides new opportunities for analysis and reflection, although (as Burn suggests) this needs to be an explicit expectation that is built into the process. Indeed, Burn's case studies show extensive evidence of students applying the 'faux-expert non-procedures' of semiotics and political economy analysis to inform such reflection.

Ole Erstad and his colleagues (2007) and Kirsten Drotner (2008) have also recently written about this remixing – looking at how students search out material on the Internet for their digital design work and then process and recombine it in various ways, using what they call 'cut-and-paste literacy'. However, they also suggest that there is a danger in being seduced by the superficial professional 'gloss' of this kind of work and by young people's apparent facility with the technology. In practice, there is a lot they don't know and a lot they can't do; and (as these authors argue) the activity of media-making needs to be accompanied by forms of analysis and theoretical conceptualisation and a set of clear curricular aims on the part of teachers.

Finally, our own recent research on digital game making provides further instances of this connection between theory and practice (Buckingham and Burn 2007; Pelletier 2009). In this project, we worked with an educational software company and a group of schools to develop a game-authoring tool: the resulting package, MissionMaker, enables users to make three-dimensional games without the necessity of programming. One thing we learned quite quickly was that even

if students are very adept game players, that does not automatically transfer to the ability to make games. Making games is very difficult: it involves computational thinking, logic and an ability to imagine a user who is not just an audience (or a reader) but a player, interacting with the text. In order to move from being a player to being a maker of games, you need to take a step back from your immediate experience and engage in some hard, systematic analysis.

Conclusion

Do we really need Media Education 2.0? Perhaps we do; but we certainly still need Media Education 1.0 as well. The advocates of Media Studies 2.0 do identify some key imperatives here. I would not accept Merrin's claim that we lose 'the right to teach' if we are not ourselves actively participating in the whole range of contemporary media. I would agree that it is necessary to keep pace with our students' media experiences and their changing orientations towards media – although we need to beware of assuming that those experiences are all the same (the 'digital generation' argument). However, keeping up with our students does not mean we should automatically import the latest technological gimmicks into the classroom, let alone start pimping up our Facebook profiles in some hopeless desire to be 'down with the kids'.

New media can offer new opportunities for participation, for creative communication and for the generation of content, at least for some people in some contexts. However, the competencies that people need in order to take up those opportunities are not equally distributed, and they do not arise simply because people have access to technology. Furthermore, it would be wrong to assume that participation is always a good thing or that it is necessarily democratic, countercultural or liberating. Creative production can be a powerful means of learning – whether it involves remixing of various kinds, appropriating and adapting existing texts or creating wholly new ones, or simply exploiting the potential for networked communication. However, all of this needs critical reflection, and it needs to be combined with critical analysis – although how that combination happens is a genuinely difficult question.

More broadly, media education itself needs to adopt a more critical stance towards the celebration of technology in education and the kind of market-driven techno-fetishism that is mistakenly seen by some as the cutting edge of educational change. There is a risk here that media education might be seen as just another way of importing computer technology into schools or indeed as a sexy alternative to the wasteland of spreadsheets, file management and instrumental training that constitutes most 'information technology' courses. There is an opportunity here, but it should not involve abandoning the traditional critical imperatives of media education – which are about much more than practical skills, or the sentimental appeal to 'creativity' and 'participation'.

Note

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Chapter 3

Learning, Becoming, Embodying: A Review of Embodiment in an Era of Learning with Contemporary Media

Azilawati Jamaludin

Keywords Embodiment • Immersive environments • Bodily knowing • Embodied cognition

Introduction

In the last couple of decades, conceptual links between natural sciences and the study of culture have emerged under the heading of embodiment. The notions of ‘embodied’ cognition stand for a specific orientation in the study of intelligence and affection that has transformed cognitive science in the last two decades, reflecting promise and potential to orient cultural studies as well (Krois et al. 2008).

The concept of embodiment has been increasingly discussed in such different fields as education (Resnick 1994; Anderson et al. 1996; Greeno 1996), linguistics (Lakoff and Johnson 1999; Regier 1996), philosophy (Varela et al. 1991; Clark 1997; Hurley 1998; Haugeland 1998), psychology (Thelen and Smith 1994; Turvey and Carello 1995), robotics (Arkin 1998; Brooks 1991), cognitive anthropology (Hutchins 1995; Suchman 1987), and in dynamical systems approaches to behaviour and thought (Kelso 1995; Port and van Gelder 1995). However, despite this wealth of literature on embodiment, few researchers can claim to be aware of all the ways in which the concept of embodiment has been applied in areas outside their particular fields of research. Shifts on school of thoughts about embodiment have taken place over the last decade (Clark 1999), but the nature and importance of these shifts have been hard to pin down. Instead, there exist very different notions of exactly what embodiment is, what kind of body or corporeality is required, and for what type of embodied cognition. While recent notions of embodiment have often been used in its simplest form, i.e. ‘intelligence requires a body’ (Weigmann 2012), the rapidly evolving technological landscape has created deeper issues concerning the complex interplay between problems of physical-virtual embodiment, complexities

A. Jamaludin (✉)

National Institute of Education, Nanyang Technological University, Singapore

e-mail: azilawati.j@nie.edu.sg

of the environment, and the principles of neural development. Within today's evolved *culture of participation* (Jenkins 2012) where more and more forms of communication, interaction, and socialisation are technologically mediated, there now exists a tighter coupling of user to these technological interfaces that are evolving to embody users progressively. A learner may be sitting in a room alone, facing a monitor, but through the computer screen, he or she is represented as a virtual subject, partaking in electronically mediated social relations with other users accessing from remote geographical locations, recognised as both present within the space and physically absent (Klich 2007). If a clear distinction is to be made between body on one side and mind on the 'other' side of the computer screen, we see semblance of the classic mind-body dualism that has dominated western philosophy since Plato (Bayne 2004; Arnold 2002). Inherently, these give rise to problems associated with the slippery binary of embodiment and disembodiment, triggering questions on what is *real* and what is *virtual*, and what are the implications of the non-material relational and semiotic mode of *being* on cognition and intelligence? Although education theorists have attempted to explicate the varying notions of embodiment within the virtual contexts (e.g. Shapiro 1994; McWilliam and Taylor 1996; Dreyfus 2001; Hocking et al. 2001), the answers to these questions remain unclear. As Wilson (2002) pointed out:

... while this general approach [of embodiment or embodied cognition] is enjoying increasingly broad support, there is in fact a great deal of diversity in the claims involved and the degree of controversy they attract. If the term "embodied cognition" is to retain meaningful use, we need to disentangle and evaluate these diverse claims. (p. 625)

Particularly, expeditious advances in new media have deemed it far from clear for what kind of body or corporeality (if any) is required for embodied cognition. Although talk of embodiment holds central within the study of human learning and *being*, it is surprisingly hard to get a firm grip on exactly what it means (Clark 1999) against a rapidly augmenting cyberculture. This renders the issue particularly important for educators involved in the theorisation of twenty-first-century teaching and learning, in that the rapidness of online interface development brings to bear a need for a new theoretical understanding of embodiment in an era of learning with new media. Against this backdrop, the theoretical orientation in this chapter seeks to push beyond the slippery binary of embodiment and disembodiment, real and virtual, and non-material relational and semiotic mode of being into an emergent phenomenic view of mind, body, and embodiment as arising from the dynamic interplay of biology, culture, and, most importantly, technology (Hayles 2002).

Through historically tracing the major developments in embodiment research from the works of ancient philosopher Aristotle to contemporary roboticist Moravec, different notions of embodiment and common underlying principles that undergird conceptualisations of embodiment are identified and discussed. Henceforth, anchoring the discussion within an instantiated context of learning in a Second Life immersive environment, a new theoretical understanding of *embodying* in an era of new media and simulated realms is proposed, aimed at filling some of

the gaps in the literature. Finally, this chapter concludes that where conventional constraints of embodiment are challenged, there is a need for educators to devise creative pedagogical approaches that can work with these new articulations for embodied learners of the new media age.

From Aristotle to Moravec: The Evolvement of the Concept of Embodiment

What exactly is embodiment? In a widest sense, embodiment can simply mean the instantiation or materialisation of a kind of process (Krois et al. 2008). However, regarded in such general terms, it raises the ancient problem in the history of philosophy. Traced back to the era of Aristotle, scholastic philosophers at that time dealt with embodiment as the problem of individuation. Aristotle's doctrine of *hylomorphism* explicated the makeup of all things by appealing to the two principles of *matter* and *form*. The form of a thing was a general essence, while matter served to provide a 'principle of individuation' (Weiss 1948). A general essential form combined with matter resulted in a particular thing's unique reality. But it was unclear how matter, which itself was considered uniform stuff, could explain individuation, in terms of individual differences. In the late medieval era, philosophers extended the notion of essential forms, proposing that a further, unique form served to make particulars unique. But the very idea of an individual form was problematic, since forms were taken to be general in nature. This problem received a new formulation in the seventeenth century when Leibniz presented his conception of unique 'individual substances' which included even the history of an entity as a concrete reality. In the nineteenth century, materialist philosophers such as Ludwig Buchner regarded even human individuals as nothing but force and matter. In the twentieth-century philosophy, Maurice Merleau-Ponty interpreted the philosophical notion of individuality in terms of the body, which he considered from a strictly phenomenological, descriptive perspective (Merleau-Ponty 1962). Merleau-Ponty's influence upon the discussion of embodiment has been great, but his approach adhering as it does to the 'body-subject' took little account of the cultural world in which this body-subject exists. Nevertheless, regarded philosophically, this way of thinking disrupts the old Descartes dualisms of mind and matter or body and soul by finding conceptual links for conscious and unconscious, biological, and social processes. This permits researchers to link medicine, psychology, and even artificial intelligence (Gallagher 2005; Pfeifer and Bongard 2007). When cognitive science arose after World War II, it was based upon the model of computation. The analogy between brain activity and computers running programs offered a way to scientifically study cognitive processes that was not subject to the strictures of behavioural psychology. The behaviourist claim that thinking was hidden in a kind of 'black box' and could only be studied in outward behaviour gradually came to be regarded as an impediment to inquiry. Modern cognitive psychology

arose in reaction to this, from the search for ways to overcome the alternative between reliance upon introspection and the restriction of psychology to external behaviour. Both approaches reflected the same philosophical dualism, for they both conceived psychological processes either as private ‘internal’ events inaccessible to scientific study or ‘outward’ behaviour. However, one of the greatest limitations of behaviouristic psychology was its inability to deal convincingly with language. In his famous critical review of B. F. Skinner’s behaviouristic treatment of language, Noam Chomsky demonstrated that language learning and use could not be explained simply by reference to the behaviouristic notion of conditioning as language use required the creative use of innate cognitive capacities (Chomsky 1965). Today, cognitive semantics reorients linguistics towards the human organism living in a world. For example, Lakoff and Johnson regard metaphors in *Metaphors We Live By* (1980) from the joint perspectives of anthropology and linguistics. They relate the universal use of body-related metaphors for psychological states such as feeling ‘up’ or ‘down’ to the fact that language users walk upright. The point is not simply that something natural—the human body as a biological organism—influences the attainment of knowledge, but that the specific character of knowledge is a function of the knower’s particular embodiment. As Lakoff and Johnson (1999) put it, the claim that reason is embodied is ‘not just the innocuous and obvious claim that we need a body to reason, rather it is the striking claim that the very structure of reason itself comes from the details of our embodiment’ (p. 4). The culmination of past works assumes contemporary relevance in the conceptualisation of intelligence applicable to robotics as well as to biological organisms. For example, in works on new conceptions of robotics (e.g. Hoffman 2012; Kirsh 1992; Marocco et al. 2010; Shim and Husbands 2012), the ‘anatomy’ of the robot and its interactions with the surroundings guide it, not any internal central (Cartesian) model of the world.

While it may seem that the evolvement of the concept of embodiment has effectively disrupted the existence of a radical ontological distinction between body as extended and mind as pure thought, it is however not uncommon to hear of Descartes dualist distinction reverberating within theoretical conceptions of cyberspace within today’s era of rapid technological developments. For example, Barlow (1996) in his seminal ‘Declaration of the Independence of Cyberspace’, termed cyberspace as the ‘new home of mind . . . a world that is both everywhere and nowhere, but it is not where bodies live’, distinctly foregrounding mind over body. In a similar vein, Turing (1950) in his classic paper ‘Computer Machinery and Intelligence’ sets the tone for the erasure of embodiment by arguing that machines *can* think by introducing his famous ‘Turing test’ where entities’ responses are used to decide which is the human and which is the machine. Introducing this ‘imitation game’ at the inaugural moment of the computer age, Turing inadvertently set the agenda for the evolvement of artificial intelligence, whereby through a dualist separation of mind and body, ‘intelligence’ becomes a property of the formal manipulation of symbols rather than enaction in the human lifeworld (Hayles 1999). Further to this, roboticist Hans Moravec pushes the dualism envelope further by proposing that human identity is essentially an informational pattern

rather than an embodied enaction. The proposition can be demonstrated, Moravec suggested, by downloading human consciousness into a computer and he imagined a scenario designed to show that machines can perform the thinking previously considered to be an exclusive capacity of humankind, thereby escaping the frailties of the human body (Moravec 1988). Although Moravec's dualistic articulations may sound radical and extreme, they underlie many mainstream discourse on technologically facilitated learning, the themes of which foreground 'mind' over matter, drawing distinctions between learning 'minds' and learning 'bodies' (Peters 2002). For example, in the case of e-learning, where learners are spread over different geographical locations, heralding the fact that learners 'have the choice over time and place to access an information world that is unlocked from the shackles of fixed and rigid schedules, from physical limitations' (Benjamin 1994), reveals the thrust of a vision of technology in education in which, as long as the 'mind' is engaged, the locus of the learner's body remains irrelevant (Bayne 2004). This perpetuates the notion of thinking, as being 'all in the head' with little need for body. Clearly, as Peters (2002) suggests, such separativist notions between mind and flesh in cyberspace remain 'the most culturally deeply embedded dualism and the most trenchant and resistant problems of education in postmodernity' that educators must grapple with. Indeed, one can only conclude that the position of Barlow, Turing, and Moravec, and other commentators who envisage the dichotomy between real and virtual, is a return to a position of Cartesian dualism. It posits a dissociation of mind and body in which the learner's subjectivity in cyberspace will move out of the corporeal, and into a virtual, simulated realm, a state of immaterial being constituted entirely through image and the symbolic (Land 2004). By this reckoning, the cybernetic circuits come to be seen as a disembodied space, a space in which the body is lost and abandoned or, as in the process grotesquely dramatised in E. M. Forster's famous science fiction short story *The Machine Stops*, becomes atrophied. A similar accusation might be levelled against post-structuralist analysis, which, in its privileging of the textual, is perhaps in peril of setting up a new form of Cartesian dualism in pitting the discursive against the material. It could be seen as reducing the body to a text, with language interpreted as something totally independent of embodiment (Burkitt 1999). Despite its often radical explanatory power in other contexts, such a perspective, it would appear, offers no adequate account of embodiment (Land 2004). To this end, these theoretical gaps necessitate a new perspective on the reconfigured embodiment experienced within the respective technological context.

The Multiplicity of the Concept of Embodiment

From the aforementioned review, various types and notions of embodiment surfaced in a wide variety of terms such as *situated embodiment* (Zlatev 1997), *natural embodiment* (Ziemke 1999), *naturalistic embodiment* (Zlatev 2001), *social embodiment* (Barsalou et al. 2003), *mechanistic embodiment* (Sharkey and Ziemke

2001), *phenomenal embodiment* (Sharkey and Ziemke 2001), *simple embodiment* (Clark 1999), *radical embodiment* (Clark 1999), *organismic embodiment* (Ziemke 1999), and *organismoid embodiment* (Sharkey and Ziemke 2001). Some of the notions are actually more or less closely related rather than single well-defined positions. For example, Sharkey and Ziemke's notion of mechanistic embodiment refers to the view that 'cognition is embodied in the control architecture of a sensing and acting machine'. This is very much closely related to Zlatev's notion of naturalistic embodiment which referred to an artificial system that is in possession of bodily structures that give adequate causal support for sociocultural situatedness (i.e. the ability to engage in acts of communication and participate in social practices and 'language games' within a community). This could include organs of perception and motor activity, systems of motivation, memory, and learning (Zlatev 2001). In the same vein, certain notions of embodiment also seem to overlap. For example, organismal embodiment is the notion that cognition takes place in physical organism-like bodies that are actually organic and alive. Such a definition appears to emerge from a restrictive notion of physical embodiment (Ziemke 2001) which proposes that to be embodied is to be realised in some physical substrate. This seemingly net-wide notion of physical embodiment problematises further the various conceptions of embodiment as it raises the question of what is meant to be *alive*. While various answers to this question have been proposed, including the ability to metabolise, reproduce, or regenerate (e.g. Maturana and Varela 1980; Von Uexkull 1934), the notion of what it means to be 'alive' still remains unclear. What is clear, however, is the palpable underlying thrust amidst these multiple notions of embodiment.

Autopoietic vis-à-vis Allopoietic: The Underlying Thrust of Embodiment

Analysed from the literature, the common underlying thrust of embodiment points towards a dualist distinction of natural vis-à-vis artificial states of corporeality required for embodied cognising activities. There exists a seemingly ascribed dichotomy whereby two distinguishing types of embodiment lie at opposite ends of the spectrum, constituted by augmenting degrees of technological stimuli from natural to artificial states of embodiment. Within this spectrum, there is a decreasing degree of technological stimuli as the *bodily* forms of embodied cognisers move from artificiality to natural states (or vice versa). Conceptualisations of natural embodiment hold that not only is an organism-like body required, but that it must be a living body. While the notions of embodiment that fall under the natural state (e.g. naturalistic embodiment, organismic embodiment) stem from a physical embodiment perspective (Ziemke 2002), the issue of what counts as 'being alive' problematises this binary classification. Rather, the notion of *autopoietic embodiment* seems to better capture the conceptualisation of a living system,

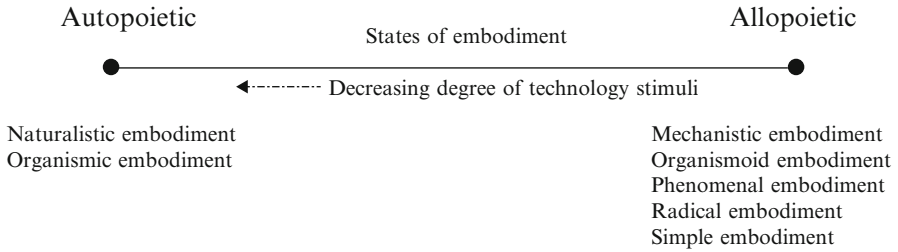


Fig. 3.1 Conceptualisations of embodiment

such as a single cell, being capable of creating and maintaining its identity in an environment with constant perturbations through structural coupling and historical processes, whereby individual components of the living system are continually changing or being renewed. In this regard, the concept of an autopoietic organism is relevant—i.e. one which ‘is a special type of homeostatic machine for which the fundamental variable to be maintained constant is its own organisation’ (Ziemke 2003), as opposed to man-made machines, whose purpose and organisation are predefined by the (human) designer. For example, the construction of an animal starts centrifugally; animal organs grow outwards from single cells and through the constant process of perturbations or coupling with its environment, becoming an embodied cogniser in its own right, ostensibly constituting *natural* forms of corporeality.

In contrast, the notion of allopoietic embodiment is proposed on the other end of the spectrum (see Fig. 3.1). Allopoiesis embodiment alludes to prior conceptualisations of *artificial* embodiment which posits that the localised physical realisation of the system must share some (possibly superficial) characteristics with the bodies of natural organisms, in terms of form and/or sensorimotor capacities, that are not alive in any sense, but are instead defined by individual components which are themselves not part of the ‘organisation’. This can be exemplified by the process of a body of a robot that originates from fabricated parts brought together, through varying degrees of technological stimuli, in a predefined configuration. The most prominent, and perhaps the most complex, examples of organismoid embodiment are humanoid robots such as Cog (Brooks and Stein 1993) and Kismet (Breazeal and Scassellati 2000) (see Fig. 3.2).

Work with these robots is based on the view that research in artificial intelligence and cognitive robotics, in order to be able to investigate human-level cognition, has to deal with systems that have bodies which, although artificial and possibly nonliving, have at least some human-like characteristics. For example, Kismet is a humanoid robot that learns how to visually track objects. To do this, a human trainer must move objects of an appropriate size at an appropriate speed at an appropriate distance in front of Kismet’s eyes. If the human trainer moves the tracked object too close to Kismet, Kismet responds by raising its eyebrows in a manner which in humans indicates a startle response. This naturally causes the human trainer to

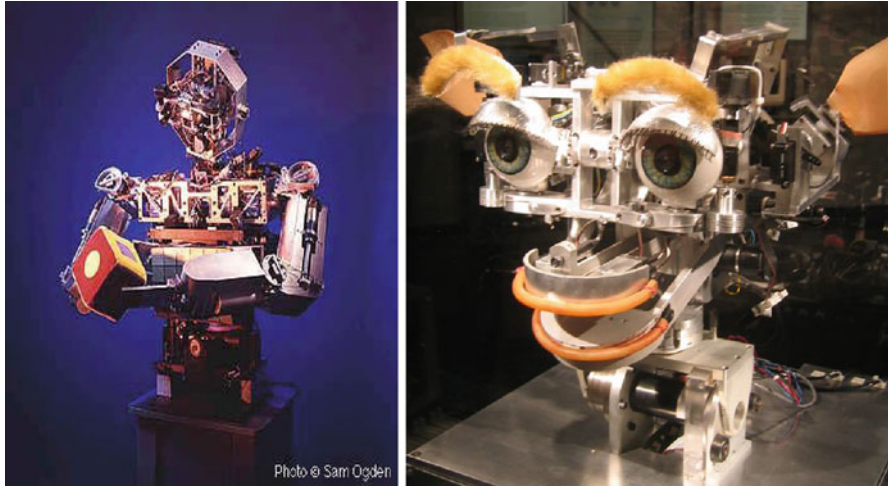


Fig. 3.2 Organismoid embodiment: Cog looking at a cube (*left*) and Kismet (*right*)

startle in return, which prompts a change in the (currently inappropriate) training parameters of speed and distance. Thus, Kismet's organismoid embodiment, in the form of eyebrows and facial expressions, is not (mere) gimmicks, but an integral part of the homeostasis-inducing aspects of the human-robot training dynamic. Consequently, most of the notions of embodiment within the domain of artificial intelligence would then fall within the conceptualisation of allopoiesis (e.g. *mechanistic embodiment* (Sharkey and Ziemke 2001), *phenomenal embodiment* (Sharkey and Ziemke 2001), *simple embodiment* (Clark 1999), and *radical embodiment* (Clark 1999)). However, while such an underlying thrust of embodiment prevails within literature, theoretical gaps exist whereby expeditious advances of online interface development have rendered it inefficacious for us to remain within a dualistic reverberation of autopoietic vis-à-vis allopoietic forms of embodiment. In an absence of a visceral self in increasingly pervasive online spaces where physical bodies are represented by virtual avatars, how may such form of embodied cognising activities be positioned on the aforementioned embodiment spectrum? To this end, a nuanced understanding of what embodiment might entail within the online simulacra is necessary. In subsequent sections of this chapter, attempts to concretise this argument are situated and discussed within the context of the increasingly popular sociotechnical network, Second Life (SL)¹, which represents a contemporary genre of immersive interfaces that are developing to embody users progressively. It is posited that the pervasiveness of technological interfaces such

¹Second Life is chosen as a concretising example among the multitude of other virtual interfaces (e.g. hypertext websites, online games, online chatrooms) due to its pervasiveness at the current time of writing, demonstrated by 41 million registered SL users, with an average of about 40,000 users logged on at any one time in world.

as SL affords a new understanding of embodiment that does not preclude one's visceral self within the online cognitive activities, signifying a turn *away* from the dualist undertones of natural states vis-à-vis artificial forms of embodiment. It is precisely this trajectory that will undergird the rest of the theoretical arguments in this chapter.

Impact of Online Interface Development on Embodiment: A Second Life Instantiation

Advances in technological mediation, through ways in which meaning is shifted by virtue of our immersion in cybernetic circuits, bring to bear new ways in which we experience and understand embodiment. While the current body of work on embodiment largely points towards corporeality for embodied cognition, be it natural or artificial, in reality, the trajectory of interface developments and our relation to new media have re-articulated our own sense of embodiment. We are able to construct textual dream bodies in chatrooms and object-oriented environments (Turkle 1996; de Freitas 2006) and to place graphical representation of our embodied selves, in the form of avatars within gaming and 3D virtual worlds. For example, within Second Life (Linden Lab 2014) a 3D online persistent space immersive environment, users called 'residents' are able to interact with each other through motional avatars, providing an advanced level of a social network service combined with general aspects of a metaverse. SL users are able to navigate, interact, and view the world through their own customised avatar—a digital representation of themselves. Users interact with objects via a graphical user interface that is largely mouse driven, and they communicate synchronously via typed chat and gestural functions. Every object in the world, including the avatars, the buildings, and the trees are three-dimensional objects rendered in real time and built from primitive shapes available in-world (see Fig. 3.3). Rather than simply picking out avatar outfits or ready-made buildings from a menu, residents can build anything they can imagine, from experimental labs to molecular atoms of scale. In this regard, personal agency is augmented for users in that, as residents of the world, they have the power to create their own objects to populate their ideal world. With the further addition of the voice chat feature, this metaverse has taken another step forward towards including senses of corporeality in its interactions. In fact, the SL world is visual, aural, and richly textured such that various codes and semiotic systems (dress codes, body shapes) come into play to bear upon its cultural orientation (Everard 2000).

Being in an immersive world like SL opens up our possibility of 'being there': a sense of personal *presence* in some place at some time and the possibility of *copresence* with co-located others (Chee 2007). By virtue of being embedded 'virtually' in the world, represented by avatars of all shapes and sizes, in an attenuated sense, we exist both *here* and *there*. It is not just a pretend game—manipulating text or a lifeless avatar from a distance—rather the text or avatar



Fig. 3.3 Three-dimensional avatars and objects rendered real time in Second Life (Screen shot is courtesy of the Second Life project LSL7/06 conducted at the Learning Sciences Lab, NIE)

is a form of identity and agency which is *real*. And although the agency and identity it manifests may be attenuated, partial and transitory, it is oneself or perhaps an aspect of oneself (Arnold 2002)—just as the avatars that occupy the government citizenry records, hospital records, or education records. To this end, enacted intelligent behaviours in the immersive world are what ultimately count for *embodied* experiences.

A theorisation of such structurally coupled, embodied experiences requires a paradigm shift away from the dualistic notions of embodiment discussed in the preceding sections. As Hayles (1999) summarises—‘the central premise is not that the cogitating mind can be certain only of its ability to be present to itself but rather that the body exists in space and time and that, through its interaction with the environment, it defines the parameters within which the cogitating mind can arrive at certainties’. This fundamentally challenges our ascribed dichotomy between mind and body, between the discursive and the material, and between the real and the virtual (Bayne 2004). Clearly, an embodied experience by virtue of our representational self and sense of presence ‘on the other side of the screen’ disrupts our conventional understanding of natural states vis-à-vis artificial forms

of embodiment and the plasticity of our body boundaries implicated in embodied virtual encounters. This in turn points towards the need for a new theoretical understanding of what we may term the relational construct of *embodying*.

A New Theoretical Understanding of *Embodying*

In the preceding discussion, we see a concretised example of the underlying technology of Second Life that affords the extension of the sense of presence for the user such that he or she coexists as an entity that has physical location in both offline and online worlds. The user's actions in the online world have very real physical effects on the presence of others, and as users invest themselves within the technology, they become enmeshed in a system that enables them to move beyond the limitations of the interface, impacting upon material reality in new ways. In this regard, the embodied subjectivity experienced by the SL user is no longer a discrete body, but a composite configuration (Klich 2007) that is not unlike the vision of a 'reconfigured posthuman' heavily contested for by the famous cybertheorist Katherine Hayles. According to Hayles (1999), as we move towards a posthuman era, the boundary between the body and technological mediations is seen as a permeable membrane and 'there are no essential differences or absolute demarcations between bodily existence and computer simulation' (Hayles 1999). The posthuman point of view constructs the human being such that it can be 'seamlessly articulated' with the rapidly evolving mediums of interaction. New media, in this sense, becomes a prosthetic extension of the human body, and interactivity between human and technology reaches its ultimate manifestation where separate activity ceases to exist and is replaced by the co-activity of merged elements. Hayles makes a helpful distinction for our purposes between the normative physical body and the notion of embodiment. The latter can be seen as specific articulations of the body with 'place, time, physiology and culture' (p. 196) permitting what has been called 'new assemblages of self constitution' Poster (2001, p. 111). This may be encapsulated in what Burkitt (1999) refers to as a *relational* approach to embodiment. A relational approach to embodiment stresses the process based ways in which we become constituted within and reconstituted by forms of embodying and the various articulations involved with other subjects, objects, and technological artefacts in sociocultural dialectics, much in the way that users of language are constituted through the language but also change the language through *using* it with *others*.

Essentially this understanding of embodying would point to a somewhat interweaved central position on the aforementioned embodiment spectrum (see Fig. 3.1), making no distinction between natural or artificial forms of corporeality but rather highlighting the relational perspective of *being* and *becoming embodied* based on different technological contextualisations.

Conclusion: Towards a Relational Construct of *Embodying*

The construct of embodying in an era of learning within new media interfaces has been explored in this chapter, rooted in a contextual discussion within the popular metaverse Second Life. Understanding embodying in terms of an emergent posthuman phenomenonic view of mind, body, and embodiment as arising from the dynamic interplay of biology, culture, and, most importantly, new media provides for new articulations of configurations for learning spaces that facilitate experiences of being embodied. In these shifting experiences, mind and body are indivisible entities and new configuration of the body does not stop at the skin, rather it extends our agency of *being* within different technological contextualisations. This translates to pertinent implications for both educators and learners turning towards digital forms of education. The notion of *embodying*, rooted in an anti-dualist foundation, implies that both teachers and learners would not see themselves as Cartesian subjects who begin by cutting themselves off from the material environment, but rather they imbibe an awareness of the malleability of their bodily boundaries, the extent to which their capability of ‘blurring’ their body boundaries and extending their bodily corporeality into the online environment would bear upon their embodied experiences within ‘virtuality’. These two strands of anti-Cartesianism and the reconfiguration of corporeal boundaries do not stand only as cultural themes or as ways of making sense of learners’ accounts of their online experience, rather they intertwine to provide a new theoretical lens in which we may look at the co-evolutionary dynamics of human, environment, and contemporary media, especially in times of rapid technological innovation where a graspable, corporeal world shifts to an increasingly slippery, elusive, and immaterial phenomena.

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Chapter 4

Games-to-Teach or Games-to-Learn: Addressing the Learning Needs of Twenty-First Century Education Through Performance

Yam San Chee

Keywords Games-to-teach • Games-to-learn • Educating • Schooling • Performance • Play • Dialog

Introduction

With the advent of new media (Lister et al. 2009; Nayar 2010), students' exposure to digital games has become increasingly commonplace. Ready access to games, especially online games via social media portals such as Facebook, has led to gaming becoming a pervasive constituent of youth culture (Dovey and Kennedy 2006; Selfe and Hawisher 2007). Given the sophistication of current digital games and the capability of 3D and high-speed network technologies to generate a strong sense of immersion and player copresence, the impact of digital games takes on added significance. Games are no longer played merely for the sake of entertainment or as an activity to while the time away. Instead, they are instrumental to how youth develop their sense of identity and personhood both online and off-line (Buckingham 2008).

In the field of education today, there is considerable interest in using games to motivate and engage student learning (Miller et al. 2011; Papastergiou 2009). This interest is fed by the rhetoric of games as a “fun” way to engage students in learning. It is hoped that the fun and enjoyment of playing digital games lead in some peripheral and painless manner to student mastery of curriculum subject matter. As critical educators, we should ask: Is this rhetoric supportable? Can games reignite student interest in school subjects perceived by students as being boring? Should games be used primarily to tackle the challenge of disinterested and unmotivated

Y.S. Chee (✉)

National Institute of Education, Nanyang Technological University, Singapore
e-mail: yamsan.chee@nie.edu.sg

students? Are games inherently suited to motivating interest in school subjects or have more potent uses of games been overlooked? Will the use of games improve student learning outcomes?

In this chapter, I address fundamental considerations that should help us respond to questions such as the above in a critically informed way. I do so by examining the established practice of schooling in relation to the goals of educating. Interrogating ontological and epistemological assumptions, I argue that educational games applied in a “games-to-teach” paradigm of game use merely serve widespread dominant interests that perpetuate the practice of schooling. In contrast, educational games applied in a “games-to-learn” paradigm pay careful attention to and advance the goals of educating that are student centric and twenty-first-century oriented. (I deliberately use the term “educating” rather than “education” to connote a process rather than an object.)

The requirements of twenty-first-century education, given the rise of globalization and the attendant reality of multiculturalism, direct our attention to another important change related to literacy that has occurred since the 1980s. Early conceptions of literacy focused on the “three Rs” that covered reading, (w)riting, and (a)rithmetic. Reading and writing were conceived of in psychological terms, as evidenced by research that approached reading comprehension and writing composition as mental activities requiring the coding and decoding of text. Since the 1980s, however, the discourse of literacy in language studies and education has shifted away from the *psychological* notion of coding and decoding text to a *sociological* one (Lankshear and Knobel 2006). This shift has redirected approaches to language development away from text-as-text to text-in-use. It arose from the recognition that text, as text, carries no fixed meaning. Rather, meaning is constructed in and through use that is located in human social practices. These practices always “involve ways of talking, interacting, thinking, valuing, and believing” (Gee 2012, p. 41), giving rise to Gee’s notion of big *D* Discourses (Gee 2011). Given the deep theoretical stirrings from social constructionist, discursive, dialogical, and hermeneutic approaches to the postmodern study of language and meaning, we should note that psychology itself has undertaken a sociocultural turn (Kirschner and Martin 2010).

Given the foregoing as context, I proceed with the observation that we can identify two broad approaches to the use of games in education today. I refer to these approaches as “games-to-teach” and “games-to-learn.” These approaches are founded on radically different conceptions of learning. In what follows, I characterize the two approaches. I contrast schooling-oriented goals with the goals of educating and interrogate the assumptions underlying both. I argue in favor of the latter, which grounds my vision of game-based learning on the theoretical construct of performance, drawn from performance studies and performance theory (Bell 2008; Carlson 2004; Schechner 2003).

Games-to-Teach

The activity of play has permeated human culture from the earliest times. Humankind is inherently playful (Huizinga 1938/1955). In his book *Man, Play and Games*, Caillois (1958/2001) proposes that people participate in four types of games: competitive games (agon), games of chance (alea), simulation games (mimicry), and games that create vertigo (ilynx). He defines the nature of play as being free, separate, uncertain, unproductive, regulated, and fictive, with the last two characteristics tending to exclude one another. Play entails stepping into a “magic circle” where an alternative reality applies (Klabbers 2006).

Digital computing and digital technologies allow the space of playful activities to extend beyond the realm of the physical. Given the ever-increasing penetration of digital technologies into homes and the enhanced ability of digital games to mimic real life, we have witnessed a human exodus to the virtual world (Castronova 2007). Riding on this momentum, Prensky (2001) is credited with helping to popularize the use of computer games for learning. His conception of digital game-based learning is articulated in the following quotation from his book:

Most simply put, Digital Game-Based Learning is any marriage of *educational content* and computer games. The premise behind Digital Game-Based Learning is that it is possible to combine computer video games with a wide variety of *educational content*, achieving as good or better results as through traditional learning methods in the process. (pp. 145–146; italics added)

This marrying of educational content with the technology of computer games represents a carry-over of the kind of thinking that pervaded the era of computer-aided instruction (CAI). CAI software models focused on helping students obtain the right answer to the question posed. Given its vintage, students were typically required to choose from one of several answers presented on a monochrome alphanumeric display. The answers were unambiguously “right” or “wrong.” The right-versus-wrong answer mind-set is carried over into the field of intelligent tutoring systems (ITS), with the application of artificial intelligence to propel instruction. While such systems were capable of more varied forms of interaction with the user, the instructional objective of having the student obtain the right answer, whether through direct selection or through problem solving (as in school geometry and algebra), held sway.

Prensky’s orientation to the use of computer games, applied to learning, may be regarded as the third wave of the application of increasingly powerful technologies to “ICT in education.” As indicated in the quotation above, the focus is on educational content—that is, information and knowledge related to curriculum subject matter—and the use of games achieving learning outcomes that are no worse than conventional instructional methods used in schools. This orientation is consistent with the distinction made by Postman and Weingartner (1969) between content and method in school lessons. Content is seen as the “substance” of a lesson. It focuses on something that students are supposed to “get.” Content exists independently of and prior to any student; it is indifferent to the form by which it is

“transmitted.” Method, on the other hand, constitutes the manner in which content is conveyed, for example, by being told face-to-face, by listening to an audio lecture streamed over the Internet, or by reading a textbook. In the present discussion, conveyance is accomplished through interacting with the computer game interface.

A simple example will serve to concretize the above idea. A fee-collecting web portal on the Internet offers students various kinds of (putative) educational games. One chemistry game that is available deals with the periodic table. The interface shows the periodic table, with this instruction: “Click on the element with the atomic mass of 58.693.” If a student selects the incorrect element in the periodic table, the system feedback states: “Oops, that is incorrect. Please try again.” A second incorrect attempt leads to the system flashing the correct element that needs to be selected on the screen. Selecting the flashing element then leads to the feedback “Correct!!!” accompanied by the presentation of extensive information about that element. It is hardly surprising that the odds of any student obtaining the correct answer on the first attempt, or even the second attempt, is approximately zero given that there are 106 different elements shown on the interface to choose from. Playing this “game” quickly reduces to an exercise in the delayed presentation of “educational content.” No typical student will find knowing “Nickel is the element with an atomic mass of 58.693” worth remembering. Such an isolated fragment of information has little relevance to a student’s lifeworld.

The game described above was developed in 2005. It is a classic example of a “serious game.” This term, first coined by Abt (1970), referred to games and simulations that could be used to train decision makers in industry, government, and education. The periodic table chemistry game, and, more importantly, its underlying pedagogical thinking, is located within the broader movement of the Serious Games Initiative. Launched in 2002 by the Woodrow Wilson International Center for Scholars, the initiative sought to redirect computer games to educational use rather than being restricted to entertainment. However, the lure of entertainment remains rather strong. For example, to Zyda (2005), a serious game is one that “uses entertainment to further government or corporate training, education, health, public policy, and strategic communication objectives” (p. 26).

As with CAI and ITS, the pedagogical thinking that drives the design of such “educational systems” is found in the discipline of instructional design, sometimes also referred to as instructional science (Smith and Ragan 1999). As explained by Jonassen and Land (2000), instructional design arose during the Second World War as a mechanistic process for producing reliable training. It is rooted in behavioral psychology, especially the ideas of operant practice and reinforcement, and communications theory that emphasizes the conveyance of ideas. These approaches view learning as entailing knowledge transmission accompanied by subsequent drill and practice.

The adoption of an instructional mind-set leads to the design of games whose implicit functions are the transmission of knowledge and the practice of skills. These ideas encapsulate the paradigm of “games-to-teach.” Today’s serious games manifest much greater sophistication in terms of presentation, animation, and interactivity than instructional systems of the 1960s and 1970s. However, they remain

fundamentally oriented toward pursuing narrowly construed learning objectives framed in terms of providing training to obtain the authority-decreed “right” answer. “Wrong” answers are deemed to have no place in learning and are viewed as having no value to the learning process. They are positioned as a waste of students’ time and energy. Instructors and teachers with this mind-set continue to miss the purpose of educating, especially in the twenty-first century.

Schooling or Educating?

Knowledge transmission and skill practice remain the dominant modes of teaching in today’s classrooms globally. They are evidenced by ubiquitous teacher expository talk and the culture of students completing worksheets designed to ensure that they have learned the target knowledge and skills. Much research has been undertaken on how best to help teachers enhance their teaching practices to befit the needs of new literacies in new times (Gee 2004). Regrettably, efforts directed toward addressing this challenge remain very much a work-in-progress.

Teachers’ pedagogical practices will not change materially unless the demands placed on them in the workplace shift from schooling students to educating them. Readers will no doubt have a good sense of the activities and practices of school as a social institution. While there are pockets of enlightened innovation in teaching across the world, novel pedagogical practices that seek to go beyond schooling have hardly taken root. There is often only technological innovation that cloaks the preservation and perpetuation of conventional instruction-centric goals and narrow assessment practices.

At this juncture, it may be appropriate for me to clarify what I mean by the term “schooling.” In the context of this chapter, “schooling” refers to the institutional practices of school that accord primary importance to helping students to achieve high scores in tests and examinations, including standards-based national examinations and international benchmarking tests. The latter form of assessment, by virtue of the overriding desire for objective comparison across countries, tends to favor narrow closed questions. Coupled with explicit and rigorously defined criteria for the scoring of student work so that the assessment outcomes will be seen as valid and reliable—and hence objective—as well as fair, the assessment of student performance in the context of schooling has become a deeply entrenched practice that brooks little questioning. There is little room for non-orthodox answers that may be novel yet valid. Intolerance toward interrogation, not merely of assessment means but, more importantly, also of ends, arises due to the social and political purposes to and for which assessment outcomes are applied. These purposes include student advancement to higher levels of learning, eligibility for scholarships, access to “top schools,” and political or ideological correctness so as to be seen as being of “good standing.”

In addition to the above, the historical emergence of schooling and the demands for mass education propelled by the industrial age have led to greater value

being placed on system efficiency than system effectiveness. Today's climate of neoliberalism, cost cutting, and national economies in perilous disrepair serve only to exacerbate the already fragile education landscape. The demand of greater output for smaller investment has spurred the expansion of e-learning, distance learning, and one-way lecture transmissions through webcasting. But deep learning is not achieved by information dissemination. It requires much action and thoughtful reflection, rooted in authentic learning experiences.

A well-known adage in education is that assessment drives learning. In the field of educational assessment, a distinction is customarily made between content standards and performance standards. Content standards define essential knowledge, understandings, and skills that should be included in the curriculum (McMillan 2008). On the other hand, performance standards are specifications of "how much" students should know and be able to do. They shape expectations for educational outcomes, provide a basis for their measurement, and provide criteria for granting rewards or imposing sanctions (Stites 1999). Three issues of concern immediately arise. First, it is important to distinguish between performance and learning. As explained by Maxwell (2009), learning itself is unobservable; hence, reliance is placed on observable performances instead. Put simply, educational assessment as practiced evaluates learning *outcomes*; it never evaluates learning as such. The consequence is that learning is actually unaccounted for. It remains undetermined and enigmatic. Maxwell acknowledges that viewing the student "as a learner is to see the student as more than a performer of separate isolated tasks. Standards that service learning may need to be represented differently from standards for performing a task" (p. 267). Second, following McMillan (2008), performance assessment covers the assessment of products—for example, a web page—and skills, for example, reading. Forms of assessment related to content include response selection, short answer, essay, and portfolio. McMillan states that assessment is carried out because "[t]eachers want to know *how much* students understand before they begin a unit of instruction, *how much* students are progressing in their understanding during instruction, and *how much* students have learned at the end of the unit" (p. 6, italics added). The bias toward objectification, quantification, and measurement is striking especially in light of Maxwell's acknowledgment that learning and understanding are not directly observable. We have something of an anomaly here: How does one measure some "thing" that is not susceptible to observation? Third, further critical examination of McMillan's assumptions related to assessment reveals a strong cognitive bias. For McMillan, assessment is limited to three "cognitive levels." He says that the first level, knowledge, is represented by operations such as retrieving, selecting, naming, and reproducing. The second level, understanding, is represented by operations such as converting, translating, explaining, comparing, and illustrating. The third level, application, is represented by operations such as analysis, synthesis, and transfer. It should be evident that the terms cited are consonant with Bloom's taxonomy of educational objectives in the cognitive domain (Bloom et al. 1956). Bloom's well-known taxonomy of learning objectives is the mantra of instructional design. Unfortunately, Bloom et al. made the error of believing that knowledge–understanding–application represents the natural

order of how people learn. I shall argue in the next section that this order is mistaken because it is completely back-to-front.

Given the dominant forms of assessment outlined above and the fact that assessment drives learning, it is little surprise that teachers teach in a manner that bridges the gap between content and performance standards on one hand and normative modes of assessment on the other. The side effect of all this is a practice of teaching and schooling that has as its outcomes inert knowledge (Whitehead 1929) and students' inability to think critically and to figure things out for themselves.

Broadfoot (2009) observes that

Despite a growing recognition of the limitations of a scientific approach to assessment, the 21st century is nevertheless finding it hard to escape from the assessment thinking and practices that were characteristic of the 20th century. As a consequence the purpose, mode, content and organization of examination and assessment practices around the world today remain strikingly similar to those that prevailed a century or more ago, despite the scale of the changes that have taken place in society during that time (pp. vii–viii).

This element of being stuck in a rut is evident even in some of the most recent publications that position themselves as “teaching and assessing twenty-first-century skills.” A case in point is the book by Marzano and Heflebower (2012). The authors state that “[w]hat is new to the 21st century is the idea that cognitive skills should take a dominant role in the curriculum” (p. 10). They also introduce the need for conative skills that refer to the “ability to analyze situations in light of what one knows and how one feels and select appropriate actions” (p. 10). One cannot but be reminded of Bloom's taxonomy once again, but, this time, in the affective domain (Krathwohl et al. 1999). While affect deals with the emotions, conation refers to how people act upon their thoughts and feelings, for example, whether in a focused and directed fashion or not.

Too many people forget, or fail to realize, that Bloom's efforts, in both the cognitive and affective domains, arose from constructing a taxonomy of educational objectives based upon the classroom practices in *his* time: that is, the late 1940s to early 1950s. This effort was conceived by Bloom et al. (1956) as “a method of improving the exchange of ideas and materials among test workers, as well as other persons concerned with educational research and curriculum development” (p. 10). It was expected “to be of general help to all teachers, administrators, professional specialists, and research workers who deal with curricular and evaluation problems” (p. 1). In executing the work, “it was agreed that the taxonomy should be an educational–logical–psychological classificatory system. . . . It was further agreed that in constructing the taxonomy every effort should be made to avoid value judgments about objectives and behaviors” so that the taxonomy “would permit the inclusion of objectives from *all educational orientations*. Thus, it should be possible to classify all objectives which can be stated as *descriptions of student behavior*” (pp. 6–7, italics added). It should be evident that Bloom and his colleagues aimed for inclusiveness, which is not necessarily a bad thing, but this inclusiveness is based upon codified descriptions of student behavior and forms of assessment prevalent in *his* time. There is nothing to suggest that Bloom intended his taxonomy to apply to all peoples of the world for all time. What we need is not the sustaining of antiquated

practice but rather the regenerating of better-informed practice. Uncritical continued adherence to Bloom's cognitive and affective taxonomies only serves to keep the twenty-first-century education shackled to the twentieth century. It is little wonder then that students today are unmotivated and disengaged. This problem is exacerbated given Bloom et al.'s construal of knowledge: "Knowledge, as defined here, involves the recall of specifics and universals, the recall of methods and processes, or the recall of a pattern, structure, or setting" (p. 201). This definition succumbs to the error of conceiving knowledge as an object stored, possibly manipulated, and certainly retrieved from memory as part of human mental processes. The mistake of conceiving of human memory as a data store rather than as a mental process of remembering is well known (Bartlett 1932). It arises from misplaced faith in the computational paradigm of information processing psychology that likens thinking to computing (Pylyshyn 1984).

Putting aside the perspective on schooling practice depicted above, how might we reconceive how learning might be from an educating-oriented perspective? The seminal writings of philosophers such as Alfred North Whitehead and John Dewey provide us with helpful clues.

In his book *The Aims of Education*, Whitehead (1929) states: "Culture is activity of thought, and receptiveness to beauty and humane feelings. Scraps of information have nothing to do with it. A merely well-informed man is the most useless bore on God's earth" (p. 1). He appeals to teachers in the following way:

With good discipline, it is always possible to pump into the minds of a class a certain quantity of inert knowledge. You take a text-book and make them learn it. So far, so good. The child then knows how to solve a quadratic equation. But what is the point of teaching a child to solve a quadratic equation? There is a traditional answer to this question. The mind is an instrument, you first sharpen it, and then use it; the acquisition of the power of solving a quadratic equation is part of the process of sharpening the mind (p. 6).

Whitehead denounces the conception of the mind as an instrument. To him, such thinking is "one of the most fatal, erroneous, and dangerous conceptions ever introduced into the theory of education" because

[t]he mind is never passive; it is a perpetual activity, delicate, receptive, responsive to stimulus. You cannot postpone its life until you have sharpened it. Whatever interest attaches to your subject-matter must be evoked here and now; whatever powers you are strengthening in the pupil, must be exercised here and now; whatever possibilities of mental life your teaching should impart, must be exhibited here and now. That is the golden rule of education, and a very difficult rule to follow (p. 6).

The way forward that Whitehead urges is "to eradicate the fatal disconnection of subjects which kills the vitality of our modern curriculum. There is only one subject-matter for education, and that is Life in all its manifestations. Instead of this single unity, we offer children—Algebra, from which nothing follows; Geometry, from which nothing follows; Science, from which nothing follows" (pp. 6–7). Whitehead's rant against the dominant learning outcome of schooling in his time—namely, inert knowledge—remains as pertinent as ever today.

Whitehead's reservation, indeed anger, directed toward the disconnect between the curriculum subject matter and the life of the child resonates strongly with the

sentiments of Dewey (1897/2004), expressed in his pedagogic creed: “The child’s own instincts and powers furnish the material and give the starting-point for all education. Save as the efforts of the educator connect with some activity which the child is carrying on of his own initiative independent of the educator, education becomes reduced to a pressure from without” (pp. 17–18). With respect to school, Dewey insists that the “school must represent present life—life as real and vital to the child as that which he carries on in the home, the neighborhood, or on the playground” because education is “a process of living and not a preparation for future living” (p. 19). For Dewey, much of education fails because it neglects the fundamental principle of the school as a form of community life, creating instead an alternative form of institutionalized social life. Far too much of the stimulus and control proceeds from the teacher. Dewey argues that the teacher should not be in school to impose certain ideas or to form certain habits in the child, but rather to select the influences that will help the child to respond appropriately to such influences. As with Whitehead, Dewey takes the social life of the child as the basis of subject matter in education. “One of the greatest difficulties in the present teaching of science,” he observes, “is that the material is presented in purely objective form In reality, science is of value because it gives the ability to interpret and control the experience already had” (p. 21). Dewey also places meaningful activity at the center of student learning. For him, the active side precedes the passive in the development of the child. “Ideas,” Dewey argues, “result from action and devolve for the sake of the better control of action [R]eason is primarily the law of order or effective action. To attempt to develop the reasoning powers, the powers of judgment, without reference to the selection and arrangement of means of action, is the fundamental fallacy in our present methods of dealing with this matter. As a result we present the child with arbitrary symbols” (Dewey 1897/2004, p. 22). Dewey’s arguments, made over 100 years ago, remain as relevant, sensible, and forceful for educational practice in the twenty-first century as when they were first made.

The tension between the practice of school “as is” and the vision of education “as it might be” should now be clear to the reader. Dewey emphasizes the central importance of inquiry to educating students. I shall expand on this idea later in this chapter. For now, it suffices to consider how different the experience of students studying in school would be if instead of being required to answer questions such as “What is the definition of a nonrestrictive clause?” or “Why did Brutus betray Caesar?” (Postman and Weingartner 1969, p. 20), they develop the capacity to respond competently and intelligently to the following question in the final exam:

Describe five of the most significant errors scholars have made in (biology, physics, history, etc.). Indicate why they are errors, who made them, and what persons are mainly responsible for correcting them. You may receive extra credit if you can describe an error that was made by the error corrector. You will receive extra extra credit if you can suggest a possible error in our current thinking about (biology, physics, history, etc.). And you will receive extra extra extra credit if you can indicate a possible error in some strongly held belief that currently resides in your mind. (Postman 1995, p. 128)

I leave it to the reader to imagine what teachers would need to do to develop the ability of students to respond to such an exam question. While I do not realistically expect such a question to ever appear in any school exam, nor do I believe that Postman has any such expectation either, the example serves to illustrate how assessment can be based on a vastly different form of questioning that will, in turn, demand learning processes and activities altogether different from what typically takes place in schools today.

I emphasize that it is not my intention, in the foregoing discussion, to suggest that schooling today is being pursued to the complete exclusion of educating or that educating must be pursued to the exclusion of schooling. My purpose was to establish conceptual clarity between the concepts of schooling and educating by clearly marking key distinctions relevant to the present discussion. I hope to have made clear how activities, behaviors, and value systems that pervade the social institution known as “school” can be oriented toward pursuing objectives that are more consequential to the lifeworlds of students today. In practice, some balance is always struck between schooling and educating. The questions are which purpose carries greater weight and, hence, what balance is appropriate?

Unraveling Onto-Epistemological Confusions

The two orientations described above arise from very different and, I should stress, conflicting ontological and epistemological assumptions; that is, they arise from antagonistic metaphysics. Barad (2003) introduced the term “onto-epistemological” to signal that ontological considerations are inseparable from epistemological ones, and vice versa, because the two are inherently coupled and hence interdependent. With the contrasting characterization of schooling and educating kept in view, let us first seek to unravel the ontological aspect of a chronic confusion that pervades education as well as the sciences.

An unfortunate legacy of Western philosophy arising from classical Greek thought is the opposition and forced dichotomy between *theoria* and *praxis*, with the latter subordinated to the former. *Theoria* arises from mental contemplation. According to Aristotle, it is about “eternal and unchanging *objects* and is the highest and best activity of which a human being is capable. A man engages in contemplation not *qua* man but in virtue of the divine intellect (*nous*) in him. Contemplation is higher than *practical reason* and is the supremely valuable life, providing complete human happiness” (Bunin and Yu 2009, p. 684). It should be noted that *theoria* is not theory; rather, *theoria* is mental activity directed toward the establishment of theory or truth. Truth, for Plato, is exemplified in mathematics and geometry. It can only be apprehended through rational thought. According to Plato’s theory of forms, such truth constitutes *reality*. In contrast, the world that we perceive with our physical senses—that is, *phenomena*—is but a corrupted copy of the ideal (Klages 2006). Beyond the world of sense, there is a *fixed* world of Ideas, a kind of transcendent Platonic heaven, that is, the real object of knowledge, namely,

Truth (Bunin and Yu 2009). In contrast, *praxis* relates to the realm of human action in the lived and sensed world. This realm lacks the necessity, immutability, and eternity of the heavenly order. For this reason, it is regarded as deficient and inferior owing to the inescapable contingency and particularity of its objects of concern (Fairfield 2000).

The obvious bias that favors contemplating “eternal and unchanging objects” over mundane contingent action has led to the prioritization of representational forms, such as language, that supposedly mirror nature: how things are in the world. In his seminal book *Philosophy and the Mirror of Nature*, Rorty (1979) argued that the assumed correspondence between word, proposition, and thought to some objective reality or truth presupposes a correspondence theory of language (ontological) and a spectator theory of knowledge (epistemological). With respect to the former, however, no such correspondence is possible, now or ever, because the relation between a representation, whether symbolic or an image, and its meaning is arbitrary. Two people can use exactly the same word and mean completely different things. This leads to the following conundrum: How then can a person communicate that which is true using language? Language, on its own, is clearly not up to the task. Quine (1960), in *Word and Object*, showed in similar fashion that we confront an enormous vagueness concerning the referents of words because of the inherent indeterminacy of reference in language. The spectator theory of knowledge, on the other hand, conceives of the mind as a kind of “immaterial eye” that impartially views what is taking place in “reality” that lies before it. On this account, the observer is just a spectator who stands removed from the phenomenon of interest and renders an account of what is “seen” objectively. Recognizing that humans construct their understanding of the world, as opposed to simply “discovering” or “finding” it through observation, lies at the heart of the constructivist versus objectivist debate and the philosophical dispute between philosophy-as-making and philosophy-as-describing (Gascoigne 2008). With a little thought, it should be evident that human beings do not have the privilege of adopting an objective God’s eye view of the world. We were born into the world and became fully socialized into our roles and positions in the world long before we could even consider conducting scientific research. Consequently, the values, beliefs, and understandings we bring to bear on the enterprise arise fully from enculturated practice.

Before Quine or Rorty wrote, however, Dewey (1925/1988) articulated “the philosophic fallacy” that “arises from confusing the *consequences* of linguistic meaning making and logical inquiry with *antecedent* metaphysical existence” (Garrison 1999, p. 292). Put simply, Dewey highlighted the need to recognize that words and language are a human construction that comes *after* the existence of the reality of the physical world and not before. However, many philosophers and most laypersons commit the error of assuming exactly the opposite. Descartes, for example, presupposed the existence and availability of language for thinking before granting the existence of the physical world to which that thinking is directed. This error of what is antecedent and what is consequent gives rise to the false dichotomy of *res cogitans*, some nonmaterial substance that is presumed to be the basis of all mental activity, and *res extensa*, the realm of extended material things—from

which the untenable position of mind–body dualism arises. The point here is that cognitive products, such as knowledge and forms of logic, are not available without first engaging in the inquiry process that is realized through thoughtful and reflective practical activity in the real world. Knowledge and forms of logic, as cognitive products, are consequents, not antecedents. Unfortunately, they are mistakenly imputed with existence prior to inquiry. This error is further worsened by hypostatization: the construal of purely conceptual entities as having real existence. A classic case of this error is furnished by Ryle (1949/2009) who cites the example of a foreign visitor shown around a British university. As described by Greetham (2006), “[h]e sees the colleges, the libraries, the playing fields, the museums, the scientific departments and the administrative offices. And then, having seen all this, he asks ‘But where is the university?’ He has made a category mistake in that he has assumed that the university is an entity over and beyond what he has seen” (p. 208). However, “the university” as an entity is purely conceptual and ideational; it has no separate material existence. In the physical sense, it is not “real.”

Progressing more deeply into the realm of metaphysics, but with an ontological orientation, we note a related but conceptually separate problem, namely, the error of assuming that the world consists first and foremost of entities—that is, objects—instead of processes. Laypersons look out onto the world and see “things.” Secondarily, they conceive of relations between the things they see. This thing-centered construal of the world gives rise to hierarchical knowledge structures exemplified by taxonomies in the physical and biological sciences. I shall concretize the nature of this problem by constructing an example from personal experience. I know of a watersports center where a wave-generating machine is used to generate artificial waves so that hobbyists can practice board surfing without needing to venture out into the open sea. Viewing the waves being churned out, a natural instinct is to “see waves” (as objects) coming forth thanks to the operation of the wave-generating machine. However, such “seeing” is not merely or only perceptual. Such “seeing” is already conceptual in that it abstracts from a complex in-process phenomenon in the world to a static idea: that of waves. Viewed as waves, they feel like the same “thing” because they all fall into the same linguistic category. However, no two waves are identical. The waves that come forth are actually part of an *emergent* phenomenon. Their shape, size, speed, and direction of motion are the outcome of many other interacting phenomena such as the weather, the number of surfers in the pool, the speed and direction of the wind, etc. No form of mathematical modeling can completely and reliably predict the direction, contours, and force of the water in every part of the pool. From this point of view, the reality of the churning water is one complex, dynamic, and emergent *process*. It is not a collection of static objects or forms—namely, waves—that come forth from the wave-generating machine. Any cohesive sense of unity of phenomenon arises due to the manifestation of similar *patterns of interaction*. The machine does not “store” waves and then simply push them out to surfers. Rather, the symbol string “waves” is merely linguistic shorthand for referring to a complex process. In effect, a process has, through abstraction and hypostatization, been “converted” into an object, which is then assumed to be a first-order reality. (It is for this

reason that I avoided the use of the term “education” in favor of “educating” from the outset.) Reducing process to object constitutes a metaphysical error. It has widespread consequences for how we understand the world in which we live and, hence, how we frame the goals we choose to pursue. These issues are addressed in the literature on process philosophy (Bergson 1913/2007; Mesle 2008; Rescher 1996, 2000, 2006) and process cosmology (Whitehead 1978). The implications for learning and education are taken up by Whitehead (1929), Allan and Evans (2006), and Chee (2010). A worldview informed by process metaphysics naturally invites approaching human learning as a process of development, change, and growth in the capacities of a learner. This perspective challenges the widespread discourse of teaching to “impart knowledge, skills, and values” to students. No such impartation is possible because knowledge, skills, and values are not objects that can be so imparted. In lieu of a transfer discourse, a reconstruction is proposed in terms of developing and honing students’ “knowing, doing, being, and valuing” in pursuit of authentic, meaningful, and valuable endeavors that are relevant to the lifeworld of a student. Notice that knowing, doing, being, and valuing are all process *verbs*, not nouns.

I now take up the epistemological thread introduced earlier to elaborate further upon it. The epistemological challenge introduced earlier—the spectator theory of knowledge—is directly coupled with the ontological issue of word and object already discussed. The onto-epistemological conundrum arises from multiple dualisms that pervade classical philosophy, for example, the dualisms of self–nonself, mind–world, and subject–object. These dualisms arise from assuming that human observers are totally detached from and independent of the objects of their study that reside in the world and possibly beyond. This assumption leads to a dichotomy between the knower and knowledge (both of which are positioned as objects). Dewey and Bentley (1949/1991) sever the Gordian knot by epistemologically repositioning this distinction in terms of knowing and the known (both of which are positioned as process). In this reformulation, that which is known is always tentative and in a state of flux. No world truths are fixed and eternal. Consistent with the stance of constructivism, what is known remains open to falsification (Popper 2002) and reconstruction.

The construct of *inquiry* and the process of inquiring are central to Dewey’s (1949/1991) formulation of a theory of knowing. Knowing as inquiry, as opposed to knowing as being capable of stating “facts,” is triggered by the occurrence of an event in the course of life activity that interferes with the ongoing course of smoothly proceeding behavior. This interference deflects the activity into a “reflective channel” where the deliberate evaluation of the conditions that led to the interference is contemplated with a view to and in preparation for resumption of the interrupted activity. Knowing is thus always located in the lifeworld of activity. As inquiry, it is “an intermediate and mediating way of behavior . . . constituted by determination of subjectmatters as on one hand means to consequences, and on the other hand of things as *consequences* of means used” (Dewey 1949/1991, p. 323). From this point of view, the framing is transactional, “so that ‘thing’ is in action, and action is observable as thing, while all the distinctions between

things and actions are taken as marking provisional stages of subject matter to be established through further inquiry” (Dewey and Bentley 1949/1991, pp. 113–114). A transactional framing allows us to view events extensionally and durationally such that they comprise a functional whole, thereby enabling the analysis of phenomena in a manner that dispenses with irreconcilable separates. Based on this theory of “trans-actions,” “we do not so much inter-act with food, water, and so forth as trans-act with it. Existence is an event that flows through us as we flow through it We should understand mediated ‘external’ and ‘internal’ inter-actions as a single functional trans-action” (Garrison 2001, p. 278). On this account, knowing is a process involving both existential and symbolic operations. The former realizes the means to consequences, while the latter furnish the consequences of means used. Subsequently, when the now-known consequences operate as ends-in-view in further action, such action is no longer experimental but rather intentional, thereby allowing for intelligent, meaningful, and targeted behavior. Because of foresight and intention, human beings can now anticipate what is to come and act accordingly. In this manner, the subsequent becomes the consequent, and human action becomes directed and effective. In short, “real” learning has taken place.

For Dewey (1916/1980), knowing as inquiry is something that we literally *do*: “analysis is ultimately physical and active; . . . meanings in their logical quality are standpoints, attitudes and methods of behaving toward facts; and . . . active experimentation is essential to verifications” (p. 367). Learning is thus triggered by interruption to meaningful activity. This interruption leads to contemplation directed toward successful resumption of the activity. Learning does not proceed by mentalistic knowledge acquisition and comprehension before then being applied to activity. For this reason, Bloom’s taxonomy fails to grasp the order of authentic real-world learning and gets things back-to-front. The transactional approach “treats knowledge as itself inquiry—as a goal *within* inquiry, not as a terminus outside or beyond inquiry” (Dewey and Bentley 1949/1991, p. 4). The truth of a knowledge claim is established experimentally through existential operations in the world that examine the consequences of those actions. This method constitutes Dewey’s experimental logic. The notion of truth is thus directed toward practical ends, a hallmark of Dewey’s pragmatic philosophy. “[T]o be a truth means to have been verified by use under test conditions” (Dewey 1911/1998, p. 118). It is a situation of achieving something “tried and true.” This working definition of truth comfortably serves inquiry in both the physical and the social sciences, with the latter placed on a behavioral rather than a mentalistic footing.

Lanvin (1991, p. xxx) argues that Dewey offers “an ultimate philosophy of naturalism, in which logic is seen to be continuous with all the contexts wherein organism and environment are in transaction.” The classical stance of logic as antecedent to nature and applied to the analysis of nature is cast aside. A unity of thinking-in-action is achieved, and the dualistic separation of thinking from action is laid to rest.

To summarize, Dewey (1938/1991) defined inquiry as *the controlled or directed transformation of an indeterminate situation into one that is so determinate in its constituent distinctions and relations as to convert the elements of the original*

situation into a unified whole (p. 108). Schoolchildren are rarely given the opportunity to participate in inquiry of the kind that Dewey articulated. Instead, they are provided with ready-made “facts,” the outputs of the inquiry of others, which they must then accept as true and remember. However, “[t]o be bound to a given conclusion is the exact opposite of being required to inquire so as to find out the means of reaching a conclusion as a decision that warrants resumption of decisive behavior” (Dewey 1949/1991, p. 325). Given the faulty onto-epistemological assumptions upon which much of schooling practice is founded, how might we, as conscientious educators, create opportunities for learning through inquiry utilizing digital games?

Games-to-Learn

In this section, I illustrate what a “game-to-learn,” rooted in the pedagogy of inquiry, might look like. *Statecraft X* is a mobile educational game that can be played on any Apple iOS device: iPhones, iPods, and iPads. The game was designed to address the topic of governance and citizenship in the Social Studies curriculum for 15-year-olds in Singapore schools. It was developed by the Learning Sciences Lab at the National Institute of Education, Singapore. The game positions students as governors of towns in the medieval fantasy kingdom of Velar that is populated by four races: dwarves, trolls, elves, and humans. When students first log into the game, they can choose the race and the gender of their in-game avatar. This functionality strengthens the sense of identity that students can develop as they perform their role of town governor. The game is a strategy turn-taking client-server game. The actions that students take, based on the quota of action points available to them, are processed by the game server at hourly intervals, and the game state is thereby updated. As a mobile 24/7 game, students access the game server intermittently anytime and anywhere through wireless or Wi-Fi connectivity. The style of game play is distributed, requiring continuous partial divided attention. The game runs continuously, typically for a period of 3 weeks, until the designated cutoff time when the game session is closed and the summative outcome of game play determined. Students play in groups known as factions. A faction represents a collection of players who forge and hold common values and ideological positions with respect to their construction of good governance. The school curriculum is enacted in the classroom during Social Studies lessons where a dialogic pedagogy is enacted. This pedagogy is aligned to the goals of inquiry outlined previously.

In my work with students using the *Statecraft X* curriculum, I always begin by asking if they view “learning swimming” as any different from “learning *about* swimming.” Within 2–3 s, students invariably start affirming that the two are different. I then ask which they would prefer to learn. Students unanimously choose swimming based on the perceived personal value of being able to swim over merely being able to answer questions about swimming. A process approach to education focuses on the equivalent of learning swimming, not merely as a skill



Fig. 4.1 View of a town of the kingdom of Velar in *Statecraft X*

but as a performance capacity. In contrast, a product approach targets the so-called knowledge: the equivalent of “*about* swimming.” It should be evident that a mode of instruction that has as its goal imparting knowledge *about* swimming will never result in students with the ability to swim. Knowledge *about* swimming is entirely conceptual and exists in the realm of representation, whether learned through lecture, video, or any other form of presentation. But learning swimming proper is always first and foremost existential and actional. The learning outcomes are vastly different. Thus, we advance a pedagogy of learning governance by governing and not by learning *about* governance, which is what typically happens in schools.

Figure 4.1 shows the view of a town in the newly independent kingdom of Velar that has just seceded from Salfreda. As governors of a town in Velar, students must first attend to meeting the basic needs of town citizens, including the needs for food, water, and shelter. Despite the initial stock of gold allotted to them, students soon find that establishing a sustainable basic economy is not such a simple matter after all. Generating revenue is not easy, and there is a tendency of having to incur greater expenses. This dilemma leads students to consideration of the possibility of engaging in trade with other towns. A marketplace in the town facilitates trade, but students have to consider what might be appropriate selling and buying prices. Affairs of state are soon complicated by epidemics that sweep through the land, requiring students to think about health care. Bandits start attacking, and this gets students thinking about their town’s defense capabilities or lack thereof.

Beyond the limits of a town, a player can traverse the kingdom of Velar to other towns via another interface, the world map. Figure 4.2 illustrates game play on the world map using an Apple iPad. Approximately 75 % through the game, a neighboring kingdom amasses its army along the border. An invasion is imminent. How will the students, as governors of Velar, respond? Will they continue to pursue their insulated town interests or will they pool their efforts and defense resources



Fig. 4.2 Playing *Statecraft X* on the world map

against a common threat to the kingdom? Amidst all this turmoil, how do students keep their citizens provided for economically and happy?

The challenges of governance are made real and visceral to students as they play *Statecraft X*. The game is deliberately balanced so as to bring forth the inherent tension between economic prosperity and citizen happiness. Pursuit of one tends to be to the detriment of the other. This tension creates the space for open dialog in the classroom. Drawing from students' experiences in game play, the teacher facilitates a conversation that interrogates students' choices and actions in game play together with their attendant consequences. In this problem space, there are no absolute "right" or "wrong" answers. Every option entails trade-offs. These trade-offs afford teachers the opportunity to delve even deeper by questioning the values that students hold in game play.

Conventional schooling with its knowledge acquisition emphasis is grounded in information-processing psychology. I have argued elsewhere (Chee 2011) that learning of this kind is inherently meaning-less; that is, it is semantics free. This is so because computation is purely rule driven and syntactic. Processing is driven by symbolic representation, not by meaning. "Games-to-teach" perpetuate meaning-less learning by encouraging memorization and recall. A "game-to-learn" such as *Statecraft X*, however, is not content centric, but inquiry centric. By virtue of the immersive sense of being projected *into* the space of the game, students construct

a projective identity (Gee 2007) of the kind of governor, entailing values and beliefs, that constitutes their being. Engaging in this embodied form of cognition that is deeply situated and rooted in activity, students experience inquiry of the kind articulated by Dewey. The flow of in-game activity is continually interfered with by new challenges that cut abruptly into the consciousness of students (as governors), demanding attention and thoughtful contemplation that would allow the resumption of normal game activity. Students are thus “forced” to engage in deep meaning making, and learning is goal driven and intentional. Reports on the educational efficacy of the Statecraft X curriculum can be found in Chee et al. (2011a, 2012a).

An important dimension of the dialogic classroom pedagogy is the hermeneutic nature of the sense-making processes that students engage in, given the sociocultural mode of learning. The practice of hermeneutics as a discipline is based on the realization that meaning is contextualized and historicized. To believe that meaning is simply to be found in dictionaries is to be extremely naïve. Meaning making, as activity, is always located in engagement in life and with Being (as a verb) in the world (Heidegger 1953/1996). The use of language as a tool for meaning making arises from the understanding that reality “does not happen ‘behind the back of language’: it happens rather behind the backs of those who live in the opinion that they have understood ‘the world’ (or can no longer understand it); that is, reality happens precisely within language” (Gadamer 1976, p. 35). Because we rely so heavily on language to construct our understanding of the world, we end up being “trapped” within a hermeneutic circle where anything new that we seek to express in language can only be achieved by reference to that which has prior existence. Consequently, any text or event in the world that we interpret has its own horizon of meaning (Gadamer 2004). Interpretation is sited within the mutual horizon of the interpreter and the thing to be interpreted. Human sense making for understanding thus “constitutes far more than a merely contingent mode of behavior or act of sovereign subjectivity but ‘embraces,’ in Gadamer’s words ‘the whole of [the human being’s] experience of the world.’ . . . It is by comprehending phenomena linguistically that the human being reflectively comports itself in a lifeworld and finds its way about” (Fairfield 2000, p. 38). As Fairfield further argues, the hermeneutic process displays an “inherent dynamic anticipation and revision, question and answer, assertion and reply, speaking and listening, appraising and learning—an essentially dialectical process or back and forth movement expressed in the concept of play” (p. 38). The dialogic pedagogy that we adopt in the Statecraft X curriculum thus seeks to foster a form of classroom conversation that “allows the truth or significance of the interpreted object to emerge in the ‘play’ of hermeneutic dialogue” (p. 39), bearing in mind that “[t]he basic hypothesis of classical pragmatism is that the meaning, justification and indeed truth of an idea is determined in light of its consequences for our practices and lived experience” (Fairfield 2011, p. 64). This orientation is particularly significant in the context of education for citizenship, as in the Statecraft X game-based learning curriculum.

The pedagogy of inquiry, as designed in the Statecraft X curriculum, is especially powerful when enacted effectively. As Fairfield (2011) argues, “[i]nquiry is an interpretively rich notion. It includes interpretation and critique, analysis and synthesis,

interrogation and explanation, narrative and metaphor, inference, judgement, taste, discrimination, remembering, information and a good deal else—much of which has little to do with technique. Interpretation, for instance, conforms to no method but the hermeneutical circle and the search for coherence and consensus” (p. 95). Furthermore, critical and intelligent thought “involves that which no method can teach: the art of asking questions and of seeing what is questionable, of reflecting and contemplating, slowly weighing the strength or force of an argument, detecting what is salient, cultivating the intellectual virtues in general, and other elements that go beyond any model” (Fairfield 2011, p. 95).

The pedagogy of instruction for schooling stands in stark contrast with that of inquiry for educating. Games-to-teach reflect the stagnation of conventional teaching practice that emphasizes the so-called knowledge acquisition, comprehension, and application. This approach to the use of games commits the error of telling-in-advance without first developing or creating an authentic need to know. Consequently, students do not remember what they learn. “Games-to-learn,” rooted in inquiry, situate learning in the action space of a game through the activity of play, which then allows the functional trans-action between acting and reflection to take place by design. In this manner, thinking and action are no longer separated. A unity of thinking-in-action is achieved instead. This unity facilitates our reconstruction of learning in terms of the performance of the *person* (and not of his mind or his body).

Game-Based Learning as Performance

The foregoing argument made in favor of games-to-learn allows us to reconstruct psychology in favor of sociopsychology. In recent work (Chee 2013; Chee et al. 2012c), I articulated a general theoretical framework for undertaking research on human learning. This framework is shown in Fig. 4.3. The ideas contained in the figure were appropriated from Collen (2003) and further extended for application in the present context of investigating human learning.

Ontos, or ontology, refers to the study of human being, human existence, and of what is. *Logos*, referring to epistemology, is the study of human knowing, what can be known, and what constitutes human knowledge. *Praxis*, or praxiology, is the study of action, the practices of human beings, and of what we (as humans) do. To understand human learning in all its situated complexity, I argue that it is vital for learning to be engaged in and studied *performatively*, in the context of humans in situated action and participating in discursive practices (Austin 1975; Barad 2003; Clancey 1997).

The construct of performance arises from performance theory and performance studies (Bell 2008; Carlson 2004; Schechner 2006). It should be noted that I am not using the term performance in the ordinary context of schooling where performance is customarily used to connote how well a student has scored in a test or exam. Bell (2008) argues that performance has three key characteristics. First, it is *constitutive*; that is, it is established, created, and given form through enactment. Second,

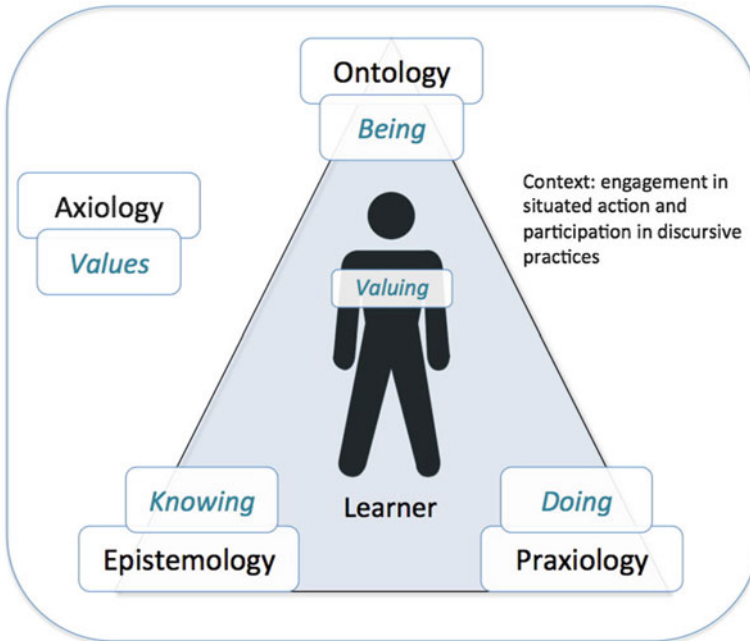


Fig. 4.3 General framework for undertaking research on human learning

performance is *epistemic*: that is, performance is a means through which human actors come to know themselves, know others, and know the world. Performative knowing also encompasses “body knowledge” or “somatic thinking”: a way of knowing the world through all our senses, emphasizing immediacy and direct involvement. Third, performance is *critical*: it provides a way for learners to stake claims about knowledge and about the creation of knowledge.

From the perspective of the individual performer, performance is deeply *reflexive*. It implies not just doing or redoing, but a *self-consciousness* about doing and redoing on the part of the performer. The difference between doing and performing lies “not in the frame of theatre versus real life but in an attitude—we may do actions unthinkingly, but when we think about them, this brings in a consciousness that gives them the quality of performance” (Carlson 2004, p. 4). All performance involves a consciousness of *doubleness*, whereby the actual execution of an action is placed in mental comparison with a potential, or ideal, or a remembered original model of that action (Baumann 1989). Thus, performance is always performance *for* someone, some audience that recognizes and validates it as performance even when that audience is the self.

A performance-theoretic perspective, subsuming *ontos*, *logos*, and *praxis*, positions human knowing as inseparable from human doing and human being. The components of the general framework in Fig. 4.3 are necessarily subsumed within a context of axiology, the study of human values, because knowing, doing, and

this trajectory. In the context of the curriculum, students develop their self-identity as a governor through enacting governorship in the game, and they thereby begin to grasp the meaning of governance in relation to citizenship. Learning entails the process of *becoming* a (virtual) governor and appropriating the identity of such a person (Semetsky 2006) so that citizenship can be understood from the perspective of governorship and vice versa.

In our empirical work, we have often found that teachers fret over whether the students will learn the required subject content mandated in the curriculum. This fear, however, is misplaced. It is not possible for performance to take place in the absence of content. Performance is always enacted within some subject domain. Just as a person who learns swimming can talk *about* swimming, assuming the absence of cognitive defect or linguistic impairment, so too learning governing necessarily subsumes learning *about* governing. The *prima facie* tension between learning governing and learning *about* governing is thus immediately dissolved; there is no need to entertain the idea of the two participating in an uneasy coexistence. The learning outcome is actually greatly strengthened because the discourse on governance is now meaning laden rather than being empty, memorized reproductions of content. Teachers who master the art of dialogic facilitation freely and effortlessly weave content references into the dialogic classroom process. Moving beyond conventional conceptions of “knowledge” as separate and distinct from “skills,” performance integrates and unifies the two. It takes students to a higher level by focusing on a single coherent capacity of the *person* to act in a way that creates personal, social, economic, and creative value in the world. I have referred to this idea elsewhere as a VIP onto-epistemology, comprising values, identity, and performance (Chee et al. 2011b).

The Statecraft X Curriculum in Practice

Our work on the Statecraft X curriculum, entailing game design and development, curriculum development, and classroom intervention research, spans a period of 5 years—2008 to 2012—at the time of writing. Commencing with two pilot studies oriented primarily to usability testing in late 2009, and continuing with three classroom interventions in 2010, two interventions in 2011, and six interventions in 2012, the author and his research team have developed a keen understanding of what it takes to bring game-based learning into the formal context of classroom learning. During this period, we have honed our skills in working with teachers to develop their capacity to enact the curriculum and to foster their professional growth. To provide a sense of what takes place in practice, I expand on some details in what follows.

The Statecraft X curriculum typically runs for 3 weeks in formal curriculum time. It comprises two lessons of approximately 45–50 min per week, thereby yielding a total of six class periods. The first period is taken up with introducing the curriculum and the game to students, as well as administering the loan of iPhones to them. The

sixth and final period is devoted to students delivering a speech to argue why they, as individuals, are best qualified to be elected as members of the interim governing council of Velar. Consistent with the backstory of the *Statecraft X* game established at the commencement of game play, this council will oversee the affairs of the kingdom until the young king Junio comes of age to rule Velar following the death of his father, the kingdom's founder. This device creates a seamless connection between events in the game world that eventually find closure in the real world of the classroom. The curriculum is enacted with an entire class of approximately 40 students each time. The students are divided into two groups of 20 students, with each group playing a different instance of the game. Hence, for each classroom intervention, two instances of *Statecraft X* are run. One teacher facilitates each group of 20 students for the four dialogic sessions that comprise sessions 2–5 of the curriculum. Hence, two teachers participate in each classroom intervention.

Schools collaborating in the research were identified by several means, including individual and public outreach. In one instance, the school leaders approached us. School leaders, including the Principal and Social Studies Head of Department, identified suitable teachers for participation and sought their agreement. Our outreach communication positioned the curriculum as a better way to help students learn to become active citizens (rather than learning about citizenship) and to develop twenty-first-century competencies. Teachers participated in professional development. The curriculum's pedagogy and rationale were articulated during these sessions. Teachers also played the game as if they were students, but within a compressed time frame of approximately 5 days. The sessions were highly interactive and focused on what teachers needed to understand and do in the classroom to facilitate dialogic conversations among students and with themselves. During the interventions, we continued to support teachers in their learning journey by holding further conversations after each dialogic classroom session to help them make sense of what was taking place, both in the classroom and concerning their own evolving understanding of the curriculum's pedagogy. This process has since been formalized as a form of reflective and reflexive guided appropriation (Chee et al. 2012b). Teacher uptake of teaching via dialogic facilitation was often effortful. Some teachers took to the required pedagogy with relative ease, while others struggled to enact a coherent classroom performance. Four challenges that we identified include (1) tensions related to professional responsibility (train students to score well in standard tests or develop students to survive in a constantly changing world), (2) difficulties related to entrenched teaching habits (having total control by adhering to a predetermined lesson plan or loosening control), (3) tensions related to deep-seated epistemological beliefs and values (teachers viewing knowledge as an object to be passed around), and (4) tensions arising from misalignment of conventional modes of assessing learning dictated by common tests vis-à-vis the forms of learning encouraged by the *Statecraft X* curriculum.

It should be noted that students also need to modify their learning practices and learn to play a different "game" (in the Wittgensteinian sense) when engaging in the *Statecraft X* curriculum. With appropriate positioning of the curriculum and constant reminding by teachers, students normally make this transition fairly

quickly. However, there is no guarantee that all students will buy in to the new learning practice. The reasons for resistance are varied. A reason often cited is “too hard to play.” It indicates an unwillingness to invest personal effort in game play. It also reflects the fact that genuine commitment to game play requires real effort on the part of the players. This is especially the case with a 24/7 game. In practice, however, school leaders requested that access to the game server be cut off between 10 p.m. and 7 a.m. the next day so that students do not stay up late playing the game. Students who showed a lack of enthusiasm for game play were typically those for whom gaming was not a leisure activity.

Most students, however, welcomed the opportunity to play, and they were deeply invested in the activity. As individual players in a multiplayer game, students were free to play as they wished in the game space. In earlier iterations of our work, each student had his or her own gold, the currency used in *Velar*. We found that this design did not work very well because students tended to be individualistic in their thinking and actions, and this led to a weak sense of faction identity being developed. The game design was therefore modified to make gold a shared faction resource. In this way, any individual player’s actions involving the use of gold impacted all other players in the faction. This redesign served to forge a stronger faction identity in game play. It also had the desirable side effect of increasing communication between faction members due to the need for greater intra-faction consultation.

During the classroom dialogic sessions, teachers invited students to share their most recent game play experiences. If an epidemic had recently swept through the kingdom, for example, some students, as town governors, would fare better than others if they had invested in the building of a healing center, the equivalent of a hospital in modern society. Teachers would encourage students to consider and reflect on the consequences of building a healing center in a timely way and make the connection to the curriculum’s message of the importance of anticipating change as a hallmark of good governance. In game play, a key driver of learning is that students’ actions have consequences. It should be noted that actions here subsume both acts of commission and acts of omission. Consequently, “doing nothing” by failing to build a healing center in good time also counts as “doing something,” and the consequences can be dire in the game space: such as when all the citizens in a student’s town die. Game play in *Statecraft X* can be very dynamic, depending entirely on what students do and do not do. Thus, while, by design, the game implicitly favors a democratic model of governance by virtue of in-game balancing, it is possible for students to be more transgressive in their approach to game play. They could, if they wished, enact a model of apartheid government by favoring one of the four races—humans, dwarves, trolls, and elves—at the expense of the other three. This model could be achieved by imposing harsh taxes on humans, dwarves, and trolls, while letting elves go tax free. In practice, however, we did not witness students engaging in deeply transgressive game play. By way of illustration, an excerpt of classroom dialog relating to the application of different tax rates to different races follows:

Teacher: So governors, at this point in time, think about it, why is it that the citizens are happy with the governors in Griffin faction, and they are not happy among themselves. Why do you think we have this kind of situation?

Student 1: Maybe because the governor did not give them equal treatment, like for example maybe the tax they charge for different races, so maybe they might be like example, elf the tax might be like lower, so they might be unhappy with why they're ... equally.

Teacher: Okay. [Goes to write on board.] Happy with the governor, unhappy among the citizens, because the government gives different tax treatment, is it? Is that what you're trying to say? Different tax subsidies?

Student 2: I think the subsidies varies like, towards the people to the government, not people to the people, because the people cannot give subsidies to the people, so I think yeah.

Student 3: [S2] said subsidies, so it's like governor give subsidies to the people, but then this case is like people don't trust the people, so I don't see how the subsidies got to do with trusting people.

Teacher: Okay. So he cannot see the link, how does the government preferential treatment actually result in unhappiness among the citizens themselves, he can't see the link, alright. [Student 4 raises hand] Governor [S4]?

Student 4: Maybe for that question ... Maybe it was because like, for example, if you give like Trolls like 10 % or ... another Elves like 5 %, then it's like human nature to be jealous of another ... race.

Teacher: Okay.

On the whole, students found the game-based curriculum motivating and fun. This sense of enjoyment is evidenced in the following student's feedback:

I had lots of fun participating in this research. *Statecraft X* definitely helped me learn so much more about current affairs and all the problems governors around the world could have possibly faced. Each decision they make would make such a great impact on not only their own country but also other countries around the world. It is impossible to please everyone in the country. This game would make me think twice before complaining about our government not doing a good job governing the country now that I tried to govern a country myself. This game also made me learn to appreciate about our government.

The *Statecraft X* curriculum provides an example of a twenty-first century curriculum. Students valued the mobility afforded by the iPhone as a learning device. The use of the iPhone foregrounded the fact that, in the real world, governance is a 24/7 responsibility. The technology's capacity to create and sustain a sense of continuous immersion in a virtual world was instrumental in helping students to appreciate this fact. One Head of Department expressed her satisfaction that students also come to understand that learning can take place anywhere and anytime. Students had no difficulty weaving game play into the fabric of their daily lives. They played the game before school commenced, during the recess break, and at home after returning from the day's cocurricular activities. At the intellectual level, students participated in a more demanding curriculum: one that required them to act through game play, reflect on their actions in light of the ensuing consequences

of their actions, and participate in classroom dialog to further develop connections between ideas and construct concepts and principles related to good governance. Beyond the interdependent coupling of doing and knowing that arose from play and dialog, students also developed a sense of self through the performance of governance and the values associated with one's identity, that is, of ontological Being.

Conclusion

In this chapter, I have argued for the design of educational games that are located within the paradigm of “games-to-learn” and not “games-to-teach.” I have marked a clear distinction between “games-to-teach,” which are deeply rooted in the established practices of schooling, and “games-to-learn,” which concretize a vision of the use of digital games for educating students in a manner that is future oriented, focusing on students' abilities to think independently and critically, act performatively, and cope with and handle change. I have interrogated the onto-epistemological underpinnings of schooling practice and found them wanting. The paradigm of “games-to-teach” harks back to twentieth-century instructional practices that assume a static and objective world capable of being truthfully and reliably established. I have explained why such thinking is misplaced and argued in favor of a pragmatic approach to the construction of understanding based on Dewey's notion of inquiry and the underlying assumptions of a process worldview. The paradigm of “games-to-learn” embodies and upholds a contemporary approach to harnessing digital games that can lift student learning to a significantly higher level. It heralds the kind of practices needed in the classroom for twenty-first-century educating. Being already in the twenty-first century, pedagogical innovation that will serve our students well is long overdue. Our goal must not be to sustain the thinking and practices of the twentieth century but rather to design afresh and regenerate teaching practices befitting current times. Will education administrators heed the clarion call? Will teachers rise to the challenge of game-based *learning*?

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Chapter 5

Issues and Challenges of Enacting Game-Based Learning in Schools

Mingfong Jan, Ek Ming Tan, and Victor Chen

Keywords ICT integration • Game-based learning • Augmented reality games • 21st century competencies • Argumentation

Game-Based Learning: A Status Quo Examination

The challenges of the twenty-first century are well recognized, with globalization provoking local responses to the problem of the kinds of education that would better prepare learners for these challenges. Educators are increasingly calling into question the limitations of an industrial model of public education, which is designed to mass produce learners with standardized skill sets for industrial societies (e.g., Robinson 2006; Shaffer and Gee 2005). The industrial model of education, however, falls short in areas critical to the twenty-first-century global society, such as creativity and higher-order reasoning skills. Tinkering, if not innovating and transforming, the twentieth-century mainstream education models to adapt to the ever-changing world therefore becomes a shared inquiry question among researchers, educators, and policy makers.

Game-based learning (Gee 2003; Prensky 2001) surfaces as a promising answer to the demand for the twenty-first-century education. Prensky (2001) maintains that games differ from the mainstream teacher-centric and content-driven education in its learner-centric model of design. Gee (2003, 2007), coming from sociocultural perspectives, argues that good games incorporate not only learning theories but

M. Jan (✉)

Graduate Institute of Learning and Instruction, National Central University, Taoyuan City, Taiwan
e-mail: mingfongjan@gmail.com

E.M. Tan

English Language Institute of Singapore, Singapore
e-mail: tanekming@gmail.com

V. Chen

National Institute of Education, Nanyang Technological University, Singapore
e-mail: victor.chen@nie.edu.sg

also social and cultural models. In his seminal book *What video games have to teach us about learning and literacy*, Gee (2003) proposes 36 principles that educators can learn from video game design when it comes to designing learning models. Under game scholars like James Paul Gee, Marc Prensky, Kurt Squire, David Williamson Shaffer, Katie Salen, Constance Steinkuehler, etc., game-based learning rapidly grows as a major education research area featured in heavyweight educational conferences (e.g., AERA, ICLS, and CSCL) across continents (e.g., ECGBL in Europe and ICCE in Asia) in the past decade.

After about a decade's rapid development in the first decade of the twenty-first century, game-based learning has gone beyond academic research interest among scholars to familiar classroom experiments. In a 2011 survey by the Joan Ganz Cooney Center (Millstone 2012), 18 % of the 505 participant US teachers (mostly K-5th grade) use games in their classroom on a daily bases. Thirty-two percent use games 2–4 days per week and 70 % of the participant teachers agree that “using games increase motivation and engagement with content/curriculum.” In Asian countries such as Singapore, games also emerge as a popular approach for teaching and learning. Schools not only work with researchers to develop learning games (e.g., Jan et al. 2010) but also utilize commercial off-the-shelf games, such as *Civilization III* in the classrooms.

Given the zeal in game-based learning across international boundaries and communities, game-based learning remains more of a question mark than a reliable solution to the twenty-first-century learning demand. School-driven game-based learning programs are usually not common practices in the classroom. Many game-based learning programs are designed for extrinsic motivation and for the efficiency of drilling practices, instead of the twenty-first-century skills. Proof of concepts conducted in out-of-school settings are increasing and convincing; however, sustainable and scalable game-based learning cases for the twenty-first-century learning are hard to find. Even large-scale implementations, such as *Quest Atlantis* (Barab et al. 2010), are still uncommon. The vision about game-based learning promoted by early pioneers still looks opaque after a decade's tremendous efforts. What's making the vision cloudy?

In this chapter, we postulate the issues and challenges of bringing game-based learning from an informal setting to a mainstream school setting. We highlight the issues and challenges by re-situating a successful game-based learning project—*Mad City Mystery* (Squire and Jan 2007)—from an outdoor setting to a school setting in the classroom. We first delineate the conditions and mechanisms through which *Mad City Mystery* was made possible as a plausible twenty-first-century learning experience. Through the analysis, we not only realize the potential of game-based learning for the twenty-first-century learning but also the enablers and critical conditions made possible by researchers. From there, we examine the plausibility and applicability of these critical conditions in the classroom context as a way to unpack the issues and challenges of enabling game-based learning programs in the classroom.

Mad City Mystery: A Game-Based Learning Proof of Concept for Out-of-School Settings

Mad City Mystery—a game-based learning project enacted at out-of-school settings—is one of the early game-based learning proofs of concepts designed and implemented in the United States (Squire and Jan 2007; Jan 2009). We choose *Mad City Mystery* as a case to (1) demonstrate the potential of game-based learning for higher-order thinking skills and (2) highlight the conditions and procedures through which a successful game-based learning program may emerge. Using *Mad City Mystery* as a reference point allows us to also examine the issues and challenges of enabling learning programs of similar nature in the classroom settings.

Mad City Mystery is an early proof of concept that exemplifies how game-based learning may engage students in the twenty-first-century learning skills-scientific argumentation. Unlike many other game-based learning scenarios where commercial off-the-shelf games (e.g., *Civilization III*) are used to foster learning, *Mad City Mystery* is a game designed by researchers to foster the practices of scientific argumentation. In this handheld augmented reality simulation game (e.g., Squire et al. 2007), Squire and Jan (2007) turned the physical space into an enormous game board. They employed game design principles such as role-playing, open-ended challenges, and rich just-in-time game resources, to investigate the potential of using game design principles to design learning contexts for scientific argumentation. In applying game design principles to designing a handheld augmented reality game, they employ domain-specific learning theories (c.f., diSessa and Cobb 2004), especially argumentation theories (i.e., Kuhn 1989, 2005), as a pedagogical design framework for the practices of scientific argumentation.

Practicing Scientific Argumentation in *Mad City Mystery*

The learning activity in *Mad City Mystery* is conceptualized as a 2–3 h three-step sequence—pregame briefing, game play, and postgame debriefing. The pregame debriefing helps players familiarize with the technology, game interface, basic troubleshooting techniques, and game play rules. The game play was initiated right after the group briefing when players read about Ivan Illyich, a non-player character (NPC), and his death from their GPS-enabled PDA (personal digital assistant).

Ivan Illyich is dead. Police claimed that he drowned while fishing by the south shore of Lake Mendota.

Between January and the time of his death, Ivan put on 25 pounds and started drinking heavily. His health condition had deteriorated considerably.

As one of his friends, your task is to investigate the case with two of your best friends.

It is your duty to present a clear picture about the causes and effects of these to the public.

In this collaborative dialogic argumentation game, students role-play as teams of environmental specialist, medical doctor, and government official to investigate the mysterious death of NPC Ivan Illyich, a devoted father, an overweight patient, and a victim of unknown causes by Lake Mendota, a real lake located in Madison, Wisconsin, USA. The investigation brought students into a complex game system where ecological, social, and cultural issues are intertwined in the game. The success of the investigation relies on players' ability to critically filter the data emerging via virtual interviews with non-player characters, examine the function of collected data, formulate hypotheses, and reconstruct theories when new evidence emerges from virtual interviews or virtual objects retrieval. During the investigation, students are immersed in the practices of coordinating theories and evidence. Though practicing the coordination of theories and evidences is critical to the development of argumentation skills (Kuhn 2005), it is neither a common activity nor a familiar discourse genre frequently designed into school-based activities. *Mad City Mystery* provides a *designed experience* (Squire 2006) through which students, as game players and investigators, collect data, make hypotheses, revise theories, and report findings. In a nutshell, *Mad City Mystery* affords students to enact discourse practices similar to that commonly found in scientists' communities (c.f., Lemke 1990; Gee 2004).

During the game play, player teams often play at different paces due to various factors—the ability to identify problems, technical issues, reading capabilities, observation of the physical space, and collaboration skills, to name just a few. Therefore, almost no player teams finish playing the game at the same time. In the postgame debriefing, players revisit the game data stored in their PDA in order to answer a few questions: What happened to Ivan Illyich? How did he die and why should it be a concern to the public?

As *Mad City Mystery* posts open-ended challenges to the players, there are no fixed “correct” answers similar to most content-driven learning programs. Players' performance is not judged based on how good they are in answering the real causes to Ivan's death. Instead, they are evaluated based on how good they are in piecing together in-game puzzles. It requires players to collect data, filter relevant evidence, come up with plausible hypotheses, and evaluate the possibility of multiple death scenarios.

Critical Enablers of *Mad City Mystery*

Even with the initial success in engaging players in scientific argumentation, MCM should be viewed as an *ideal* rather than a *pragmatic* model of game-based learning whether it is used in out-of-school or school settings. That is, MCM is designed, managed, and enabled by researchers to demonstrate what game-based learning can do to transform current content-driven teaching and learning approaches. It cannot be enacted without several critical enablers. We illustrate the critical enablers in the design and enactment phases.

In the design phase, the confluence of the following factors enables *Mad City Mystery* to take shape.

The Marriage of Technology, Pedagogy, and Game-Based Learning Principles

This is the foremost factor that enables *Mad City Mystery* to be a successful game-based learning project. Learning theories, such as constructivism, situated learning, and argumentation theories, inform how game-based learning principles are interpreted as well as how handheld augmented reality technology is used.

The Availability of Technology MIT’s handheld augmented reality game engine/editor (Klopper et al. 2002) enables role-playing and the integration of physical locations and “virtual” game scenarios. The technology allows the designers to design *Mad City Mystery* as place-based mystery game.

Flexibility in Designing Learning Objectives and Curricular Structure The designers are not constrained by school-related requirements, such as fixed time for each learning session and prescribed contents to learn.

Flexibility in Choosing the Learning Sites It requires the flexibility to design a meaningful game—meaningful in the sense that the game contents, problems, and inquiry are situated in or pertinent to the physical space. In *Mad City Mystery*, the game content and the problems players face in the game are also correlated to the physical space and real-world problems in the gaming site.

Flexibility in Designing Alternative Assessment As the design objective of *Mad City Mystery* is to engage students in the coordination of evidence and theory, the researchers must come up with unconventional ways to understand the learning process. The researchers evaluate students’ performance based on how good they work as a team in coming up with plausible scenarios about Ivan’s death.

In the enactment phase, at least three factors are critical in enabling *Mad City Mystery*.

Administrative and Logistic Support As *Mad City Mystery* requires PDA, GPS, game engine, and researcher-designed game to play, it is critical that both hardware and software issues are expected and handled properly before, during, and after the game. Common issues include short battery life, game engine freezing, failed GPS connection, delayed GPS signals, players dropping PDA to the ground, etc. It is particularly challenging when several player teams play *Mad City Mystery* at the same time. It demands several trained staffs to look over each team in order for the game to go smoothly.

Roles and Social Dynamics Designed as a collaborative game, *Mad City Mystery* requires players to collaborate (instead of divide-and-conquer) through the game and debriefing. The collaboration design does not work well in extreme conditions. For example, it does not work when any players are loners or try to dominate the team. Even when players can collaborate, it demands players to develop effective communication skills to be successful.

Diverse Learning Pace Because of the above issues, all players' teams require different time frames to finish the game. The researchers need to accommodate learning and playing at different paces and fill the "gaps" arising from the pace control challenges.

The analysis here delineates the design and enactment conditions that enable *Mad City Mystery* as a successful game-based learning project. These are the conditions that must be met in order for *Mad City Mystery* to enact successfully on a regular basis whether it is enacted in out-of-school or school settings. In the next session, we examine how *Mad City Mystery* might be made possible in a school setting by situating these conditions in the classroom. Doing so allows us to better understand the issues and challenges arising from the context of schooling when we attempt to enact a game-based learning program in schools.

Situating Mad City Mystery Enablers in the Classroom

The Marriage of Technology, Pedagogy, and Game-Based Learning Principles *Mad City Mystery* provided a framework for how technology, pedagogy, and game-based learning principles can be designed to help students learn. While the framework is conceptualized using a specific technology—augmented reality games on handheld computers—it may not require the same technology to enact the learning practice.

The Availability of Technology Since *Mad City Mystery*, MIT has iteratively redesigned the game engine and come up with multiple game editors that can work on different operating systems. In the meanwhile, mobile technologies with integrated GPS have significantly improved and become much more affordable. Today the technological infrastructure not only enables more advanced features but also reduces the need for technological support.

Flexibility in Designing Learning Objectives and Curricular Structure This is one of the areas where a new context in the classroom constraints some innovative learning programs, especially when the learning program is adopted in educational systems with more rigid (and yet different) learning objectives. It is relatively easy for educational systems that allow teachers to teach based on academic standards (e.g., Wisconsin, USA) than based on contents to deliver. A system with more flexible curricular structure, such as flexible timetable, will also face fewer challenges in this regard.

Flexibility in Choosing the Learning Sites Site choice is a critical concern to the design of *Mad City Mystery* as it is where learning is *situated* in the community and in the social, ecological, and political confluence. In the mainstream learning,

learning at alternative sites is usually a logistical, managerial, and safety issue. Even if these issues can be solved, there is the challenge of relevancy. *Mad City Mystery* may be a meaningful game to learners in Madison, Wisconsin. It may not apply to learners in Europe and Asia. Therefore, there may be a need to localize a game like *Mad City Mystery* for the extra layer of site-specific learning experience.

Flexibility in Designing Alternative Assessment This is perhaps the most daunting challenge in enabling *Mad City Mystery* in the classroom as a regular learning program. The assessment in *Mad City Mystery* (conducted in the debriefing session) is designed to drive the players toward the desired learning process—coordination of theory and evidence. Assessments in schools, especially standardized tests, are often designed as a filtering mechanism—to quantify learning outcome so that students' performance can be ranked. The differences in the underlying assumption for assessment make a learning program without school-defined assessment unlikely to enter the classroom.

Administrative and Logistic Support As students' learning experience is mediated by *Mad City Mystery* game, there is a need to manage both hardware and software issues as a routine. It means that schools will either buy or loan the hardware and software. In the meanwhile, there must be trained staffs to help manage the outdoor implementations. This poses a financial, technical, and logistical challenge for schools. Many traditional learning technologies, such as textbooks and blackboard, do not require regular maintenance and are inexpensive. Most innovative digital technologies, on the other hand, are expensive and require higher degree of maintenance. Perhaps the most challenging part is that digital technologies expire very quickly, resulting in great financial pressure for schools.

Roles and Social Dynamics The social relationship in traditional classroom is often hierarchical and individualistic. The standardized tests encourage students to outcompete their rivals—other students. Students rarely get the opportunities to collaborate, not to mention knowing how to collaborate. Furthermore, teachers and students often misunderstand cooperation as collaboration. These issues, however, are perhaps less challenging comparing with curricular structural issues, logistical and financial issues, and assessments.

Diverse Learning Pace Mainstream schools are often designed to accommodate similar learning paces across subjects regardless of how students prefer to pace themselves. This is not only true today, but has not changed much since Dewey's (2013) comments on the compartmentation of subjects and grades in schools. Students are expected to learn at a similar pace accordingly. For a game like *Mad City Mystery* to be played meaningfully, it is important to accommodate different learning paces. Hence, it may create managerial challenges for classroom learning as *Mad City Mystery* foregrounds critical thinking (instead of content mastery) and self-managed learning pace.

Enacting Mad City Mystery in the Classrooms: Issues and Challenges

In analyzing how we may enable the factors that make *Mad City Mystery* a successful game-based learning program in the classroom, we come to the realization that enabling *Mad City Mystery* in the classroom requires significant changes from the school side. These changes are systemic and pervasive: *pedagogical, technological, curricular, situative, performative, logistical, social, and temporal*. Table 5.1 summarizes the discussion in the above session.

Among the challenges suggested above, we maintain that pedagogical, technological, and logistical issues are *Grade Two* challenges, while curricular, performative, social, and temporal issues are *Grade One* challenges. Grade Two challenges are issues that can be solved when research and financial resources are in place and are more likely to be solved. *Grade One* challenges are often systemic, cultural, and social challenges, which are more resilient to changes even when external resources pour in. In order for game-based learning programs like *Mad City Mystery*

Table 5.1 Issues and challenges of enacting Mad City Mystery in the classroom

Essential <i>Mad City Mystery</i> enablers	Issues and challenges in enabling a <i>Mad City Mystery</i> in the classroom	Aspects of change
The marriage of technology, pedagogy, and game-based learning principles	The learning program has been designed so it is not a major issue	Pedagogical
The availability of technology	The specified technology has become mature so technology-wise it is feasible	Technological
Flexibility in designing learning objectives and curricular structure	Curricular structure in the mainstream schools is often too rigid to accommodate learning programs with diverse needs	Curricular
Flexibility in choosing the learning sites	Learning is still mostly constrained in the classroom	Situative
Flexibility in designing alternative assessment	Filter-oriented assessments are often not aligned/compatible with performative assessments, especially when performative assessments are designed to help students learn and not for ranking	Performative
Administrative and logistic support	Innovative technologies increase the degree for administrative, financial, and logistical support	Logistical
Roles and social dynamics	The hierarchical teacher-student relationship and individualistic working style are against the spirit of the learning program design	Social
Diverse learning pace	Schools demand students to learn with similar speed, and school curricular system is designed with this assumption	Temporal

to occur on a regular basis, it may require changes at both Grade 1 and Grade 2 levels. To enable a game like *Mad City Mystery* to take place on a regular basis, we may need a new learning system with distinctly different culture, curriculum, and organization from the current mainstream educational system.

This optimal view described above would not be a feasible solution. The one best system we have today is often a compromise of many, if not mutually exclusive, factors (Tyack 1974). For policy makers, there is always a budget and efficiency concern at play. For teachers and school administrators, they are always dealing with human issues and not just educational issues in schools. For researchers, they would always want to come up with the best possible learning scenarios that demonstrate the power of future learning. *Mad City Mystery* represents a possible good learning scenario from researchers' perspective, and it certainly can happen and become scalable in out-of-school settings when Grade One challenges are minimalized—an easier way to replicate the learning system the researchers have designed and tested. In other words, enabling *Mad City Mystery* by replicating the perfect conditions in informal and less restricted system is a far more pragmatic scenario than enabling *Mad City Mystery* in the classroom.

Then what is the point of conceptualizing, designing, and analyzing the conditions that enable successful game-based learning projects if we come to the conclusion that it is too good to be true for the mainstream education system? Besides the scenario we suggested, how might a project like *Mad City Mystery* inform learning that takes place in the mainstream classroom?

Our analysis of the required conditions for enabling *Mad City Mystery* helps us identify some common issues, whether they are structural, cultural, pedagogical, or social. In examining the issues and challenges, we maintain that the goal of enacting game-based learning in the classroom is not to replicate the game-based learning program in the classroom. Instead, we should examine *the degree* to which a game-based learning program can be enacted in the classroom pragmatically—requiring minimal resources support while achieving partial objectives. It requires researchers to frame game-based learning more as a pedagogical innovation and less as a technological innovation. Of course, this is a question that requires more researchers to interrogate, synthesize, and answer with creative designs and empirical data.

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Mingfong Jan Dr. Mingfong JAN is an Assistant Professor at the Graduate Institute of Learning and Instruction in National Central University, Taiwan. Previously, he led several research projects and taught graduate courses as a Research Scientist at the Learning Sciences Lab, National Institute of Education, Singapore. He is a member of the *Games, Learning and Society* research group at the University of Wisconsin-Madison since its inauguration. He employs a design-based research approach and sociocultural perspectives to understand how the concept of play and games can be leveraged for learning in formal and informal learning contexts, especially for the development of twenty-first century competencies. Currently he investigates the design of Collaborative Dialogic Argumentation Games (also known as CoDA Games) for problem solving. He also inquires teachers' professional development models by engaging teachers as context designers.

Chapter 6

The Digital Textbook in South Korea: Opportunities and Challenges

Hyeonseon Jeong and Amie Kim

Keywords Digital textbook • SMART education policy • Teaching and learning culture • Education paradigm shift

At Seoul's Guil Elementary School, where fifth and sixth graders participate in the trial, every student in the digital classrooms has a Hewlett-Packard laptop. Students toggle between their digital textbook and the Internet, which they use like an encyclopaedia for fact checking and research.

On this particular day, students are learning about pinhole cameras—a simple device that captures images upside down. When teacher Lee Yeon-ji asks her 24 students how the device works, she sends them to the Internet.

'I think I found something that sounds true', one student says.

Minutes later, she asks them to double-click on a video, embedded in the digital textbook, illustrating the process. Students watch the video either on their laptops or on a high-definition monitor at the front of the classroom, in place of a chalkboard.

<'In South Korean classrooms, digital textbook revolution meets some resistance' (*Washington Post*, 24 March 2012)>.

H. Jeong (✉)

Department of Korean Education, Gyeongin National University of Education,
Anyang, South Korea
e-mail: hyeonseon@gin.ac.kr

A. Kim

BK21Plus Institute of Future Education Design, Seoul National University, Seoul, South Korea
e-mail: amkim@snu.ac.kr

Introduction

Due to the proliferation of new media technology and rapidly changing media environment, active use of educational technology is being required at the school level. For instance, in many countries, traditional chalkboards are being replaced by interactive whiteboards or high-definition monitors with interactive features. The possibilities of combining offline and online learning are being tested (e.g. the future school experiment in Singapore). In addition, there are growing interests in the possibilities of replacing print-based textbooks with digital textbooks (e.g. the Digital Textbook Collaborative in the USA). In South Korea, the Ministry of Education, Science and Technology has launched the ‘Promotion Strategy for Smart Education’ which emphasises the introduction of customised teaching and learning in schools. Its aim is to ‘[innovate] the overall education system, including its environment, contents, teaching method, and evaluation’ (MEST 2011). To fulfil the target, it plans to equip all schools with wireless networks to enable ubiquitous learning and provide students with ‘an education information system that can run in a variety of devices including PCs, laptops, tablets and Internet-connected TVs’ (MEST 2011).

As part of the ‘Smart Education’ strategy, the South Korean government announced its plan to replace traditional print-based form of textbooks with the digital textbook, starting from elementary schools. Since 2007, several elementary schools were designated as research schools for implementing digital textbooks in classrooms. As of 2010, 132 elementary schools nationwide are taking part in the pilot programme. Accompanying the pilot programme, there have been rich studies looking into its effectiveness and raising practical issues and/or concerns related to the use of digital textbooks (e.g. Byun et al. 2008, 2010; Noh et al. 2011). This chapter reviews the literature related to the digital textbook experiment in Korea. We look into the reports published by government-sponsored institutes such as the Korea Education and Research Information Service (KERIS) and Korea Institute for Curriculum and Evaluation (KICE) and journal articles and papers that deal with the digital textbook project in South Korea. In addition, to better understand how digital textbooks are being used in the real school setting, one of the authors conducted a focus group interview with two elementary school teachers who have been using the digital textbook for more than 3 years. The interview data are not used as empirical data but are mentioned in the chapter to contextualise the discussions. The interview data are used to help us to make sense of the research that often indicates contradictory results.

This chapter does not aim to review the whole range of topics related to digital textbook implementations (e.g. effectiveness, technical infrastructure, copyright issue, standardisation of the format, etc.). The focus of this chapter is the cultural aspects of the digital textbook. We aim to look into the opportunities for changes in ‘learning culture’ that the implementation of digital textbooks can bring about in school settings and challenges it faces. We will start this paper by describing the overall structure and characteristics of the digital textbooks used in South Korea and discuss the opportunities and challenges created by the implementation of the digital textbook.

Contexts: Young People and New Media in South Korea

Young people in South Korea are expected to be well disposed to the implementation of digital textbooks. South Korea is well known as one of the most wired countries in the world. Internet usage rate amongst the population of age 3 and over is reported to be 77.8 % in 2010, and nearly 100 % of young people and adults under 40 accesses and uses the Internet (NIDA 2010). In addition, as reported by the Organization for Economic Co-ordination and Development (OECD), South Korean teenagers are the most competent digital technologies users amongst the young people of 16 developed countries who took part in the survey (Eason 2011).

Within this context, the government planned to finish implementing digital textbooks in all school levels by 2015. However, recently, the initial plan to replace print-based textbooks with digital textbooks has changed. The government's new plan is to focus on developing digital textbooks for subject areas such as social studies, science, and English (as second language) and implement them to schools from 2014. In 2015, implementation of digital textbooks will be expanded to other subject areas including Korean and Mathematics. The youngest group who will be using digital textbooks are the third-grade elementary students (9–10 year olds) and the oldest group are the second-grade high school students (17–18 year olds) (Joo 2012).

The Digital Textbook in South Korea

The digital textbook, which is being piloted in South Korean schools, is not simply a digitised version of a paper book. The Korea Education and Research Information Service (KERIS), a government-sponsored institute that is working with private companies to create digital textbooks, defines the digital textbook as ‘the textbook of future which provides various interaction functions with students to study anytime, anywhere (“ubiquitous” learning) and also contains references books, workbooks, learner’s dictionaries, notebooks, and existing textbooks’ (Jung and Lim 2009). The chart below shows how the print-based textbooks are converted to the digital textbooks (Fig. 6.1).

As seen above, the digital textbook consists of three different layers. First, there is the textbook content, which includes not only e-textbook but also supplementary learning materials such as reference books (workbooks); multimedia contents including video, animation, and virtual reality; and other learning resources such as dictionaries and hyperlinks. These components of the digital textbook are expected to help students to become motivated learners and provide them with more relevant and up-to-date learning materials. Second, the digital textbook provides students with a learning management system that includes evaluation tools, learning management tools, and authoring tools. The learning management system makes individualised learning possible for students by accumulating information about

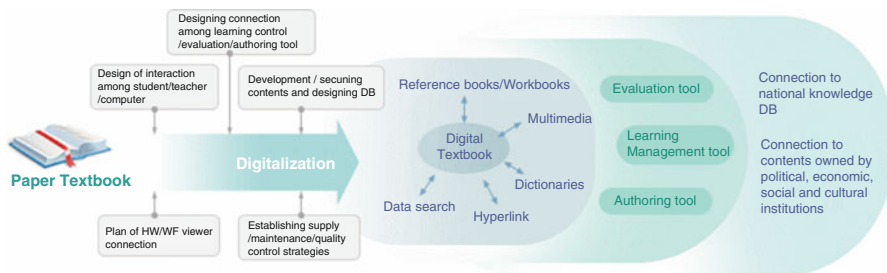


Fig. 6.1 Flow chart of a digital textbook (Adapted from Jung and Lim 2009)

their performances (e.g. test results, teachers' written comments, etc.). Using the learning management system, teachers can also provide students with learning material tailored to the level of each individual, helping them to study as specified by their aptitudes and interests (Lim 2010). Finally, the digital textbook supports extended learning by offering links to learning resources outside school.

The deployment of digital textbooks is expected to bring about positive changes for students, teachers, and parents. The use of digital textbooks has an apparent merit of freeing students from the burden of carrying the bulky textbooks around. The government's ultimate plan is to make students' digital textbooks accessible on any type of digital media (e.g. not only laptop but also tablet PC, mobile phones, etc.). Being equipped with a digital textbook that is accessible on any digital device at any place where wireless network is provided (e.g. in schools, at home, or even on the subway), students can take part in ubiquitous learning which is tailored to their levels and interests. The digital textbook can provide students and teachers with tools which can support interactive and collaborative learning. Using the digital textbook platforms, teachers can easily share teaching materials and lesson plans with other teachers. It would lessen their workloads when preparing for classes. From parents' point of view, the digital textbook can provide them with information concerning students' interests and abilities. The information accumulated via the digital textbook can function as the basis for an effective and positive parent-teacher partnership (MEST 2011).

Opportunities: Creating a New Culture of Teaching and Learning

Based on the discussions above, it can be said that the implementation of digital textbooks is anticipated to bring about changes in the learning culture and reshape the roles of teachers and learners. However, as monitored in the schools taking part in the pilot study, when the digital textbook is implemented in the actual classroom context, often there are issues raised that hinder those possibilities or change the directions of how the technology is used. In the following section, we

will discuss the new opportunities expected from the use of digital textbooks and examine the challenges that often accompany these possibilities brought about by digital textbooks.

Enhancing Interactivity and Facilitating Collaborative Learning

When implemented in schools, teachers in the interview acknowledge the increased amount of interactions between teachers and students as well as those amongst students (Jeong, 12 May 2011, personal communication). They describe it is easier for them to share the results of work in the classroom and give individual feedback to students. It can be said that the digital textbook makes it easier for users to practice ‘interactivity’ not only between teacher and students but also amongst students.

The interactivity is supported by both the textbook contents and the digital textbook platform. As seen above, the digital textbook used in South Korea consists of a digital textbook developed by textbook publishers and the digital textbook platform that supports learning practices with diverse online tools related to learning and its management. Characteristics and features of the digital textbook being piloted are based on the combination of those included in the textbook and basic tools provided by the digital textbook platform.

In the study of digital elementary English textbooks, Ihm (2011) describes the interactive features embedded in the textbook contents. Students can interact with one another by playing the games designed as part of the lesson. Student-contents interaction happens via the ‘help’ function and dictionary embedded in the digital English textbook. In addition, interactions between teachers and students are supported by the features incorporated in the digital textbook platform. Students and teachers can exchange short messages using the ‘note’ function integrated in the digital textbook platform. For instance, when a teacher asks questions to the class, students can individually send replies to the teacher via the ‘note’ function. After receiving students’ replies, the teacher can provide them with feedback that is suitable to their levels of understanding. By using the note function, a teacher can motivate students to attempt to answer important questions the teacher poses and, in addition, give them appropriate feedback to support further learning. This ‘note’ feature is considered effective in enhancing the interactivity between teachers and students.

Using these interactive features, teachers can guide students according to their aptitudes. At the same time, students can use these features to collaborate on a classroom project or activities. They can work on each other’s comments and ideas using the communicative functions and interactive features and build upon each other’s learning experiences. In the report comparing the digital textbooks of Korea with those of Japan, these interactive functions are considered unique to the Korean digital textbook platform (Taizan et al. 2012).

Yet, the implementation of technology (i.e. the digital textbook) and making use of the functions do not always guarantee enhanced interactivities. Some schools,

taking part in the pilot study, report back that the interactions between students and teachers and students and students have decreased rather than been enhanced by the implementation of digital textbooks. They say that as the classes focus on making use of numerous features provided by the digital textbook, teachers and students pay more attention to the individual learning conducted via the digital textbook. The offline interactions such as students asking questions to a teacher or students discussing with one another do not happen as often as without the digital textbook (Leem 2010).

It can be suggested that the newness of the digital textbook, especially in schools where digital textbooks are being piloted, led teachers to make use of its full functions, often lacking considerations about how it can be used together with other offline teaching materials and activities.

Once the digital textbook is implemented in all school levels and contents for the digital textbooks are sufficiently developed, it will be necessary for teachers to work out the balance between the use of digital textbook functions and offline activities in classrooms.

A teacher's role in finding the right balance between activities based on the digital textbook (online activities) and the offline activities becomes important. Reshaping of teachers' and students' roles is promoted by the use of the digital textbook. However, it is not the case that the digital textbook can replace or diminish teachers' traditional roles in the classroom. Teachers' appropriate intervention and guidance are essential for the efficient and effective use of digital textbooks. This issue will be discussed further later.

Motivated Learning: Engaging Students by Making Use of Media

In addition to enhancing the interactivity, digital textbooks are reported to help the attitude of students. Students can become more motivated and engaged in learning when using the digital textbook, especially due to the new media platforms and multimedia learning materials provided by the digital textbook (Jung and Lim 2009; Harlan 2012). Previous studies suggested that young people's preferences towards new media and multimedia materials contribute to their increased motivations and desires to learn when ICTs including the electronic books are used in class (Sutherland et al. 2004; Maynard and Cheyne 2005). In addition, young people are reported to prefer multimodal contents and interactive components and are thought to be skilled at interpreting them (Jenkins 2006). It can be said that a digital textbook as a medium and its multimedia components have appeal to young people.

One of the benefits of the digital textbook is its potential to carry diverse multimedia learning materials as well as texts. The digital textbook integrates texts with multimedia learning materials such as videos, audios, animations, and virtual reality contents. These multimedia contents not only function as appealing factors

to young students, but also contribute to young people's further engagement in learning by providing them with a lively learning environment (Jung and Lim 2009). First, the multimedia contents embedded in the digital textbook make alternate ways of approaching a concept available besides the traditional text and 2D illustrations. For instance, using a science digital textbook, students can view 3D images of molecules. When learning about dialect and standard languages in Korean, students can listen to the audio files to better understand how those languages differ from one another. Second, the multimedia learning materials can be designed and used in ways that contextualise the learning. For instance, students' foreign language lessons can be contextualised. During English language classes, students can take part in a role-play via the virtual reality setting. These features of the digital textbook are expected to enhance students' self-motivation and support different learning styles.

In addition, reports from schools piloting digital textbooks suggest that young people find the digital textbooks appealing, as they are accessible via new media (e.g. laptop computers, tablet PCs, smart phones, etc.), which young people are more accustomed to. By implementing digital textbooks, it is suggested that the gap between young people's in-school and out-of-school media experiences as well as learning experiences can be bridged (KERIS 2007). However, there is always an issue of the new media used in schools (either in terms of their contents or their technical features) lagging behind the new media young people access out of school (Buckingham 2007). For instance, the visual quality of online games young people enjoy outside school often surpasses the quality of those designed for educational use. Furthermore, the hardware (e.g. computers or laptops purchased for the digital textbook use) and software (e.g. operation system running on the computers) installed in school settings to implement digital textbooks risk being obsolete in comparatively short time spans. In the case of digital textbooks platforms, for example, the digital textbook platform which can run on both Windows and Linux operating system was developed in 2009. However, by 2010, due to the wide appropriation of smart tablets such as Apple iPads, this version of the digital textbook which cannot run on tablet PCs became outdated (Nam 2012).

Therefore, the use of new media (i.e. the digital textbook and multimedia contents provided by it) alone does not guarantee an increase in student motivation. It is more important to carefully design the multimedia contents in a way that can contextualise the learning experience better and support students who have different learning styles.

Personalised Learning

The implementation of digital textbooks is expected to enable personalised learning by providing each student with learning contents that are tailored to their interests, aptitudes, and learning styles (Lim 2010).

First, the digital textbook contents can be developed according to the learners' level. For instance, English digital textbooks for elementary students are designed in three different levels (e.g. textbooks for beginner, intermediate, and advanced level) (Ihm 2011). Also, using the adaptive technology, the digital textbook can be designed to provide students with personalised activities or 'help' to support them to tackle subjects they might find difficult.

Second, personalised learning can be realised with the support of the learning management tools embedded in the digital textbook platforms (see Fig. 6.1 for the digital textbook structure).

For instance, using the 'e-portfolio' feature of the digital textbook, students can manage academic progress and save information related to their learning achievements (e.g. results of the formative assessments or teachers' feedback on their activities in classrooms) (Kim and Jung 2010). Based on the information accumulated by these learning management tools, teachers can provide additional learning materials that are appropriate for each student. In addition, the hyperlinks (e.g. links leading users to the resources provided by various social institutions and national knowledge database) embedded in the digital textbook enable students to explore the subject they find interesting further (Leem et al. 2008). The paper-based textbook has limits concerning the length and forms of the materials (e.g. unable to include multimedia contents) it can provide. Compared to the paper-based textbook, the digital textbook has the potential to provide users with a greater variety of learning resources and modalities. For instance, when a student is interested in a specific topic, he/she can easily look up how it is dealt with in different grade levels and subjects via the digital textbook system. These features of the digital textbook are expected to contribute to promoting non-linear learning (KERIS 2007).

However, as with other new learning practices enabled by the digital textbook, to provide students with personalised learning experiences, appropriate technologies and rich learning materials are needed. At the same time, there is a danger of assuming that young people have an innate ability to take part in non-linear learning. Young people are considered as being used to non-linear learning due to the characteristics of new media they use outside school. Nevertheless, the digital divide amongst students exists. It should be noted that due to the gap in young people's new media access and ownership, the opportunities they have to experience non-linear learning can differ from each other.

Self-Directed Learning

As mentioned above, the digital textbook is designed to provide students with the resources from outside school, which students can access and navigate through. Based on the personalised learning contents and resources accessed through the digital textbook system, students can take part in self-directed learning. They can initiate the learning and research the information relevant to their learning levels and interests by accessing the resources provided by the digital textbook.

Students also get an opportunity to manage their own learning resources via the digital textbook (MEST 2012). They can produce their own learning materials using the information they researched through the links provided by the digital textbook and share them with others using the interactive features embedded in it. It can be said that digital textbook contents and platforms enable students to create their own learning materials according to their interests, learning styles, and aptitudes. In addition, the implementation of the digital textbook is expected to make learning anytime and anywhere possible (MEST 2011). Students can access learning resources which are from out of school using the Internet, and they can also actively construct their learning outside schools (e.g. places such as in nature, or other social institutions such as the museum or bank) (Lim 2010). Digital textbooks enable students to create information as well as consume it.

Students can participate in creating information not only by researching and putting the information together, but also by taking part in the production of multimedia contents using the tools provided by the digital textbooks (MEST 2012). For instance, the digital textbook can be connected to other mobile media such as a mobile phone or a digital camera to produce multimedia contents. Students can record their activities and share them in class using the electronic whiteboard. They can also get asynchronous feedback from their peers using the interactive features embedded in the digital textbook. The electronic whiteboard has features to capture contents written on the board and record the lessons. The multimedia files saved via the electronic whiteboard can be uploaded on the digital textbook platform to be shared amongst students or with other classes. As such, the digital textbook enables students (as well as teachers) to become an author of their own learning materials, actively share them with others, and build upon each other's learning materials.

Students are allowed to create information using digital textbooks. However, the resources they can access through the digital textbook might be regulated. The learning management system of the digital textbook is considered a closed system which does not make use of commercial services such as social networking services or other outside links that are not approved by schools. Filtering students' access and use of the Internet has always been an issue in schools. It is important to control the quality of information accessible via the digital textbook. At the same time, there is a risk that what students learn with digital textbooks can be controllable and even manipulated by the content regulators. The issue of how open the school can be to the outside e-learning services or social networking services still remains.

Shifts in the Role of Teachers and Students

It can be said that the digital textbook contributes to constructing a student-centred learning environment which focuses on the learner integrating new information rather than the teacher conveying the new information. In a student-centred learning environment, students' needs are considered and they are encouraged to participate in the learning process at all times (Johns 2007).

The teacher becomes a member of the team as a participant in the learning process and works as a facilitator, who guides, manages activities, and directs. Therefore, the implementation of digital textbooks brings about shifts in the role of teachers and students.

Digital textbooks support students to take more active roles in learning than before (Lee 2008). However, it does not mean that when learning via digital textbooks, students individually go off to the paths of their own in the classroom, randomly choosing what to study or which resources to access, while teachers only provide guidance when needed.

Teachers' role is important to fulfil the potential provided by the digital textbook technology. For instance, the use of the digital textbook can enhance interactivity. Yet, teachers' appropriate interventions and design of teaching activities are also needed to improve the interactivity in classrooms. Student-centred learning relies heavily on the teacher's expertise. Teachers make student-centred learning possible by communicating with students, ensuring necessary resources, evaluating outcomes, and promoting critical thinking (Hiemstra 1994).

In addition, partnerships between a teacher and students can be developed further through the student-centred learning supported by the digital textbook. By guiding and advising individual students via the digital textbook platforms, teachers can have more responsive relationships with students. The collaborative relationship between students and teachers in the student-centred learning environment is expected to help improve learning for some students (Rallis 1995).

As seen above, the implementation of the digital textbook is expected to lead to shifts in the learning culture. Digital textbooks support interactive learning, engage and motivate students by providing them with multimedia tools and contents, and offer them individualised learning paths according to their interests, aptitudes, and learning styles. Digital textbooks also enable self-directed learning and positions students not only as consumers but also as creators of information. However, there are barriers to the adoption of digital textbooks. Challenges that schools met when implementing digital textbooks in the school setting will be discussed in the following section.

Challenges: Gap Between the Ideal and the Reality

As mentioned at the beginning of the chapter, since 2010, more than a hundred elementary schools nationwide have been taking part in the pilot programme testing out digital textbooks and reporting the benefits and challenges of implementing digital textbooks in schools. Challenges identified in the reports are mainly issues related to technology and pedagogy.

Challenges of Device Procurement

To successfully implement digital textbooks into the school setting, it is necessary for the schools to transform the classrooms and schools into the digital learning environment. Each classroom needs to be equipped with electronic whiteboards. Furthermore, schools need to install wireless mobility networks. Students should have easy access to devices to run the digital textbooks. For the digital textbook to play an important role in teaching and learning, it should be easily accessible for students in terms of the portability and usability (Byun et al. 2006).

However, schools often face difficulties in figuring out the best way to equip students with necessary devices. For instance, several schools in the pilot study provide students with tablet PCs for digital textbook use. Yet few schools are willing to give students the expensive device to take home. In most cases, students are required to leave the device at school and work on their own devices at home. However, it cannot be assumed that all students have access to the devices that are compatible with digital textbooks. For some students, it is difficult to use the digital textbook at home, as the size of the database is too big to work smoothly on home computers (Leem 2010).

The heavy data load of digital textbooks is considered the disadvantage of the current digital textbook platform. It offers too many supplementary features, which make it difficult to maintain (Kim and Jung 2010). In addition, due to the large data size of digital textbooks, some pilot schools report that it often takes a long time for students to load other contents (e.g. textbooks used in different grade levels) when they attempt to explore a subject further.

Once classrooms are equipped with computers or laptops, issues of maintenance and upgrading the devices remain. Due to the fast pace of technology development, the devices purchased by schools for the implementation of digital textbooks are under risks of becoming technologically obsolete in a short span of time. The digital platform developed for Windows and Linux operating systems becomes obsolete, as growing numbers of schools choose to equip students with smart tablets such as Apple iPads. As such, the limits of technological system often restrict how the digital textbooks are used. Oftentimes, the expected opportunities of digital textbooks are not fully realised due to the technological challenges.

Pedagogy and Contents: Development of Instruction Models and Digital Textbook Contents

Implementation of technologies to support digital textbooks in school is not the only requirement to realise the new learning practices discussed above. Contents and learning models suitable for digital textbooks need to be developed further. Digital textbook contents used in the pilot study are closer to the electronic version of print-based textbooks and do not actively incorporate various features enabled by

digital textbook technology. For instance, besides the English language textbook for elementary schools, not many digital textbook contents are designed according to students' learning levels (see Ihm 2011 for the case of English digital textbooks). The digital textbook is expected to assist personalised learning. Yet, to realise the potential, learning materials, resources, and strategies which can accommodate learners' different learning styles and levels are essential.

In addition to expanding digital textbook contents, learning models that can be applied to digital textbooks need to be developed. The position and role of the digital textbook in the classroom are often unclear because of the insufficient learning models that can be applied to the digital textbook (Byun et al. 2006). It is argued that instructional methods should be designed for the use of digital textbooks, which can differ from those developed for conventional textbooks (Kim and Jung 2010). Leem et al. (2008) recommend employing an activity-based learning model, which focuses on supporting meaningful learning through student activity. They suggest that 'activities' designed to engage both students and teachers can maximise the effectiveness and efficiency of digital textbooks.

However, combining the offline activities with the use of the digital textbook can be proved more effective for certain subject matters or lessons within a subject (Lim 2010). In addition, as mentioned in the introduction, the government's initial plan to completely replace print-based textbooks with digital textbooks has changed. The government's new plan is to maintain the print-based textbooks and use it together with digital textbooks. Therefore, the issue of figuring out which roles to assign to these two and how to mix them in the classroom remains. Teachers face the challenge of balancing digital textbooks and other offline learning resources including the print-based textbooks.

Conclusion

In this chapter, we discuss the opportunities that the digital textbook brings about and the challenges it faces when developed, researched, and implemented in schools. Despite the practical challenges, the implementation of the digital textbook is expected to contribute to paradigm shifts in education. It can contribute to changing the teaching and learning environment into a more student-centred one. With the support of the digital textbook, teaching and learning experiences can be extended beyond the confines of the classroom. Students can be provided more easily with individualised and flexible learning paths and with means to take part in creating and sharing knowledge via the digital textbook.

However, a technologically deterministic approach should be avoided. The implementation of the technology itself does not guarantee these changes. There needs to be consistent technical support and maintenance and sufficient in-service teacher training. Digital textbook contents and learning models need to be developed. Most importantly, to realise the potentials of the digital textbook, the way in which teachers approach teaching and learning needs to be changed. Depending

on the learning aims and content, teachers need to be capable of using the digital textbook in different ways and taking on different roles and responsibilities accordingly. For instance, in certain subjects and topics, a student-led approach can be more effective. In that case, teachers can take on the role of a co-ordinator and facilitator. In other subject areas and topics, teacher-driven lessons can be needed. In that case, for students who already have the required knowledge, teachers can function as an advisor and provide them with advanced learning materials. For those who do not have the knowledge, teachers can shift their roles and focus on helping students achieve necessary knowledge.

The fast pace of change in technology (e.g. when the digital textbook was piloted in 2007, it was mostly used via tablet PC. Yet, in 2011, the technical platform changed into smart pads such as Apple's iPad or Samsung's Galaxy pad) can put too much pressure on teachers to keep up with the new technology. However, it is more important for teachers to acquire abilities to design learning models and devise strategies to effectively support students' learning via the new media technology, than to learn practical skills in using the cutting-edge technologies.

Furthermore, the implementation of the digital textbook requires both teachers and students to become media literate. Media literacy is necessary for students to judge the credibility of abundant information made available by the digital textbook. Students need to learn not only how to search for the information they need but also how to judge the credibility of the information. They need to be aware of the copyright issues when authoring and sharing the materials related to their learning experience. To participate in the creation of multimedia learning materials, they need to learn how to produce the media. In addition, media literacy education can help narrow the gap between digital haves and have-nots. Currently, there are few lessons that are planned to support students' use of the digital textbook. Supplementary education programmes are planned to prevent students from being addicted to the new media and the Internet and to advise them on the ethical use of the new media. Taking a protective approach, these supplementary programmes will not be enough to help students effectively take part in learning via the digital textbook. The implementation of the digital textbook should be accompanied with media literacy lessons that focus on promoting students' ability to access, understand, and create contents using digital media.

At the same time, as digital textbooks tend to include the social media capabilities, media literacy education should include discussions of how the social media change communication practices and the strength and limits of the social media when applied to teaching and learning. In addition, for a more effective use of digital textbooks, parents also need to be provided with media literacy education. By doing so, students can gain support to effectively navigate through the new media learning environment.

Development and implementation of the digital textbook bring about diverse issues and discussions. However, it should be noted that the digital textbook project is not a one-off implementation of a new technology, but rather an attempt to incorporate the new media culture into the school setting to create changes in the teaching and learning culture. Researchers need to continue producing credible and

valid studies concerning the digital textbook. At the same time, the government and policy makers need to pay attention to and actively take part in the discussions involving diverse agents (e.g. technicians, content providers, teachers, parents, students, etc.).

As of 2014, with the change of government, there was steep budget cuts related to the digital textbook implementation plans. It has resulted in the slow implementation of digital textbooks by the government. However, many schools and teachers are constantly experimenting with smart pads and other digital technologies to innovate teaching methods and classroom culture. In this chapter, we argued that implementation of digital textbooks should be about changing the teaching and learning culture rather than just about the use of new technology per se. Technology can function as catalysts for educational change only when it is supported by thoughtful consideration of the relationship between teachers and students and which ultimately needs to be led to a paradigm shift in education from teacher-centred to student-centred one.

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Chapter 7

The Construction of Media in Education Policies: A Comparative Study of Singapore and Taiwan

Tzu-Bin Lin and William Choy

Keywords Media literacy education • Policy analysis • Singapore • Taiwan

Introduction

During the education reform movement since the mid-1990s, many educational initiatives from the Western countries have been introduced to the East Asian region. Due to the increasingly intense globalisation, the transfer of policy discourse from one country to another is becoming a significant phenomenon in the field of education policy analysis. As Ball (2006) calls it, ‘big policies/small world’. In East Asia, media literacy was introduced in the 1990s. And, with the advent of the new media era, there has been a boom in advocating media literacy and in preparing students with media literacy through education in the past decades (Lin 2011).

Incidentally, media literacy education is one of the travelling policy discourses that is becoming more significant in a number of Asian countries such as Taiwan, Singapore and Hong Kong. In 2002, the first official policy on media literacy education in the Asian region was issued by the Ministry of Education (MOE) in Taiwan. In Singapore, media literacy was proposed as part of ‘the 21st century skill sets and key development areas for students’ by the only teacher training and educational research institute (National Institute of Education 2009). At about the same time, the association of media education was established in Hong Kong to promote media literacy in schools. However, there is no official policy discourse

T.-B. Lin (✉)

Department of Education, National Taiwan Normal University, Taiwan

e-mail: Tzubin_lin@ntnu.edu.tw

W. Choy

National Institute of Education, Nanyang Technological University, Singapore

e-mail: william.choy@nie.edu.sg

related to media literacy in Hong Kong. Due to the increasing interest in policy discourse in media literacy education in the Asian region, this study has chosen Taiwan and Singapore where there are policy-related documents that draw upon the vision of media literacy education.

This chapter aims at exploring how media literacy is defined and articulated in education policies in Singapore and Taiwan and seeks to discuss if the construction of policy discourses is similar or different from their origin in the Western countries, especially in the UK. Specifically, this study is an ‘analysis of policy’ (Rizvi and Lingard 2010), which focuses on critically reviewing the existing policies on media literacy. Data are collected from policy-related documents and government websites, while the framework of analysis is based on policy sociology and critical discourse analysis. This chapter will offer a comparative study of policy borrowing/transfer and how the Western education discourse is localised in Asian context. Before examining how media literacy is specified in authoritative documents in both Singapore and Taiwan, an introduction to media literacy is provided. In the following sections, some popular/major definitions and discourses of media literacy are briefly reviewed.

Remarks on Media Literacy

The term media literacy has been defined in various ways. For example, it can refer to the ability to access, understand, critically evaluate and create communications in various contexts (European Commission 2007). Another definition of media literacy focuses on the development of a critical understanding of how the media construct reality and produce meaning (Thoman and Jolls 2008). More recently, Chen et al. (2011) proposed a two-continuum framework to define ‘new media literacy’, which is highly required in the era of the twenty-first century. On the one hand, the definition continuum ranges from consuming (i.e. ability to access and use media message) to prosuming (i.e. ability to produce media contents), while, on the other hand, it ranges from functional (i.e. textual meaning making and primary use of media tools) to critical (i.e. ability to analyse, evaluate and criticise media contents).

Apart from definitions, various discourses (or paradigms) of media literacy can be also identified from the literature. One of the most prominent discourses is the protectionist approach that develops from the earliest cultural protectionism to more recent moral panic and anti-consumerism (Lin 2010). Generally, the protectionist discourse aims to keep younger generation away from the ill effect of media. Another discourse, influenced by Marxist tradition, focuses on unpacking the hidden ideologies/values in the media content (Lin 2011). That is, media literacy enables individuals to get free from the ideological control by certain authoritative figures. There has been another widely acknowledged discourse that perceives media literacy as an indispensable component of the twenty-first-century citizens. This discourse pays more attention to civic engagement and sociocultural

engagement/participation (e.g. Buckingham 2007; Goodman 2003; Lin 2010). As Lin (2011) illustrated, ‘media literate young people can engage in the discussion of social issues through their media productions, which express their concerns and viewpoints’ (p. 69).

Media Literacy in the Global Context

The earliest notion of a preliminary concept on media literacy can be traced back to the discrimination approach proposed by F. R. Leavis and Denys Thompson in 1933 in the UK (Buckingham 2003) due to the uneasy atmosphere brought by the growth of popular cultural forms. The aim of media literacy education is to strengthen the influence of high culture to fight against the increasing growth of popular culture in printing media at that time (Lin 2010). Therefore, there is a strong cultural value flavour in its origin.

In the 1950s, media literacy was introduced to the USA as a concept with the acknowledgement of the increasing impact of mass media such as radio and television on people’s daily life and schooling (Schwarz 2005). Up to now, media literacy has not been fully integrated into school curriculum in the USA. Each time there is a new media technology that causes collective anxiety in the society, the importance of media literacy is brought back to the educational agenda (see Lin 2010). Take East Asia as an example, where the growing interests in media literacy in various countries such as China (including Hong Kong), Taiwan, Japan and Korea since the late 1990s (Cheung 2009) come from the emerging new media technologies, including the Internet, that cause cyber cafe phenomenon. In Taiwan, media literacy education is viewed as a practice with the potential to liberate and empower (Ministry of Education Taiwan 2002). As Cappello et al. (2011) point out, the current media literacy education strikes a balance between discrimination/protection and empowerment approaches (Leaning 2009; Lin 2010), and the recognition of media as an aspect of social environment is a driving force for the recent development of media literacy in the world.

Three terms, including media education, media literacy and media literacy education, are widely used in the discussion of media literacy. Some may consider that these terms are interchangeable, but a common understanding is that media (literacy) education refers to the process of learning about the media and media literacy is the outcome (Buckingham 2003).

Media literacy is recommended as an essential part of modern citizenship in the Grunwald Declaration on media education (UNESCO 1982). However, besides citizenship education (Burroughs et al. 2009; Lavender 2003), media literacy in different countries may be associated with various educational practices such as civic engagement (Goodman 2003), English/mother tongue education (Buckingham and Domaille 2009), multicultural education (Cortés 2000) and media/film studies.

Like other concepts in social science, there are various definitions of media literacy. Among them, the definitions from the Office of Communications (Ofcom), UK, and the National Association for Media Literacy Education (NAMLE), USA, are popular ones. Ofcom (2004) defines media literacy as ‘the ability to access, understand and create communications in a variety of contexts’. The basic definition of media literacy by NAMLE (n.d.-a) is ‘seen to consist of a series of communication competencies, including the ability to access, analyze, evaluate, and communicate information in a variety of forms, including print and non-print messages’. Based on these two definitions, media literacy refers to a set of competencies that enable individuals to access, analyse, evaluate and create communications in different media platforms. It is crucial to point out, as NAMLE defines, that media here cover printing and nonprinting ones.

The concept of media literacy is an expanded version of the traditional literacy practice (Burn and Durran 2007; Cappello et al. 2011). In the era of the great presence of printing media, such as books, magazines and newspapers, a literate individual needs to know how to read as well as how to write. Then, the mutual communication is possible. With the advent of new and social media such as the Internet, digital TV and smart phones, the media messages are no longer in written forms. Instead, they are in ‘a combination of various languages’ such as visual images, audio and written language (Buckingham 2003). Therefore, individuals need different competences to make mutual communication possible. Media literacy is the collective title for these competences. Two major components are identified in the discussion of media literacy: one is reading the media message, and the other is writing or producing media content (see Chen et al. 2011). Across different mediums, the component of reading media messages is related to accessing, understanding/analysing and evaluating media information, while the component of producing media content is about creating and communicating information.

Purposes/Aims

NAMLE sums up the purposes of media literacy education in one sentence as ‘the purpose of media literacy education is to help individuals of all ages develop the habits of inquiry and skills of expression that they need to be critical thinkers, effective communicators and active citizens in today’s world’ (NAMLE n.d.-b). Livingstone et al. (2004) offer a more detailed set of purposes of media literacy which we summarise as the following three points. The first one is on democracy, participation and active citizenship. It refers to a media-literate individual, someone who can make informed decision and actively participate in various forms of discussion in public domain. The second one is on knowledge economy, competitiveness and choice. To elaborate further, this point is to indicate that, in the era of knowledge economy, a media-literate individual and society will be more innovative and competitive. Moreover, the society is able to offer richer choices to its citizens

regarding the sources of information. The last point is about lifelong learning, cultural expression and personal fulfilment. Living in a world full of mediated messages and various channels of media, a media-literate individual is able to apply critical and expressive skills to achieve a meaningful life and to collectively create an informed, creative and ethical society.

As we indicated above, media literacy has a close link to citizenship education and is considered as a key competence of contemporary citizen for a better engagement in the democratic process (Burroughs et al. 2009; Goodman 2003; Hobbs 1998). Moreover, one key aim of media literacy is to help individuals become creative and innovative citizens who are able to respond to the need of knowledge economy in contemporary society. Living in a knowledge-based society, lifelong learning is crucial to all members within the society (Livingstone et al. 2004).

Means

As it is stated by Ofcom (2004, p. 5), ‘formal education plays a vital role in laying the foundations of media literacy’. The major means of cultivating media literacy is through school curriculum. Media literacy is taught as an independent subject such as media studies or as a cross-curricular theme integrated in various subjects like mother tongue, social studies, and citizenship. However, in recent years, some researchers (Dennis 2004; Livingstone et al. 2004) have noticed that most research and literature on media literacy are focusing on the youths and children rather than adults. However, the dominant discourse in this field is still on how to teach the youths and children media literacy through schooling.

Media Literacy in the Singapore Context

In the Singapore context, media literacy appears as one of the initiatives to make Singapore ‘a global media city’ by the Media Development Authority (MDA) of Singapore (MDA 2003). MDA (n.d.) views media literacy as ‘a life skill that is essential for work, learning and play’. In the Singapore education system, unlike information literacy which has been in the education policy since 1997, media literacy has less support from the MOE. There is no single guideline for media literacy although media literacy is mentioned as one of the literacy skills to enhance the teaching of various language competences in the English Language Syllabus 2010 Primary and Secondary (Express/Normal Academic).

Meanwhile, media literacy is represented in a document mapping out the twenty-first-century teacher education in Singapore as a component of the twenty-first-century skill sets and key development areas for students. Because of its importance to students, it becomes a main consideration in the model of the twenty-first-century teachers’ training proposed by the National Institute of Education (NIE 2009). NIE is the only teaching preparation higher education institute working

closely with the MOE and schools in Singapore. Thus, its teacher training model has been a collaborative effort between the Ministry of Education Singapore, NIE and schools. Therefore, it can be argued that the importance of media literacy is recognised in the education system in Singapore.

Media literacy is defined in Singapore by MDA (n.d.), MOE (2010, p. 128) and NIE (2009, p. 31) as follows:

- MDA: Media literacy refers to the ability to critically assess information that is received daily via different media platforms. When a person is media literate, he would be able to read, analyse and interpret messages, regardless of whether he is using media to gain information, for entertainment or for educational purposes.
- MOE: The ability to access, analyse, evaluate and create information in a variety of forms and media.
- NIE: Teachers should be adept in using multiple media, such as text, video, audio, and animation to facilitate effective teaching and learning. Advances in digital technologies have integrated multiple media using graphical and interactive interfaces. This necessitates new literacies to decipher, interpret and communicate using visual imagery such as icons, as well as new man-machine interactive modes such as the technology used in touch-screen handphones and interactive whiteboards.

MDA's definition on media literacy focusing solely on reading, analysing and interpreting media messages only represents the 'reading' part of media literacy. Following MDA's definition, a media-literate person is an individual who can critically read, analyse and interpret media message for various purposes. This definition, compared to those by NAMLE and Ofcom, makes a two-way communication process with reading and writing in the field of media literacy to one-way which is on reading only. Meanwhile, MOE's definition of media literacy not only includes the access and analysis of media but also the move to 'create' information. This feature is also captured by NIE's definition of media literacy while describing one of the key functions of media literacy which is to 'communicate' through various media. In order to communicate, an individual needs to be able to read and produce. It can be viewed as implying media production which leads to a two-way process and moving beyond MDA's definition. Moreover, in the definition by NIE, a key feature of media literacy is the multimodality of contemporary media, i.e. the various modes in modern communication. Text, video, audio and animation are mentioned although it is necessary to point out that animation is not in the same conceptual category as the rest of the three. Compared to MDA's definition, NIE's interpretation of media literacy includes more details in terms of modality. As to the implementing plan, some key learning points related to media literacy are stated in the English syllabus. They are as follows (MOE 2010):

- Teachers will facilitate students to 'construct meaning from visual texts (e.g. pictures, diagrams, charts, icons, maps, graphs, tables)' and 'identify and analyse media techniques' (p. 33).

- Teachers will ‘provide opportunities for pupils to plan, organise and deliver appropriately their ideas in a variety of media and forms, such as through the use of posters and planned multimedia and spontaneous presentations’ (p. 46).

These learning points identified by MOE capture the most significant aspects of media literacy education, i.e. reading and producing. After reviewing definitions and learning points on media literacy from MDA, MOE and NIE, we argue that they collectively are able to represent what media literacy is although each definition is not complete. Therefore, there is still a need to consolidate various definitions of media literacy into one in the local Singapore context.

On 1 August 2012, MDA announced the launch of Media Literacy Council (MLC) that is going to promote media literacy and cyber wellness based on the previous work done by MDA (2012). It is a milestone in terms of the development of media literacy education in Singapore. This council has 21 members representing various interest groups including education. The creation of MLC proves the determination of the Singapore government in implementing media literacy extensively – both in schools and the general public.

Media Literacy in Singapore

Living in Singapore, media exposure is prevalent, and the younger generation is growing up in a very much media-saturated environment. In other words, media is the environment that Singaporeans are living in now. There is no escape from media in one’s daily life. Thus, the education sector has noticed the importance of preparing the young people with media literacy (Lin 2011). Due to such developments in the Singaporean society, policymakers in Singapore have taken measures to address the issues of media literacy in the country. In order to equip a nation’s citizens with twenty-first-century skills necessary to face the challenges of globalisation, policymakers have remarked that a major means is through education. In a visionary report, titled TE 21: A Teacher Education Model for the Twenty-First Century, the National Institute of Education (NIE) proposed skill sets and key development areas for students and teachers (National Institute of Education 2009). The policymakers have emphasised that

In the 21st century landscape, education must focus on nurturing the whole child – morally, intellectually, physically, socially and aesthetically. Students need to acquire new knowledge, skills and dispositions to ensure their survival and success as individuals, as members of the community, and as citizens of our nation. To achieve this, we must develop teachers who are able to undertake greater responsibilities as they are at the forefront of educating our youth. It is now universally accepted that the quality of the teaching force determines the quality of education. As we raise the standards for our children, our 21st century teachers will also need the right values, skills and knowledge to be effective practitioners who will bring about the desired outcomes of education. (National Institute of Education 2009)

In the course of the children's formative education in Singapore, the Singapore government has identified information literacy, media literacy, and information and communication technology (ICT) literacy as part of the essential skill sets to be developed in the students in schools. For the purpose of this chapter, the definition and description of media literacy in Singapore is based on the documents released by two prominent government organisations: the Media Development Authority (MDA) and the National Institute of Education (NIE). In the following sections, the definitions of media literacy are discussed within the public and educational contexts, respectively.

Media Literacy in Public Context: MDA's Definition

The Media Development Authority (MDA), a statutory board under the Singapore Ministry of Communications and Information, was formed on 1 January 2003 by the merger of the Singapore Broadcasting Authority, the Films and Publications Department and the Singapore Film Commission, so as to champion the development of a vibrant media sector in Singapore by promoting and regulating the media sector. The merger was to ensure there would be greater contribution towards economic growth and help foster a cohesive and inclusive society through its initiatives (MDA 2011a). To ensure a globally competitive Singapore media sector, MDA would be investing in the following initiatives:

- Enhancing the innovative capacity of the media sector
- Developing competitive media infrastructure
- Nurturing quality manpower
- Supporting sustainable enterprise development
- Enabling Singapore media to go global

And, at the same time, MDA will be formulating clear and consistent regulatory policies, based on these guiding principles:

- To foster a probusiness environment for industry players
- To ensure fair market conduct and effective competition
- To safeguard consumers' conduct
- To increase media choices for consumers
- To uphold social values in tandem with societal expectations
- To foster a cohesive and inclusive society through quality content with wide reach and impact while promoting nation-building (MDA 2011a, b)

Inevitably, the Singapore government recognises that increasingly, in this age of connectedness that people are living in, media literacy is becoming an important life skill that is essential for work, learning and play for its citizens. And to ensure that Singapore is able to benefit from the use of media, and to spur the growth of a vibrant media industry, MDA aims to foster a media-savvy population through various media education programmes. However, in order that the people have a deeper

awareness of the various media in society, it is deemed critical to first establish an understanding of the meaning of media literacy for Singapore (MDA 2011a, b). An explicit definition of media literacy can be found on MDA's website:

Media literacy refers to the ability to critically assess information that is received daily via different media platforms. When a person is media literate, he would be able to read, analyse and interpret messages, regardless of whether he is using media to gain information, for entertainment or for educational purposes (Media Development Authority of Singapore 2011b).

According to Chen et al.'s (2011) framework, MDA's definition of media literacy is narrow in scope. Specifically, it focuses mostly on the functional and perhaps some part of critical media literacy in the consuming dimension. In other words, this definition may overlook the prosuming media literacy, which is more important nowadays (see Lim and Nekmat 2008).

In one of its reports (i.e. Media 21: Transforming Singapore into a Global Media City), MDA describes media literacy by using the 'protectionist' discourse, in which

Media will embark on a series of programmes to enhance audience development and foster a culture of appreciation for media products among Singaporeans. Through its community outreach efforts, MDA hopes to increase audience appreciation of films and TV, thereby increasing media literacy awareness among Singaporeans. (Media Development Authority of Singapore 2003, p. 15)

As seen above, the rhetoric MDA uses share many similarities to the cultural protectionism discourse (see Leavis and Thompson 1933) of media literacy. This type of media literacy is to 'foster a culture', and the content of media literacy is restricted to the cultural appreciation of films and TV. However, the aim of enhancing a culture is problematic because various cultural forms and ideologies have gradually emerged and developed especially in the new media era. As a consequence, individuals are now expected to unpack and embody various cultural ideologies/values when they consume and prosume media contents.

One must take note that MDA's description of media literacy shows much biasness towards films and TV. Unfortunately, many other promising media platforms have been neglected. As Wu and Chen (2007) maintain, contemporary media should be conceived as a major component of contemporary cultural environment. In brief, the diversity of both media cultures and platforms needs to and should be further explored rather than attempting to achieve a unified media culture (Lin 2011).

Media Literacy in Educational Context: NIE's Definition

The National Institute of Education (NIE) is a national teacher training institute, which is an integral part of the educational service in Singapore. The institute collaborates with the Singapore Ministry of Education (MOE) and its schools to improve the quality and impact of the education system to ensure it continues to meet the demands of the education environment and the changing needs of the stakeholders for the future. NIE also plays an important role in providing education

research and research-based pedagogical curriculum and direction to the Ministry. This is all in line with the mission and vision of the Ministry, which is to mould the future generations of the nation (MOE 2012; NIE 2012).

In recent years, there has been a great deal of consonance with MOE's initiative to develop a new framework for Teacher Professional Development. Furthermore, NIE's recent body of research data has given a richer understanding of how teachers presently teach. Among other things, research data on Singapore schools appears to suggest that:

- Teachers need a stronger dose of PCK (Pedagogical-Content-Knowledge);
- Teachers need a deeper understanding of the nature of the disciplines they teach;
- Teachers need to develop capacity to initiate their students into the knowledge and practice of the discipline;
- Teachers need a sophisticated understanding of the fundamentals of lesson planning, questioning and feedback, capacity for differentiated instruction, strategies for effective peer work and inquiry approaches. (NIE 2009)

Together those main drivers point towards key areas where a review and reconsideration of the content and pedagogy was necessary for NIE to continue to produce teachers with relevant twenty-first-century skills and knowledge, who were then equipped in all aspects to guide the twenty-first-century students in schools. The new insights required that the Institute's teacher education programmes encapsulate the requirements of the twenty-first-century skill sets and key development areas for students. These in turn have to be aligned to the developmental needs of twenty-first-century teachers. One such key aspect of the requirements is the inculcation of knowledge, information, media and technology literacy skills in the students (NIE 2009). No doubt, there is much emphasis in unpacking the notion of media literacy within the Institute.

Compared to MDA, NIE's definition of media literacy places more emphasis on educating people. A more detailed illustration on how to put media literacy into practice is also provided:

Teachers should be adept in using multiple media, such as text, video, and animation to facilitate effective teaching and learning. Advances in digital technologies have integrated multiple media using graphical and interactive interfaces. This necessitates new literacies to decipher, interpret and communicate using visual imagery such as icons, as well as new man-machine interactive modes such as the technology used in touch-screen handphones and interactive whiteboards. (National Institute of Education 2009, p. 31)

According to NIE's definition, the multimodality of contemporary media, a key feature of media literacy, is well captured. Contrary to MDA's definition, more modes of media platforms (e.g. text, video, audio and animation) rather than merely films and TV are favoured. Another important feature of media literacy (e.g. 'interactive interfaces'), namely, interactivity (Lister et al. 2003), has been also covered. Similarly, this feature is not captured in MDA's definition. Moreover, NIE's definition also involves one of the significant functions of new media, namely, 'to communicate'. Such function encompasses the necessity of consuming and prosuming media contents. Generally, NIE's definition is more comprehensive than MDA's, in terms of the characteristics of new media.

It is crucial to point out that the above definition bears much resemblance with the common ICT literacy rhetoric that emphasises more on technology. According to Chen et al.'s (2011) framework, NIE's definition focuses more on the functional dimension of new media literacy (i.e. functional consuming and perhaps functional prosuming). Nevertheless, less attention is given to an individual's critical analysis, synthesis and evaluation of media contents. That is, the critical dimension of media literacy seems to be lacking in this definition. Furthermore, NIE's definition generally does not involve any types of aforementioned discourses of media literacy. Unlike MDA's definition, the cultural protectionism discourse is not evident in NIE's definition. Besides, there is also no explicit discourse that focuses on revealing the hidden ideologies of media contents. This echoes the aforementioned lack of critical dimension of media literacy in the definition.

Although both MDA and NIE have attempted to define media literacy, their definitions do not fully capture the meaning of media literacy in the new media era. Generally, two key features of media literacy are overlooked. Both definitions attach more importance to the functional and consuming dimensions, but less to the critical and prosuming dimensions. However, the lacking dimensions seem to be more important for the media literate.

Media Literacy in Taiwan

Unlike Singapore, media literacy education has gained much support from the Ministry of Education (MOE) in Taiwan. In East Asia, Taiwan is the first country that officially promotes media literacy as a cross-curriculum theme in formal education system (Lin 2011). No doubt, in Taiwan, media literacy education (the official title employed by the Ministry of Education) has been booming in the last decade. An official white paper titled 'White Paper on Media Literacy Education' which clearly expressed the determination of the Taiwanese government in promoting media literacy education was issued by the Ministry of Education in 2002 representing the growing interest in the subject among academics, media professionals, consumer activists and non-profit organisations (Lin 2009).

This White Paper was co-written by a ten-member committee consisting of seven academics, one media professional, one secondary school head teacher and one representative of the National Teachers Association from Taiwan. Among them, two coordinators are academics from media studies. In the following paragraphs, some discourses, selected from the White Paper which are related to the assumption about the media and media literacy education, are analysed and discussed below:

The majority of educators around the world acknowledge that "the school," the system, as the education process and educational content evolved over the past century, replaced the family, in particular, as the main source of education. However, few realized that with the emergence of television and other forms of mass communication that developed over the past four decades, mass media has become the second education curriculum for children and youth. The dominance of the media is so strong that it is possibly threatening the

position of schools as the first education system. . . . It is becoming more difficult for most of us to differentiate fact from fiction in what is presented or reported in the media. Some of us do not believe that we are biased by the media, but tend to think that others are influenced. . . . As the hours children and youth are exposed to the media (including the Internet and computer games) already exceeds that the time they spend in the classrooms of elementary and high schools, it could be claimed that the media is the first education curriculum rather than the second. (MOE of Taiwan 2002, p. 4)

Accordingly, the goal of media literacy education is 'to foster critical thinking and to enable all citizens to become people who can shape the cultural taste of the nation and communities' (MOE 2002:4). This illustrates to some extent that the media should be the 'first curriculum'. Because of the considerable amount of time that the younger generation spends in school, media might have the potential to replace the role of schools. As stated in the White Paper, it may be proper even if we could claim that the media might be the first education system rather than the second (MOE 2002, p. 4). After describing the current media environment in Taiwan, the policy text states that 'to an individual, media can bring news, entertainment, education, and at the same time, media contain the biased ideologies, single values and unreal representations of the society' (MOE 2002: 5). Here, media effects are seen to be overwhelming and more prominent than that of the education system. The rhetoric in the White Paper takes a step further than the discourses of the advocate groups by stating that citizens should be able to positively 'detoxify' and 'decode' messages in order to engage in the process of producing information and in exercising surveillance over the media. Thus, the importance of media is acknowledged; however, by describing it as 'toxic', once again it is shown in a negative light.

As strongly emphasised by Sophia Wu (2002), media literacy education is about 'understanding the sign system and technology of media', 'understanding the representation of media', 'rethinking the meaning of audience', 'analysing media organisation' and 'accessing and influencing the media'. She also refers to different dimensions of media literacy education, which approximately coincide with current trends worldwide, and repeatedly states that the most important essence of media literacy education is 'not refusing the media' and that the best way to practise media literacy education is 'to build up a defensive preparation for kids' (Wu 2002).

All in all, as seen in the above excerpts of the policy paper and arguments, the MOE of Taiwan is placing much emphasis on the role of media literacy education in the country. The White Paper firstly points out people's tendency to treat 'school' as the first curriculum. It then highlights the role of media as being 'the second education curriculum for children and youth'. The role of media is further emphasised through the statement that 'it is possibly threatening the position of schools as the first education system'. Last but not least, the White Paper even explicitly states that 'it could be claimed that the media is the first education curriculum rather than the second'. Compared to the two definitions provided by MDA and NIE in Singapore, the Taiwanese White Paper has put more prominence on the role of media literacy at least in elementary and secondary school education.

Besides, the rhetoric in the Taiwanese White Paper has taken a step further than the discourses of both the Singapore MDA and NIE documents in at least revealing the constructed and biased nature of media. Relevant statements include 'It is becoming more difficult for most of us to differentiate fact from fiction in what is presented or reported in the media' and 'Some of us do not believe that we are biased by the media, but tend to think that others are influenced'. This interpretation gains support from another discourse from the White Paper, that is, 'media contain the biased ideologies, single values and unreal representations of society' (MOE 2002, p. 5). In this regard, the White Paper seems to suggest that the citizens are able to critically interpret and evaluate media contents. This is rather distinct from the MDA's emphasis on 'appreciation of films and TV' without criticality. Generally, the critical dimension of media literacy (see Chen et al. 2011) is evidently addressed in the White Paper of Taiwan, rather than the documents from MDA and NIE in Singapore. Furthermore, the Taiwanese White Paper seems to involve two types of discourses, which are typically overlooked in both MDA's and NIE's definitions of media literacy. The first type focuses on addressing the hidden ideologies/values in the media contents (Lin 2011), while the second on sociocultural engagement/participation (e.g. Buckingham 2007; Lin 2010). Rather, the protectionism discourses (e.g. MDA's definition) are rarely observed in the White Paper (see the excerpt):

... providing the media production and broadcast skills, actively expressing the community opinions and constructing the media cultural taste that belong to the community. (MOE 2002, p. 9)

The Taiwanese White Paper has also covered the perspectives of prosuming and critical media literacy, which have been neglected in both MDA's and NIE's definitions. For example, 'media production and broadcast skills' are proposed in the White Paper. This may reflect the Taiwanese policymakers' emphasis on the role of media production/distribution as mentioned by other scholars (e.g. Buckingham 2009; Lim and Nekmat 2008; Thoman and Jolls 2008). Besides, the concept 'community' seems to indicate Jenkins' (2006) 'convergence culture' that underlines active contribution from every member belonging to a certain group/community. More importantly, the statement 'constructing the media cultural taste' may indicate the engagement of criticality. That is, individuals' critical reflection on the cultural ideologies/values embedded in the media is required. More information about the emphasis on the issues of prosuming and critical media literacy in the White Paper is detailed in Lin's (2009) book chapter.

Although the Taiwanese White Paper has addressed the issues of prosuming and critical media literacy, there are no further specific suggestions about how these perspectives are put into practice. As Lin (2009) points out, the suggestions for promoting media literacy education in the White Paper 'are abstract and blurred' (p. 176). For example, there is no detailed advice on the development of relevant curriculum. This is because the White Paper, as a policy document, is at the very beginning stage. Hence, more time and work are required to develop the necessary processes to promote media literacy in the education system in Taiwan.

Conclusions

Based on a preliminary comparison of the policy discourse in Singapore and Taiwan, three main conclusions are reached. First, both regions acknowledge the key role of media literacy (e.g. civic engagement and citizen competence). Second, the two regions differ in their focus on the dimensions of media literacy and relevant suggestions provided. Specifically, Singapore documents focus mainly on the functional and consuming dimension, with certain specific suggestions provided (e.g. NIE). The White Paper of Taiwan covers the prosuming and critical dimension, but provides few practical suggestions. Third, different types of discourses of media literacy are used in two regions. Singapore seems to employ the cultural protectionism discourse, while Taiwan used discourses that address ideology/value and sociocultural participation.

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Chapter 8

Forecast the Scarcity of Game Generation: Digital Game Literacy

Tsung-Yen Chuang and Chia-Min Tsai

Keywords Game literacy • Digital game • Game-based learning • Parenting
• Generation difference

Introduction

The progress of information technology and the rapid development of the Internet have brought considerable and real benefits into all aspects of human life. The widespread use of electronic media such as computers, mobile phones, digital media, and games completely transforms the traditional lifestyle of people and changes children's real-world experiences to a stage that has become a part of their lives (Edwards 2005; Fromme 2003). In recent years, digital games have begun to spread into the life of every family. Electronic forms of entertainment such as game software installed on computers, game consoles, handheld game devices, and mobile phones have become one of the main recreational activities of children and teenagers (Children's Welfare League Foundation 2009).

Being cognizant of the change on how children and teenagers interact with the media in recent years, the Fubon Cultural and Educational Foundation has funded the Center for Media Literacy in Taiwan at the National Chengchi University to implement the "2009 National Children's Media Use Behavior Survey" (2009). The survey focused on the youth learners from the third to sixth grade in the elementary schools. The results showed that besides the time spent on studying, sleeping, and commuting, the elementary school students have barely less than 4 h left out of 24 h. Of which, 3 h were spent on the media, i.e., as many as 21 h on the media a

T.-Y. Chuang (✉) • C.-M. Tsai
Department of Information and Learning Technology, National University of Tainan,
Tainan, Taiwan
e-mail: chuangyen@mail.nutn.edu.tw; rila84@gmail.com

week. Among the media use, TV watching, video game playing, and Internet surfing account for most of the time. The Kaiser Family Foundation in the United States also surveyed the daily use of media among children and adolescents aged from 8 to 18. The results showed that on average, they spent 7 h and 38 min on entertainment media. The weekly use of the media amounts to 53 h (Rideout et al. 2010). This study also showed that approximately 75–90 % of school-age children played digital games. The Children's Welfare League Foundation (2009) investigated the online game behavior of Taiwanese children, surveying 5th and 6th graders, and found that up to 76 % of students play online games and sometimes play to excess.

The outcome of the above studies indicates that the age children begin to use information media and computer technology is lowering and the percentage of children who play online games is increasing. Digital games have become an important part of children's life, irrespective of the type of digital games and media and reasons for their engagement with the media (i.e., purely for entertainment, pressure relief, or as a leisure activity). However, earlier and longer exposure to technology may not translate directly toward media literacy. In addition, elementary students are at a critical stage where their world view and outlook toward life are still being shaped; thus, they have a limited ability in making a good judgment. Children have less self-control and are more susceptible to media influence. The impact of subjecting them to long-term exposure of unfiltered media information is a concern for many parents. Digital games as a form of new media are especially of concern since they are attractive to young children.

The fact that children nowadays are increasingly occupied by indoor electronic entertainment media does not necessarily mean that digital game playing is completely negative. It is only worrying if children overindulge in gaming or are addicted to it. To elevate the concern, parents need to be knowledgeable about digital games. Adopting the approach of unprincipled prohibition may be counterproductive in causing tension. Adopting a balance and informed perspective about gaming, on the other hand, help to build reasoned positions within the family. Therefore, this study aims to assess parents' and their children's attitudes toward digital games and digital literacy and to obtain a better understanding of whether differences exist between parents' and children's attitudes toward digital games.

Literature Review

Game playing is a necessary process in which children develop cognitively and socially (Fileni 1988; Piaget 1962; Provost 1990). Children love games naturally and game playing is learning, acting, adapting, living, and working. Children can learn through playing with other people. For instance, according to Parten's social interaction theory of games, important concepts of how society works can be developed through game activities (Robert and Hooper 1984). Some scholars such as Vygotsky believed that game playing is the first activity through which children acquire abstract thinking (Johnson et al. 1999). Because gaming often involves

role-playing that is beyond what children might experience in daily life, children can fulfill what they aspire to be. Games are the starting point of children's imagination.

Games also increase skills in problem-solving, critical thinking, concept formation, creativity, and social and emotional development (Taylor 1991). Charlesworth (1992) emphasized that children's games have seven functions: developing problem-solving ability; promoting social cognitive abilities; developing the ability to distinguish between fantasy and reality; promoting a sense of curiosity and fun; enhancing communication skills; increasing attention span, self-control, social, language, reading, and writing skills; and providing adults a tool with which to learn how children view the world and offering its therapeutic quality.

Digital Game Literacy

Advancements of technology have resulted in digital games that can create strong immersive effects. Researchers have also begun to investigate issues regarding game literacy (Tamborini and Skalski 2006). Klimmt (2009) pointed out that the modern digital games have developed many new forms of gaming, most notably the massively multiplayer online role-playing games. These games have proven themselves as highly engaging.

The popularity of online games and children's exposure to the Internet imply that they are susceptible to inappropriate game content. Some digital games often contain contents that depict adverse social reality, such as violent and aggressive behaviors. It is possible for the players to pick up aggressive and hostile attitude or behavior from these games (Kim et al. 2008; Porter and Starcevic 2007; Wood 2008). However, Kutner et al.'s (2008) study indicates that teenagers are inclined to think that exposure to games of violent contents can have a negative effect, but they are immune to the influence. Thus, it is necessary to consider developing a new game literacy and education as well as effective instructional strategies to minimize the harmful effect of games on teenage players. In other words, developing a more systematic digital game literacy concept is for certain. In addition, without regular guidance from adults, children who immerse in gaming environments are more likely to develop antisocial behaviors. Absence of adult guidance may also be detrimental to parent-child interaction (Aarsand 2011; Mendoza et al. 2007). Thus, in the push to develop a framework for game literacy, attention toward parents' game literacy should not be excluded.

Game literacy should involve two elements: technique and ethical concerns. In terms of technique, game literacy is the demonstration of the players' ability to effectively use game-related information. It is the ability to approach, analyze, select, evaluate, and create games (Tao 2009). It also involves the ability to think reflectively of their own game playing behavior and sense of judgment when under the influences of reception analysis (Chang 2009). On the other hand, the ethical concerns of digital game literacy reflect players' psychological and affective

states, ethics, and aesthetic appreciation (Potter 2001). Tao (2009) integrated the interpretation of various research results and came up with four main components:

- Cognitive component: possesses the ability to correctly define all kinds of digital games, to identify negative or unhealthy game content, and to interpret, analyze, and evaluate games. It allows media receivers to understand the reason why media is presented the way it is (Ontario Ministry of Education 1986).
- Affective component: possesses a relatively positive mind-set and emotional involvement and able to effectively control one's own emotions.
- Experience component: observes ethical regulations during game playing; refuses pirated, phonographic, or excessively violent games; and respects game rules.
- Skill component: is able to effectively use the process of game playing to enrich and develop oneself and to think and learn through games.

These four components of digital game literacy reveal that the construct of game literacy is multidimensional. It involves the ability to take initiation to learn and interpret media information, to apply rational thoughts to distinguish the authenticity of media information, to learn how to use media communication to express one's own feelings through experiencing game playing, to express one's own emotion, and to make moral judgment and possess aesthetic appreciation (Christ and Potter 1998).

In short, digital game literacy can be interpreted as the ability to judge and assess games and the ability to experience and appreciate them. Digital game playing is also a multi-literacy activity; it involves interpreting complicated three-dimensional virtual environment, reading texts on the screen or on paper, and dealing with auditory information. Although the literacy may not necessarily help people become top game players, it nonetheless will enable a better and easier understanding of games and allow better mastery of the degree of involvement with games. Squire (2008) proposed that the basic element of game literacy is the ability to actively participate and create games, being adept at manipulating games, and the ability to use a variety of technologies to express thoughts and feelings. In the world of digital games, success is measured by self-discipline and the ability to gain skills and knowledge through devotion. The new concept of literacy is not only functional. Buckingham (2003) pointed out that the skills required to deal with digital media not only are limited to the ability to retrieve information but also involve the ability to critically evaluate and use media critically.

Because of the characteristics of digital games, it is very easy for players to immerse in the game world. Thus, it is necessary to have an appropriate evaluation indicator with which consumers can refer to when selecting the appropriate game software. Funk et al. (2009) suggested that official experts need to improve the implementation of the rating system on the digital games. They also encouraged parents to have a better understanding of the rating system because it would affect their actual monitoring behavior. Hence, the components of game literacy should include knowledge of the rating system so that consumers and parents can select the appropriate game software according to the age and content rating.

Generation Difference in Digital Games

Previous researches indicated that parents' active involvement in their children's digital game activities, their filtering of the game content, and their monitoring of the time that their children spent on digital games positively correlate to their children's academic performances, interpersonal relationship, and attitude toward life (Rideout and Hamel 2006). Researches also found that parents' attitude is the key factor that determines the game playing behavior of their children and suggested that parents should limit the content of the games and length of time their children engage in game playing (Aarsand 2011; Gentile et al. 2004). In addition, parents can help their children to become intelligent media users through the influential power of the media (American Academy of Pediatrics 2001) that can be applied to digital game playing. If parents understand the positive and negative influences of the media, they naturally show their concern and actively involve in their children's activities. This also highlights the importance of parents' attitudes (Barkin et al. 2006).

Kutner et al. (2008) conducted a qualitative investigation of parents' and boys' perspectives on digital games. The parents were dissatisfied with their ability over the control of their children's digital game playing behavior. The rapid development of digital games is beyond parents' life experience; they are not as familiar with the new technology and do not have sufficient digital game literacy to help their children so that educating their children becomes a challenge. Prensky (2001) stated this as the gap between digital natives and digital immigrants. Olson et al. (2007) pointed out that parents cannot overly rely on game rating systems due to the diversity of the content of modern digital games. The rating system in Taiwan adopts a self-regulatory approach which allows game publishers to rate their own products because of the lack of no well-established review bodies. Therefore, it relies on parents' control and discipline to prevent their children from exposure to inappropriate game content. Therefore, parents need to develop multidimensional digital game literacy and persist in enriching their knowledge.

Research Design

This study aims to assess parents' and children's game literacy. The participants are fifth and sixth graders and their parents as these children are facing academic pressure in preparation for junior high school entrance. Previous studies show that they resort to playing digital games, getting online, and watching TV to deal with the pressure. If these children become addicted to digital games, it not only affects their social, physical, and psychological development but will also affect their academic performance (Chiu et al. 2004; Kim et al. 2008; Van Rooij et al. 2010). It is hoped that through the analysis and discussion of the study, parents will treat children's

digital game playing culture more seriously and show more concerns for their children's digital game playing behavior. It is also expected to be informative for those who hold doubts toward digital games.

For this purpose, this study adopted a questionnaire survey for data collection. The construction of the questionnaire items is based on the purpose of the research and the inferences of the literature review. The researchers used the interpretation put forward by experts and scholars on information media literacy and media literacy as reference and came up with the concept of digital game literacy which included key components such as basic game knowledge, game ratings, game ethics, and game etiquette. A total of nineteen 5-point Likert-scale question items were included in the questionnaire to address aspects of digital game literacy. The main purpose is to investigate whether children and parents possess basic knowledge of various digital games, whether they are able to apply the rating system of game software, whether they are able to identify negative or unhealthy game content, and whether they are able to balance between learning and game playing. This survey adopted paired-sample distribution. The questionnaire was distributed by the class teachers of the 5th and 6th graders to the students; the children forwarded and returned the parents' questionnaires. Once all the questionnaires were collected, the statistical analysis was performed on the data. It is hoped that through the participants, sufficient information can be collected to answer the research questions.

Data Collection

The questionnaires focus on two major parts: participants' personal information and their digital game literacy. Participants' personal information includes gender, age, education level, digital game equipment, and digital game experiences. The analysis was performed on the complete participants' personal information to infer whether different variables of personal background affected the degree of digital game literacy.

Validity and Reliability

With regard to the content of the questionnaire, five experts and scholars in the field of digital game and education were invited to examine the questionnaire, and expert validation was performed to judge the adequacy of each questionnaire item. Face validity is thus established.

After the questionnaire was completed, 955 questionnaires were distributed to 5th and 6th graders (ages 11–12) in public elementary schools in Taiwan and to their parents. A total of 698 of parent questionnaires were returned, making the response rate 73 %; a total of 894 student questionnaires were returned, making the response

Table 8.1 Internal consistency of students' and parents' digital game literacy questionnaires

	Item (N)	Cronbach's alpha	Cronbach's alpha based on standardized items
Student	19	.866	.875
Parent		.906	.913

rate 88.9 %. After removing questionnaires that have no matching samples and those that are incomplete, 501 valid questionnaires remain, making the valid questionnaire paired-sample rate 52.5 %. Thus, if one party failed to submit the questionnaire or failed to answer all the questions, both the questionnaires are invalid.

For the reliability of this study, a reliability analysis of the questionnaire was also performed to test the internal consistency and validity of the scale. Cronbach's alpha was used to perform the internal consistency reliability analysis of 501 samples. As shown in Table 8.1, with regard to the digital game literacy questionnaire, Cronbach's alpha coefficient reaches 0.866 for student feedbacks and 0.906 for parent feedbacks. It shows that Cronbach's alpha coefficient reaches more than 0.7 for all items on children and parents' questionnaire, indicating that both the analyses were adequately reliable (Nunnally 1978). It is evident that the consistency exists between each questionnaire item and that the questionnaire of this study meets the standard reliability requirement.

The 5th and 6th Graders' Personal Information

The statistical description of the effectively collected students' questionnaires is shown in Table 8.2. A total of 487 (97.2 %) students had digital gaming experiences and a total of 14 (2.8 %) students did not. Therefore, the majority of the students in the sample had digital gaming experiences.

As shown in Table 8.3, 134 (26.7 %) students played digital games when they were in 3rd grade, indicating that they had 2 or 3 years of digital game playing. There are 8 (1.6 %) of them who played digital games for less than a year.

The Parents' Personal Information

The statistical description of the effectively collected parents' questionnaires is shown in Table 8.4. A total of 346 parents are female parents, of which 335 are mothers, 4 are grandmothers, and 7 are other female caregivers. The female parents are more than the total of 155 male parents, of which 146 are fathers, 4 are grandfathers, and 5 are male caregivers, in the sample.

The parents aged 36–40 are 158 (31.5 %) and those aged 41–45 are 193 (38.5 %), which account for the majority of the parents in the sample. Those aged between

Table 8.2 Personal information of 5th and 6th graders ($N = 501$)

Item	Classification	Number of people	Percentage (%)
Gender	Male	217	43.3
	Female	284	56.7
Grade	5th grade	285	56.9
	6th grade	216	43.1
Residential area	Tainan county	245	48.9
	Tainan city	256	51.1
Game equipment	Computers w/ the Internet	50	6.4
	Computers w/o the Internet	442	56.9
	Video game consoles	163	21.0
	Handheld game devices	112	14.4
	Other	10	1.3
Digital gaming experiences	Yes	487	97.2
	No	14	2.8

Table 8.3 First time that 5th and 6th graders contacted with digital games

Contact with digital games	Number of people	Percentage (%)
None	14	2.8
3 years old	20	4.0
4 years old	11	2.2
5 years old	38	7.6
6 years old	36	7.2
1st graders	73	14.6
2nd graders	60	12.0
3rd graders	134	26.7
4th graders	69	13.8
5th graders	38	7.6
6th graders	8	1.6

26 and 35 account for 12.4 % and those aged below 20 account for 0.8 % in which the students' brothers or sisters filled out the questionnaire.

The majority of the parents in the sample that have high school diplomas/GED are 256 (51.1 %), those who have associate degrees are 87 (17.4 %), those who have college degree diplomas are 68 (13.6 %), and those who have master's and doctoral degrees are 22 (4.4 %) which is the minority. The researchers retrieved data of statistics from the Ministry of Education website (2012) that indicated that the majority of the population aged 36–45 have high school diplomas so that the education level of the sample in this study is reasonable.

The parents who had digital gaming experiences are 270 (53.9 %) and those who did not are 231 (46.1 %) that make the ratio close to 1:1. Comparing to their children's feedback, only 2.8 % of the students did not have digital gaming experiences. There is a large gap between the parents' and students' digital game playing experiences.

Table 8.4 Parents' background of 5th and 6th graders ($N = 501$)

Item	Classification	Number of people	Percentage (%)
Gender	Male	155	30.9
	Female	346	69.1
Age	Below 20	4	0.8
	26–30	8	1.6
	31–35	54	10.8
	36–40	158	31.5
	41–45	193	38.5
	Above 46	84	16.8
Education level	Less than high school	68	13.6
	High school diplomas/GED	256	51.1
	Associate degrees	87	17.4
	Bachelors	68	13.6
	Masters and beyond	22	4.4
Digital gaming experiences	Yes	270	53.9
	No	231	46.1

Parents under age 20 are mostly the students' brothers or sisters

Findings

The results of the digital game literacy questionnaire show that the mean value of the parents' and students' digital game literacy survey is above 3, indicating that the students and parents possess a certain level of digital game literacy (see Table 8.5). Both the students and parents are conscious that exposure to games that contain sex and violence should be prevented. Also, situations created in the digital game world differ from the real world, and the students should refuse to play pirated games. Such results show that both the children and parents possess basic game literacy, are capable of making moral judgment, and have the ability to criticize, evaluate, and make use of the digital media (Buckingham 2003; Christ and Potter 1998).

Table 8.5 displays the students' high scores on "children believe they are able to refuse to play games that contain sex and violence (Item 14, $M = 4.39$)," "they follow the rules of the game (Item 16, $M = 4.31$)," "they know that there are differences between the content of digital games and real world (Item 13, $M = 4.26$)," "they are able to refuse to play pirated games (Item 15, $M = 4.18$)," and "they respect others during game playing (Item 17, $M = 4.13$)." On the other hand, the students scored lower on "purchase price of game software is not considered an important factor (Item 3, $M = 2.65$)," "trial play a game to see if the content is appropriate (Item 5, $M = 2.90$)," "setting game-related equipment in the open to public access place (Item 6, $M = 3.36$)," "negotiate game playing time with family and set penalty rules and carry them out (Item 10, $M = 3.67$)," and "an agreement was made with families before playing games" (Item 9, $M = 3.69$).

Table 8.5 Description of the statistical analysis of digital game literacy questionnaire

Item	Student			Parent		
	Mean	SD	Rank	Mean	SD	Rank
I pay attention to the information about the rating system labeled on the product.	3.92	0.96	7	3.80	0.93	15
I would choose appropriate games based on the rating system of the game software.	3.84	1.08	12	3.89	0.95	14
Purchase price of the game software is not considered an important factor.	2.65	1.33	19	2.83	1.13	19
I thoroughly understand all game-related information before purchasing digital game software.	3.90	1.00	9	3.72	0.96	16
I ask family members to trial play the digital game to see if the content of the game is appropriate for me.	2.90	1.24	18	3.34	1.08	18
I would set game-related equipment in the open to public access place.	3.36	1.36	17	3.57	1.18	17
I would let the whole family use digital game-related equipment.	3.91	1.12	8	3.98	0.92	13
I pay attention to whether the design of digital games is potentially harmful to the health.	3.84	1.06	12	4.11	0.82	6
I make an agreement with family members before playing digital games.	3.69	1.10	15	4.09	0.80	8
I negotiate game playing time with family members.	3.67	1.10	16	4.02	0.85	11
I understand correct concepts of playing digital games.	3.85	1.02	10	4.03	0.84	10
I understand the effects of a longtime playing of digital games on the body.	3.98	1.04	6	4.05	0.82	9
I understand that there are differences between the content of digital games and the real world.	4.26	0.91	3	4.16	0.80	4
I refuse to play digital games that contain sex and violence.	4.39	1.06	1	4.24	0.83	2
I refuse to play pirated digital games.	4.18	1.12	4	4.29	0.86	1
I follow the rules of digital games.	4.31	0.91	2	4.02	0.87	11
I respect others during digital game playing.	4.13	0.98	5	4.11	0.81	6
I practice self-control in distributing digital game playing time.	3.79	1.10	14	4.17	0.75	3
I follow mutually agreed rules of digital game playing.	3.85	1.07	10	4.13	0.79	5

The results of the parents' questionnaire show that the items they scored higher on are "parents believe that they stop their children from playing pirated games (Item 15, $M = 4.29$)," "they do not allow their children to play games that contains sex and violence (Item 14, $M = 4.24$)," "they teach their children to practice self-control in distributing digital game playing time (Item 18, $M = 4.17$)," "they teach their children the differences between the content of digital games and the reality

(Item 13, $M = 4.16$),” and “they request their children to follow the mutually agreed rules for game playing (Item 19, $M = 4.13$).” On the other hand, items that the parents performed less well include “the purchase price of the game software is not considered an important factor (Item 3, $M = 2.83$),” “trial play a game to see if the content is appropriate (Item 5, $M = 3.34$),” “setting game-related equipment in the open and public access place (Item 6, $M = 3.57$),” “when buying game products, they thoroughly understand all game-related information before purchasing (Item 4, $M = 3.72$),” and “they pay attention to the information about the rating system labeled on the product package when purchasing the game software (Item 1, $M = 3.80$).”

As shown in Table 8.6, a paired t -test analysis reveals that there are significant differences in the children’s and parents’ digital game literacy performance, especially in “trial play a game to see if the content is appropriate (Item 5),” “pay attention to whether the design of the games is potentially harmful to the health (Item 8),” “make an agreement before game playing (Item 9),” “observe the agreed-upon game playing time (Item 10),” “practice self-control in the distribution of digital game playing time (Item 18),” and “observe the agreed-upon digital game playing rules (Item 19)” ($p = 0.000 < 0.05$). The mean value of the students’ questionnaire is higher on “follow the rules of games (Item 16),” and the difference is significant ($p = 0.000 < 0.05$). Except for questionnaire items 2, 7, 12, 15, and 17, the differences did not reach a significant level ($p > 0.05$).

Table 8.6 Paired t -test of the students’ and parents’ digital game literacy questionnaire

Item	Mean	SD	t	Sig. (2-tailed)
1	0.12	1.18	2.19	.03*
2	-0.05	1.36	-0.86	.39
3	-0.18	1.71	-2.33	.02*
4	0.18	1.37	2.97	.00**
5	-0.44	1.55	-6.39	.00**
6	-0.21	1.59	-3.01	.00**
7	-0.07	1.32	-1.15	.25
8	-0.27	1.27	-4.71	.00**
9	-0.40	1.30	-6.89	.00**
10	-0.35	1.36	-5.84	.00**
11	-0.18	1.24	-3.16	.00**
12	-0.07	1.27	-1.27	.21
13	0.11	1.19	2.04	.04*
14	0.15	1.21	2.60	.01*
15	-0.11	1.40	-1.81	.07
16	0.29	1.19	5.42	.00**
17	0.02	1.23	0.36	.72
18	-0.36	1.26	-6.67	.00**
19	-0.26	1.29	-4.77	.00**

* $p < .05$, ** $p < .01$

The Current Situation of Students' Behaviors in Digital Games

As shown in Table 8.7, the students who played digital games for 1–2 h on weekdays are 132 (26.3 %); those who played digital games for less than 1 h on weekdays are 120 (24.0 %); those who played digital games for 1–2 h on weekends are 136 (27.1 %); and those who played digital games for 3–4 h on weekends are 114 (22.8 %); in general, the students spent more time playing digital games on weekends than weekdays. Those who did not play digital games on weekdays are 111 (22.2 %), and those who play digital games for more than 8 h on weekdays are 21 (4.2 %).

As shown in Table 8.8, the results of the analysis indicate that the students who played digital games at home are 432 (67.2 %), those who played digital games at school are 69 (10.8 %), those who played digital games at relatives' places are 59 (9.2 %), those who played digital games at Internet cafes are 14 (2.2 %), and those who played digital games at gaming centers are 10 (1.6 %).

Table 8.7 Hours of 5th and 6th graders' digital game playing

	Number of people	Percentage (%)
Weekdays		
None	111	22.2
Less than 1 h	120	24.0
1–2 h	132	26.3
3–4 h	73	14.6
5–6 h	30	6.0
7–8 h	14	2.8
Over 8 h	21	4.2
Weekend		
None	39	7.8
Less than 1 h	95	19.0
1–2 h	135	27.7
3–4 h	114	22.8
5–6 h	49	9.8
7–8 h	28	5.6
Over 8 h	40	8.0

Table 8.8 Locations of digital game playing

Location	Number of people	Percentage (%)
Home	431	67.2
Relatives' place	59	9.2
Friends'/classmates' place	50	7.8
Internet cafe	14	2.2
School	69	10.8
Gaming center	10	1.6
Other	8	1.2

The Current Situation of the Parents' Behaviors in Digital Games

The study investigated the parents' behaviors in digital games that included years of digital game playing, hours of game playing weekly, and other variables analyzed by frequency distribution and percentage.

As shown in Table 8.9, there are 231 (46.1 %) out of 501 parents in the sample who did not have digital gaming experiences, and those who had digital game playing experiences are 270 (53.9 %); those who played digital games for up to 5 years are 216 (43.1 %), those who played digital games for 6–10 years are 33 (6.6 %), and those who played digital games for more than 16 years are 14 (2.8 %).

As shown in Table 8.10, the parents who did not play digital games on weekdays are 304 (60.7 %); those who played digital games for less than 1 h on weekdays are 122 (24.4 %); and those who played digital games for more than 8 h on weekdays are 5 (1 %). Moreover, those who did not play digital games on weekends are 298 (59.5 %); those who played digital games for less than 1 h are 103 (20.6 %); those who played digital games for 1–2 h on weekends are 62 (12.4 %); those who played

Table 8.9 Years of parents' digital game playing

Years	Number of people	Percentage (%)
None	231	46.1
Up to 5 years	216	43.1
6–10 years	33	6.6
11–15 years	7	1.4
More than 16 years	14	2.8

Table 8.10 Hours of parents' digital game playing weekly

	Number of people	Percentage (%)
Weekdays		
None	304	60.7
Less than 1 h	122	24.4
1–2 h	47	9.4
3–4 h	19	3.8
5–6 h	3	0.3
7–8 h	1	0.2
Over 8 h	5	1.0
Weekend		
None	298	59.5
Less than 1 h	103	20.6
1–2 h	62	12.4
3–4 h	25	5.0
5–6 h	7	1.4
7–8 h	1	0.2
Over 8 h	5	1.0

digital games for 3–4 h on weekends are 25 (5 %); and those who played digital games for more than 8 h on weekends are 5 (1 %). In general, the parents spent more time playing digital games on weekends than weekdays; however, it is far less than the hours of students' digital game playing.

The results of the analysis show that 97.2 % of the students have digital game playing experiences, indicating that a large proportion of the current students access digital games consistent with the survey results of Wallenius et al. (2009) and the Children's Welfare League Foundation (2009). Most students have played digital games when they were in the 3rd grade; a few of them have played digital games when they were 3 years old. The students played digital games for 1–2 h on weekdays and for longer hours on weekends. They mostly liked to play online games alone at home.

Majority of the parents have digital game playing experiences for up to 5 years; some parents have digital game playing experiences for up to 16 years. Most of them played digital games for less than 1 h on weekdays and weekends.

Discussion and Conclusion

The popularity of products of digital technology and their influence have been inevitable. Comparing to traditional games, digital games are more complicated in both the content and types of games. As some digital games may contain child-inappropriate content or plot, a trial play is necessary for parents. According to the results, there is a statistically significant difference in the children's and parents' digital game literacy. The fact that the parents performed better on some questionnaire items contradicts to the literature review which shows that parents lack game-related knowledge. The explanation provided by the researchers is that the questionnaire items that the parents performed better reflect the aspects of their children's game playing behaviors that the parents would like to have most control over. Thus, they naturally performed better on those items. With regard to "trial play a game to see if the content is appropriate," all parents believed that they carried out trial play and game software filtering. However, the results on the students' part show that the children did not always give their game software to their parents for a trial play. Overall, disparities exist between the children's and parents' digital game literacy performance, indicating that the children are reluctant to have external control over their game playing. Other factors such as differences of prior knowledge and digital game playing experiences may also play a part for this situation.

The results of the study show that the majority of the 3rd graders (26.7 %) have digital game playing experiences; it means that most 5th and 6th graders have played digital games for at least more than 1 year and some students have more than 9 years of game playing. Moreover, the results also indicate that toddlers have digital game playing experiences which are not a good phenomenon; they are still developing both physically and psychologically. It is too early to contact with those digital game

products with visual and sound effects which may lead to developmental problems or delays, such as physical development and health, emotion and sociality, creation and intellectual development, and moral development (Cordes and Miller 2000). More than 50 % of the students played digital games for more than 1 h on weekdays; more than 70 % of the students played digital games for more than 1 h on weekends. The students liked to play online games alone at home. The results point out that the parents had a few digital gaming experiences and hours of game playing than that of the students. Most parents did not play digital games; those who played digital games with their children are quite a few so the students played games alone. The differences of parents' and students' behaviors of game playing may cause biased attitude toward digital games due to an insufficient understanding of digital games. Parents' negative attitude toward digital games is not a good indicator. It is expected that even though parents do not play digital games, they could at least show concerns of their children's gaming behaviors timely and appropriately to make children possess correct attitude toward digital games.

The results of the study showed that even though the parents possessed better game literacy than the students did, indicating that the parents want to supervise all of their children's behaviors. In general, the unfamiliarity of new technology may lead to the inability to discipline their children and form problems of parental authority; educating their children becomes a challenge. If parents can develop their digital game literacy, they could have a better understanding of managing their children's game playing and enhance their relationship (Feil et al. 2008). Because the modern society is full of diverse information media, parents need to develop their multidimensional digital game literacy and also to constantly update their knowledge about digital games. In addition, timely and appropriate intervention and participation of their children's digital gaming life is necessary. It is an old saying, "An ounce of prevention is worth a pound of cure," so that parents play an important keeper role to prevent problems from occurring before their children possess sufficient wisdom.

Some aspects of game literacy which the researchers identified as more important did not appear to be considered so by the children and parents, such as trial play a game to check its content and the positioning of digital game-related equipment. The content of a game, whether good or bad, would inevitably have an indirect impact on children. As some games contain child-inappropriate content or plot, a trial play is necessary if the content is to be understood. The setting location of digital game equipment is also important. It is easier for parents to monitor their children's game playing behavior if the equipment is placed in an open to public access place, such as the living room. However, before that, parents need to play the role of a good gatekeeper, filtering out the inappropriate game software for their children and teaching their children to appropriately judge the game using time. After all, it is inappropriate to play games for a long period of time because of potential health problems (i.e., vision weakening and finger joint injuries). In addition, children also need to learn to control digital game playing time. Digital game playing can be part of a pastime activity, but it should not be all. Children should diversify their recreational activities and participate in more outdoor activities. One question

that remains to be answered is whether children and parents behave as they say they would in real life. This study does not conduct the in-depth investigation on the differences. Further research specification is required to clarify this issue. The researchers also need to consider that much of digital game playing takes place on mobile devices in these days, and the location of play may be less important as the Internet access in the future.

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Appendix

Parents' Digital Game Literacy

Please circle the number that represents how you feel about the digital game software or devices					
	Strongly disagree	Disagree	Neither	Agree	Strongly agree
Scenario 1: When purchasing a digital game software					
I pay attention to the information about the rating system labeled on the product package.	1	2	3	4	5
I would choose appropriate games based on the rating system of the computer product and game software.	1	2	3	4	5
Purchase price of the game software is not considered an important factor.	1	2	3	4	5
I thoroughly understand all game-related information before purchasing digital game software for children.	1	2	3	4	5
I would trial play the digital game to see if the content of the game is appropriate for children.	1	2	3	4	5
Scenario 2: Before playing digital game software (digital game-related equipment refers to computers or consoles)	Strongly disagree	Disagree	Neither	Agree	Strongly agree
I would set game-related equipment in the open to public access place.	1	2	3	4	5
I would let the whole family use digital game-related equipment.	1	2	3	4	5
I pay attention to whether the design of digital games is potentially harmful to the health.	1	2	3	4	5

I make an agreement with children before playing digital games.	1	2	3	4	5
I negotiate game playing time with children and set penalty rules and carry them out.	1	2	3	4	5
I would help children understand correct concepts of playing digital games.	1	2	3	4	5
I would let children understand the effects of a longtime playing of digital games on the body.	1	2	3	4	5
I would let children understand that there are differences between the content of digital games and the real world.	1	2	3	4	5
Scenario 3: When children play digital game software	Strongly disagree	Disagree	Neither	Agree	Strongly agree
I refuse to let children play digital games that contain sex and violence.	1	2	3	4	5
I refuse to let children play pirated digital games.	1	2	3	4	5
I teach children to follow the rules of digital games.	1	2	3	4	5
I teach children to respect others during digital game playing.	1	2	3	4	5
I teach children to practice self-control in distributing digital game playing time.	1	2	3	4	5
I ask children to follow mutually agreed rules of digital game playing.	1	2	3	4	5

5th and 6th Graders' Digital Game Literacy

Please circle the number that represents how you feel about the digital game software or devices

<i>Scenario 1: When purchasing a digital game software</i>	Strongly disagree	Disagree	Neither	Agree	Strongly agree
I pay attention to the information about the rating system labeled on the product package.	1	2	3	4	5
I would choose appropriate games based on the rating system of the computer product and game software.	1	2	3	4	5
Purchase price of the game software is not considered an important factor.	1	2	3	4	5

I thoroughly understand all game-related information before purchasing digital game software.	1	2	3	4	5
I ask family members to trial play the digital game to see if the content of the game is appropriate for me.	1	2	3	4	5
<i>Scenario 2: Before playing digital game software (digital game-related equipment refers to computers or consoles)</i>	Strongly disagree	Disagree	Neither	Agree	Strongly agree
I would set game-related equipment in the open to public access place.	1	2	3	4	5
I would let the whole family use digital game-related equipment.	1	2	3	4	5
I pay attention to whether the design of digital games is potentially harmful to the health.	1	2	3	4	5
I make an agreement with family members before playing digital games.	1	2	3	4	5
I negotiate game playing time with family members.	1	2	3	4	5
I understand correct concepts of playing digital games.	1	2	3	4	5
I understand the effects of a longtime playing of digital games on the body.	1	2	3	4	5
I understand that there are differences between the content of digital games and the real world.	1	2	3	4	5
<i>Scenario 3: When children play digital game software</i>	Strongly disagree	Disagree	Neither	Agree	Strongly agree
I refuse to play digital games that contain sex and violence.	1	2	3	4	5
I refuse to play pirated digital games.	1	2	3	4	5
I follow the rules of digital games.	1	2	3	4	5
I respect others during digital game playing.	1	2	3	4	5
I practice self-control in distributing digital game playing time.	1	2	3	4	5
I follow mutually agreed rules of digital game playing.	1	2	3	4	5

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Chapter 9

Effects of Digital Gaming Among Children and Adolescents in Singapore: A Summary of Research Findings

Angeline Khoo, Vivian Hsueh-Hua Chen, and Choo Hyekyung

Keywords Video gaming • Pathological play • Aggression • Mental health problems • Prosocial behaviour • Empathy • Social relationships

Background: Why Study Video Games?

The popularity of video gaming was accompanied by growing concerns regarding the potential detrimental outcomes on young children and adolescents. Anecdotal reports painted a picture of parents becoming increasingly worried, and teachers, counsellors and social workers also reported increasing cases of students neglecting studies to devote themselves to online gaming, thereby increasing strains and stresses between parents and their children. At the same time, gamers argued that playing digital games has many benefits. Media reports were confusing, covering both positive and negative effects. However, it was often the negative aspects of video gaming that were highlighted and remembered. These reports included stories of addiction – of how video gaming could be “dangerously” addictive (Choy 2005), how games could enslave children (Robertson 2005) and how the addictiveness could carry on even after gamers are married (Chua 2005). Other stories detailed accounts of how gamers became aggressive as a result of playing video games (Reuters 2005; Chua and Leung 2006).

A. Khoo (✉)

National Institute of Education, Nanyang Technological University, Singapore
e-mail: angeline.khoo@nie.edu.sg

V.H.-H. Chen

Nanyang Technological University, Singapore
e-mail: ChenHH@ntu.edu.sg

C. Hyekyung

Department of Social Work, National University of Singapore, Singapore
e-mail: swkch@nus.edu.sg

There was a need for deeper understanding of the effects of video gaming, both positive and negative, on our young gamers. In 2003, a survey by market research International Data Corporation found that online gamers constituted 39 % of Singapore Internet users. Another survey conducted by the Parents Advisory Group for the Internet (PAGI) on teenagers between ages of 13 and 17 found that 73 % are reported playing digital games, of which 11 % play 5–7 days a week and 38.6 % played games that involved some violence and shooting (Khoo et al. 2004). While there were numerous research overseas on the effects of playing video games (e.g. Anderson 2004; Durkin and Barber 2002; Funk et al. 2002; Gentile and Sesma 2003), local evidence, especially longitudinal studies, was lacking. Hence, the project was undertaken in 2006 with the main objective of investigating positive and negative effects in playing video games among primary and secondary school students in Singapore. Negative effects referred to pathological play, aggression and mental health problems. Positive effects investigated included prosocial behaviour and empathy and social relationships.

How We Collected the Data: Methodology

A research grant of \$398,926 was received from the Ministry of Education's Educational Research Grant (ERDF) and the Media Development Authority (MDA). As this was a longitudinal study spanning a period of 3 years, commitment from the schools was essential. Hence, schools were invited to participate, and a total of twelve schools, six primary and six secondary, volunteered to participate in this study. We had a total sample of 2,527 students which were followed up for 3 years.

Four sets of counterbalanced questionnaires were delivered to all the schools. Letters of parental consent were sent to the parents through the schools. A liaison teacher from each school collated the information and excluded students from the study whose parents refused consent. The questionnaires were administered in the classrooms with the help of school teachers at the convenience of the schools. Detailed instructions were given to school teachers who helped in the administration of the survey. Students were told that participation in the survey was voluntary and they could withdraw at any time. Privacy of the students' responses was assured by requiring the teachers to seal collected questionnaires in the envelopes provided in the presence of the students. It was also highlighted on the questionnaires that the students' responses would be read only by the researchers.

In addition to the 3-year longitudinal survey, a face-to-face interview was conducted to study social interaction in games. A total of 90 primary and secondary students from six schools participated in this study. One-to-one interviews, lasting for an hour, were conducted to understand how playing games influences their interaction with family, friends and other individuals.

Results: What We Found

Pathological Video Gaming

The Literature

The definition of addictive video gaming was still an ongoing debate among researchers and clinicians (e.g. Shaffer et al. 2000; Shaffer and Kidman 2003). The existing literature suggested that a substantial percentage of gamers may exhibit what may be called game “addiction” (e.g. Bricolo et al. 2007; Griffiths and Hunt 1998). Hall and Parsons (2001) defined it as a psychological dependence on playing video games whereby a game player will experience psychological discomfort when he or she is unable to play a desired video game. There is evidence showing that the addicted gamer shows signs of restlessness and irritability when away from games, disturbed patterns of eating and sleeping due to long hours spent playing and neglecting school or work responsibilities, as well as withdrawing from social contacts (Griffiths and Wood 2000; Yee 2002). They were also found to have more arguments and physical fights in schools, are more likely to attribute actions of others as hostile and had lower academic grades (Hauge and Gentile 2003).

There have been measures of problematic or pathological use of video games or video/computer game addiction with evidence supporting their construct validity (Fisher 1994; Griffiths and Dancaster 1995). Many researchers studying pathological gaming used the criteria for pathological gambling in the Diagnostic and Statistical Manual of Mental Disorders version IV (DSM-IV) because both pathological gambling and gaming are behavioural addictions (Tejeiro Salguero and Bersabé Morán 2002). Both pathological gambling and gaming require players to respond to predictable stimuli, to have quick eye-hand coordination and to have total concentration, for which the gamer is rewarded in the game as well as gets affirmation from peers (Griffiths and Wood 2000). Players are also able to reach a state of “flow”, defined as a state of being fully immersed in the activity which is intrinsically rewarding, to the extent that they experience a loss of sense of place or time (Csikszentmihalyi 1990). Motivations for playing include relaxing and escaping from stress and giving players the sense of competence and autonomy (Ryan et al. 2006).

In a recent review of the literature on pathological gaming, Sim and his co-authors (2012) concluded that although many researchers have defined and measured pathological gaming in different ways, there is sufficient reliability for the players, especially for those that conform more closely to the DSM-IV pathological gambling criteria. There is also evidence of construct validity in terms of both convergent validity and comorbidity, similar to other kinds of addictions. It was only in 2013 in DSM-V that pathological online gaming became known as “internet gaming disorder” ([Internet Gaming Disorder n.d.](#)).

Our Findings

Our study of Singaporean children and adolescent gamers between 9 and 17 years old found that 8.7 % were categorised as pathological (Choo et al. 2010). This was similar to the prevalence of 8.5 % among US youth aged between 8 and 18 in Gentile's study (Gentile 2009). However, our study found that compared to their US counterparts who played an average of 13.2 h per week, our youth averaged 20.2 h per week. Boys spent more time playing games than girls. Those who were pathological played an average of 37.5 h per week and were also more likely to have access to games in their bedrooms and visited LAN centres more frequently *compared to their non-pathological counterparts*. In addition, they also had more problems with impulse control, poorer social competence and greater hostile cognitions. Their grades were lower than their non-pathological peers, and they also reported greater reliance on friends to help them with their homework. They were more likely to be late for school, to neglect sleep and hygiene and to skip meals and bath. Not surprisingly, they faced more conflicts with their parents over their gaming habits.

The instrument used to measure pathological gaming comprised ten symptoms to which participants responded with “yes”, “sometimes” or “no”. The most frequently cited symptom is “playing to escape from problems, bad feelings or stress” (30 % answered “yes” and 24 % answered “sometimes”). This suggested that video gaming may be a coping strategy for these youths.

Li's research (Li et al. 2011) on pathological gamers' self-discrepancy, depression and escapism suggests that pathological gaming may indeed be a form of coping. The sample in this study comprised 161 students from secondary schools. Students who experienced discrepancies between what they are (actual self) and what they hoped to be (ideal self) were expected to be more likely to seek escapism through gaming. Results confirmed that depression was a mediator between actual-ideal self-discrepancies and escapism. Similarly, escapism was a mediator between depression and pathological gaming. Figure 9.1 below depicts a simplified version of the mediation model.

The relationship of pathological gamers with their parents was also examined in another of our studies (Cheong et al. 2011). Results showed that pathological gamers had poorer relationships with their parents compared to those who are not

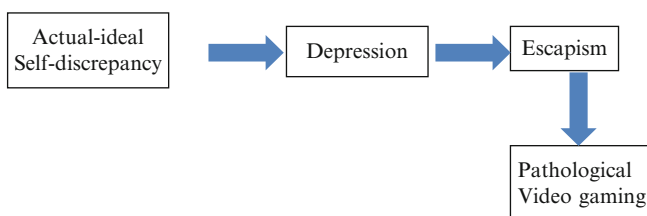


Fig. 9.1 Mediation model of self-discrepancy and pathological gaming

pathological. However, their relationship with their mothers seemed to be better than with their fathers. Also, compared to non-pathological gamers, those who were pathological perceived their home living environment to be less favourable.

Mental Health Issues

The Literature

Studies have found that those who play video games excessively often report pathological symptoms such as impairment in normal social and occupational or educational functioning, tolerance, withdrawal or relapse (e.g. Griffiths and Wood 2000; Tejeiro Salguero and Bersabé Morán 2002). Early studies (Kraut et al. 1998; Shapira et al. 2000) showed that those with depression or anxiety tend to be more vulnerable to pathological gaming because of their turning to games as an escape from stress. This finding was further confirmed in later studies (Yeh et al. 2008; Longman et al. 2009) which showed that gamers who are depressed tend to seek solace and obtain support from the online gaming community. Furthermore, depression may moderate one's self-regulatory process, resulting in higher likelihood of future problematic gaming (Seay and Kraut 2007).

Other studies focused on the risk of ADHD among children who play video games. Sonuga-Barke (2002) proposed that video game playing may fit the cognitive style of ADHD very well. Cognitive and motivational dysfunction in ADHD children causes changes in quality and quantity of their task engagement and preference for immediate rewards and events over delayed ones. Video game playing, on the other hand, provides ever-changing, multimodal stimuli and an immediate reward with minimal delay. Therefore, ADHD children would be attracted to and spend considerable time playing video games. Besides, children with ADHD are able to attend to things they find exciting to a far greater degree than what they find boring. They require high interest in order for them to pay attention (Kelker 2003). This explains their attraction for exciting video games. Indeed, Chan and Rabinowitz (2006) reported that adolescents who play for more than 1 h on a console or Internet video game may have more intense symptoms of ADHD than those who do not. Also, Bioulac et al. (2008) found an association between the level of ADHD symptoms and the severity of video game addiction in children.

Our Findings

Previous research by Seay and Kraut (2007) has found that those with high self-regulation, which refers to a person's ability to manage his or her own behaviour through observation, evaluation and reflection, are less likely to demonstrate problematic gaming behaviours. Liao and colleagues (2012) examined the role of impulsivity and self-regulation in pathological gaming and hypothesised that

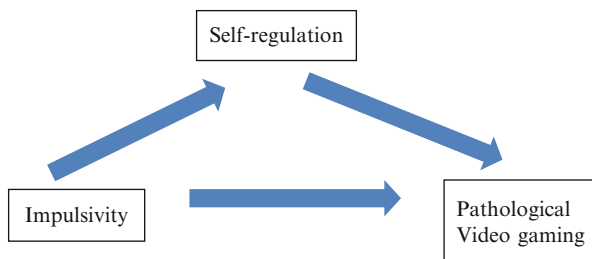


Fig. 9.2 Relationship between impulsivity, self-regulation and pathological video gaming

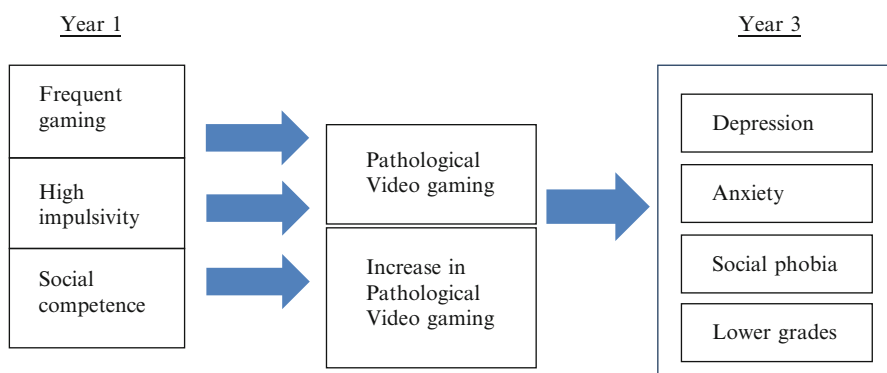


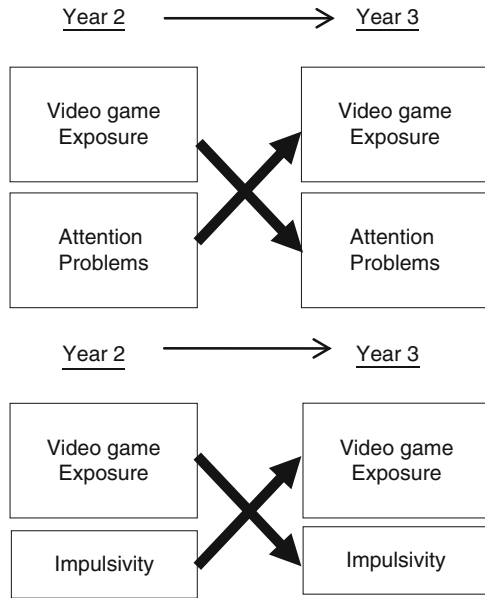
Fig. 9.3 Frequency of gaming in year 1 predicting mental health and grades in year 3

self-regulation would mediate the relationship between impulsivity and pathological video gaming. In other words, higher levels of impulsivity, which can be considered as a personality trait, would be related to lower levels of self-regulation, and this in turn would be related to higher levels of pathological video gaming. Results of the study confirmed the hypothesis. There was also a direct effect of impulsivity on pathological video gaming. This relationship is illustrated in Fig. 9.2.

In a study using longitudinal growth modelling (Gentile et al. 2011), the authors found that the amount of gaming and impulsivity significantly predicted how many pathological symptoms one starts with. The frequency of gaming and higher impulsivity predicted greater tendency to be a pathological gamer. Social competence and impulsivity in year 1 also predicted who will have more pathological symptoms, such that children with lower social competence and greater impulsivity increased in their pathological symptoms. In turn, children who began with more pathological symptoms in year 1 demonstrated higher depression, anxiety, social phobia and lower grades in year 3. If they became more pathological, this further increased their depression, anxiety, social phobia and poor school performance. Figure 9.3 simplifies the model, showing changes in year 1 and year 3.

The relationship of video gaming, impulsivity and attention problems was also examined in another longitudinal study (Gentile et al. 2012). Results confirmed

Fig. 9.4 Model illustrating video game exposure and attention problems and impulsivity as bidirectional causal variables



the findings of studies in the literature which showed that excessive gaming is related to attention problems. But what is significant about our study is the evidence of a bidirectional causal relationship between video game playing and attention problems and impulsiveness. Video game exposure in year 2 of the project was associated with both attention problems and impulsivity, and year 3 showed the same association. Children with impulsivity and attention problems tend to spend more time playing video games, and this in turn results in greater impulsivity and attention problems. These findings are illustrated in Fig. 9.4.

Aggression, Prosocial Behaviour and Empathy

The Literature

The relationship of video games and aggression has been a controversial one. There has been considerable research done on how playing violent video games can lead to gamers becoming more aggressive. Many studies have found that children who play violent games have been found to exhibit higher levels of aggression (e.g. Anderson and Dill 2000; Funk et al. 2004; Griffiths 1999). On the other hand, there are critics of these studies who argued otherwise (e.g. Ferguson et al. 2008; Goldstein 2005; Williams and Skoric 2005) and challenged the results as well as the methodology of these studies.

Nonetheless, there is overwhelming support that violence in video games do have some effects on children and adolescents. The review of the research on violent video game effects (Gentile and Stone 2005) supports the general aggression model (Anderson and Carnagey 2004) which explains that exposure to media violence can have both short-term and long-term effects. A meta-analytic study which involved a rigorous selection of research papers confirmed that playing violent video games decreases prosocial behaviour as well as increases aggressive thoughts and behaviours (Anderson 2004). Krahe and Möller (2004) also found that violence in games is associated with increased acceptance of physical aggression as normative. In a study of aggressive content and gamers' self-perceptions involving the use of automatic associations in the Implicit Association Test, players of violent games saw themselves as being more aggressive, in contrast to players who played a non-violent game (Uhlmann and Swanson 2004). Gentile et al. (2004) found that playing violent digital games is not only related to hostility, arguments with friends and teachers, physical fights and poor performance in school, but more importantly, the harmful effects of playing violent games may be stronger for children who are more hostile and are already at higher risk for aggressive behaviour.

Developments in brain research, using fMRI to show which parts of the brain are activated, also provide supporting evidence that playing a violent video game can have negative effects. Mathews et al. (2005) and Weber et al. (2006) found that the brain scans of gamers who engaged in virtual violence showed decreased activity in the rostral anterior cingulate cortex and increased activity in the dorsal anterior cingulate cortex. These results demonstrated that those who played the violent video game showed an increase in emotional arousal and a corresponding decrease of activity in the areas responsible for self-control, inhibition and attention (Carnagey et al. 2007).

In addition to the studies on video game aggression, there is also evidence showing that exposure to violent video games is related to decreased empathy levels in children and that children could become desensitised to violence (Anderson and Bushman 2001; Funk et al. 2003). The meta-analysis by Anderson and Bushman (2001) involving over 4,000 participants in 54 studies showed that playing violent games also decreases prosocial behaviours. The study by Funk and her colleagues (2003) presented 35 8–12-year-olds with vignettes describing everyday situations with aggressive and empathetic responses after playing either a violent and a non-violent game. Pre-existing empathy and attitudes towards violence were also measured. Results of their study indicated that long-term exposure to violent video games contributed to lower empathy.

More recent studies investigated whether prosocial video games can contribute to prosocial behaviour and empathy. Narvaez et al. (2008) randomly assigned 125 undergraduates to violent, helping and neutral video game conditions. Results of their study showed that those in the helping condition were more helpful, as measured by a story completion test, compared to players in the other game conditions. They concluded that prosocial video game exposure had at least short-term priming effects for prosocial thoughts, feelings and behaviour. Similar results were found in studies by Greitemeyer and Osswald (2009) who confirmed that playing

prosocial video games can decrease aggressive cognitions. Their experiments found that participants who played prosocial games had lower antisocial scores on word completion tests compared to those who played a neutral game.

Our Findings

Although our study was not experimental in nature but cross-sectional and correlational, we found similar results that those who play more prosocial games tend to behave more prosocially (Gentile et al. 2009). Seven hundred and twenty-seven secondary school students were measured on their video gaming habits, prosocial behaviours, aggressive cognitions and prosocial and violent game exposure. For prosocial and violent game exposure, students listed their three favourite games and estimated the number of hours per week they spent on each game and described how often they helped or hurt and killed other players. This prosocial and violent content was then multiplied by the amount of time spent playing, averaged across the three games. Prosocial behaviour was measured using the Prosocial Orientation Questionnaire (Cheung et al. 1998) and a modified version of the Children's Empathic Attitudes Questionnaire (Funk et al. 2008). Aggressive cognition was measured using the Normative Beliefs about Aggression Scale (Huesmann and Guerra 1997), and hostile attribution bias was measured using an adapted version of Crick's "Why Kids Do Things" scale (Crick 1995). Results of the regression analyses confirmed that prosocial game exposure was positively related to prosocial behaviour in terms of helping behaviour, cooperation and sharing and empathy. As expected, violent game play was negatively related to prosocial behaviour but positively related to approval of aggression and hostile attribution.

Our results reported in this cross-cultural paper were similar to two other studies. Longitudinal studies on Japanese students found that they behaved more prosocially after playing more prosocial games, and in an experimental study involving US students, those who played games with more prosocial content were found to be more helpful and those who played games with violent content were less helpful and more aggressive towards others.

Social Relationships

The Literature

Studies on the impact of gaming on social relationships have yielded mixed results. Some positive effects of gaming include the development of new relationships. Kline (1999) found that gamers, especially males, perceived video gaming to be a part of a network of friendships and social bonding. Neiberger and Gullett's (2007) findings support the stimulation hypothesis, which proposes that online communication facilitates the formation of relationships with strangers and enhances

the relationships with friends. This is due to the nature of communication on the Internet, which allows for greater self-disclosure (McKenna and Bargh 2000; McKenna et al. 2002). Siitonen's (2007) research on multiplayer gaming environments found that players' social interactions in the game were an extension of real-world social relationships. Gamers share a strong motive for social interaction and form new relationships with other gamers, using the modes of communication within the games as well as connecting with fellow gamers through phones, emails, chats and face-to-face meetings.

Contrary to the stimulation hypothesis, however, the reduction hypothesis maintains that online communication hinders the development of relationships. This is because time spent online is at the expense of time with real-life friends and family members and online relationships are superficial and thus less rewarding compared to contact with real-life friends. The research findings of Kraut and his colleagues (1998) and Nie and Erbring (2000) lend support for this hypothesis.

Valkenburg and Peter's (2007) study found that the stimulation hypothesis works only for known friends and not for online strangers. While communication with existing friends online can be rewarding, this does not apply to relationships with strangers. Their results showed that adolescents who often communicated with known friends online reported feeling closer to them.

The research by Blais et al. (2008) found, in a study of 884 adolescents, that online communication with known others using instant messaging enhances relationships between best friends and romantic partners. However, results of their study also showed that communication in chat rooms and computer games increased alienation and conflict and decreased companionship and intimacy with best friends. Although games can meet the need for companionships, they tend to be deleterious to romantic relationships. Another study (Padilla-Walker et al. 2010) confirms the association of video gaming with poor relationships with friends and parents.

Regardless of whether online social interactions help or hinder relationships, the Pew Internet and American Life Project (Lenhart et al. 2008) found that for most American adolescents, gaming is essentially a social activity and constitutes a major part of their social experience. Almost half of the adolescents surveyed who played online games, especially younger teens, did so with people they already know. Older adolescents were more likely to play with people they first met online. Their experiences are both positive and negative. The survey found that 85 % of those who reported witnessing other players being aggressive in the games also reported seeing generous and helpful behaviours by other players.

Our Findings

Our interview study (Chai et al. 2011) focused on their interactions with family and friends. Out of the 90 students interviewed, 49 % felt that gaming did not affect their time with their family. These students gave three reasons for this: firstly, they explained that they did not play games excessively but spent very limited

time on playing games due to either a low interest in playing these games or that they were keener on other activities, like playing sports or reading. Secondly, some reported that they faced strict parental restrictions on the amount of time they could spend on gaming. Their parents, particularly mothers, controlled the amount of time or decided when they could play. Permission to play games usually was granted after the fulfilment of certain responsibilities or rules, for instance, after homework had been completed or after examinations. Thirdly, their gaming hours and family time did not clash. They usually gamed when their parents were at work or when their parents were busy with other tasks at home and thus had no time to engage in joint activities with them. Therefore, playing games provided some form of companionship and also was a means of passing time and to relieve boredom.

Another group of students explained that gaming did not affect their time with family because they played games with their family members. However, many students felt that gaming together with family members was not a popular choice of activity. Parents were either not interested or were too busy to play with them. Those who were interested were often not IT savvy enough and preferred traditional board games or sports.

For a small number of families, although all family members played video games, the family members did not play with one another for a variety of reasons. Each family member had a different preference for game genres due to either age or gender. The lack of game equipment or game design itself, for example, single-player games, may also limit the opportunity for family members to play together.

Students also reported that they experienced conflicts with their family over playing games. Conflicts commonly occurred with regard to gaming time and the disregard for rules or their breaching of limits which parents had set. With siblings or other members of the family, conflicts usually occurred in regard to competition or perceived unfairness over the use of the computer.

Unlike playing with family members, those who played games together with their friends seemed to develop deeper friendships with one another. These findings are consistent with the stimulation hypothesis. When they played the same game together, they got to know their friends better through both their in-game and real-world behaviours. They considered gaming with friends as spending quality time together. They enjoyed the social interaction especially in multiplayer online games where friends made it easier to achieve game goals. Students also reported learning cooperation and teamwork when playing with friends.

Students reported that the game environment facilitated the development of new online friends as well as friendships in real life. Their shared activities and their exchange of game information and social interaction in the game helped to enhance relationships. However, the majority of the students were also wary of online relationships. Many felt that due to anonymity, they did not know the identity of the other party and therefore were less likely to trust them with personal information. Instead, the level of trust was higher with friendships in real life as they received real-time social cues from friends while interacting and were therefore able to judge whether or not a friend is trustworthy. The majority of the students still preferred

their real-world friends because of the wider range of activities they could do with them. Playing online games could be regarded as a continuation of their offline activities.

For online friends, conversation topics and game activities were only limited to the scope of the game, which restricted the amount of enjoyment of gaming. Online relationships were formed due to a common interest in games and also due to the benefits of help being rendered to one another during the process of gaming. Thus, these friendships were limited to the game itself and were thus less likely to persist over time. When students lost interest in the games, subsequently, there would be no further interaction with their online “friends”. Hence, the likelihood that individuals would move away from real-life relationships to online relationships is low. In spite of this, there were situations where online friendships developed to the extent that they moved on from the virtual to the real world.

Conclusion

Although there have been longitudinal studies of violent game effects, there have been none that included such a comprehensive range of measures including gaming habits, individual skills, beliefs, behaviours and psychological well-being, as well as measures related to the home environment. Reviewers of our papers have commented that it is rare to find a longitudinal study with a sample size of over 2,500 students, sustained over a period of 3 years. However, it is important to remember that this sample is a convenience sample. There are more boys represented in this sample, and six of the schools are the premier boys’ schools. Thus, it may not be a representative of the student population in Singapore.

Future studies should look into coping strategies of children with gaming problems and compare their perspectives and practices with that of their parents and counsellors. Evaluation of the efficacy of intervention strategies used by agencies such as TOUCH Cyber Wellness is already in progress.

Finally, our research has shed light on the gaming habits of our children and teenagers in Singapore. It has shown some risk factors as well as some protective factors. It is the hope of the research team that the findings can help all who are concerned about our youth and who are committed to help them mature into well-adjusted people.

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Chapter 10

Is It Still *King Lear*? English Teachers and the E-reader Phenomenon

Andy Goodwyn

Keywords E-readers • Digital texts • English teaching • Reader response theory • Reading

Introduction: The Nature of E-reading Devices

The ‘death’ of the book has been predicted since the late nineteenth century, yet the production of books themselves continues to increase year on year (for a recent journalistic account, much cited on the web, see Ben Ehrenreich’s (2011) *The Death of the Book*; for a celebrated scholarly discussion, see Birkerts, *The Gutenberg Elegies*, updated in 2006). One reason for the regularity of that morbid prediction was the frequency of technological innovations, starting with the invention of the ‘phonograph’ and continuing, after the digital revolution, with expectations that simply everything would be read on a screen; this history has been well covered in depth in Schreibman and Siemens (2008) but also from different perspectives in Landow (1994), focusing on hypertextuality (Manguel 1996), on the evolution of the reader (McGann 2001), on literature in, and on, the Internet (Negroponte 1995) and on how the digital world will revolutionise human experience. However, what was being elided in these predictions were two key assumptions, the first that ‘the book’ was just a text trapped in a material form and second that readers wished to be released from this physical limitation and enslavement to paper and print. These assumptions were never deeply challenged by technology, for example, reading on a computer never ‘felt’ like reading a book; even the advent of portables and laptops did not replicate the book reading experience. Therefore, the robust relationship between the living reader and the physical book has both stood the test of time, and the regular waves of new technological devices seemed not to threaten that ‘love’ of books. It is worth noting, of course, that the book is itself an artefact of technology,

A. Goodwyn (✉)
Institute of Education, University of Reading, Reading, UK
e-mail: a.c.goodwyn@reading.ac.uk

a mass produced object, commercially marketed and essentially disposable; its cultural capital, however, has tended to mystify its value. The term ‘book’ is also somewhat misleading as books come in an enormous range of shapes, sizes and costs; this is another element somewhat challenged by the e-reader phenomenon [see below].

That relationship between the reader and physical book is facing a more severe test because of the introduction of ‘e-readers’, that is, devices which are specifically designed for reading books and which deliberately emulate the characteristics of books. The device best known globally is the Kindle [produced by Amazon], but there are an increasing number entering the market. This paper explores the e-reader phenomenon from the perspective of those who are arguably most likely to defend the book – teachers of English. It explores teachers’ perspectives on the use and value of e-readers and compares these with their opinions of books.

E-readers

The success of these devices deserves the term *phenomenal* although product information in terms of sales is hard to acquire. The very frequent degree of comment in the media about them is perhaps sufficient evidence of their impact on reading. However, it would be wrong merely to assume familiarity at this stage of their development, and so it is first important to describe what such devices can do. This is also significant because the research discussed below is based on the characteristics of these devices as understood in November 2011, given the very rapid pace of both change to particular models [such as the Kindle, a new touch device that was launched in March 2012] and proliferation of devices, and then these characteristics are likely to be immediately dated. However, the very deliberate ‘book-like’ modelling of such devices suggests that some key characteristics are likely to be maintained and enhanced, rather than replaced.

The characteristics these devices tend to share are:

- Looking ‘book-like’, i.e., about the size and shape of a page in a typical paperback fiction book
- Small size and portability being light in weight and thin and can be held comfortably in one hand
- Having a screen which reproduces the look of a book, i.e., black print on a white ‘surface’
- Able to store a large number of texts [books, articles, documents, etc.]
- Wi-Fi enabled, allowing for instant downloading of new texts from almost anywhere on the planet
- Capacity to adjust font size, larger or smaller
- Capacity to ‘work on’ the text, e.g., highlight, annotate, etc.

- Capacity to hear the text read using head phones
- Constant access to a dictionary and encyclopaedia
- Having a dictionary function that allows the instant provision of a word definition

There are, already and rapidly developing, variants on these e-readers because mobile phones, iPads and other computer style devices also now emulate more book-like reading experiences; however, for the purposes of this article, the discussion will almost exclusively focus on the e-readers that resemble the Kindle.

It must be stated that the familiarity of books is in itself misleading. They are obviously no more 'natural' than an e-reader, and one might argue there is no natural reading. Books are produced by technology, and it might be argued that even the handwritten texts that were produced pre-Caxton needed a writing/painting tool and a suitable surface. Going further back to the inscriptions made on stone, these still required a made or adapted tool. Despite this and based on 'common sense' consensus, there are some distinct features of a book that an e-reader cannot replicate. The features of the modern book that are 'lost' in reading on an e-reader are:

- The tactile dimension, i.e., the weight and 'feel', usually two handed.
- The 'smell' of a book, which can be everything from clean and new to old and musty.
- The materiality of the page and its 'turning' and the capability of moving to any page via a physical action.
- The truly static text which never 'moves', i.e., the pages turn and readers move their eyes.
- The cover of the book and its numerous messages and signs. [This is a 'loss' felt strongly by bibliophiles who argue that a cover is an aesthetic artefact in itself and part, usually, of a book's 'beauty' and attractiveness. Again, there is an irony in that in the common parlance one 'should not judge a book by its cover'. It might be argued that the devotion to covers is part of an elite model of reading in which certain covers distinguish the 'classic' text from the 'trashy' novel and, since the early twentieth century, much more to do with marketing than with aesthetics.]
- The capacity to 'share' reading, e.g., a parent reading to one or more young children – this is unlikely to be a long-term difference as an e-reader could emulate the size and use of colour of a picture book, devices like iPads already can do this.
- A final point is that the remarkable speed with which a text can be selected and downloaded bypasses the settings in which 'real' books are housed such as a bookshop, a library, a study and a simple book case.

The power of book collections is historically of great significance (Manguel 2006) and it is multilayered. Such collections were once only the preserve of the rich or the scholarly. They were, in themselves, signals of some institutional or ideological stance, for example, religious, political and artistic; they were potentially visual manifestos. For individuals they were statements of cultural identity. The invention of the 'public library' opened the world of books to the poor and underprivileged. It is an interesting point to compare an online catalogue with a

book collection. In one way they are the same, i.e., a collection of books arranged by someone, almost always in an order which reveals that order, e.g., categories and authors alphabetically, and in another way they differ in that the scale of the collection, its impressiveness, is lost online however huge it actually might be, it is reduced to the size of a screen, and libraries, especially large ones, evoke feelings through their size and substance.

The e-reader is therefore a rather hybrid device; it is genuinely a new use of technology with some innovative features, but it deliberately disguises its technological character by emulating bookishness. As with most technological developments, it was not designed with teachers or the classroom in mind; this may of course change with 'education-friendly' versions, but currently its pedagogical uses would come via the adaptiveness of teachers. However, given the relationship of English teachers with books, exploring their viewpoints of e-readers is useful in speculating how these developments may be used in the classroom in the future.

Theoretical Perspective

In reporting the findings from this small-scale research, this paper draws on two key perspectives. The first is phenomenological (Cohen et al. 2007), in that the meaning is understood or made sense of as reported by those that experience that in which we are interested.

The second informing perspective is that of Reader Response theory in which Rosenblatt [see Rosenblatt 1995] argues that the text, especially the aesthetic text, is a dynamic entity created in a transaction between the reader and the text they are in the act of reading. This perspective emphasises the experiential nature of reading. Previous research demonstrates that this is the key view of English teachers that underpins that 'love of reading' and also influences their pedagogical approach to teaching literature (Goodwyn 2003). It can be argued, certainly in England, that reader response [not a term used much by teachers in England] is embedded within a Personal Growth pedagogy,¹ an approach which is explicitly espoused by English teachers. There will be some discussion [see below] about how this pedagogy relates to a conceptualisation of the 'lifeworld' of young people. This research was therefore interested in how teachers would comment on the reading experiences they personally had using e-readers and also their mostly speculative views about students' experiences.

¹Personal Growth. This model or theory of English was articulated most succinctly in the first National Curriculum document for English in England in 1989 as one of the 5 such models [DES 1989]. As a model it is the subject of much debate but has remained, arguably, the most influential and favoured model of English teachers in England; see Goodwyn (2011a). The 1989 definition was 'A personal growth' view focuses on the child: it emphasises the relationship between language and learning in the individual child, and the role of literature in developing children's imaginative and aesthetic lives.

This perspective now takes on a new significance. Despite the comments above about the relationship between English teachers and the physical nature of ‘real books’, they also love the experience of reading. This might usefully be summed up as being ‘lost in a book’, i.e., when the intensity of the reading experience is such that the material world fades away and the reader enters the ‘world of the book’ and is completely absorbed. This is a psychological state in which the physical book becomes simply the text on the white page and the reader simply turns the page in an automatic way, fully absorbed in the experience happening as a mental state. This being the case, then it may be theorised that the e-reading experience can provide exactly the same ‘experience’ as the physical book. To put this simply, Rosenblatt was not describing ‘book response’ theory but reader response, the dynamic transaction between the reader and the text itself. The discussion below reviews this possibility based on the responses of the participants.

Finally, although this paper is placed within the context of a discussion of New Media, there is no space for a discussion of the emergent fields that may be characterised as ‘e-learning theory’ or ‘digital design’. E-learning theory seems currently concerned with adapting a range of well-known theories, e.g., behaviourist, cognitive, constructivist, etc., and applying them to technologically oriented activities; for a useful overview, see Dyke et al. (2007), Haythornwaite and Andrews (2011, Chapter 2) and also Manovich (2001). Equally digital design, at least in education, is concerned with the multifaceted relationship between ‘users’ and ‘designers’ where both sets of actors are often interactive, making a digital ‘object’ very different to traditional educational resources such as, inevitably, printed books; see Seal et al. (2007), Beetham and Sharpe (2007) and Grainine and Oliver (2007) for useful reviews.

Methods

Previous research (Goodwyn 2011b) might suggest a number of predictable reactions from English teachers about these ‘book-like’ devices, but the approach taken was not to hypothesise but to enquire openly about their views and habits in relation to e-readers. The only suppositions assumed were that they would have an idea of what something like a Kindle was and could do [given their high media profile and persistent advertising] and that, as a teacher of texts, they would have opinions about such devices; these assumptions were certainly correct in relation to the respondents, although the lack of overall returns [see below] may suggest this is not true of the majority of teachers. The approach in the research was therefore to treat e-readers as a phenomenon and to ask teachers their views both as personal readers and as teachers.

Data Collection Data was collected via an online survey of teachers of English using Survey Monkey. A survey offered a very efficient way to gather data quickly and with only a light demand on teacher’s time and being online allowing the teachers to complete the questionnaire whenever and wherever it suited them.

Teachers were initially contacted via email using the National Association of Teachers of English (NATE) members list and invited to participate and give their independent views, i.e., not those of NATE. NATE was chosen as a sampling frame as it is a voluntary subject association which represents the interests of both the subject and the teachers of English. In total 600 teachers were contacted. 137 participated in the online survey, giving a response rate of 23 %. A potential limitation of the study is that NATE, being a voluntary organisation, can be considered to have members who are particularly dedicated professionals and, as NATE produces publications about English teaching, are also very well informed. Whilst the survey response rate is modest, the data set may best be considered as consisting of a sample of English teachers who do have useful knowledge of e-readers and have begun to think about their potential impact in schools; their views are therefore valuably well informed. In addition to the survey, telephone interviews were also conducted with 20 teachers who had indicated a willingness to take part. Of those interviewed, approximately 50 % owned an e-reader, whilst 50 % did not. Teachers included in this research may therefore be considered to represent some up-to-date thinking within the English teaching professions, and using NATE as a sampling frame offers privileged access to that thinking.

The national survey collected data on personal and professional experience of e-readers as well as attitudes to the use of e-reading devices in the teaching of English more generally. The reliability of the survey was first tested with a small pilot of 15 English teachers who offered feedback on the survey design. Questions in the main survey were both closed and open ended and included a number of Likert-scaled questions that allowed for an exploration of strength and direction of responses. For example, questions explored attitudes to the value of e-readers and perceptions as to potential future developments of media devices in the English curriculum. Open-ended questions asked teachers to give examples of their current teaching practice using e-readers and to reflect on the value of these in relation to more traditional methods of teaching. Telephone interviews explored the survey responses in more depth.

Sample Of those included in the survey, 81 % of teachers were female and 19 % male. Seventy-three percent of these are working in secondary schools, 7 % in primary and 16 % in tertiary and higher education, and 4 % were retired. In terms of length of time teaching, 15 % have been teaching for less than 5 years, 37 % between 5 and 15 years and 48 % for 15 years and more. The age of respondents ranged from under 29 and up to 69 years of age, with most teachers aged between 40 and 49 (27 %).

Data Analysis The survey data was analysed in SPSS with frequencies of responses and cross-tabulations used to explore the data in the first instance. Using frequencies allowed an overall picture of the data, whilst cross-tabulations enabled exploration of patterns and trends. A chi-square test of association was also carried out on some of the key variables of interest and within subsets of the data to explore relationships between responses and the strength of these.

Most of the open-ended data from the survey was coded to enable key themes to be identified. 'Free' or open coding was applied initially to themes relating to, for example, positive and negative attitudes to e-readers. Data was also categorised inductively in response to emergent themes arising through the first stage of the coding process. Data was coded by two separate coders and the results of the coding process were then compared. Comparing the similarity and difference in the coding process allows for a degree of confidence both in the reliability and validity of the codes identified and with their application to the rest of the data. Once coded, data was then transferred into SPSS for further analysis. In addition, Survey Monkey includes an application that uses Cloud imagery to highlight the frequency of actual words used. This tool allows a graphical representation of text which was useful for comparative purposes, with respect to the coded themes. However, interviews (and some of the open-ended comments), which offer examples of current teaching practice or reflections on media devices more generally, were explored using a much more grounded approach, adopting a more focused emphasis on the narrative and the discourse of responses. So as not to lose meaning, this data is presented in its qualitative form. For the purposes of this paper, the key themes drawn on are those that relate to *teachers as readers, e-readers and the teaching of English and the future*. In carrying out this research, all ethical procedures and guidelines were complied with as directed by the University's Ethics Committee and the British Education Research Association.

Findings

Teachers as Readers

Of those surveyed, 99 % of teachers considered themselves to be regular readers, with 89 % strongly agreeing that reading was an important part of their lives. Reading was considered important (99 %), relaxing (90 %) and pleasurable (74 %). However, whilst nearly all teachers agreed that reading was an important part of their job, 89 % also stated that they would like to read more than they currently do.

67 % of those surveyed did not attend reading groups and 22 % did not use a library, yet nearly all bought books at least a couple of times a year. Of those that purchased books more frequently, between once a month and once a week, 64 % were purchasing these online.

98 % of teachers were familiar with e-readers, 68 % having someone close to them who had one and 78 % having tried one out. Half of those surveyed owned one. The Kindle was the most popular e-reader, owned by 79 %, the iPad by 15 %. Owning an e-reader, however, was a relatively new development for most teachers, with three quarters having had one for less than a year. There were a range of reasons why teachers had an e-reader. Perhaps rather unsurprisingly, receiving an e-reader as a gift was the case for 38 %. Whilst curiosity and a liking for technology was also stated as a reason for its acquisition, a sense that it is a convenient tool,

Books Available **Carry Convenience**

Download Ease Live Number of Books

Portable Reading Size Storage Taking Travel

Turn Weight

Fig. 10.1 Text analysis of open-ended comments on aspects of e-readers that are liked

Battery Colour Dislike **Easily Flick Look Page**

Numbers Pass **Physical Prefer Real Book Share**
Books

Fig. 10.2 Text analysis of open-ended comments on aspects of e-readers that are disliked

and therefore useful, was expressed by 33 %. Ninety percent of teachers use their e-readers frequently, with just under half (45 %) stating e-readers are as good as reading from a book and for some (18 %), even better.

When asked to explain what they liked most about their e-readers, primarily responses related to their practical features.

As the text analysis in Fig. 10.1 illustrates, the ease with which books are accessed via *download* for *travel* and the ability to *carry* multiple numbers of books with *ease*, making whole libraries more *portable*, as well as the range of tools available to enhance the *reading* experience, were all seen as just some of the perceived strengths of e-readers.

In terms of the dislikes, these principally related to ‘difference,’ with respect to the tactile experiences afforded by a book.

The text analysis in Fig. 10.2 relates to the inability to *flick easily* through pages that e-readers did not resemble a *real book* in terms of *colour*, *look* and the way they feel *physically*. Issues with *battery* life, absence of *page numbers* and an inability to *share* and *pass* books onto family and friends were also seen as negative features.

E-readers and the Teaching of English

Only 15 % of teachers surveyed had e-readers available in their schools, and only 10 % of these currently used them in their teaching. However, just over half

	Agree/ strongly agree	Not sure	Disagree/ strongly disagree
E-readers would be useful in teaching English	67% (90)	27% (36)	6% (8)
E-readers would make teaching English easier	34% (45)	50% (66)	16% (22)
E-readers would engage more students with reading	61% (81)	32% (43)	7% (9)
E-readers would be distracting for students	8% (11)	42% (55)	50% (65)
E-readers would make the teaching English more difficult	8% (10)	29% (39)	63% (84)
E-reading would not make any difference in teaching of English	11% (14)	34% (45)	55% (73)

Fig. 10.3 Perceptions and attitudes to e-readers and teaching English

stated they would like to use them in their classrooms if they were available. Overwhelmingly, e-readers were seen as being particularly useful because of the ease with which texts could be accessed for annotating and for the use of the dictionary.

In terms of perspectives on the broader value of e-readers in the teaching of English, Fig. 10.3 illustrates that attitudes were largely positive. More than two thirds of teachers thought they would be a useful addition, with one third believing they would actually make teaching easier. Whilst there was some uncertainty as to whether these would prove distracting for students, make teaching more difficult or actually engage more students with reading, a far larger proportion of teachers felt the opposite would be true.

A deeper analysis indicated that there was no noteworthy association between positive attitudes to e-readers and owning one. In fact, whilst proportionally those teachers that did not have a device were more likely to be unsure as to how useful they would be and those that did were a little more positive, a chi-square test of association indicated that these relationships were not statistically significant. The

only measure on which attitudes to e-readers were related to owning one was in respect to views on whether e-readers could potentially engage more students with reading (chi-square 13.686, df 3 significance 0.003). This suggests, perhaps, that personal experiences of reading with an e-reader are important in conjecture on the reading experiences of 'others'.

As the following open-ended comment demonstrates, even teachers who described themselves as 'purist' in relation to books can see huge advantage in using e-readers with their students:

Previously I used e-readers with my 'Reading Champions' group. I have always found that students enjoy the process of reading much more on an electronic device than they do with a 'traditional' book. For me personally this notion is baffling as I love reading traditional books, seeing how far I get through them, the feel of a book, owning the book. However, many students have told me that the stigma around books and reading being 'un-cool' is removed when they are reading on a gadget. Reading on a screen is much more normal for them as they spend a great deal of their time on the internet. Thus, whilst I myself do not enjoy reading on an e-reader, I recognise the appeal and potential to motivate.

Only one teacher believed that students would not want to use these devices in the classroom. In addition, 66 % felt e-readers would be particularly useful for students with specific needs:

I think it would be particularly useful for learners with disabilities, or just lazybones, who are too torpid and apathetic to even go and get a dictionary off a shelf. I also think Gifted and Talented students would benefit by being creative with the multi-media functionality It's the way we need to be going I think.

As Fig. 10.4 illustrates, reluctant boy readers, readers with special educational needs and weak readers were the groups of students for whom electronic reading devices were deemed as potentially very valuable. Open-ended comments also suggested that students with visual impairment or English as an additional language would also benefit greatly.

The 'Future'

More than three quarters of teachers consider that e-readers will become important in schools in the future, with 61 % believing they will also become increasingly useful in the classroom and in the teaching of English in particular. Interestingly, 83 % of those surveyed also felt that there will be a growing expectation to use them. Again, there was no statistically significant relationship between these views and owning a device.

As Fig. 10.5. shows, the explanation given by teachers as to why they predict the prospect of a growing emphasis on media devices was primarily student centred, relating to the belief that students like and use technology but that they would also expect to use it. A view that resources would make it more probable was also the opinion of 60 % of teachers. Interestingly, parental or government expectations appeared to matter far less, in terms of their capacity to influence the future.

Sixty-four percent of teachers also felt the curriculum was likely to change in the future to include the use of e-readers, yet only 19 % of teachers saw this as a potentially negative development. However, that is not to say that those teachers

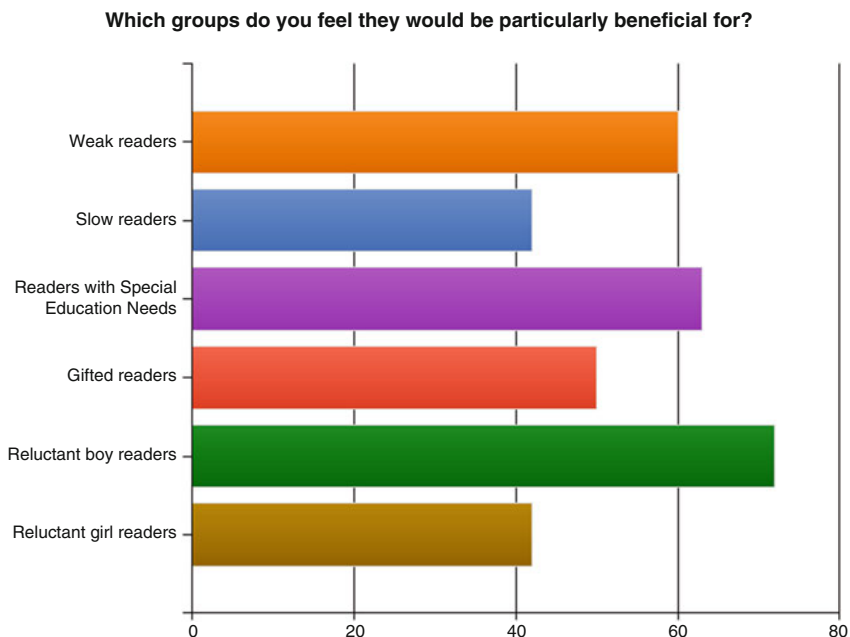


Fig. 10.4 Groups for which e-readers would be particularly useful

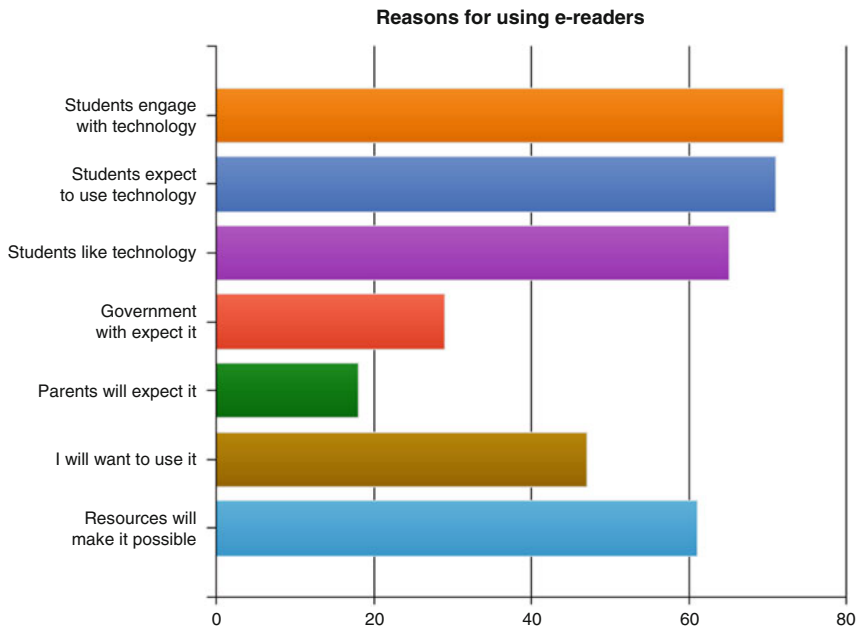


Fig. 10.5 Reasons for expectations to use e-readers

who saw this as a positive move forward were eager or keen on the potential change; more, it was seen as something that was almost inevitable:

I don't particularly want this move to technology to happen, but I think it is inevitable and can only be seen as a good thing

Other open-ended comments in relation to potential curriculum changes in English for the large part reflected a sense of acquiescence alongside a general feeling of unease at the potential for imposed prescription as opposed to a reticence to e-readers per se:

Enough expectation – let teachers do it who want to do it

I think an imposition of a specific resource on pedagogy is unwise – it is just one device from a whole 'shelf' of technology tools

Unnecessarily prescriptive: the curriculum should not be defined by the kind of resources teachers use.

Forty-three percent of teachers felt that an increasing expectation to use e-readers would require new forms of pedagogy and would ultimately be detrimental to books for one third of those surveyed. However, this somewhat pessimistic view was strongly associated (chi-square 10.536, df 2, significance 0.005) with whether a teacher owned an e-reader or not, again, suggestive of the value of familiarisation and hands-on experience. Most of the open-ended comments relating to the relative positioning of books and e-readers, however, related to a resigned acceptance that technology could not be avoided due to the advent of the *e-generation*. The fact that the majority of teachers in the survey were over 40 is a likely factor in this positioning of the '*e-generation*' as other than themselves. Some teachers expressed nostalgic fear that books and bookstores would *disappear*. Others were convinced that the tactile experience of reading a book was not something that could be readily replaced and as one teacher noted 'art survived the invention of photography'. Whilst for some teachers it appeared that e-readers were positioned in opposition to books, this was not true for all. As another teacher noted, 'what is a book after all? It's text on pages so, what's the difference between paper and screen?'

Whether English teachers embraced the notion of using technology in their classroom or expressed anxiety over the demise of books, the overall view was that engaging students with reading was the key issue, and as teachers, the responsibility was to do this in any way that worked. Ultimately, for most teachers it was the content not the medium that mattered:

I think the vital thing is that people keep reading and keep engaging with the wide range of written texts, especially fiction. It doesn't matter so much how they do it.

My overall view is that these devices won't replace traditional books in school any time soon but as an English teacher I'd be keen on any development that boosts students' interest and enthusiasm for reading as a leisure activity

Like all new technology, it is not new for long and there will be continuing developments. As teachers we have a responsibility to enable our students to be prepared for the world of tomorrow and, therefore, must embrace new developments.

It is not the medium by which we can motivate pupils it is the message. King Lear is a great play and an e reader makes it no more or less great!

Discussion and Conclusion

English Teachers and 'Traditional' Reading

The results of this research refer chiefly to teachers of English in England, partly because of the evidence cited about them but also because the sample in the research is only from England. However, it seems very likely that the majority of these comments would apply to English teachers in a range of countries that share some literary history [e.g. the USA, Australia, Canada, New Zealand] and also to mother tongue teachers of literature in many countries. What we know about English teachers in England is that the very great majority studied literature in higher education before undertaking teacher training [Goodwyn 2010]. They profess to a love of reading that goes back, usually, to early reading experiences. By a 'love of reading' they mean that they gain a great deal of pleasure chiefly from reading aesthetic works such as novels, poetry and plays. One of their major reasons for becoming a teacher is to 'pass on' this love of reading to future generations, and one of their concerns is whether the advent of technology may damage or constrain the development of a love of reading [Goodwyn 2003]. This 'love' has a very material element; it is not abstract or simply intellectual. These teachers love the artefacts called 'books' with a physical passion, and they love to hold them; the turning of a page is an event, and the smell and 'feel' of a book is a delight, handling books, admiring their covers and keeping them on shelves – all these elements demonstrate a physical/embodied relationship. Therefore, however book-like an e-reader may be or become, it is never a book and so potentially, for a 'book lover', a threat and source of anxiety.

These are large-scale generalisations, and many individual English teachers do not conform to all of them, but there is plenty of evidence to support these views, and they are useful lens in which to view the emerging relationship between English teachers and e-readers.

Teachers of literature love books; love is the word they use and it is a passionate and physical relationship. The respondents to this survey express conflicted feelings about their pleasure in the physical materiality of a book and their experiential recognition that young people enjoy technological devices and reading on their screens and that the physical book may be of little interest to them.

The findings of this study are that the English teachers who responded are very aware of e-readers and of their capabilities. They are increasingly becoming personal users, and they are enjoying what e-readers provide without expecting such devices to displace 'real' books from their lives. They are also equally aware of their popularity and the likelihood of them becoming increasingly prevalent. As yet, there is only very modest use of such devices in schools. However, the teachers have a strong belief that the affordances of the devices offer real potential for a range of readers and may well provide reading experiences that are more valuable for some readers because of the nature of an electronic text that can be easily manipulated, e.g., changing font size, and that has features that include an immediately accessible

dictionary and web access. Recent research has also found evidence to support the importance of this facility for adolescent readers although e-readers were not then available; see Sternberg et al. (2007) and Larson (2009).

Anticipated issues related very much to the practical: to do with cost per device, battery life and the vulnerability of the devices themselves. Teachers also had concerns about being able to monitor reading. However, they do not see such problems as significant enough to outweigh the benefits such as portability, book storage and the attraction of such devices to adolescent readers.

How attractive such devices are to adolescents [as opposed to adults] is yet to be researched. There has been some experimental work, mostly in academic settings (see Grudzien and Casey 2008), where students have been supplied with e-readers and their behaviours studied; such projects have been inconclusive and somewhat hampered by the nature of the academic context where the texts have tended to be the required texts of a course only. A recent study of 3rd grade readers (Sternberg et al.) provides evidence of young children's easy adaption to, and pleasure in, e-readers but with no significant impact on reading comprehension. Larson's studies of elementary classrooms show how rapidly even second graders begin to use the special features of the e-reader, changing font size, using annotation, etc. (Larson 2009, 2010, see also Jones and Brown 2011).

A new direction in the field has been the provision of e-readers to children into rural parts of Africa (see the World Reader, web site, 2012) where the devices have been loaded with hundreds of books in both English and native languages, instantly offering such readers a vast increase in book provision that would be impossible using conventional books. Indeed conventional books are physically very vulnerable in such rural settings where climate is a major enemy to paper. Essentially, in some parts of the world, the e-reader may be a materially more pleasing experience than a crumbling book.

Overall, the nature of the e-reader, its 'bookishness', seems to make it much more acceptable than the computer generally. English teachers were [and still are] very concerned that the computer was a form of enemy to serious reading and a constant distraction for young people. Yet teachers also recognise that young people relate, and respond, to technology. On the basis of this study, it seems likely that English teachers will be open to experimenting with e-readers and to trialling their capabilities both in the classroom and in the home. Given the accessibility of e-readers, in terms of cost, and the very growing availability of e-books, it seems even more likely that more and more teachers will themselves read on an e-reader and that this may well further establish a positive relationship between the English teacher and the reading device but without displacing physical books. E-readers are therefore likely to become increasingly a complementary form of reading. The next stage of research will be to investigate how teachers begin to use the e-reader in the classroom and also how e-readers may be designed for more educational settings.

In conclusion it is intriguing to ponder on what Rosenblatt's reaction might have been to this new phenomenon. Given that the transaction between reader and text is perhaps enhanced and made more transparent, perhaps she would have approved? It seems likely that the next generation of teachers will also approve.

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Chapter 11

Towards a Web 2.0 TPACK Lesson Design Framework: Applications of a Web 2.0 TPACK Survey of Singapore Preservice Teachers

Joyce Hwee Ling Koh and Ching Sing Chai

Keywords Web 2.0 • TPACK • Technological pedagogical content knowledge • Pre-service teacher education

Introduction

The Facebook website reports that to date, there are more than 800 million active Facebook users, and an average user is connected to 80 community pages, groups, and events (Facebook 2011). A 2009 survey by Technorati found that one in five bloggers update their blogs daily (Technorati 2009), whereas it was reported that the number of unique visitors to Twitter grew from 475,000 to seven million between 2008 and 2009 (NielsonWire 2009). Web 2.0 tools such as Facebook, blogs, and Twitter are defined as those which “facilitate a more socially connected Web where everyone is able to add to and edit the information space” (Anderson 2007, p. 5). These tools have created new possibilities for people to interact with and via the World Wide Web. Educators propose that such kinds of affordances can be advantageous for supporting pedagogies that are more constructivist and student centered (Alexander 2008; Cochrane and Bateman 2010). While the use of Web 2.0 tools to support teaching and learning activities is an educational trend that cannot be ignored, questions have been raised about whether teachers have adequate pedagogical expertise to integrate Web 2.0 tools (Albion 2008; Nelson et al. 2009). To date, this aspect of teachers’ ICT expertise has not been fully analyzed or understood.

Teachers’ expertise for integrating Web 2.0 tools can be understood as a form of technological pedagogical content knowledge (TPACK). Mishra and Koehler (2006)

J.H.L. Koh (✉)

Learning Sciences and Technologies Academic Group, National Institute of Education,
Nanyang Technological University, Singapore
e-mail: joyce.koh@nie.edu.sg

C.S. Chai

National Institute of Education, Nanyang Technological University, Singapore
e-mail: chingsing.chai@nie.edu.sg

theorized that teachers' expertise for integrating information and communication tools (ICTs) involves them synthesizing their technological knowledge, pedagogical knowledge, and content knowledge into a unique form of knowledge termed as TPACK. Since its conception, the TPACK framework has been widely accepted in the field, leading to the development of several TPACK surveys to assess teachers' perceptions of ICT integration expertise. Surveys designed to measure teachers' Web 2.0 TPACK can contribute to the assessment of their pedagogical readiness for Web 2.0 integration. However, there are no existing TPACK surveys designed specifically to assess their integration of Web 2.0 tools as only those related to the teaching of Science, the use of e-learning pedagogies, and the use of web-based resources have been developed (Archambault and Barnett 2010; Graham et al. 2009; Lee and Tsai 2010). In view of this gap, this study first seeks to understand Singapore teachers' perceived expertise for Web 2.0 integration through the administration of a Web 2.0 TPACK survey with 270 graduating preservice teachers. Using exploratory factor analysis and regression analysis, it examines the factor structures underlying these teachers' Web 2.0 TPACK and the relationships among these factors. It then discusses the implications of these findings for teacher educators and proposes a TPACK-driven lesson design framework that can be used to scaffold preservice teachers' integration of Web 2.0 tools during lesson design.

Literature Review

Affordances of Web 2.0

The term Web 2.0 and its differences with Web 1.0 were first discussed by O'Reilly (2005) where the key distinction was found to be user control. Firstly, Web 2.0 tools allow web users to engage in personal content creation and expressions (Ravenscroft 2009). Users can put up web content through easy-to-use interfaces on blogs and wikis which substantially reduce the barriers of web publishing. Users can also share their self-created audios and videos through sites such as YouTube. Therefore, web content can easily be mounted and shared by anyone. Secondly, users engage in social communities to cocreate content and engage each other in feedback and conversation on the basis of their self-created content. Wikis, for example, allow web users to coedit web pages. Online discussions are no longer restricted to the online groups that were common in Web 1.0 platforms. It now includes users visiting and leaving comment on blog sites and YouTube or providing wall posts on social networking sites such as Facebook and MySpace. RSS feeds also allow users to be informed of the latest developments in online communities of their interest. Thirdly, users are able to repurpose web content to present new concepts and ideas (McLoughlin and Lee 2007). Social booking sites like del.icio.us allow users to share their personal bookmarks of web resources, while mash-ups allow users to remix media and information from multiple sources into their unique representation.

These affordances of Web 2.0 have changed the ways that users can interact with the World Wide Web. Unlike the Web 1.0 era, users are no longer passively

consuming information through websites of hyperlinked pages. They play an active role in contributing, discussing, and repurposing the information that they encounter on the World Wide Web.

Pedagogical Implications

These affordances of Web 2.0 have generated much interest among educators, primarily for its potential to change pedagogy beyond a classical view of knowledge which embraces one correct answer from an authoritative source (Dede 2008). Firstly, the ability of Web 2.0 tools to support learner content generation is a feature that educators felt would appeal to learners today, which are termed as “digital natives” by Prensky (2001). These learners approach learning as active doers rather than passive receivers of information from their teachers (Baird and Fisher 2005–2006). When learners are involved in generating their learning content, they can also be engaged in deeper inquiry and reflection of the knowledge that they are acquiring (McLoughlin and Lee 2007). Web 2.0 platforms facilitate learners to share content and discuss these with peers. Such affordances support social constructivism (Cochrane and Bateman 2010) where learning is viewed as a social-cultural process whereby meaning is negotiated among members in a community of practice (Duffy and Cunningham 1996). In so doing, the learning scaffolds for students can be enlarged beyond the teacher to include peers and content resources contributed within the virtual community (McLoughlin and Lee 2007). Students learn the skills to function as responsible and active contributors of a community, as well as gatekeepers of the knowledge claims that are being developed within the community (McLoughlin and Lee 2010). These are important competencies needed by students to maneuver what Dede (2008) termed as a “new epistemology” that is brought about by the proliferation of Web 2.0 tools in our daily lives. By supporting students to remix and repurpose web contents, Web 2.0 tools present teachers with new possibilities to design learning experiences that are more personalized and authentic to the students (McLoughlin and Lee 2007). It allows them to take charge of their own learning by engaging in the knowledge creation process rather than passively taking in content supplied by their teachers (McLoughlin and Lee 2008). Baird and Fisher (2005–2006) purport such kinds of learning have positive influences on students’ retention and self-regulation.

A learning pedagogy that scaffolds learner self-direction with content resources and opportunities for dialogue and conversation through online communities is described by McLoughlin and Lee (2008) as Pedagogy 2.0. It is a pedagogy that exploits the affordances of Web 2.0 to support student-centered learning. Pedagogy 2.0 also supports digital natives to acquire the various literacies needed as Web 2.0 becomes part and parcel of their lives. This is described by Dede (2008) as a new epistemology of learning that involves one having the competency to engage in unbiased dialogue and meaning negotiation within a community rather than accepting one right answer supplied by the teacher. Besides this, students also need cyberwellness competencies to manage issues such as cyberbullying and copyright

infringement as they engage with Web 2.0 environments (Nelson et al. 2009). Educators suggest that students need to acquire these literacies through a tighter integration of Web 2.0 applications within their learning experiences (Alexander 2008; Solomon and Schrum 2007). To support this endeavor, teachers' ability to make pedagogical uses of Web 2.0 tools needs to be enhanced (Albion 2008).

Understanding Teachers' Web 2.0 TPACK

There is a need to distinguish between technology and activity because teachers may use Web 2.0 tools without any changes to their pedagogy (Glud et al. 2010). Therefore, the integration of Web 2.0 tools by teachers into their lessons does not automatically mean that teachers are engaging in Pedagogy 2.0. Teachers can be said to possess the appropriate form of TPACK or expertise for integrating Web 2.0 tools when they are able to use these tools to transform pedagogy for meaningful learning (Nelson et al. 2009). Therefore, Mishra and Koehler's (2006) TPACK framework can be used as a theoretical lens to understand the nature of teachers' TPACK for integrating Web 2.0 tools, that is, their Web 2.0 TPACK.

Mishra and Koehler's (2006) TPACK framework premises that teachers draw upon technological knowledge (TK), pedagogical knowledge (PK), and content knowledge (CK) as the three knowledge bases for ICT integration. Four other types of knowledge arise from the connections made between these three knowledge bases. These are pedagogical content knowledge (PCK), technological content knowledge (TCK), technological pedagogical knowledge (TPK), and technological pedagogical content knowledge (TPACK). TCK and TPK represent teachers' expertise with respect to general content representation with technology and pedagogical uses of technology, respectively. TPACK represents teachers' application of these general forms to expertise to specific lesson content and topics. Figure 11.1 illustrates how the TPACK framework can be used to understand teachers' Web 2.0 pedagogical expertise.

As shown in Fig. 11.1, technological knowledge (TK) would essentially comprise of teachers' technical knowledge of Web 2.0 tools, that is, Web 2.0 TK. Teachers' specific expertise for representing their teaching content with their Web 2.0 TK is interpreted as their Web 2.0 TCK. Their Web 2.0 TPK can be understood as their ability to make appropriate pedagogical use of Web 2.0 tools, whereas the combination of their Web 2.0 TCK and Web 2.0 TPK with their PCK derives their expertise to apply Web 2.0 tools in specific lesson content and topics, which is their Web 2.0 TPACK.

Mishra and Koehler's (2006) TPACK framework was the first attempt by researchers to systematically define the different facets of teachers' ICT integration expertise. Therefore, this framework has been used in the development of surveys to assess teachers' TPACK perceptions. To date, there are no TPACK surveys that specifically assess teachers' Web 2.0 TPACK perceptions as most TPACK surveys are in the process of being developed and validated. A 58-item general TPACK survey was developed by Schmidt et al. (2009) to measure pre K-6 teachers' TPACK

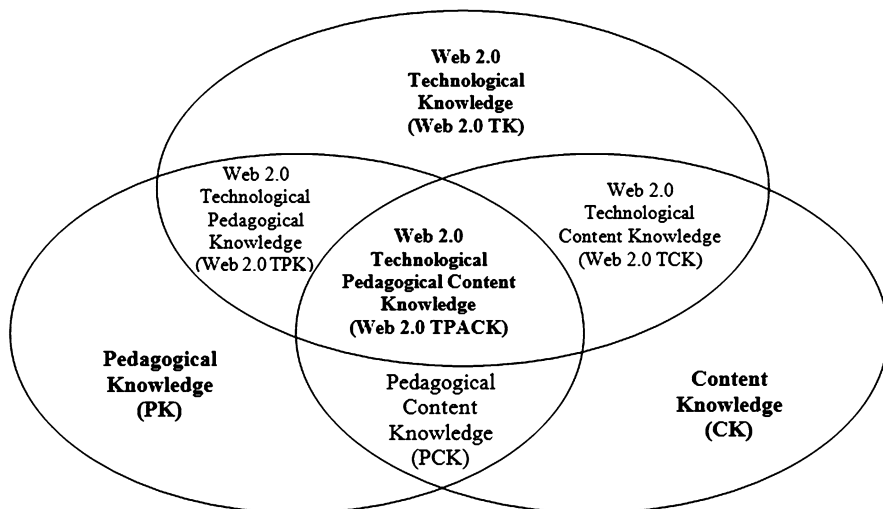


Fig. 11.1 Framework for describing teachers' Web 2.0 TPACK (Adapted from Mishra and Koehler (2006, p. 1025))

perceptions. The survey results in this study were only subject to tests of internal reliability. Koh et al. (2010) adapted Schmidt et al.'s survey to study the general TPACK perceptions of 1,185 Singapore preservice teachers. Their exploratory factor analysis validated only TK and CK, whereas the other items merged into three factors: knowledge of pedagogy, knowledge of teaching with technology, and knowledge from critical reflection. Archambault and Barnett (2010) developed a 24-item survey to measure practicing teachers' TPACK for online teaching and derived similar factor structures as Koh et al. A more successful study was conducted by Lee and Tsai (2010) who assessed Taiwanese practicing teachers' TPACK for using web-based resources. Their exploratory and confirmatory factor analysis validated the factors of TK, TCK, TPK, and TPACK. However, their survey does not comprise of the other TPACK factors. Chai et al. (2011a) reported some success with validating the seven TPACK factors through survey, but their survey dealt with the pedagogical use of technology to support Jonnasen's five dimensions of meaningful learning and was not focused on Web 2.0.

The factors influencing teachers' Web 2.0 TPACK can be understood through statistical modeling of the results from quantitative TPACK survey studies. Regression analysis conducted by Chai et al. (2010) on a TPACK survey of 889 Singapore preservice teachers found that PK had the largest contribution to TPACK as compared to TK and CK. In another TPACK survey of 214 Singapore preservice teachers, Chai et al. (2011a, b) found that when the seven constructs of TPACK were considered, the intermediary constructs of TPK and TCK had stronger positive correlations with TPACK than TK, PK, and CK. These results suggest that some TPACK constructs are more influential than others. These relationships need to be better understood so that development programs for teachers' Web 2.0 TPACK can be designed more effectively.

Focus of Study

It can be seen that available TPACK survey instruments were focused on general TPACK (Koh et al. 2010; Schmidt et al. 2009) and specific pedagogical approaches (e.g., Chai et al. 2011b) or were designed for aspects of web-based learning outside of Web 2.0 (e.g., Archambault and Barnett 2010; Lee and Tsai 2010). The Web 2.0 TPACK perceptions of teachers are not well understood as appropriate survey instruments are not available. As such, there are few studies that can inform teacher educators of the gaps in teachers' Web 2.0 perceptions and possible ways to plug these gaps. Given this gap, this study aims to describe the development and administration of a Web 2.0 TPACK survey on Singapore preservice teachers. The results of this survey administration are used to answer these research questions:

- What is the factor structure underlying Singapore preservice teachers' Web 2.0 TPACK?
- What factors impact Singapore preservice teachers' Web 2.0 TPACK?
- How do Singapore preservice teachers envision the use of Web 2.0 tools in their teaching?

Through these analyses, future directions for enhancing Singapore preservice teachers' Web 2.0 TPACK will be discussed.

Methodology

Study Participants

The study participants were a cohort of 420 graduating preservice teachers in Singapore who were being trained to teach in primary schools. The survey was administered at an enrichment seminar conducted for these teachers. Participation for the survey was voluntary and a total of 270 teachers responded to the survey, constituting a response rate of 64.3 %. The survey respondents were largely female teachers ($n = 191$, 70.7 %). Thirty teachers did not report their gender (11.1 %).

The Web 2.0 TPACK Survey

The Web 2.0 TPACK survey was developed using the framework outlined in Fig. 11.1. The items for PK (e.g., I know how to assess student performance in a classroom), CK (e.g., I have sufficient knowledge about my Curriculum Subject 1), and PCK (e.g., I know how to select effective teaching approaches to guide student thinking and learning in my Curriculum Subject 1) were not related to Web 2.0.

These were taken from the TPACK survey from Koh et al. (2010) that was previously administered with 1,185 Singapore preservice teachers.

The items for Web 2.0 TK, Web 2.0 TCK, and Web 2.0 TPK were newly developed for the study. Web 2.0 TK items assessed teachers' perceived confidence with respect to the technical skills related to using Web 2.0 tools (e.g., collaborate with others using a wiki). While Mishra and Koehler's (2006) definition of TCK was focused on teachers' representation of content with ICT tools, Web 2.0 pedagogies advocated student involvement in content creation. Therefore, the Web 2.0 TCK items assessed both the aspects of teachers' and students' content representation (e.g., represent complex concepts of CS1 with Web 2.0 tools; facilitate students to construct models that represent their understanding of CS1 with Web 2.0 tools). Glud et al. (2010) proposed that Web 2.0 pedagogy is more problem based, whereas Web 1.0 is more curriculum and content based. Therefore, the Web 2.0 TPK items dealt with various aspects of facilitating Pedagogy 2.0 (e.g., engage students to co-construct knowledge using Web 2.0 tools; present authentic problems to engage students with Web 2.0 tools). As TPACK dealt with the amalgamation of technology, pedagogy, and content, the Web 2.0, the items from Koh et al.'s study were used, but references of general ICT tools were modified slightly to incorporate to Web 2.0 (e.g., I am able to use strategies that combine content, Web 2.0 technologies, and teaching approaches that I learned at NIE in my classroom). Since cyberwellness issues are critical for supporting teachers' implementation of Web 2.0 activities, four questions related to this area were added into the survey (e.g., I am able to guide students on the safe use of the Internet).

The final survey comprised of 43 survey items. The study participants rated each item on a seven-point Likert-type scale where 1 means strongly disagree, 2 disagree, 3 slightly disagree, 4 neither agree nor disagree, 5 slightly agree, 6 agree, and 7 strongly agree. An open-ended question "How are you currently using Web 2.0 tools to support your teaching? Give specific examples" was also included to gather teachers' comments for further insights into the survey results.

Data Analysis

The first research question was investigated by analyzing the internal reliability of the entire survey and survey constructs with Cronbach's alpha. Following this, exploratory factor analysis was used to analyze the factor structures underlying preservice teachers' Web 2.0 TPACK perceptions. The total variability explained by an exploratory factor analysis was first analyzed, and the factor structure was confirmed by removing items that had loadings below 0.50, as recommended by Fish and Dane (2000), and the items that were cross-loaded (Bentler 1990).

The second research question was answered through content analysis of the student responses to the open-ended survey questions. These responses were qualitatively examined for emerging themes, and the frequency of comments within each theme was tabulated.

Results

Research Question 1; What Is the Factor Structure Underlying Singapore Preservice Teachers' Web 2.0 TPACK?

The Cronbach's alpha of the survey was 0.98, whereas the Cronbach's alphas of the seven TPACK constructs and cyberwellness ranged from 0.90 to 0.98, indicating high internal reliability. Exploratory factor analysis yielded five factors which explained a total variance of 79.15 % (see Table 11.1). Item Web TK1 (I know how to create a blog site) was removed as it had a factor loading lower than 0.50. There were no cross-loaded items.

Table 11.1 Results of exploratory factor analysis

Items		Factor loadings
<i>Factor 1 – Web 2.0 Efficacy (M = 5.22, SD = 1.15, $\alpha = 0.82$)</i>		
Web 2.0 TK2	I know how to collaborate with others using a wiki	.64
Web 2.0 TK5	I know how to create podcasts	.61
Web 2.0 TK7	I know how to use social bookmarking tools	.66
Web 2.0 TK8	I know how to manipulate security settings to control who can access my Web 2.0 sites	.66
<i>Factor 2 – Social Networking Efficacy (M = 6.22, SD = 0.93, $\alpha = 0.91$)</i>		
Web 2.0 TK3	I know how to network with my friends through Facebook/MySpace	.76
Web 2.0 TK4	I know how to use online synchronous conferencing tools, e.g., MSN/Skype	.69
Web 2.0 TK6	I know how to share photos and videos online	.72
<i>Factor 3 – Efficacy for Teaching without Web 2.0 (M = 5.48, SD = 0.82, $\alpha = 0.96$)</i>		
CK1	I have sufficient knowledge about my CS1	.81
CK2	I can think about the subject matter like an expert who specializes in my CS1	.81
CK3	I have sufficient knowledge about my CS2	.82
CK4	I can think about the subject matter like an expert who specializes in my CS2	.82
PK1	I know how to assess student performance in a classroom	.82
PK2	I can adapt my teaching based upon my assessment of students' level of understanding	.82
PK3	I can adapt my teaching style to different learners	.82
PK4	I can use a wide range of teaching approaches in a classroom setting (collaborative learning, direct instruction, inquiry learning, problem-/project-based learning, etc.)	.78
PK5	I know how to organize and maintain classroom management	.77
PCK1	I know how to select effective teaching approaches to guide student thinking and learning in my CS1	.82

(continued)

Table 11.1 (continued)

Items		Factor loadings
PCK2	I know how to select effective teaching approaches to guide student thinking and learning in my CS2	.82
<i>Factor 4 – Efficacy for Teaching with Web 2.0 (M = 4.84, SD = 1.19, $\alpha = 0.99$)</i>		
Web 2.0 TK9	I know how to teach my students to use Web 2.0 tools	.79
Web 2.0 TCK1	I know how to present content related to my CS1 with Web 2.0 tools	.87
Web 2.0 TCK2	I know how to represent complex concepts of CS1 with Web 2.0 tools	.90
Web 2.0 TCK3	I know how to represent complex relationships of CS1 with Web 2.0 tools	.88
Web 2.0 TCK4	I know how to facilitate students to construct models that represent their understanding of CS1 with Web 2.0 tools	.89
Web 2.0 TCK5	I know how to present content related to my CS2 with Web 2.0 tools	.88
Web 2.0 TCK6	I know how to represent complex concepts of CS2 with Web 2.0 tools	.88
Web 2.0 TCK7	I know how to represent complex relationships of CS2 with Web 2.0 tools	.87
Web 2.0 TPK1	I know how to design effective online learning activities that can be conducted with Web 2.0 tools	.89
Web 2.0 TPK2	I know how to present authentic problems to engage students with Web 2.0 tools	.90
Web 2.0 TPK3	I know how to facilitate students' project work using Web 2.0 tools	.86
Web 2.0 TPK4	I know how to monitor students' understanding when they are learning with Web 2.0 tools	.90
Web 2.0 TPK5	I know how to engage students to co-construct knowledge using Web 2.0 tools	.90
Web 2.0 TPK6	I know how to facilitate students to participate actively when they are using Web 2.0 tools for online discussion	.90
Web 2.0 TPK7	I know how to create an online learning community that has a positive learning atmosphere when students are learning with Web 2.0 tools	.88
Web 2.0 TPACK1	I know how to use appropriate methods to teach my CS1 with Web 2.0 technologies	.88
Web 2.0 TPACK2	I know how to use appropriate methods to teach my CS2 with Web 2.0 technologies	.87
Web 2.0 TPACK3	I know how to select Web 2.0 tools to use in my classroom that enhance what I teach, how I teach, and what students learn	.87
Web 2.0 TPACK4	I know how to use strategies that combine content, Web 2.0 technologies, and teaching approaches that I learned at NIE in my classroom	.90

(continued)

Table 11.1 (continued)

Items		Factor loadings
Web 2.0 TPACK5	I know how to provide leadership in helping others to coordinate the use of content, Web 2.0 technologies, and teaching approaches at my school	.84
<i>Factor 5 – Cyberwellness Efficacy (M = 5.62, SD = 0.94, $\alpha = 0.95$)</i>		
CW1	I am able to guide students on the safe use of the Internet	.81
CW2	I am able to teach students about cyberwellness issues	.86
CW3	I model and teach legal and ethical use of the Internet	.87
CW4	I implement classroom procedures that guide pupils' legal and ethical use of the Internet	.83

The Web 2.0 TK items were split into two factors and were relabeled as “Web 2.0 Efficacy” and “Social Networking Efficacy.” Items for CK, PK, and PCK merged to form a factor that was labeled as “Efficacy for Teaching without Web 2.0.” Web 2.0 TCK, TPK, and TPACK items merged to form a factor which was labeled as “Efficacy for Teaching with Web 2.0.” Due to its phrasing which alluded to the teaching of Web 2.0 tools, item Web 2.0 TK9 was also merged with this factor. The last factor comprised of the four Cyberwellness items which were interpreted as the teachers’ Cyberwellness Efficacy. All the factors had high Cronbach’s alphas ranging from 0.82 to 0.99, indicating high reliability (see Table 11.1).

The exploratory factor analysis showed that Singapore preservice teachers perceived conceptual differences between using Web 2.0 tools in activities that involved social networking and those that did not. In terms of Web 2.0 TPACK, they were not able to distinguish between the intermediate constructs such as Web 2.0 TCK and Web 2.0 TPK. Neither were they able to distinguish between PK, CK, and PCK. These teachers only perceived conceptual differences between teaching with and without Web 2.0 tools, as indicated by the third and fourth factors. On the other hand, these teachers perceived cyberwellness as being conceptually distinct, as indicated by the fifth factor.

The descriptive statistics from Table 11.1 also show the teachers being most confident of their Social Networking Efficacy as its mean rating is 6.22 out of a seven-point scale. Their perceived confidence with respect to the factors Web 2.0 Efficacy, Efficacy for Teaching without Web 2.0, and Cyberwellness Efficacy were also fairly high as these were all rated above 5.2 on a seven-point scale. Notably, among the five factors, these teachers were least confident about their Efficacy for Teaching with Web 2.0, giving it a mean rating of only 4.84 out of seven.

Research Question 2: What Factors Impact Singapore Preservice Teachers’ Web 2.0 TPACK?

Table 11.2 shows significant positive Pearson’s correlation among the five factors. Strong correlation of 0.69 was obtained between Web 2.0 Efficacy and Efficacy for

Table 11.2 Correlation among the five factors

	Factor 1 – Web 2.0 Efficacy	Factor 2 – Social Networking Efficacy	Factor 3 – Efficacy for Teaching without Web 2.0	Factor 4 – Efficacy for Teaching with Web 2.0	Factor 5 – Cyberwellness Efficacy
Factor 1 – Web 2.0 Efficacy	1	.55**	.38**	.69**	.40**
Factor 2 – Social Networking Efficacy		1	.37**	.45**	.54**
Factor 3 – Efficacy for Teaching without Web 2.0			1	.47**	.37**
Factor 4 – Efficacy for Teaching with Web 2.0				1	.48**
Factor 5 – Cyberwellness Efficacy					1

**Correlation is significant at the 0.01 level (2-tailed)

Table 11.3 Stepwise regression models

		B	Std. error	Beta	Significance	R ²
1.	(Constant)	1.129	.290		**	0.46
	Factor 1 – Web 2.0 Efficacy	.708	.054	.675	**	
2.	(Constant)	-.282	.409		n.s.	0.51
	Factor 1 – Web 2.0 Efficacy	.608	.056	.580	**	
	Factor 3 – Teaching Without Web 2.0	.355	.076	.249	**	
3.	(Constant)	-.900	.441		*	0.53
	Factor 1 – Web 2.0 Efficacy	.552	.057	.527	**	
	Factor 3 – Teaching Without Web 2.0	.289	.077	.203	**	
	Factor 5 – Cyberwellness Efficacy	.225	.068	.179	**	

n.s. not significant

* $p < 0.05$; ** $p < 0.01$

Teaching with Web 2.0. The correlation between Efficacy for Teaching with Web 2.0 and the other factors were moderate, ranging from 0.45 to 0.48.

Using Factor 4, Efficacy for Teaching with Web 2.0, as the dependent variable and the other factors as independent variables, a stepwise regression was carried out. The model was significant, with an R² of 53.4 % (see Table 11.3).

Table 11.3 shows that all factors contributed significantly to the regression model except for Factor 2. Therefore, teachers’ Social Networking Efficacy did not have any impact on their Efficacy for Teaching with Web 2.0. In comparison, their Web

2.0 Efficacy had the largest impact as it explained 46 % of the total variance in Model 1. The addition of Factor 3, Teaching Without Web 2.0, increased the total variance explained to 51 %. Factor 5, Cyberwellness, had some impact but was not as large as that of the other two factors. The addition of this factor only enhanced the total variance explained by 2–53 %.

Research Question 3: How Do Singapore Preservice Teachers Envision the Use of Web 2.0 Tools in Their Teaching?

Close to 55 % of the survey respondents provided open-ended comments ($n = 148$). Table 11.4 shows the breakdown of the 157 open-ended comments received by categories.

Analysis of the open-ended responses showed that about a third of the preservice teachers studied categorically stated that they were either not using Web 2.0 tools in their teaching or had no specific ideas for using it. Another 6 % of the comments only stated Web 2.0 tools but did not describe how they would be used. About 34 % of the comments were related to teacher-directed uses of Web 2.0 tools. Some teachers envisioned using Web 2.0 tools such as blogs, wikis, and Facebook as a platform to post learning resources and homework for the students, just as they would use a learning management system. Others wanted to use Web 2.0 sites to produce lesson materials (e.g., produce podcasts as lesson resources). They also wanted to use platforms such as YouTube and Wikipedia to access learning resources for dissemination to students. Close to 30 % of the comments were related to student-centered uses of Web 2.0 tools. The teachers saw potential in using Web

Table 11.4 Student comments on envisioned used of Web 2.0 tools in teaching

Category	No. of comments	% of total comments
Not using at all/no specific ideas	47	29.94
Only Web 2.0 tool stated but no elaboration on specific uses	10	6.37
<i>Teacher-directed uses</i>		
As a platform to post learning resources for students	28	17.83
As a platform for teachers to produce e-learning materials	20	12.74
As a platform to access online resources to support teaching	5	3.18
<i>Student-centered uses</i>		
As a platform to engage students in online discussion	21	13.38
As a tool to support student reflection	16	10.19
As a platform to engage students in content cocreation	10	6.37
Total	157	100.00

2.0 platforms such as blogs and Facebook to engage students in online discussion. Nevertheless, there were only a small number of comments ($n = 16$, 10.19 %) that showed teachers envisioning the use of Web 2.0 tools such as blogs and wikis to support student reflection. An even smaller number of comments ($n = 10$, 6.37 %) were related to using platforms such as Google Docs or wikis for students to cocreate learning content through collaborative writing.

Discussion

In this study, 270 Singapore preservice teachers' Web 2.0 TPACK, the interrelationships between TPACK constructs and their conceptions of pedagogical uses of Web 2.0 tools were studied. The regression analysis also shows that teachers' perceived Web 2.0 Efficacy, Efficacy for Teaching without Web 2.0 tools, and Cyberwellness Efficacy had positive impacts on their perceived Efficacy for Teaching with Web 2.0 tools. On the other hand, their perceived Efficacy for Social Networking had no significant impact. The factor structures showed that these teachers largely distinguished between teaching with and without Web 2.0 tools. However, within these factors, they did not make conceptual distinctions between constructs such as Web 2.0 TPK, Web 2.0 TCK, and Web 2.0 TPACK and constructs such as PK, CK, and PCK. There are several reasons for these findings:

Personal Versus Pedagogical Uses of Web 2.0

The descriptive statistics of teachers' TPACK perceptions reveal that teachers' Web 2.0 Efficacy ($M = 5.22$) was rated much lower than their Social Networking Efficacy ($M = 6.22$). This could indicate that their exposure to Web 2.0 tools was predominantly in the area of social networking via platforms such as Facebook and MySpace, whereas they may not be as adept with using other Web 2.0 tools such as wikis and social bookmarking. This concurred with Moore and Chae (2007) who found that Web 2.0 tools were not often used by preservice teachers in a personal context. Therefore, it cannot be assumed that they have sufficient exposure and expertise with Web 2.0 practices beyond social networking that can be transferred naturally to their teaching. The results from this study support this observation because even though their Social Networking Efficacy was rated the highest among the five factors, the regression analysis indicated that this factor is not a significant predictor of their Efficacy for Teaching with Web 2.0 Tools. Bull et al. (2008) commented that preservice teachers tend to use social media within the context of pop culture. Therefore, there are differences between personal and pedagogical uses of Web 2.0 (Ravenscroft 2009).

Sophistication of Preservice Teachers' Web 2.0 Pedagogical Conceptions

The exploratory factor analysis of Singapore preservice teachers' Web 2.0 TPACK perceptions found five factors which rather than the seven constructs postulated in Mishra and Koehler's (2006) TPACK framework. Teachers' inexperience and lack of expertise with using specific ICT tools have been cited as a reason for their inability to distinguish between TPACK constructs in factor analyses performed on TPACK surveys (Koh et al. 2010; Lee and Tsai 2010). McLoughlin and Lee (2008) described Pedagogy 2.0 as one that supports student personalization, participation, and productivity. Its corresponding instructional system would reflect one which consists of learning content that are created, shared, and revised by students; learner involvement in setting learning goals; communication with and support from peers, teachers, and experts; inquiry-based learning processes; authentic and personalized learning tasks; and access to media-rich resources from multiple sources. The teachers' open-ended comments revealed that they had some appreciation for the communicative aspects of Pedagogy 2.0. However, a significant portion of their conceptions were still centered upon teacher-centered uses of the World Wide Web and lacked the full range of pedagogical activities embodied under Pedagogy 2.0. These results are not surprising as other studies have also found it common for teachers to be integrating ICT tools without significant shifts towards more student-centered pedagogies (Albion 2008; Glud et al. 2010; Wallace 2004).

Contextualization of Survey Items

The difficulty of isolating the seven TPACK constructs through exploratory factor analysis is not uncommon in TPACK survey studies (see Archambault and Barnett 2010; Chai et al. 2010; Koh et al. 2010; Lee and Tsai 2010). Problems such as the merging of survey items for PK and PCK into one factor have been attributed to the complexities involved in operationalizing the TPACK framework (Archambault and Barnett 2010). Conceptual TPACK studies such as Cox and Graham (2009) have also espoused similar views as the boundaries between TPACK constructs tend to be easily blurred. A recent paper by Chai et al. (2011a) found that the contextualization of PK items towards a specific pedagogical approach enabled them to isolate the seven TPACK factors through factor analysis. This could be because TPACK is an example of what Shulman (1999) termed as pedagogical reasoning, which is highly contextualized to different teaching situations. Therefore, it could be easier for teachers to distinguish between TPACK constructs with respect to specific pedagogical approaches. In this study, elements of Pedagogy 2.0 were incorporated into the Web 2.0 TPK and Web 2.0 TCK items. Since the potential of Web 2.0 tools is best exploited when integrated in ways that support

student-centered learning (Dede 2008; Nelson et al. 2009), it is worthwhile to consider if similar contextualization should be extended towards PK, PCK, and Web 2.0 TPACK items.

Towards Pedagogy 2.0: A Web 2.0 TPACK Lesson Design Framework

The above discussion shows that Web 2.0 TPACK may be pedagogical practices that need to be taught explicitly to preservice teachers. There is much evidence that engagement of teachers in ICT design activities is effective for helping them to make connections between their technological, pedagogical, and content knowledge (Mishra and Koehler 2006; Chai et al. 2011a, b). However, this study shows that the integration of Web 2.0 tools requires a unique set of pedagogical contexts which may be challenging for the preservice teachers. For these teachers who are still inexperienced pedagogically, scaffolds to help them consider various aspects of TPACK during lesson planning could be needed.

Angeli and Valanides (2009) proposed the need for instructional design processes that guide teachers to apply various aspects of their ICT integration expertise. Harris et al. (2009) also proposed the need to scaffold teachers' application of TPACK through the design of different content-based activity types. A Web 2.0 Lesson Design Framework is therefore proposed whereby the gaps in teachers' Web 2.0 TPACK which surfaced are incorporated as guidelines for lesson planning within a generic lesson design process (see Fig. 11.2).

The framework integrates the TPACK constructs as elements within a lesson planning process for teachers. Contextual influences such as curriculum and state educational policies are factors that impact teachers' adoption of ICT (Lim and Chai 2008). This framework suggests that teachers understand the pedagogical demands as indicated in the curriculum, state policies, and school policies in Phase 1. Teachers need to consider the types of CK that are to be constructed by the students, as mandated by the national curriculum. At times, the pedagogical approaches adopted for particular subjects or lessons may be influenced by school curriculum policies or national policies that point towards student-centered approaches. An example would be Singapore's IT Masterplan 3 which aims to foster students' competencies for engaging in self-directed learning and collaborative learning as part of their preparation for twenty-first-century skills (Teo and Ting 2010). Teachers need to examine their PK to determine the extent to which they need to be prepared for implementing these pedagogical approaches. Schools may also choose to adopt particular Web 2.0 technologies for certain subjects or learning activities. These three aspects in teachers' contextual environment may present them with opportunities for integrating Web 2.0 in new pedagogical approaches, or it may present some constraints to their lesson design by way of predetermined ICT tools.

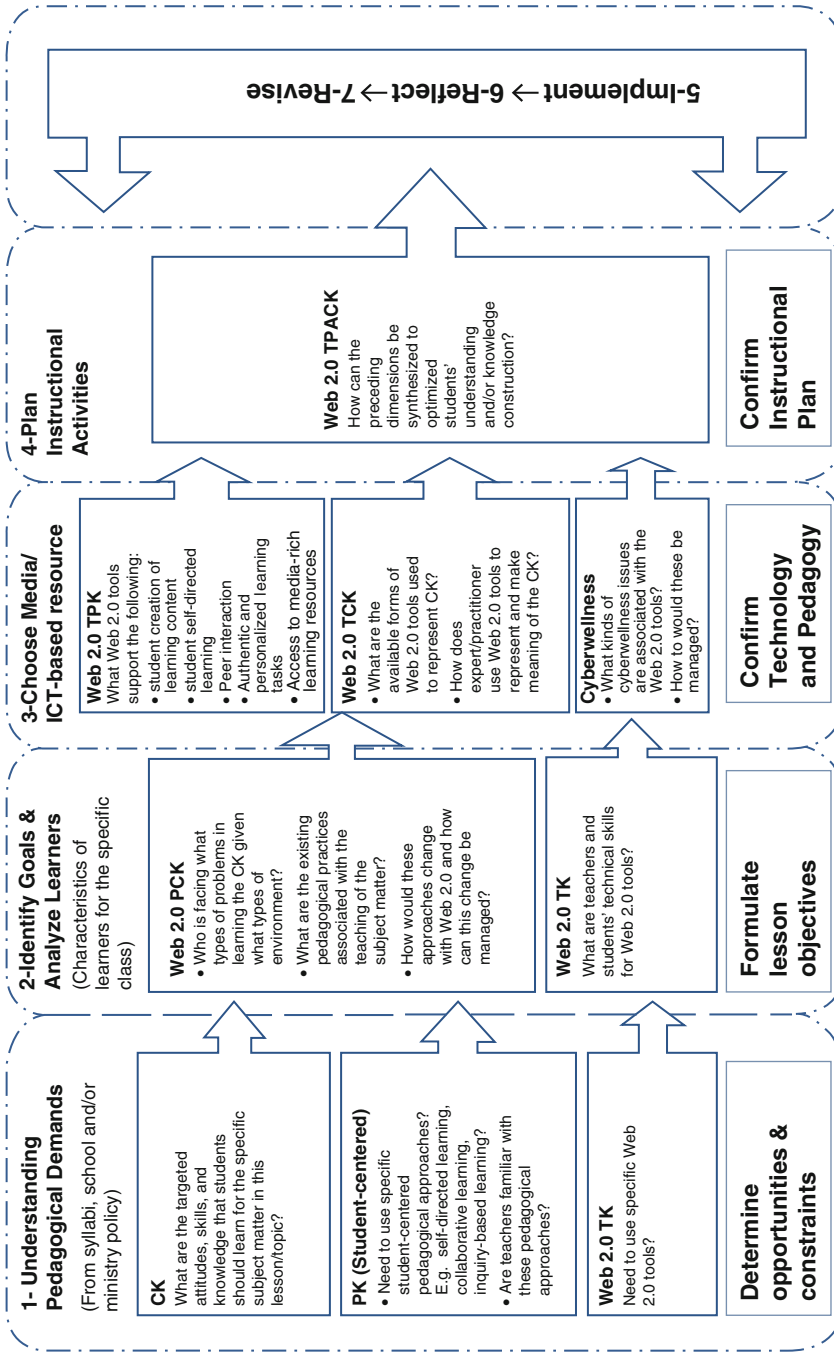


Fig. 11.2 Web 2.0 TPACK Lesson Design Framework

With an understanding of the pedagogical demands from state and school in Phase 1, teachers move to Phase 2 to better identify their instructional goals and to analyze their learners. In Phase 2, teachers first draw upon their PCK to analyze the learners, particularly their current pedagogical approaches for addressing the problems and misconceptions that different groups of students typically face with the subject matter to be learnt (Shulman 1986). The infusion of Web 2.0 tools may also require teachers to transform their established pedagogies for the lesson topic. Teachers need to be cognizant and ready to make these transformations. In addition, teachers also need to consider aspects of Web 2.0 TK, especially if both they and the students have adequate technical skills to teach and learn with these tools, respectively. These considerations help teachers to formulate their lesson objectives in Phase 2.

As teachers choose media and ICT resources in Phase 3, they can further consider the elements of Web 2.0 TCK and Web 2.0 TPK and also Cyberwellness. In terms of Web 2.0 TPK, teachers need to consider the affordances of various Web 2.0 technologies and their strengths and weaknesses for supporting facets of Pedagogy 2.0, that is, student creation of learning content, student self-directed learning, peer interaction, authentic and personalized learning tasks, and access to media-rich learning resources. Where specific Web 2.0 tools have already been preselected in Phase 1, the opportunities and constraints of the tool for supporting these facets of Pedagogy 2.0 need to be considered. Teachers also need to consider their Web 2.0 TCK in terms of the types of Web 2.0 tools that can be used to represent CK and if there are any Web 2.0 tools currently used in expert practice of the subject area. Based on the findings of this study and recommendations from Nelson et al. (2009), considerations of Cyberwellness have also been incorporated into the lesson design framework. As teachers choose the Web 2.0 tools to use, they need to consider its associated cyberwellness issues and how these should be managed. These analyses by teachers in Phase 3 will help them to confirm the technology to be used and the associated pedagogical approach.

Cox and Graham (2009) proposed that TPACK be contextualized knowledge at the level of lessons and activities. After teachers have analyzed the pedagogical demands, instructional goals, and learners and chosen the media in the first three phases, they can move into the planning of instructional activities in Phase 4. In this phase, they synthesize their analysis of the preceding dimensions to optimize students' knowledge construction and deep learning. Once the instructional plan is confirmed in Phase 4, teachers move to Phases 5–7 which involve implementation, personal reflection of lesson outcomes, and finally revision to improve the lesson. By infusing the various TPACK constructs into the framework, preservice teachers can be better scaffolded to consider the different dimensions associated with ICT integration more comprehensively.

Future Directions

The results of this study point to two areas for future research. Some studies suggest that practicing teachers may be better able to distinguish among the various TPACK constructs because of their familiarity with teaching practices (Koh et al. 2010; Lee and Tsai 2010). The first area would be to replicate this study with practicing teachers. In addition, the contextualization of the survey items to incorporate student-centered pedagogical items into the existing PK, PCK, and TPACK items can also be explored (e.g., see Chai et al. 2011a). Such kinds of studies can be used to understand how the validation of the seven-construct factor structure theorized by Mishra and Koehler (2006) can be improved. This contributes towards the methodological development of TPACK surveys and also allows the differences between preservice and in-service teachers' TPACK to be understood. These are gaps in current TPACK research that are outside the scope of this study and therefore not adequately explored.

The second area of future research is associated with formative testing and evaluation of the Web 2.0 TPACK Lesson Design Framework. Qualitative case studies can be conducted to compare the ICT lessons designed by practicing teachers who have and have not used the lesson design framework. This can allow researchers to understand if a Web 2.0 TPACK-integrated lesson design framework contributes to higher quality of Web 2.0-integrated design decisions by teachers. Studies of preservice teachers can also be conducted to determine if such a framework better scaffolds them to make Web 2.0-integrated design decisions during lesson planning. The practical applicability of the TPACK framework has been raised (Cox and Graham 2009). Further analysis of the Web 2.0 TPACK Lesson Design Framework can address this gap in current TPACK research.

Conclusion

This study examined how a TPACK survey can be contextualized for the integration of Web 2.0 tools into teaching and learning activities. Based on the results obtained, it proposed a Web 2.0 TPACK Lesson Design Framework that can be used to scaffold teachers' decision making during the integration of Web 2.0 tools. Such kinds of frameworks can enhance the theory-practice nexus of the TPACK framework and need to be further developed.

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Chapter 12

Learning by Doing in the Digital Media Age

Lynde Tan and Beaumie Kim

Keywords Digital media • Learning by doing • Social theory of literacy • Ethnographic perspective • School literacy practices • Out-of-school literacy practices

Introduction

Technology is now more than what is commonly known as information technology (IT) or information and communication technology (ICT) (Buckingham 2008). The changing characteristics of technology in contemporary times are described as being digital, interactive, hypertextual, virtual, networked and simulated (Lister et al. 2009), otherwise known as digital media. Digital media are electronic media that operate on numerical representations or digital codes (Manovich 2001). As the digital codes make media programmable, digital media allow convergence of various media for producing and distributing multimodal productions and reassembling these texts to accentuate its interactivity and aesthetic power (Everett 2003; Lankshear and Knobel 2007; O'Reilly 2005). What is distinctly new about digital media is not just the shift in physical properties from the analogue to the digital form but, more importantly, what changes this shift brings to social practices.

Digital media have enabled adolescents these days to become both consumers and producers of their own media texts (Lankshear and Knobel 2010; Reid et al.

L. Tan (✉)
School of Education, University of Western Sydney, Locked Bag 1797,
Penrith NSW 2751, Australia
e-mail: lynde.tan@uws.edu.au

B. Kim
Werklund School of Education, University of Calgary, Calgary, AB, Canada
e-mail: beaumie.kim@ucalgary.ca

2002). Lankshear and Knobel (2010) argue that the role of a text consumer and producer is no longer clearly defined in adolescents' multimodal literacies. They argue for a new role which they call the producer (Bruns, as cited in Lankshear and Knobel 2010, p. 10) to refer to a person who actively uses the resources available in their literacy practices to (re)create new resources that are in turn made available to others in their network.

Ito et al. (2008) emphasise that in this digital age, young people are acquiring social and technological skills necessary for participation in contemporary society while participating in friendship-driven and interest-driven online participation. They further argue that contrary to the perceptions held by educators, parents and policymakers, young people's online participation has given them access to different forms of learning. There is an increasing body of literature that describes adolescents' new culture of learning, such as *learning by doing* while creating texts using digital media (e.g. Lankshear and Knobel 2010). For instance, the young people in Lankshear and Knobel's (2003) study learnt about Microsoft's 3D Movie Maker and FrontPage, and how to use these applications, while using them to create web pages. Lankshear and Knobel (2003) argue that learning by doing or 'learning as you go' is the norm when young people experiment with digital media (p. 188).

However, Luke (2002) notes a general agreement that a dichotomy between school and out-of-school literacy practices exists. He further argues that the dichotomy is perpetuated by policymakers who 'lack the necessary designs, expertise, and generational orientations' (Luke 2002, p. 190) to realise new literacies, which are more evident in youth's everyday lives, in school. In line with Luke's (2002) argument, King and O'Brien (2002) argue that teachers play a part in translating policy that privileges print into classroom practices that devalue youth's expertise with language and literacy associated with technology use outside the school. Teachers, thus, establish a dichotomy between school and out-of-school literacy practices, when they use technology as 'old wine in new bottles' (Lankshear and Knobel 2006, p. 55).

A baseline research was conducted in 51 primary and secondary schools as well as junior colleges in Singapore to study the relationships amongst teachers' beliefs about knowledge and learning and their pedagogical practices. The study highlighted a gap between policies and implementation of technology for teaching and learning (Jacobson et al. 2010). Although teachers believed in the potential of technology in inculcating higher-order thinking skills in more authentic learning (such as analysing data collected from real-world contexts), technology was predominantly used to reinforce content-based or didactic instruction which teachers deemed more appropriate for preparing their students for the national examinations (Jacobson et al. 2007, 2010). Similarly, teachers' preference for didactic instruction was also reported by Lim (2006) in his study of technology integration in Singapore schools. In short, it can be inferred that technology used in Singapore schools has not incorporated adolescents' use of technology outside the school.

We acknowledge the need to understand the contexts in which adolescents' social practices of learning are better brought into play through their voices. This chapter therefore examines different contexts in which the emergence of their learning

culture happens and what the practices look like. This chapter contributes to the ongoing dialogue on a new culture of learning afforded by digital media in Singapore contexts. It specifically expounds on the term, learning by doing, and makes use of illustrative examples from two adolescent research studies to unpack the term.

The Social Practice View of Literacy and Learning

The social practice view of literacy and learning is the orienting theory that underpins the arguments we put forward in this chapter. By social practices, it refers to the ‘recurring patterns of behaviour that are culturally recognizable’ and ‘they involve people making meaning and communicating their meanings, by using language and other semiotic means’ (Papen 2005, p. 30). Hence, by literacy as social practice, I refer to the six tenets of the social theory of literacy espoused by Barton and Hamilton, namely:

- Literacy is best understood as a set of social practices; these can be inferred from events which are mediated by written texts.
- There are different literacies associated with different domains of life.
- Literacy practices are patterned by social institutions and power relationships, and some literacies are more dominant, visible and influential than others.
- Literacy practices are purposeful and embedded in broader social goals and cultural practices.
- Literacy is historically situated.
- Literacy practices change and new ones are frequently acquired through processes of informal learning and sensemaking (2000, p. 8).

From this perspective, literacy as social practice is used interchangeably to refer to the social view of literacy.

Gee’s work is widely cited for applying the practice view of literacy to learning. In his books (Gee 2003, 2004), he has made a unifying argument that children learn best through ‘cultural processes’ where there are modelling of behaviours by masters and support, feedback and information are given just in time only when needed (Gee 2004, p. 12). He contends that this learning is situated and less alienating for children. He furthers his argument by contending that children are more likely to acquire the skills that are important in new times by playing computer games in their everyday lives than through traditional schooling. He claims that computer games embed principles of learning that are more anchored in contemporary learning theories. Acquiring these skills through game play is in fact producing *mushfaking*, a term Gee (2008) borrows from prison culture to refer to ‘[making] do with something less when the real thing is not available’ (p. 180). Gee (2008) argues that *mushfaking* can be a possible starting point in applying the practice view of literacy to classroom teaching and learning.

Building on Gee’s perspective on the practice view of literacy and learning, Ito et al. (2008) further contend that literacy and learning are inseparable in social practices regardless of the sites of their occurrences. In Ito et al.’s (2008)

ethnographic work of young people in America, they suggest that young people have been using online spaces to extend friendships and interests. While participating in such online practices, the young people are also participating in self-directed and peer-based learning. Their study suggests that social contexts and learning are inseparable which thus shows how social and educational affordances of digital media can be related.

Brown (2005) strongly suggests that in the digital age, the culture of learning characterised by tinkering, experimenting and sharing in a community creates a new learning environment in education. Drawing on examples such as blogging, online chatting, participation in wiki and video-based game playing, the unifying argument points to the work of Lave and Wenger (1991) who argue that learning is best viewed as a social process that is situated in one's participation in social practices. Participation in social practices presupposes learning by doing something that is significant to the social and cultural contexts that one finds himself or herself in. This is the starting point for the discussion in this chapter.

We aim to identify the key tenets of learning by doing suggested by the work of Gee (2003), Ito et al.'s (2008), Brown (2005) and others who are proponents of Lave and Wenger's (1991) work on *situated learning*. These are the tenets that are taken up and expounded in the following sections of this chapter. It is important to note that we do adopt the narrower view of learning by doing which connotes hands-on experience or drills and practice.

Foregrounding Student Voices: Cases from Two Schools

We draw on cases from two different schools in Singapore to illustrate the ways in which learning by doing happens. Although both studies described in this chapter are based on different curriculum designs, they share similar approaches and dispositions. First of all, both studies foreground student voices in learning approaches and involve teachers to design curriculum. Second, there is a strong interest in listening to student voices in order to understand adolescents' media use through ethnographic perspective.

Barton and Hamilton's (1998) four aspects of an ethnographic perspective represent how we seek to understand the adolescents' engagement with digital media:

- It focuses on real-world settings.
- Its approach is holistic, aiming at whole phenomena.
- It draws on multiple methods of collecting data.
- It is interpretive and aims to represent the participants' perspective(s) (p. 57).

The primary merit in adopting an ethnographic approach lies in its ability to provide meaning in context, a cultural description of how communicative practices are instantiated and how artefacts are created (Barton and Hamilton 2000; Green and Dixon 2008; Heath et al. 2008; Kress and Street 2006). In the following parts of

the chapter, we illustrate how learning by doing happened in the two schools using various types of digital media through selected data (i.e. observations, interviews, artefacts, videos and online postings). We selected key incidents from the data we collected for in-depth analysis and discussion in this chapter. By key incidents, we refer to Emerson's (2007) notion that they are the events from my participant observations that 'suggest and direct analysis in ways that ultimately help to open up significant, often complex lines of conceptual development' (p. 457). Given the characteristics of an ethnographic perspective, it is more appropriate to achieve communicative validity that stresses 'the soundness of the argument put forward' (Carspecken, as cited in Knobel 1999, p. 15) by drawing on a range of data and providing thick descriptions of our two cases.

Multiliteracies Curriculum in Lakeshore High School

Lakeshore High School's (LHS, pseudonym) English Department was redesigning their language arts curriculum, informed by the New London Group's (Cope and Kalantzis 2000) pedagogy of multiliteracies when the first author started working with them. The department was keen to explore how this pedagogy could support their plan to incorporate the linguistic and paralinguistic modes of communication in their Year 2 language arts programme (for the 14-year-olds) (Tan and Guo 2009). The revised language arts curriculum for the Year 2 students included the reading, viewing and production of multimodal and multimedia texts. Hence, the revised curriculum in that year had made provisions for the students to participate in text production, such as developing brochures, PowerPoint and Flash multimedia presentations and 3D films.

The students discussed in this chapter were involved in creating Flash multimedia presentations and MediaStage productions as part of their multiliteracies curriculum. Flash allowed the students to create animation, integrate video into web pages, make games and develop Internet applications. To use Flash for these purposes, the students had to learn the programming language within the software called ActionScript. The production task of creating a Flash multimedia presentation was a combination of their language arts and computer literacy group project. The students were tasked to create a multimedia presentation to promote their new language arts curriculum targeted at potential overseas students who might be interested in learning English and studying in their school.

The Year 2 students had been reading Shakespeare's *Macbeth* in their language arts classes. At the end of the unit, the teacher wanted the students to use MediaStage to produce a short clip of 30 s to 1 min to cast parts from *Macbeth* Act 1 Scene 7 with the aim to portray any of the themes they had learnt from the literary study. MediaStage was an appropriate software for the literary study as the students were able to create 3D productions such as short films, television news, pop music video using the range of backdrops, props, sounds, images, recording facilities, text-to-speech technology, lighting and camera work made readily available within the animated learning environment.

All the adolescents who participated in this multiliteracies curriculum were Chinese, and they were about 14 years of age. They learnt how to use Macromedia Flash 8.0 (predecessor of Adobe Flash) not from their language arts lessons but in their computer literacy lessons for about 8 weeks. For MediaStage, however, only a 3-hour crash course was conducted by the local vendor that sold the software to the school. Due to the constraints of space and time, the language arts teacher asked for one or two student representatives from each project group to attend the training session. Eight participants, Jay, Wendy, Sally, Xin, Yenny, Tiffany, Melissa and Amanda, appear in this chapter, as we illustrate how they learnt by doing in small groups for all their production tasks around this multiliteracies curriculum.

Learning Geography in Good Shepherd Secondary School

Good Shepherd Secondary School (GSSS, pseudonym) had a group of Geography teachers who got together for professional learning circle with our project researchers every week to redesign and reflect on their Secondary one Geography lessons. The curriculum was designed based on our six design principles of game-integrated curriculum (Kim 2010):

- Engage them in group activities (developing epistemic communities), starting with open-ended questions (setting up the meaningfulness of the topic).
- Engage them in activities that provide relevant experience (using game or other tools).
- Require them to produce group or individual artefacts (encouraging their ownership of the process and product).
- Develop a sharing mechanism of the class (encouraging making their ideas public and further conversations).
- Engage them in consolidation and linking activities (understanding the connections and gaining confirmation about their ideas).

These principles were implemented by incorporating a game and other tools for Geography learning and creating spaces for sharing learners' ideas and artefacts in and out of the classroom.

The cases presented in this chapter emerged within the context of the changed curriculum. Secondary one Geography at GSSS in 2011 started with disaster-related topics (volcanoes, earthquakes, plate tectonics, landforms) differently from the typical sequence of the curriculum. This was done deliberately to set up a better context of meaningful and collective learning of Geography (i.e. common experience outside of school due to the proximity to Indonesian volcanoes and the sporadic minor tremors in Singapore affected by their activities). Two of the digital media that students used and we will discuss here are Edmodo and a game called Voyage to the Age of Dinosaurs (VAD). The latter was developed by involving the students and their teachers throughout different phases of the game development (Kim et al. 2013). VAD used in this curriculum was the project's third game

prototype that was focused on topics of navigation, maps and rock types with fossil search, excavation and assembly activities. Edmodo (www.edmodo.com) is a social learning site that resembles social media features, such as those of Facebook (www.facebook.com), but caters for the educational use of teachers and students by providing a safer platform for them to connect and collaborate.

GSSS is an all-boys school, and the students described in this chapter were in their first year of the secondary school. In GSSS's Geography classroom, VAD was used to teach the identified curriculum topics. It was also used outside of curriculum time in order to facilitate the longer play time. The teacher used Edmodo as an extended space for discussions; she did not use Edmodo to curricular topics solely but to let students continue exploring their areas of interest related to Geography or earth sciences. In Edmodo, there were around 13 frequent visitors and another 10 occasional ones who posted and responded throughout the semester. The rest of them were quiet or were responding only to the class matters such as exam time, homework and other assignments.

The Ways in Which Learning by Doing Happens

In this section, we put forward our arguments on how learning by doing can be understood by the way it can happen in adolescent literacy practices. Our viewpoints about learning by doing repudiate the Cartesian assumption that learning is the transmission of decontextualised and discrete knowledge from one individual to another (Brown and Adler 2008). By focusing on adolescent literacy practices, we advocate that learning by doing happens by situating learning in social practices, through learning in participatory culture and by tinkering with tools in everyday practices.

It Happens by Situating Learning in Social Practices

We argue that learning by doing means participating in the social practices similar to those of experts (Burn 2009). Learning by doing in the context of our studies was similar to learning to be practitioners of some sorts through 'enculturation into a practice' (Brown 2005, p. 3). Citing studio-based learning environments as an example, Brown (2005) explains how students learn to be architects, physicists and engineers by making public their work in progress and engaging in critiques with experts and peers. In such social learning environment, the students were enculturated into a practice by thinking like an expert and participating in processes and practices that experts in their field would involve themselves in. In other words, the students took on various roles needed for experts' practices that are comparable to those in professional communities.

In Burn's (2009) study on how a secondary school worked with four primary school children to create animations of *Little Red Riding Hood*, he describes

the shared responsibilities in the collaborative production and argues that such shared responsibilities are shared authorship where students ‘may adopt different roles in the production process, and practices of the industry may be simulated’ (Buckingham, Grahame & Sefton-Green, as cited in Burn 2009, p. 135). Such enculturation into the media production practices was tacitly acquired as one participated in the shared authorship of a collaborative digital media production that closely matched with the social practices of a media producer.

In LSH’s multiliteracies curriculum, the division of labour as shared authorship was also observed during the participant observations. For instance, on the first day of creating the Flash presentation in Xin’s group, Xin, Wendy and Jay were the scriptwriters when they discussed what to represent in the Flash presentation. Xin doubled up as a scribe whenever she typed out the group’s ideas on the possible narrative using Microsoft Word. Sally was the producer who used Flash to actualise their work and final ideas. In Xin’s group, Xin had to be the storyboarder to draw out their Flash presentations on the hard copy storyboard.¹ Wendy was also the proofreader to ensure that the written texts in the Flash presentation were grammatically correct. At different stages of creating their Flash presentation, the group was a team of producers or directors when they discussed how visual and music could be used to mediate their target audience’s perceptions of their school learning environment and programmes.

Similarly, various roles and practices that may look similar to geoscience practitioners were emerging in Edmodo with the students in GSSS. As the Edmodo space is less regulated by the teacher, students started asking new questions and suggesting opinions that are outside of curriculum, monitoring credibility of information sources, moderating discussions, asking clarifying questions and so forth. For example, a student named Greg realised that a question raised in class was never resolved, so he suggested revisiting it in Edmodo (see Excerpt 12.1).

Excerpt 12.1: Extended Geoscience Talk (Global Warming and Volcanic Eruptions) on Edmodo

I was flipping through my thinking journal and found out that we had forgotten to discuss the thinking question: Does global warming affect the number of eruptions. Well, most information I researched on states that volcanoes affect global warming, but this still does not answer the thinking question . . . Does anyone found the answer yet? Or does this question remain unsolved?

Five people participated in this discussion over 3 days trying to understand the relationships between global warming and the number of eruptions. The group eventually concluded that global warming would not affect the number of eruptions, but they acknowledged that there might be a need for more relevant research in this area in the future. Figure 12.1 shows a screen capture of another Edmodo discussion about ‘earthquake proof buildings’.

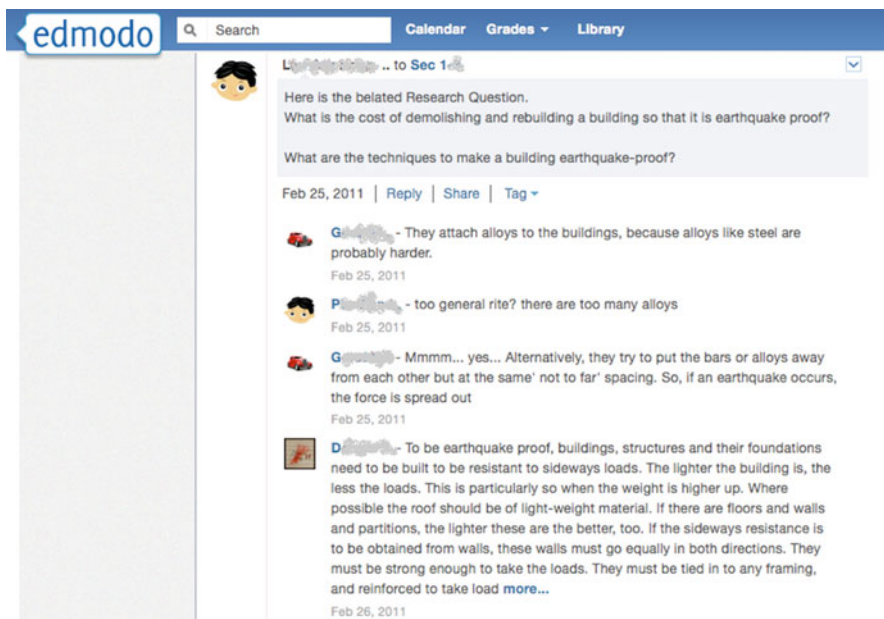


Fig. 12.1 Students' discussion on Edmodo

The roles more similar to geoscience community of practitioners emerged when Japan's devastating earthquake and tsunami happened on March 2011. Students started monitoring and sharing news online and continued to do so as the natural disasters developed. Their activities online started on 13 March and continued until 15 April. Dan, for example, shared about Indonesia's event followed by Japan's earthquake (see Excerpt 12.2).

Excerpt 12.2: Extended Geoscience Talk (Volcanic Eruption and Earthquake) on Edmodo

One of Indonesia's most active volcano has erupted, sending lava and searing gas clouds tumbling down its slopes. Volcanology official Agus Budiarto said on Friday that authorities were still trying to evacuate residents living along the slopes of Mount Karangetang . . . The eruption happened hours after a massive earthquake in Japan that triggered a Pacific-wide tsunami.

After Dan shared this news on 13 March, four students discussed about this event by sharing more details and other connected events and exploring relationships amongst them until 20 March. They discussed the causes, the magnitudes, the plates' faults and the changes that happened. Through their discussions, they verified and elaborated information and knowledge shared with each other and challenged their

own previous assumptions about the world. Their activities resembled the group of scientists who would have been studying these events at that time.

Nevertheless, further analysis demonstrated that the impetus for learning by doing, in school and out of school, was different. In out-of-school literacy practices, learning by doing was self-directed. It was also 'passion-based learning' (Lankshear and Knobel 2010, p. 20), as the learning was driven by their self-generated interest, purely for fun, curiosity and personal concerns. In LHS, Tiffany and Amanda are good examples of how they learnt by doing as they explored 'specialized and niche interests' in ways that gained acknowledgement from their network peers (Ito et al. 2008, p. 1). While learning to use digital media to create blog skins and fan fiction, Tiffany and Amanda were learning to be a blog skin creator and a fan fiction writer, respectively, in the online community that they participated in. In the case of GSSS, it was also apparent that Greg and Dan's postings and the responses to them also show that they were exploring and trying to understand about the earth's events out of their own interest and concerns. In contrast, coping with the demands of completing and submitting their schoolwork to meet a deadline appeared to be the impetus for learning by doing in school even though it was their inherent way of learning, in their literacy practices, in and out of school.

It Happens Through Learning in Participatory Culture

Earlier, we argue that learning by doing happens by situating learning in social practices. Building on this point, we explain how learning by doing happens in young people's participatory culture in their everyday practices. Participatory culture has been widely cited in adolescent literacies, such as by Dowdall (2009), Jenkins (2007) and Sefton-Green (2004), amongst many others. Jenkins explains that participatory culture includes:

- Affiliations: Memberships, formal and informal, in online communities centred around various forms of media, such as Friendster, Facebook, message boards, metagaming, game clans or MySpace.
- Expressions: Producing new creative forms, such as digital sampling, skinning and modding, fan videomaking, fan fiction writing, zines, mashups.
- Collaborative problem solving: Working together in teams, formal and informal, to complete tasks and develop new knowledge (such as through Wikipedia, alternative reality gaming, spoiling).
- Circulations: Shaping the flow of media (such as podcasting, blogging) (2007, p. 3).

Gee (2003) suggests that learning in the participatory culture is learning by doing. In the first study of (LHS) the participants' out-of-school literacy practices, this was evident when the bloggers claimed that they learnt about blogs from their peers who blogged. These peers taught them what a blog was and how to blog. For instance, based on my individual interview with Melissa, she reported that she learnt how to create blogs from her classmate, named Beatrice, in Class 2 F when she was

13 years old. She had seen Beatrice blogging at school (but outside school time) and was interested to learn how to blog. Beatrice guided her in her search for a free blog creation tool called blogger and sat down beside her to show her how to go about creating a blog, step by step. After Beatrice had introduced her to blogskin.com, she learnt how to change her blog skin on her own.

It is interesting to know that Melissa then taught Yenny how to create blogs. Yenny read her friends' blogs when she was 13 years old, but she approached Melissa to guide her through the steps needed to create her first blog, from choosing a template from blogger.com to adding a tag board, creating links to other people's blogs and publishing her first blog post. After Melissa did an example for her, she later picked it up on her own.

As in Greenhow and Robelia's (2009) study, both these girls started using their blogs not only to keep themselves updated on each other's lives but as sites of learning about schoolwork. For instance, Melissa once wrote on Yenny's blog post to ask her for help in using Flash. Although explicit instruction was given on how to use Flash, the girls needed just-in-time help in learning how to use Flash to create their productions. Instead of waiting for the next lesson on Flash where Melissa could have approached the teacher for technical advice, she would rather use blogs like a helpline to get her peer's technical advice to resolve her problem when learning to use Flash to create a presentation.

Through Edmodo interactions in GSSS, participatory culture could be seen from their affiliations and collaborative problem solving. On 31 January in discussing volcano in the classroom, some students were wondering about the difference between lava and lahar. 'How is lahar formed?' A student asked and the teacher wrote on the board, but it was not discussed in class. The students searched and discussed about lahar online for the next 10 days (1 January–9 February). Jason started the post on 31 January (see Excerpt 12.3).

Excerpt 12.3: Extended Geoscience Talk (Lahar) on Edmodo

I found out what Lahar is. It is the mixture of all the pyroclastic materials mixed with half-solid and half-liquid lava. Meaning that the lava looks like mud because it is solidified and it is half liquid, thus it flows down like a mudslide.

After Jason posted, two other students shared what they found about how lahar forms, and the discussions continued until 9 February amongst 17 students, elaborating on the process, contents and effects of lahar. The discussion continued to talk about relevant cases (i.e. Mt. Vesuvius and Pompeii), to compare lahar with volcanic ash and to discuss geologists' efforts to predict lahar's paths and disaster prevention measures. They were practising collaborative problem solving to understand various aspects of a natural disaster.

This example demonstrates classroom practices being extended through the digital media. Their membership for Edmodo was requested by the teacher, but the participation in the discussion was voluntary and often emergent around their own

interest (but within geography content related). Edmodo can be seen as a ‘boundary object’ (Bowker and Star 1999, p. 16), which has similar characteristics of Facebook and provides an informal space to discuss issues of their own interest. At the same time, it would limit their issues closer to their school Geography-related topics and also can be a space that can be tightly focused on supplementing classroom practices (e.g. sharing notes, making announcements, conducting quizzes).

It Happens by Tinkering with Tools

Extending on our last two arguments about learning by doing, this part of the chapter explains how learning by doing happens by tinkering with tools in adolescents’ participatory culture in their school and everyday practices. Learning by doing, in the sense of learning how to ‘first and foremost engage with the software’ (Sefton-Green 2005, p. 100), was our research participants’ way of learning how to use digital media. These practices were learnt by what Ito et al. (2008) describe as ‘tinkering and exploration’ with the new digital media.

In LSH’s multiliteracies curriculum, learning by doing was exemplified as the adolescents in the study showed that they would rather experiment with the digital media than engage in storyboarding before the actual production began (Tan 2013). Storyboarding was an imposed school literacy practice, and it was expected to precede the actual digital media production in school. The data in this study, however, suggest that the participating adolescents were more preoccupied with the experimentation with digital media so that they knew what could be afforded by the digital media. These adolescents show that it was possible to complete a digital media production without first completing a storyboard.

The interview data with the adolescents also confirm that learning by doing was their way of learning how to use new digital media for text production. Yenny’s viewpoint is a good illustrative example (see Excerpt 12.4).

Excerpt 12.4: Yenny’s Viewpoint on MediaStage Production

We didn’t follow our plan because we find it too tedious and also we didn’t get a feel of how using MediaStage is like before the planning. While doing the actual movie, we found out more and better approach to doing our task. If we had a chance to explore the functions in MediaStage more before planning, maybe we could come up with ideas and a more ideal and realistic plan and thus follow our plan.

There was evidence that learning by doing was integral to the participating adolescents’ out-of-school literacy practices. This was first noted when none had to refer to any form of training manuals or help sites to learn how to use a range of digital media to engage in out-of-school literacy practices, such as creating their

own emails, instant messages on MSN, blogs and blog skins, fan fiction and personal profile pages on social networking sites such as Friendsters.

For instance, Tiffany started blogging when she was 13 years old. She first learnt how to use html language in her computer literacy class when she was in Year 1 in 2006. Although she had learnt how to use html language from the explicit instruction received at school, my interview data suggest that she relied more on self-exploration when using it to create blog skins in 2007. In my individual interview with Tiffany, she explained to me how she first started using html language, Photoshop and Adobe ImageReady to create her blog skins from scratch (see Excerpt 12.5).

Excerpt 12.5: Tiffany's Viewpoint on Experimenting with Digital Media

I wasn't really familiar with html at that time. You must you must like, you must I mean you must know that programme well in order to create better, better products. Then you must explore (on your own) . . . Er they are not very easy to use. You try, if possible, you try to see some works of others, then you try to follow and you must try it out frequently like almost every day. Then from there, after you know how to use the tools. Yah, then you can try making your own [sic].

In GSSS geography classroom, tinkering with tools happened in a different way when they were playing the VAD game. As the third prototype, some of the programmers' interface of the game could be accessed. Although it was not apparent in the players' interface, some students found out the menus or the shortcut keys and started teaching other students (see Fig. 12.2a). Some students figured out how to move their view out of the playing avatar and see the terrain from above (see Fig. 12.2b). This, in some ways, changed the rules of the game play because they were playing 'navigation' quest. Students were supposed to find multiple X marked locations within time limits in order to acquire fossil digging tools, based on the navigation clues with compass bearings or general directions. They were checking out the landscape and comparing the views from above with the first-person view, which would accelerate their finding and moving to the X marked locations. In a certain level, they were challenging game restrictions and modifying the game out of their interest, which Ito et al. (2008) saw as the behaviour of 'geeking out'.

Conclusion

When designing learning opportunities for adolescents in the digital age, it is worthwhile to consider Street's (2005a) and Barton et al. (2007) strong suggestion that literacy curricula and assessments should be designed around adolescents' literacy practices by taking account of their entrenched ways of participating in



Fig. 12.2 Tinkering with VAD: (a) changing options and (b) viewing from above

social and cultural practices. The adolescents in both studies have introduced their out-of-school literacy practices into their school literacy practices when using digital media. This finding is similar to those of the studies conducted by Bulfin and North (2007) and Ito and colleagues (2008). We tend to follow Ito et al.'s (2008) argument that '[r]ather than assuming that education is primarily about preparing for jobs and careers', policymakers in Singapore might want to 'think of it as a process guiding young people's participation in public life more generally' (p. 3).

In this chapter, we have highlighted learning by doing as one emergent culture of learning that has been increasingly observable in adolescents' literacy practices. By focusing on the practice view of learning by doing, we believe that pedagogical

connections can be more accessible when practitioners understand ‘the kinds of things young people are doing and being outside school’ (Lankshear and Knobel 2003, p. 206) and then consider ways of integrating ‘their experiences of learning outside school with what [practitioners] can and should teach about discrete media’ (Sefton-Green 2005, p. 109) and digital media production. The ethnographic accounts of how learning by doing is enacted in adolescents’ school and out-of-school literacy practices provide a good starting point for practitioners and educators who are keen to redesign learning opportunities that are more viable in the digital media age.

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Chapter 13

Singapore Youth's Digital Culture of Informal Learning

Rose Yee Hing Liang and Li-Yi Wang

Keywords Digital culture • Informal learning • Singapore youth • Self-directed learning • Social learning

Introduction

New media is characterized by Web 2.0 interactive and participatory technologies which exert an impact on society through their use by different groups of people acting and interacting with each other. This is said to converge towards the development of Thomas and Brown's (2011) new culture of learning afforded by digital technologies in general to specific cultures developed in the environment of particular digital platforms, such as Facebook and online fantasy sports games. As a contribution to this burgeoning work in the study of cultures of learning afforded by new media technologies, we present our study of a group of youth's new media engagements and the emergence of this new culture of learning in the Singapore context.

In this paper, we present findings from our focus group study of 32 secondary and preuniversity students in Singapore on their new media practices. Our findings suggest the existence of a digital culture of informal learning that has emerged and developed through the youth's online participation in different new media such as Facebook and YouTube and different gaming spaces. This digital culture of informal learning is characterized by self-regulated learning (learning on one's

R.Y.H. Liang (✉)

Department of Sociology, Faculty of Arts & Social Science, National University of Singapore, Singapore
e-mail: soclyrh@nus.edu.sg

L.-Y. Wang

National Institute of Education, Nanyang Technological University, Singapore
e-mail: liyi.wang@nie.edu.sg

own) and social learning (learning from others including peers, family members, and online participants) and learning through prosuming (involving both consuming and producing) *and* interlinks across spaces of formal/informal learning. We begin this chapter with a brief review of relevant literature on digital culture and informal learning, followed by the methodology and the findings. We conclude with a discussion of implications of our findings for transforming learning and pedagogical practices.

Relevant Literature: Digital Culture and Informal Learning

Digital Culture

The concept of digital culture is used interchangeably with a plethora of other related concepts including new media culture, cyberculture, networked culture, or Internet culture (Silver 2004). Digital culture, since the 1980s, has burgeoned into a field of study (Rabinovitz and Geil 2004) as technological innovations related to the development of computer and digital technologies are shaping every aspect of our lives – how we think, how we socialize and behave, our sense of who we are (Gere 2008; Turkle 1995), and how we learn (Shaffer et al. 2005). This emergence and development of digital culture (Gere 2008) or computer-mediated culture (Manovich 2003) as a dominant descriptor of contemporary society is also evidenced in the proliferation of digital culture research centres, professional associations, conferences, and journals on the topic (Silver 2004).

The early interpretations of digital culture were inflected with a certain utopianism extolling the possibilities for engaged citizenship and democracy (Hawk 1993). Others, however, expatiated a pessimism about the emergence of a new space of commercial and ideological power (Hartley 1999). Furthermore, these early explanations focused on the technology that was somehow able, perforce, by itself, through its affordances to bring about a radically transformed society based on digital culture. However, current research in the field recognizes the importance of considering human and social agency (Livingstone 2002; Sefton-Green 2004), particularly in regard to people's use or practices of new media, in mediating the affordances of digital technology to evolve specific digital cultures in different.

To unpack digital culture, we consider the concept of *culture* of which digital culture is a part. As well known, the literature has identified hundreds of ways to define culture. For the purpose of this chapter, we use Liang's (2007) definition of culture which is adapted from Shibutani (1986):

Culture is an inter-related set of beliefs, values, norms, and practices manifested in acts and artefacts that characterize particular social units – a community or any of its constituent groups. It is also the product of collective adaptations made to the particular circumstances that a particular social group faces. (Liang 2007, p. 42)

Also, although there are many definitions of digital culture (Gere 2008), for the purpose of this chapter, we use the following definition that is informed by the definition of culture above:

Digital culture is an emerging set of values, beliefs, norms, and practices that characterize a unit or any of its constituent parts that are created, sustained or transformed through people's acts and interactions within the current network society.

In this definition, we would like to highlight three important points in the conceptualization of "digital culture":

1. The definition gives significance to people's acts and interactions and is focused on everyday life.
2. Digital culture is associated with the concept of "network society" (Castells 2010). This network society refers not only to the technological aspects of network society but to both the virtual and actual world. We understand this network society to consist of many interconnected social units (i.e. social groups/communities) in the digital world as well as the actual world. And each of these social units such as Facebook, YouTube, and other types of online communities can form distinctive cultures. These social units constitute part of a multilayered whole. In other words, digital culture is part of and nested with larger concepts, for example, of youth culture and commercial culture. Digital learning culture itself includes the digital culture of informal learning among other kinds of learning cultures.
3. Digital culture is emergent and ever changing particularly since digital technologies are constantly creating new or modifying old practices. For example, the earlier Web 1.0, which facilitated information retrieval, has been superseded by Web 2.0 which includes "a social element where users generate and distribute content, often with freedom to share and reuse" (Creeber and Martin 2009, p. 3).

The above definition of digital culture informs our argument that the youth in our study are developing a digital culture of informal learning in their new media participations. Through their acts and interactions in network society, the youth in our study have emerged a specific form of informal learning culture.

Informal Learning

For the purpose of this chapter, we define informal learning as:

A natural accompaniment to everyday life. Unlike formal learning and nonformal learning, informal learning is not necessarily intentional learning, and so may not be recognized even by individuals as contributing to their knowledge and skills. (European Commission 2000)

Various frameworks have been used to conceptualize informal learning and the other two forms of learning (i.e. formal and nonformal learning). These frameworks recognize that the boundaries among the three learning forms are fluid (Colley et al. 2004; Sefton-Green 2004). Colley, Hodkinson, and Malcolm, for example,

identify 20 criteria distinguishing formal and informal learning and further grouped these into four clusters of process, location and setting, content, and purposes to describe formality/informality in learning situations. In addition, they conceptualize formal and informal learning as differently interrelated or balanced in different learning situations. The specific balance of formal and informal learning is said to be important to educational studies since they may indicate the emergence of new learning models in different contexts. The authors also suggest that the different interrelationships between formal and informal learning influence the nature and effectiveness of the learning. We argue that this framework, with the idea of different balances in formal and informal learning that characterize learning situations, is useful in transcending polarized interpretations of the three forms of learning. To us, the point of studying the intersectional spaces of formal and informal learning to identify the emergence of new/alternative learning models is particularly useful.

On the literature on informal learning itself, Schugurensky (2000) has identified three forms of informal learning: self-directed, incidental, and tacit. However, these characteristics are not unique to informal learning and may also constitute aspects of formal learning.

Digital Culture and Informal Learning

Digital culture and informal learning may be conceived as part of an emerging area of study – informal learning with technology outside school (Sefton-Green 2004). A variety of perspectives which converge to articulate literacy as practice informs this area. These include New Literacy Studies (NLS) (Gee 2010), new media literacy perspective (Jenkins et al. 2006), new literacies approach (Carrington and Robinson 2009; Sefton-Green 2003), media and cultural studies (Buckingham 2007), and the cultural/anthropological approach (Ito et al. 2010).

There has been much work on the study of out-of-school literacy and nonschool digital practices (Hull and Schultz 2001) emanating from the NLS approach. As well, Ito and team (2010), in their study of youth's new media participation and kid's informal learning, proposed two schemes of youth genres of new media participation in their study of kid's informal learning. One scheme describes genres of friendship and interest-driven practices and another describes genres of hanging out, messing around, and geeking out.

In addition, there are many studies of out-of-school learning which are suggestive or identify different models of learning as part of a digital culture of informal learning that formulates interlinks with formal learning, including Sefton-Green's (2004) study of chatrooms used by primary school girls. The author notes the emergence of new models of learning developed through these girls' interactions and negotiation, involving the transferring of formal knowledge to the informal chatroom setting. Also included is the work by Shaffer and his colleagues (2005) on video games and their potential to develop new and alternative models of learning through meaningful activity in virtual worlds.

In light of this discussion, we note that the study we are reporting partly addresses this gap in work on informal learning in the Singapore context which has tended to be focused on the study of formal learning. In addition to this study, we may mention the work of other researchers in the Learning Sciences Lab, National Institute of Education, such as Anderson and Wales' (2012) project on digital storytelling in- and out-of-school contexts, Kim et al.'s (2010) work on the use of kids' informal learning experiences for the design of learning environments for study of the Earth sciences, and the work of Wong and colleagues (2010) on mobile learning.

Methodology

The findings we report emanate from a part of a larger study, the Singapore Digital Youth Project, the purpose of which is to develop a grounded theory of youth's new media participation. In this study, we are in the process of developing a modified ethnographic approach, involving a variety of methods: physical and online observations, focus group, and semi-structured and in-depth interviews. For this paper, we focus on the focus group data, which had been conducted to ascertain the ground in terms of youth's new media engagements. In this paper, we draw on our focus group study and report findings relevant to the focus of this paper on our claim that youth through their new media participation have emerged and developed a distinctive culture of informal learning. We stress that our findings are preliminary and that our hypothesis of the youth's development of a digital culture of informal learning will require more empirical and theoretical work to achieve theoretical saturation of this theme of culture of informal learning.

We conducted seven focus group discussions involving a total of 32 students, 4–6 per group, aged 13–18 years, from secondary school (government government-aided schools or special schools) and preuniversity (junior college) students in Singapore. Our criteria for selecting focus group participants were based on criteria of age, from 13 to 17 which covers the secondary and preuniversity age group and fluency in use of new media. The participants were recruited through personal contacts and snowballing; some of these contacts linked us with several schools. Thus our focus groups varied from groups being composed of students from one class level or from different class levels in a particular school, as well as those focus groups which combine individual students from our personal contacts. The focus groups were audio- and video-taped and transcribed. The transcriptions were analysed using grounded theory procedures. We began with line-by-line initial coding to focus coding with memo-writing to support the researchers' hypotheses and reflections on the emergence of categories. In supporting our argument about the emergence and development of digital culture of informal learning, we re-examined our transcribed data and rearranged our categories to support the argument of the development of a culture of informal learning. We report on these in this article. In the findings, we identify the youth by fictitious names, followed by gender, then age at time of interview, and focus group details.

Findings

We present our findings that relate to our hypothesis that youth in our study are emerging or have emerged a digital culture of informal learning. Our findings disclose two aspects of the digital culture of informal learning: practices of learning and learning across formal/informal space.

Practices of Learning

In the practices of learning aspect of the digital culture of informal learning, we further identify two subcategories, including *self-directed/social learning* and *learning through prosuming*. Self-directed learning refers to learning on one's own, characterized by intention towards attaining a goal and awareness of trying to reach such a goal (Schugurensky 2000). Social learning refers to learning through others (from and with) such as peers, family (parents, siblings), and online participants, not necessarily with intention and awareness with aspects of cooperation or collaboration. We propose a continuum of self-directed to social learning in which there is blurring of boundaries of these two kinds of learning. In reality, any particular learning situation can locate along a continuum to include attributes of both self-directed and social learning.

In learning through prosuming category, prosuming is noted to be a specific characteristic of Web 2.0 which provides technological affordances for learning through prosuming (Ritzer and Jurgenson 2010). Learning through prosuming involves both learning by consuming and producing (e.g. content). Given this, we envision a prosuming continuum with consuming on one end and prosuming on the other. Many activities involve a blend of both consuming and producing which involve different skills and competencies. In learning through consuming, a person learns by receiving information, by watching something. However, when it comes to activities such as playing a game, there is certain amount of creative production inherent in the performance.

In learning through producing, a person creates something like a piece of work, such as art, music, or strategies in a game. For example, learning (although often incidentally) through prosuming is instanced in Facebook which combines consuming and producing in which a community consumes the content that they produce as when a person takes pictures to upload for others to enjoy and provide commentary on. We highlight learning through prosuming as a continuum of learning from consuming to producing. We do so in consideration that, although the Web 2.0 technologies afford learning through prosuming to occur, the particular way in which it is used by users that leads to the creation of a particular learning culture may show more emphasis on learning through consuming than producing, as our data will indicate for the youth in our study. Thus, different digital cultures of informal learning may locate differently in the prosuming continuum from consumption to production. If we present our two continuums in diagrammatic form, we can derive

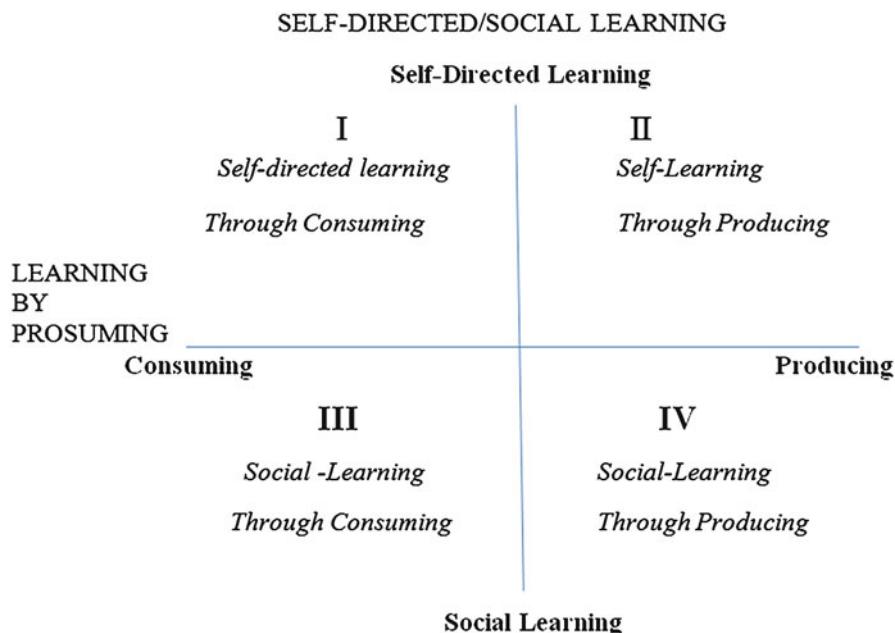


Fig. 13.1 Practices of learning

four possible combinations (Fig. 13.1). These possible combinations are evident in our data. We discuss each of these practices illustrated with examples from our study. We note, however, that these practices are interrelated but separated for purposes of analysis:

1. Practices of self-directed learning through consuming
2. Practices of self-directed learning through producing
3. Practices of social learning through consuming
4. Practices of social learning through producing

Practices of Self-Directed Learning Through Consuming

In practices of self-learning towards the consuming end of the prosuming continuum, youth in our study are learning on their own (quadrant I, Fig. 13.1). They are motivated by interest and learn mainly as a consumer who access, digest, and acquire some knowledge/skills during the learning process. For example, PFP Sony searches the Internet (a lower-level form of creative production) for content knowledge (information) from websites and YouTube in pursuit of his interest in animation:

I watch animation . . . , then maybe check out some of the background like who's the voice actors, who's the one who created the opening themes or all these things. Yea . . . , because

some of their animation is seriously very good I sometimes use Youtube to check up trailers for the future animation that is about to come out (PFP Sony, male, 17 years old)

In his search for information, Sony is learning about a different language and culture and gaining some appreciation of it through his liking of animation. As he notes about animations, “they are quite unique from reality, they can exaggerate the jokes and make it more hilarious and absurd” (PFP Sony, male, 17 years old). Similar practice lies in the conversation with Bell when she talked about watching Korean dramas:

[I watch] Korean drama [while on YouTube] . . . , I find that Korean language is very cool . . . , the way they speak is very cool and some of the actors are very good looking And the way they act in the show is really nice. (Bell, female, 17 years old)

Thus, we suggest that Bell is coming to have some familiarity with Korean language (to see it as “cool”) and culture at least as portrayed in the dramas and therefore an appreciation of linguistic differences and cultural differences between people of different countries. The youth watch YouTube to learn how to make a French braid on hair, to play *Bruno Mars*’s songs with a guitar, to make an extraordinary makeup for a party (Bell, female, 17 years old), as well as how to run, sprint, build stamina, and cook (James, male, 15 years old). Also, the youth go to YouTube to involve in other consuming activities – watch new episodes of TV programmes or listen to and keep updated on new songs (Yaorock, male, 17 years old).

Practices of Self-Directed Learning Through Producing

In practices of self-learning through production, the youth are learning on their own (quadrant 2, Fig. 13.1). They are motivated by an interest to create content using different media (e.g. YouTube, blogging website). Self-learning through production is instanced in Rocky (female, 15 years old), who uses Facebook mainly to upload pictures taken from various events (school activities and outings). Also Rin writes her self-reflections in a blog which she keeps private rather than sharing with anyone:

I will post whatever I feel [on blog] The real things that I feel right So I do not want people to know what I was thinking about. So it is more of a self-reflection for me. (Rin, female, 17 years old)

In this learning process, Rin is self-reflecting on her own (her blog is private and not shared), by which we can assume the presence of some self-awareness and understanding of self. In another instance of this form of learning, Happy Boy (male, 13 years old) talked about being bored and surfing the Internet for applications, latching on to a video-making application, and creating a video which he quickly completed and continued to search for more applications in his “goal” to ease his boredom.

Practices of Social Learning Through Consuming: Learning from Others

In practices of social learning through production, the youth are learning from others (quadrant 3, Fig. 13.1) – *from* peers, family (parents, siblings, relatives), and online participants who provide knowledge, direction, and guidance. In terms of learning from family, PFP Sony (male, 17 years old) already referred to above talking about his brother introducing him to his animation hobby. As he describes his interaction with his older brother, “I always watch what he (watch) and (I) learn I just watch, ah, or we will chat a little bit and if possible on different topics la”. This chatting includes PFP Sony asking his brother about the meaning of “weird” Japanese terms and humour. In this process, PFP Sony is learning about a language and culture different from his own. Also, Bell mentioned that “with the help of friends”, she was able to solve her problem in using blog. She described a learning process involving problem-solving with a particular digital technology:

When I was having my own blog right . . . , there is a lot of html codes, which I do not know what it is about initially . . . , it is like just this page cannot be displayed . . . So I took like one week or so to learn how to edit those html codes With the help of my friends, like it take quite some time, it is not as easy as like Facebook and Friendster. (Bell, female, 17 years old)

In this kind of learning, Bells is learning to problem-solve with regard to technical aspects of a particular media. In another example of social learning *from* friends, ZuZi had accepted some strangers as friends on her Facebook account but ran into problems with these stranger “friends”:

In Facebook . . . , there were some of them like, they started chatting when I was online. Then they ask where are you from, name, everything, then it was like quite scary So I told my friends, so actually when I created Facebook I did not know that you can actually block the person. Yea so my friends said that you can actually block, so I asked the process so it was just like click the word block so you can block him. (ZuZi, female, 16 years old)

Thus, ZuZi is learning about emerging “norms” from friends with regard to online social relationships, in this case, on accepting strangers as friends on Facebook and the personal security that may be compromised. In yet another example, Stephanie and Rocky (both females and 14 years old) noted that although they did not have their own Tumblr accounts, they visit their friends’ websites frequently and read their postings.

Practices of Social Learning Through Production

In practices of social learning in production, the youth learn *from* or *with* others or both (quadrant 4, Fig. 13.1).

Learning from Others This means being supported and learning from knowledgeable others not formalized in a teacher role. This is instanced in the case of You (female, 17 years old) whose self-learning through producing took place via a

story-writing website – a learning community in which participants share their work and receive feedback to develop and improve their stories. You talked about being involved in this various story-writing websites, including a fan-fiction website for several months. Her learning process was as follows: Every week she would train herself to write a story in a specific genre (e.g. tragedy or romance) of 3,000–4,000 words in 3 h. She would then submit the story and later would rewrite and resubmit the story taking into consideration the comments received from online participants in the story-writing website.

Thus, You is creating content, sharing with others, and receiving feedback. In so doing, she said that she had improved her English grammar and composition writing as well as getting inspiration, thereby spurring and building creativity. Although You said she read other people's stories, she stopped because of school-determined "time constraints". Given this, we identify You's example as evidence of learning *with* and *from* others through production but more on learning *from* others. Another instance of learning *from* others through learning production is Boystar (male, 15 years old), who told a story about his friend teaching him how to remix song, to "first choose (the) song, drag, put beat in the correct place" after which he would practise making songs after he learned.

Learning *with* Others Learning *with* rather than *from* others involves collaboration and co-constructing of knowledge and is instanced in YaoRock's (male, 17 years old) account of his involvement in MapleStory, a massively multiplayer role-playing online game (MMORPG). YaoRock is interested in developing his skills and abilities in the game. He likes chitchatting with friends about how to improve their skills, what items to get, and how to kill the monsters in the game. He is guided by and takes advice from more experienced friends who are also playing the game. Meanwhile, he gives his opinions to his friends who want to play the game. During the learning process, both he and his friends are learning with one another in terms of getting to a higher level in the game. As another example of learning *with* others through producing, Kim (female, 14 years old) would "mix (her) own ideas with some music/notes of songs with classmates for a school project and with friends outside school".

So far we have presented the four kinds of practices of learning with which the youth are engaged. Comparatively, the youth are more involved in self-directed learning and social learning through consuming (end of the prosuming spectrum) than through producing. In social learning through producing, the youth are more involved in learning *from* (supported or scaffolded learning) than co-constructing knowledge *with* others (collaborative learning). We suggest that this distinctive pattern of learning practices characterizes the informal culture of learning of the group of youth in our study. In the next section, we move on to the other feature of the culture of informal learning of youth in our study: the relationships between formal and informal learning. The first relationship highlights that learning across formal/informal space is going on in this culture of informal learning, and the second relationship features a particular construction of the informal learning binary that is constructed by the youth.

Learning Across Informal/Formal Space

Our findings suggest that in the primarily informal learning of the youth's culture of informal learning, formal learning is going on. For example, students noted that teachers are using Facebook pages, Yahoo Messenger (MSN), or Google to upload lesson materials for them to download. Also, many students participate in their Facebook class group (e.g. Gary and Zuzi) or MSN chat (e.g. James and Zuzi) to find out about or keep classmates abreast of classroom developments, to conduct CCA duties (e.g. Rajo, female, 16 years old), or to do school project work, whether to communicate with team members about project work logistics, share resources (i.e. PowerPoint slides), or do actual research such as using their Facebook networks to administer a project survey (e.g. PFP Sony).

And vice versa, we note the example of Gary (male, 15 years old), in which his formal learning in the school setting is strongly characterized by informal attributes of learning. Within the context of school curriculum, Gary's school activities are characterized by voluntarism in the choice of topics of interest. He has worked on projects of his own choosing such as women's and children's rights and teacher stereotypes and is involved in online communities that advocate these issues. This may be due to the kind of school Gary attends, a special arts school charged with the mission to develop the arts. Another illustrative example is the e-learning day in Rocky's (female, 15 years old) school, which creates a learning environment incorporating aspects of informal learning within a formal setting.

Our analysis reveals that many students construct a binary in which schools are for education and online activities are for entertainment purposes. James (male, 16 years old) asserted that games "are a form of entertainment" rather than learning, while PFP Sony saw Japanese anime as a "form of entertainment – fun". In articulating this binary relationship between "learning" in formal and "entertainment" in informal space, the students added that they see school as spaces of stress and online as spaces of relaxation from the stress of school, of "de-stressing" after exams. They seem to have difficulty imagining that school can involve play.

Discussion and Conclusion

In this section, we want to highlight our two major findings for further discussion:

1. The practices of learning are characterized more by self-directed and social learning through consuming than through producing:

We would like to reflect on whether this finding is cause for any concern. After all, the youth are consuming media for entertainment and relief from the stress of school and that may appear healthy. However, we contend that this is a cause of concern from the literacy perspective. The economic transformations related to the development of a knowledge-based economy require emphasis on

creative and critical thinking and other twenty-first-century competencies. Many authors have noted that in producing media content, students will learn critical new media literacies to engage and interrogate different kinds of texts based on different modalities (visual, gestural, spatial, etc.), while mere consuming lacks this embedded criticality. When PFP Sony watches Japanese animation or Rin watches Korean drama, they are entertained and their response is not, in the first instance, to interrogate critically what they are watching, whereas if PFP Sony were to create a Japanese animation carton, he would have to consider point of view, voice, delivery, and many other considerations that involve higher-order thinking skills related to media production.

We also note that the students in our study are involved in self-directed and social learning through production. However, their involvement involves basic skills, such as finding a video and uploading (a more basic and simple form of production) as compared to actually creating a video. However, even in the case of actually creating a video, students need support and scaffolding. This may be seen in the example of Happy Boy who created a video rather quickly using Movie Maker and just as quickly abandoned it, out of boredom to look for other applications. We wonder if perhaps Happy Boy's boredom may be attenuated if he possessed relevant knowledge and higher-order skills related to video production. We know that the students in our study are learning some basic technological skills like the software *Photoshop*, but some also report learning through other means, such as YouTube. Also, Flash noted that she will only produce a video, if required by the school as project work. The indication from these examples is that students have yet to tap the potential of participatory media in terms of sharing their media productions and inviting commentary and learning as a community of practice based on this. You seems to be on the edge in this, in her story and fan-fiction writing, but she abandoned this eventually because of time constraints related to an exam-driven Singapore school system. Thus, there is a need to recognize the importance of youth's digital of informal learning and to develop synergies with formal learning in which schools could have a supportive (nondirective) role in moving the learning of the students described in this paper to a higher level of engagement with twenty-first-century learning skills.

2. Learning across formal/informal space is going on. There are two themes related to this:

- (a) Learning interlinks across informal/informal space. We note that teachers are using new media informal space for curricular purpose, i.e. project work. In these kinds of engagements, we see that potential for developing pedagogical models of learning which incorporate aspects of formal and informal learning. For example, some learning models may not turn out to be feasible, or challenges posed by, for example, one possible model, i.e. related to blogging platform, may lead to the discovery of new models of learning that incorporate both self-directed and collaborative learning.
- (b) Students' construction of a formal/informal binary. We note that students construct a binary in which schools are work and online engagements are

entertainment and fun. They have difficulty conceiving that games can be for learning and that school can involve play. We need to bring play (engagement, authenticity, and goal direction) into students' learning and to equip teachers with the competencies to support student learning in this way.

To do the above, further research needs to be conducted. Our focus groups have disclosed that the youth's digital culture of informal learning is characterized by practices of self-directed and social learning through prosuming. However, we need to delve more deeply into these learning processes by conducting qualitative in situ ethnographic studies. Studying these learning processes particularly self-learning and collaborative learning and their nuanced particularities will allow understanding of learning processes and emerging alternative models of learning with different digital technologies that are emerging in youth's informal practices. Furthermore, our data suggests that there are some evolving blendings or integrations of formal with informal learning. Thus, in accord with the work by Colley and others (2004), we agree on the need to examine these intersections or interstitial spaces of formal and informal to identify these emerging models of learning.

Note

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Index

A

Ability, 11, 19, 28, 32, 39, 43, 45, 46, 52, 62, 70, 80, 84, 89, 94, 96, 98, 101, 110–113, 117, 133, 152, 163, 164, 184, 208
Access, 6, 12, 16, 19, 24, 27, 37, 41, 51, 60, 79, 80, 83–87, 89, 94, 96, 98, 104, 117, 119, 122–124, 132, 147, 150, 152, 153, 157–158, 172, 174, 177, 182, 193, 195, 205
Addiction, 6, 129, 131, 133
Agency, 14, 31, 34, 140, 200
Animation, 40, 79, 82, 98, 102, 185, 187, 205–207, 210
Application, 4, 39, 42, 55, 60, 151, 161–178, 182, 185, 206, 210
Artificial, 25, 26, 28–33, 39, 48
Assessment, 5, 41–43, 46, 71, 73, 84, 162, 193

B

Blogs, 11, 161, 162, 168, 172, 173, 184, 190–193, 206, 207, 210

C

Classroom, 2–7, 10, 15, 17, 19, 41, 43, 51, 53, 54, 58–60, 62, 68, 69, 72–75, 77, 78, 80–82, 84, 86–88, 90, 104, 130, 148, 153, 154, 156, 158, 167, 182, 183, 186, 187, 191–193, 209
Cognition/cognitive, 23–26, 28–31, 42–44, 48, 54, 58, 110–112, 132, 133, 137

Collaborative, 2, 7, 13, 16, 59, 70, 71, 73, 78, 80–82, 86, 98, 101, 167, 173, 175, 187, 188, 190, 191, 204, 208, 210, 211
Communication, 1, 2, 14, 16, 19, 24, 28, 40, 59, 60, 71, 81, 89, 94, 96, 98, 100, 103, 111, 112, 138, 162, 174, 181, 185
Community, 1, 28, 45, 68, 70, 72, 99, 101, 104, 105, 133, 161–163, 184, 186, 187, 189, 190, 200, 201, 204, 208–210
Competencies, 3, 6, 16, 19, 57, 59, 96, 97, 106, 131, 132, 134, 163, 175, 204, 210, 211
Computer, 15, 19, 24–26, 33, 39, 40, 72, 83, 87, 104, 109, 110, 131, 138, 139, 145, 147, 158, 183, 185, 186, 193, 200
Creation, 1–3, 7, 56, 89, 99, 123, 162, 163, 167, 177, 191, 204
Creativity, 3, 10, 13, 15, 17, 19, 67, 111, 208
Critical, 3–5, 7, 9, 12, 13, 16–19, 26, 37, 38, 42, 43, 55, 56, 62, 67, 68, 70–73, 86, 94, 96–98, 101, 103–106, 110–112, 165, 167, 210
Critique, 10, 13, 14, 17–19, 54, 187
Culture, 1–4, 7, 9–20, 23, 24, 33, 34, 37, 39, 41, 44, 75, 78, 80–86, 89, 90, 95, 101, 105, 114, 173, 182–184, 187, 190–192, 194, 199–211
Curricular, 5, 18, 43, 61, 71–74, 97, 187, 210
Curriculum, 1, 6, 10, 11, 15, 37, 39, 42–44, 51, 54, 57–62, 68, 75, 78, 95, 97, 102–105, 148, 150, 154, 156, 167, 175, 184–188, 192, 209
Cyberwellness, 6, 163, 167, 168, 170, 172, 173, 177

D

Design, 4, 5, 7, 15, 18, 27, 29, 40–42, 51, 54, 55, 57, 58, 60, 62, 67–73, 75, 78, 81, 83, 84, 86, 88, 89, 113–117, 139, 146, 148–150, 158, 161–178, 182, 184, 186, 193, 195, 203
 Device, 6, 51, 59, 61, 77, 78, 80, 87, 109, 124, 145–151, 153, 154, 156–158
 Digital, 1–2, 9, 31, 37, 69, 77, 96, 109, 129, 145, 163, 181, 199
 Discourse, 5, 17, 27, 38, 49, 58, 70, 93, 94, 97, 101, 103–106, 151

E

Edmodo, 186–189, 191, 192
 Educating, 38, 41–46, 49, 55, 62, 99, 102, 113, 123
 Education, 1, 9, 23, 37, 67, 78, 93, 109, 130, 148, 161, 184, 202
 Educators, 1–4, 6, 7, 24, 25, 27, 34, 37, 45, 51, 67, 68, 103, 161–164, 166, 182, 195
 E-learning, 27, 42, 85, 149, 162, 209
 Embodiment, 4, 23–34
 E-reader, 3, 6, 45, 46, 146–158

F

Facebook, 19, 37, 161, 172, 173, 187, 190, 192, 199, 201, 204, 206, 207, 209

G

Game, 5, 11, 26, 37, 67, 81, 104, 109, 129, 183, 199
 Game-based, 5, 38, 39, 54–58, 61, 62, 67–75
 Game-related, 111, 117, 119, 122, 123
 Gamers, 129–138
 Games-to-learn, 5, 37–62

I

Implementation, 68, 69, 73, 78–83, 85–90, 98, 99, 109, 112, 167, 175, 177, 182, 186
 Informal, 7, 15, 68, 75, 183, 190, 192, 199–211
 Information and communication technology (ICT), 100, 103, 161, 162, 164, 167, 174, 175, 177, 178, 181
 Inquiry, 5, 25, 45, 47–51, 53–57, 62, 67, 71, 76, 96, 102, 163, 174
 Instruction/instructional, 6, 39–42, 52, 55, 62, 76, 87–88, 102, 111, 130, 174, 175, 177, 182, 191, 193

Integration, 71, 162, 164, 175, 177, 178, 182, 211
 Intelligence, 3, 23–26, 29, 30, 32, 39, 45, 50, 55, 113
 Interaction, 2–4, 7, 24, 26, 31–33, 39, 48, 79, 81, 82, 110, 111, 130, 138–140, 177, 191, 201, 202, 207
 Interactive, 9, 14, 59, 78, 80–82, 85, 86, 98, 102, 149, 181, 199
 Interactivity, 1–2, 33, 81–82, 86, 102, 181
 Interface, 24, 30–33, 40, 52, 69, 98, 102, 162, 193
 Internet, 2, 7, 12, 14, 16, 18, 40, 77–79, 85, 89, 95, 96, 104, 109–111, 120, 124, 130, 131, 133, 138, 145, 154, 167, 185, 200, 205, 206

K

Knowledge, 1, 6, 7, 9–11, 13, 15–17, 26, 39–44, 46–50, 52, 53, 55, 56, 58, 59, 84, 88, 89, 94, 96, 97, 99, 102, 110, 112–114, 122, 123, 150, 161–167, 175, 177, 182, 187, 189, 190, 201, 202, 205, 207–210

L

Learner, 3–6, 9, 15, 17–18, 24, 25, 27, 34, 42, 49, 56, 57, 67, 73, 79, 80, 84, 85, 88, 109, 154, 163, 174, 177, 186
 Learning, 1, 9, 24, 37, 67, 77, 95, 109, 139, 148, 161, 182, 199
 Literacy(ies), 2, 10, 38, 68, 89, 93, 109, 163, 182, 202

M

Mobile, 51, 72, 80, 85, 109, 124, 147, 203
 Mode, 1, 5, 11, 12, 14–16, 24, 41, 43, 52, 54, 59, 98, 102, 138, 185
 Model, 1, 5, 12, 17, 25, 26, 39, 48, 55–57, 60, 67, 70, 87–89, 97–99, 132, 134–136, 146–148, 165, 167, 171, 172, 183, 202, 210, 211
 Motivation, 16, 28, 68, 82, 83, 131, 133
 Multiliteracies, 185–186, 188, 192
 Multimedia, 79, 82–86, 89, 99, 185

N

Network, 2, 3, 19, 30, 31, 37, 78, 80, 87, 137, 181, 182, 190, 200, 201, 209

Networking, 6, 7, 11, 16, 85, 162, 170, 171, 173, 193
 New media, 1–7, 9, 11–14, 19, 24, 25, 33, 34, 37, 78, 79, 82–84, 89, 94, 95, 101–103, 110, 199–203, 210

O

Offline, 14, 33, 78, 82, 88, 140
 Online/on-line, 2, 5, 10, 11, 14, 15, 24, 30–34, 37, 78, 81–83, 110, 111, 113, 122, 123, 129–131, 133, 137–140, 147–151, 162, 163, 165, 173, 182, 184, 185, 189–191, 199–201, 203, 204, 207–210
 Out-of-school, 68–70, 72, 75, 83, 85, 182, 190, 192, 194, 202, 203

P

Paradigm, 9, 32, 38, 40, 44, 62, 88, 90, 94
 Participation, 1, 7, 13, 14, 16, 17, 19, 24, 59, 95, 96, 105, 106, 123, 130, 166, 174, 182, 184, 191, 194, 199, 201–203, 211
 Participatory, 2–4, 9–20, 57, 187, 190–192, 199, 210
 PCK. *See* Pedagogical content knowledge (PCK)
 Pedagogical, 3–7, 12, 25, 40, 41, 62, 69, 74, 75, 101–102, 148, 161–166, 173–175, 177, 178, 182, 194, 200, 210
 Pedagogical content knowledge (PCK), 102, 164, 166, 170, 173–175, 177, 178
 Pedagogy, 2, 9–11, 17, 25, 45, 51, 52, 54, 55, 59, 71, 72, 86–88, 102, 148, 156, 161–165, 167, 174–178, 182, 185
 Perceptions, 6, 28, 136, 150, 153, 162, 164–167, 173, 174, 182, 188
 Performance, 37–62, 70, 71, 73, 80, 113, 119, 122, 134, 136, 166, 204
 Platform, 80–87, 89, 96, 98, 101, 102, 162, 163, 172–173, 187, 199, 210
 Policy, 3–5, 10, 15, 40, 67, 69, 75, 90, 93–106, 175, 182
 Preservice, 6, 161–178

Q

Questionnaire, 114–119, 122, 130, 137, 149

R

Reflection, 17–19, 42, 55, 105, 133, 151, 163, 165, 173, 177, 203, 206
 Role, 4, 6, 16, 43, 47, 51, 69–71, 73, 80, 82, 83, 85–89, 97, 101, 104–106, 110–111, 123, 133, 148, 163, 182, 187–189, 207, 208, 210

S

School, 2, 9, 23, 37, 68, 77, 93, 109, 130, 150, 166, 182, 202
 Schooling, 4, 5, 7, 16, 38, 41–46, 51, 53, 55, 62, 72, 95, 97, 183
 Self-directed, 7, 84–86, 163, 175, 177, 184, 190, 202, 204–206, 208–211
 Situated, 4, 12, 15, 27, 28, 30, 43, 50, 51, 54, 55, 61, 63, 68, 71–74, 117, 120–122, 136, 140, 174, 183, 184, 187–190, 202, 204
 Social, 2, 11, 24, 37, 67–68, 79, 95, 110, 129, 161, 181, 200
 Software, 18, 39, 71, 73, 83, 109, 112, 114, 117, 119, 122, 123, 185, 186, 192, 210
 Statecraft, 5, 51–54, 57–62

T

Teaching, 1, 4, 6, 9–19, 24, 41, 43–45, 49, 55, 59, 62, 68, 70, 78, 80–90, 97–99, 102, 123, 148, 150–154, 161, 162, 164–167, 170–174, 178, 182, 183, 193, 208
 Technological content knowledge (TCK), 164, 165, 167, 170, 173, 174, 177
 Technological pedagogical content knowledge (TPACK), 161–178
 Technological pedagogical knowledge (TPK), 7, 161, 164, 165, 167, 170, 173–175, 177
 Technology, 1–3, 5–7, 11, 13–19, 24, 26–31, 33, 34, 37, 39, 41, 61, 69, 71–75, 78–81, 84, 86–90, 95, 98, 102–104, 109–113, 122, 123, 145–149, 151, 154, 156–158, 162, 164, 165, 167, 175, 177, 181, 182, 185, 199, 200, 202, 207, 210, 211
 Textbook, 4, 5, 40, 73, 77–90
 Theoretical, 9, 18, 24, 26, 27, 30–34, 38, 55, 148–149, 164, 203
 Theory, 3–5, 15, 18, 24, 27, 32, 38, 40, 44, 46, 47, 49, 50, 55, 67–71, 73, 110, 161–162, 178, 183, 203

V

Video, 11, 13, 14, 39, 52, 68, 77, 79, 82, 98,
102, 110, 129–139, 162, 184, 185, 190,
202, 203, 206, 210
Violence, 6, 117, 118, 130, 136
Virtual, 2, 23–24, 27, 30–32, 34, 39, 57, 58,
61, 70, 71, 79, 82, 83, 112, 136, 140,
163, 181, 201, 202
Visual, 29, 31, 83, 96, 98, 122–123, 147, 154,
188, 210

W

Web, 4, 6, 11, 13, 14, 40, 42,
145, 157–158, 161–178, 199,
201, 204
Wikipedia, 3, 172, 190

Y

YouTube, 14, 162, 172, 199, 201, 205, 206,
210