Chapter 16
The Role of Gender in Mobile Game-Based Learning

Susan Gwee
Nanyang Technological University, Singapore

Yam San Chee
Nanyang Technological University, Singapore

Ek Ming Tan
Nanyang Technological University, Singapore

ABSTRACT
This paper investigates whether there are gender differences in gameplay time and learning outcomes in a social studies mobile game-based curriculum. Seventeen boys and 24 girls from a ninth-grade class in Singapore used a mobile learning game Statecraft X to enact governorship in the game world. The data suggest that boys spent significantly more time playing Statecraft X than girls. However, there were no significant gender differences in their scores in an essay question assessing their learning about governorship in terms of criteria of relevance of content, perspective, and personal voice. There was also no significant correlation between gameplay time and relevance of content, perspective, and personal voice scores. Thus, higher engagement in gameplay alone does not necessarily lead to higher-order learning outcomes. This paper discusses the factors giving rise to these results.

INTRODUCTION
Teenagers in the twenty-first century have the opportunity to engage in new digital literacy practices as they can now play digital games on mobile devices such as mobile phones and tablet devices. There are currently 5.3 billion mobile phone subscribers in the world (MobiThinking, 2011). In the United States, 23% of mobile users played games on the mobile phone; in Europe, 25%, and in Japan 16%. To explore the potential of out-of-school meaning-making practices of students, schools are looking into the inclusion of mobile digital games in the curriculum.

However, there are concerns about using digital games in the curriculum, one of which is
that gaming is established as a male activity and that males may have an unfair advantage in a game-based curriculum. Thus, the main objective of this paper is to examine whether indeed there is a relationship between mobile gameplay time and learning outcomes in a mobile game-centered social studies curriculum. We hypothesize that with more access to and control over a mobile device compared to traditional male-dominated gaming spaces; girls may play as often as boys and achieve similar learning outcomes.

**Games and 21st Century Learning**

Changes in society and economy in the developed countries require that young people are equipped with new skills that are consonant with a knowledge economy rather than an industrial one (Ananhiadou & Claro, 2009). These skills are often referred to as twenty-first century skills as they are more related to the needs of the economic and social models of this century. Wagner (2010) has identified seven survival skills for careers, college, and citizenship in the twenty-first century for American students. One of them is critical thinking and problem solving because the best companies want employees to be able to improve their products and processes or their services, or even create new ones. Thus, companies expect their employees to look at connections, to weigh evidence, to look at issues or problems in new ways, and to understand their interrelationships. Another skill is agility and adaptability because American workers need to adapt and be agile in daily lives due to changes in technology and the fast pace of work.

Twenty-first century learning is also the direction to which school reforms are directed in the United States (Alexander & Murphy, 2000; Lambert & McComb, 2000; Wagner, 2010) and in East Asia including Singapore (Koh & Luke, 2009). The United States administration stated that it would ensure that all students were trained to use technology to research, analyze, and communicate in any discipline because of 21st century workplace demands (Obama & Biden, 2007). In Singapore, the emphasis is on the creation of a nationwide education and learning infrastructure so that students can learn on the go (Infocomm, 2009). Koh and Luke (2009) noted that there has been a move towards educational reform and innovation as a result of educational policies which encourage more critical and creative thinking practices in Singapore schools. Assessment reforms include the advent of alternative assessment methods such as Strategies for Active and Independent Learning (SAIL) and Science Practical Assessment (SPA).

Digital gameplay has been associated with gains in skills which are in line with twenty-first century skills required in the workplace. Good games confront players with problems, allowing them to make decisions after having critically thought through them by analyzing the information available and then evaluating the options given in the game space (Gee, 2003). Gee (2003) also noted that players in massively multiplayer games also often collaborate in teams, each using a different set of overlapping skills and sharing knowledge, skills, and values with others both in the game and outside. This results in the creation of distributed and dispersed knowledge within the community in ways that are consonant with the contemporary, high-tech, and cross-functional-team-centered workplace (Wenger, McDermott, & Snyder, 2002). Thus, Gee (2003) argued that game-based learning prepares students and workers better for the twenty-first-century workplace than traditional schools because it allows people to re-create themselves in new worlds, to enjoy themselves, and to engage in deep learning at the same time.

The Federation of American Scientists (2006) also recommends using video games in the classroom because these games integrate systems thinking, identified as a skill necessary in the twenty-first century. Video games enable students to learn higher-order thinking skills such as strategic thinking, interpretive analysis, problem solving,