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Educator perceptions of digital game-based learning in the instruction of foreign languages in Japanese higher education

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EDUCATOR PERCEPTIONS OF DIGITAL GAME-BASED LEARNING IN THE INSTRUCTION OF FOREIGN LANGAUGES IN JAPANESE HIGHER EDUCATION

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By

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ABSTRACT

Digital Game-Based Learning (DGBL) is an innovative educational approach that is becoming increasingly popular among researchers and practitioners in technologically advanced countries in the West, but is largely unknown or ignored in the instruction of Foreign Languages (FL) in Japanese higher education. This is problematic because more interest in research and implementation among faculty in Japan would likely contribute to the development of DGBL and improve the quality of FL education. The purpose of the present study was to better understand the lack of interest in DGBL in Japan by employing Everett Rogers' Innovation Diffusion Theory to explore the perceptions of relative advantage, compatibility, complexity, trialability, and observability of DGBL among FL faculty in Japanese higher education. A concurrent mixed-methods approach was employed to collect data through an online self-completion questionnaire and asynchronous email interviews. The results indicate that while most faculty members believe that DGBL would have a beneficial impact on learner motivation, they are unconvinced that it offers real learning outcomes. Further, participants were divided as to whether the approach would be compatible with course learning objectives, and many regarded it as suitable primarily as supplemental learning material. Faculty members with a research interest in Computer-Assisted Language Learning (CALL) expressed a willingness to try the approach, but at the same time pointed out that there were few opportunities to do so.

Chapter 1: Introduction

Education experts have increasingly recognized Digital Game-Based Learning (DGBL) as a theoretically sound, and indeed preferable, alternative to conventional *tell and test* methods of formal learning for a wide variety of educational goals, including proficiency in a foreign language (Clark, 2007; Gee, 2004; Liu & Chu, 2010; Neville, 2009; Neville, Shelton, & McInnis, 2009; Peterson, 2009; Stanley & Mawer, 2008; Turgut & İrgin, 2009; Zheng, Wanger, Young, & Brewer, 2009). The empirical evidence shows that educational games can improve learner motivation (Batson & Feinberg, 2006; Papastergiou, 2009), result in a better understanding of subject matter (C. Lim, 2008; Tuzun, Yilmazsoylu, Karakus, Inal, & Kizilkaya, 2009), and foster the creative and collaborative problem-solving skills that are in high demand among employers operating in a knowledge-based economy (Federation of American Scientists, 2006). This trend has led to broad interest in game-based learning, particularly in Europe, Oceania, and the United States. In western developed countries, digitally-mediated games and simulations for training and education have been adopted in government and military contexts (Bonk & Dennen, 2005; Harteveld, Guimaraes, Mayer, & Bidarra, 2009; Hubbard, 1991; Lane & Johnson, 2008; Mills, Smith, & Swain, 2003); enjoy growing popularity in childhood, adolescent and adult education (Demirbilek, 2010; Millstone, 2012; Wastiau, Kearney, & Van Den Berghe, 2009); and are now even represented by policy advisors at the highest levels of the American federal government (Toppo, 2012). Moreover, the New Media Consortium (NMC) has predicted in both the 2012 and 2013 issues of their *Horizon Report* that DGBL will become mainstream in American colleges and university education by 2017 (Johnson, Adams, & Cummins, 2012; Johnson et al., 2013). According to Johnson and colleagues (2013), “Although still in its nascent

stages, the gamification of education is gaining further support among researchers and educators who recognize that games stimulate productivity and creative inquiry among learners" (p. 20).

The ascendancy of DGBL in Western countries notwithstanding, mainstream educators have not widely accepted it for foreign language (FL) instruction in Asia. Reflective of this dearth of DGBL implementation in practice, there is also an apparent lack of interest in the subject among researchers in Asia generally, and in Japan in particular. While the number of research papers on digital games and learning have been increasing steadily in technologically advanced countries, only a small fraction of those have originated in an Asian country (Hwang & Wu, 2012), and fewer still are related to FL learning (G.-J. Hwang, personal communication, July 9, 2012). Only a limited number of projects have involved experimental curricular implementations of a DGBL solution for FL (e.g., Green, Sha, & Liu, 2011). While analog games have been used in FL education for decades, they have tended to be marginalized, used sparingly as a "reward" for studying hard, or as a diversion when student morale is low (Susser). Computer games for FL have also been developed (Phillips, 1987), but they have been far from commonplace. In addition, computer-mediated learning materials in general have never exhibited widespread popularity in the field of FL education because, as Bax (2003) argues, the technology has failed to meet exaggerated expectations, and so has failed to realize a mainstream status. This situation persists (Bax, 2011) despite the fact that the technology is currently capable of enabling many types of learning activities prescribed by the most current theoretical models of FL learning, including learning through the use of digital games (Peterson, 2009). Yet, in the minds of most FL educators, CALL (Computer Assisted Language Learning) is still synonymous with *drill-and-kill* software (Bush, 2008), and is generally consigned to language labs as supplementary or self-study material (Brown, Campbell, & Weatherford, 2008).

While it is true that DGBL is a new approach to learning, and as such remains unproven in many respects, the disparate levels of interest between regions are notable. Many socio-cultural explanations are given for the lagging recognition of DGBL in Asia in general, and particularly in Japan. Thomas (2011) attributes the lack of interest to an emphasis on the conventional tell and test method of instruction when he cites a "rigid adherence to prescriptive forms of teaching and the rise of product-oriented or "high stakes educational testing" (p. 2) as the most commonly mentioned obstacles to the acceptance of DGBL for FL education in Asia. With regard to a cultural explanation, Marginson (2010) points to the influence of the Confucian values of merit-based social advancement and deference to authority figures in cultures represented by the political regions of China, Hong Kong, Japan, Korea, Singapore, and Taiwan, where competitive gatekeeper tests almost exclusively determine access to higher levels of education. According to Salehi and Salehi (2011), this emphasis on high-stakes exams creates pressure among teachers and textbook publishers to focus on established test preparation methods, and detracts from interest in new or innovative pedagogical approaches involving the use of digital technology. Additional factors affecting teachers' decisions to employ or eschew DGBL include a lack of technical and training support from administrations (Koh, Kin, Wadhwa, & Lim, 2011). Finally, in the case of Japanese higher education, administrative ineptitude and bureaucratic inertia have also been cited as obstacles to reforms that would allow experimentation with innovative educational approaches (Bachnik, 2003). Yet, there remains little empirical data that would indicate whether or not these obstructions to the adoption of DGBL are ultimately surmountable, and if so, what approaches would be useful in facilitating the diffusion of DGBL.

DGBL constitutes a novel approach to FL instruction, particularly in Japan, because it is still unknown or unused in most educational institutions. Rogers (2003) provides a robust general theory for understanding and predicting the diffusion of various types of innovative technologies and methods through a social system. His theory is based on nearly 60 years of empirical data collection from a wide variety of cultural contexts, and offers a means to account for the characteristics of members of a social system that indicate whether they are likely to adopt an innovation, and the perceived attributes of an innovation among potential adopters that influence their decision to adopt. This theory has been applied in investigations of the adoption of various information technologies (IT/ICT) in educational systems (Martins, Steil, & Todesco, 2004; Shelley, 1998; Surry & Farquhar, 1997; Tetiwat & Huff, 2002), as well as DGBL solutions for math instruction (Kebritchi, 2010). It is commonly used to inform strategies for fostering change and innovative behaviors in organizations (Smith, 2012). However, as yet, no studies have applied diffusion theory as a framework for understanding the lack of interest in DGBL for FL education in Japan.

Applying diffusion theory to an investigation of perceptions of DGBL among FL educators in Japan offers several possible benefits. First, framing educator perceptions in the constructs of the theory, namely the posited perceived attributes of relative advantage, compatibility, complexity, trialability, and observability, yields insight into the future rate and ultimate success or failure of any diffusion of DGBL in the FL field in Japanese higher education. Such information also is useful to researchers and developers who intend to produce DGBL solutions for FL in this context because it reveals the specific needs and concerns of local practitioners. Second, the data informs strategies to initiate and foster the diffusion of DGBL in the FL field in Japan. Scholars have suggested that such change efforts should initially

concentrate on informing the more receptive elements of a population about the existence of an innovation and its purpose as a means of initiating and fostering the diffusion of an innovation (Enfield, Myers, Lara, & Frick, 2011). Thus, it is advantageous to be able to associate interest in DGBL to demographic characteristics, particularly in a diverse population such as FL educators in Japanese higher education, as a step towards targeting such an outreach effort.

Purpose of the Proposed Research

This examination of the perceptions of DGBL among FL instructors in Japanese higher education took place through a concurrent mixed methods study. In the study, electronic survey data along with individual interview data was used to assess how faculty members perceive DGBL. Mixed methods was an appropriate methodology choice as the combination of both quantitative survey data and qualitative interview data ensured a better understanding of the factors that may influence the rate and success of the diffusion of DGBL, and likely inform the development of strategies aimed at initiating and expanding the use of DGBL in foreign language education.

The following research questions guided the investigation:

RQ1: How do FL educators in Japanese higher education perceive DGBL?

RQ2: What are the differences in perceptions of attributes of DGBL based on educator demographic characteristics of experience, employment rank, term of office, nationality, research interest, and teaching objectives?

Conceptual Focus

This study of FL educators' perceptions of an innovative DGBL approach was grounded in Rogers' (2003) theory of the diffusion of innovation (hereafter referred to as DT) discussed in the previous section. More specifically, the present study is closely related to a sub-field of

diffusion studies referred to as *acceptability research*, which is the "investigation of the perceived attributes of an ideal innovation in order to guide R&D so as to create such an innovation" (Rogers, 2003, p. 253). This branch of research diverges from other focuses on diffusion in that, in Rogers' (2003) terms, it is more concerned with "prediction" as opposed to "postdiction" (p. 227). Whereas many applications of DT have looked at phenomena of diffusion as they occur during or after the fact, this study constitutes a pre-hoc investigation into the diffusion of DGBL for FL education in Japanese higher education. The present study resembles acceptability research because, although DGBL solutions for instructed FL do in fact currently exist, they are products of a fledgling field of educational materials generation that displays a negligible degree of diffusion and or acceptance among FL educators in Japanese higher education. Thus, it was assumed that either such FL educators have no knowledge of DGBL, or DGBL applications acceptable to their particular circumstances have not yet been devised. In other words, there is no recognizable diffusion process in the case of DGBL for FL education in Japanese colleges and universities.

Rogers (2003) outlines three possible predictive applications of DT: the first is to base a prediction on analogous precedents, the second is to provide information about a possibly unknown innovation and collect data on the perceptions of its attributes, and the third is to provide an innovation provisionally in a limited capacity and gather data on its use. The present study adopted the second use of the theory. According to DT, the five perceived attributes of innovation—relative advantage, compatibility, complexity, trialability and observability—that a potential adopter could associate with an innovation account for the largest percentage (49% to 89%) of the differences in the rate at which innovations proliferate in a social system. Because these attributes have been found to be major variables in a wide variety of diffusion phenomena,

including the adoption of innovative educational uses for technology, it was assumed that they may also be used to analyze perceptions of DGBL among English as a foreign language (EFL) educators in Japan.

Definition of terms. Key constructs in Rogers' (2003) theory that were central to the present study are the "perceived attributes of innovation" (p. 12). They have had broad application, and they so will be defined here in a narrower sense that is more focused on the purpose of the study. Also, while DGBL is becoming more popular, it still represents a nascent paradigm with possible applications in multiple academic domains, so a common definition of the term is often elusive. Moreover, the phenomena of *game* and *play* are themselves highly complex and inherently multi-disciplinary in nature, further complicating a construct for DGBL. Thus, DGBL will also be defined for the purposes of the present investigation.

Perceived attributes of innovation. Rogers (2003) identifies five perceived attributes of innovations that influence potential adopters' decision to adopt. The attributes are defined concretely as follows, phrased to fit within the scope of the present study:

1. Relative advantage: The extent to which DGBL is seen as superior or inferior to conventional approaches to FL education in terms of helping students accomplish educational goals.
2. Compatibility: The extent to which DGBL is seen to be suitable for helping a given group of learners meet predefined educational objectives.
3. Complexity: The level of confidence that FL educators have in their own abilities to understand and implement DGBL for multiple learners in a course of study.
4. Trialability: The opportunity for FL educators to use DGBL provisionally before making a decision with regard to adoption.

5. Observability: The extent to which DGBL is recognized as present and or influential in an FL educator's context.

Additional attributes have been proposed and or used, but there is substantial agreement among diffusion scholars that most of these can or should be integrated into one of the five perceived attributes.

Digital game-based learning. For the purposes of the present investigation, DGBL (Digital Game-Based Learning) will be defined within both a macro framework, which will describe a construct of DGBL useful from an educator's perspective, and a micro framework, which pertains more to a learner's standpoint. In the macro or disciplinary-level context, DGBL is considered a sub-field of learning technologies. Learning technologies are digitally-mediated Information Technologies (IT) or Information and Communication Technologies (ICT) that are designed for or adapted to pedagogical use. This term is used interchangeably with *instructional technology*. DGBL is a digitally-mediated IT that supports a learning activity characterized by game design features defined in the following paragraph on the micro level. Furthermore, DGBL applications that are designed for or adapted to FL instruction will be considered a form of CALL, which itself will be treated as a sub-category of learning technology. DGBL is included in the larger categories of learning technology and CALL because, according to Rogers (2003), members of a social system often fail to distinguish between related technologies and methods that combine to constitute an innovation. Rather, such technologies tend to be grouped together into a *technology cluster*, which is adopted or rejected comprehensively. Thus, the fact that DGBL involves digital mediation likely includes it in the broader categories of learning technology and CALL from the standpoint of potential adopters in Japanese higher education,

and the treatment of learning technology and CALL in general is likely to reflect the treatment of DGBL.

At the same time, a definition of DGBL based on a user's viewpoint is useful for distinguishing it from other types of teaching/learning methods involving IT/ICT technology. Games have been studied from multiple disciplinary perspectives, and have proven difficult to describe comprehensively. From the standpoint of a professional game designer, Schell (2008) defines a game simply as, "A problem-solving activity, approached with a playful attitude" (p. 37). While it is not true that all games are universally *fun* any more than all learning activities are inherently tedious, skilled game designers are generally successful at creating activities that are intrinsically motivating for targeted users. According to Chen (2007, 2008), concrete goals, immediate and ongoing feedback, and balancing participant skill with the level of task difficulty are three commonly used design features that facilitate a state of flow, or optimum concentration, which is closely related to intrinsic motivation and enjoyment (Csikszentmihalyi, 1975). In practice, commercial game designers use increasingly challenging levels that integrate skills and ongoing indications of progress toward a goal to the extent that these features can be considered industry standards (Rollings & Adams, 2003; Rouse, 2005). Koster (2005) describes a hierarchy of *challenges* wherein higher order goals are interconnected with lower order tasks, and while accomplishing a series of simpler challenges players are gaining the skills that will help them successfully achieve the more difficult higher-level goal. Feedback that is immediate, unambiguous, and largely intuitive is provided immediately after each short challenge. An example of a DGBL solution for FL that incorporates these features is Duolingo, wherein learners progress through activities based on mastery of skills that are recycled and integrated with other skills in increasingly difficult levels. In Duolingo, levels are interconnected by topics

that are interconnected by lessons, and lessons are interconnected by simple problems. As learners progress, they are provided with continuous and ongoing feedback at the problem level, the completion intervals of which are only seconds long. The problems themselves may not be readily distinguishable from standard CALL tasks, comprising conventional scrambled sentence, dictation, translation, multiple choice problems, and the like. However, the frequency, clarity, and pervasiveness of the feedback are more characteristic of digital games for entertainment than of conventional CALL learning materials.

Another aspect of games that renders them intrinsically motivating is the use of interactive narrative. According to Bruner (1995), narrative facilitates comprehension and problem solving by building a framework that assists cognitive processing to anticipate the future development of events. Dickey (2006a, 2006b) suggests this framing acts to motivate participation in games because it evokes curiosity, or the desire to discover the consequences of past events. Moreover, in a game involving an interactive narrative where players make choices that determine various outcomes of past events, curiosity and the desire to discover are enhanced because the unknown future outcomes are personalized. An example of a DGBL solution for FL that exploits this game feature is the ISLET (Integrated System for Language Education and Training) game developed by Alelo Inc. The system is a 3D role-playing game (RPG) in which players are situated in an African village and must interact with the artificial intelligence (AI) controlled villagers or with other human players in African French in order to accomplish certain *missions* that define the storylines. During the missions, players are given hints but remain in control of how various possible storylines are resolved. In this way, DGBL contrasts with conventional FL approaches that may require learners to simply read a story or article, view a video, or listen to a podcast and remain passive observers of a developing narrative.

For the purposes of the present investigation, a digitally-mediated FL learning activity was considered DGBL if it was designed purposefully for fostering intrinsic motivation by applying one or both of the aforementioned design strategies. That is, a learning activity is DGBL if it is designed to facilitate a flow experience by providing immediate and ongoing feedback, intuitive indicators of progress toward a goal, and a dynamic mechanism for balancing skill level with task difficulty. Furthermore, a learning activity is DGBL if it represents a scenario defined by an interactive story arc in which players determine the progression of events and eventual outcomes.

Significance of the Study

A lack of attention to DGBL among FL educators in Japanese higher education is problematic because many educational researchers and experts in North America, Europe, and Oceania (and some in Asia) recognize that game-based methodologies may contribute to a significant improvement in education. This growing recognition makes it incumbent upon FL faculty in Japanese higher education to at least render DGBL fair and adequate consideration. If a more fully developed DGBL discipline has the potential to improve FL education in Japan, then FL faculty in Japanese higher education should also use and experiment with DGBL applications in order to contribute to the development of the field by determining whether such materials are or can be made suitable for their specific contexts.

The potential benefits of improved FL instruction are far-reaching. It is widely recognized that education has a great impact on economic activity, and this is certainly no less true in the case of foreign language skills, particularly in the modern context. Currently, a trend toward globalization has created an enormous demand for foreign language skills in Japan, and the future of its economy may be greatly influenced by the ability of its workforce to

communicate with speakers of other languages. For instance, Japanese companies are growing increasingly reliant upon overseas markets and suppliers for expansion opportunities, and communications required for such dealings are mostly mediated in English. Yet, these companies are troubled by an increasing demand for English-speaking employees, and a lack of university graduates capable of meeting that need (McNeill, 2011). In fact, Japanese university students and graduates have consistently been among the lowest performers in Asia in terms of English proficiency based on standardized international measures (Educational Testing Service, 2012). Also, DGBL offers the opportunity to develop other skills useful for improving economic activity. A general adherence to the conventional tell and test method of formal instruction has the effect of stifling creativity and collaborative problem-solving skills (W. Lim, 2010), which are considered necessary for success in a modern, knowledge-based economy (Cheng, 2010; Riboud, Savchenko, & Tan, 2007). The general adoption of DGBL in FL pedagogy has the potential effect of not only improving communicative proficiency in English, but also producing higher quality economic participants equipped with sought-after workplace skills. At the very least, more widespread use of DGBL would help Japanese institutions maintain competitiveness and comparability with educational systems in other countries. North American institutions of higher education are poised for a broad integration of digital games into the general curriculum (Johnson et al., 2012, 2013) at a time when Japanese universities are struggling to become more international and modernized (Aoki, 2005; Tanikawa, 2012; Yonezawa, 2010). Despite this, DGBL is virtually non-existent in mainstream FL education and academia in Japan, particularly when compared against other regions such as North America and Europe, and the system of higher education in Japan has already fallen behind other countries within the region in the general integration of learning technologies (Latchem, Jung, Aoki, & Ozkul, 2008).

A further significance of the present study is that prospective DGBL material developers would be well informed by a deeper understanding of the attitudes and perceptions of those who ultimately decide whether or not, and to what extent, DGBL takes place in an FL curriculum. The Federation of American Scientists (2006) recognizes the important role of startups and venture projects in meeting the needs of a DGBL materials market in terms of quality and amount. Absent a concerted effort to overcome a significant lack of guiding expertise in initial development, the technology and know-how associated with DGBL will not likely reach a level conducive to wider spread application. Yet, the Federation of American Scientists also acknowledges that commercial companies would be reluctant to carry out such enterprises given the level of uncertainty associated with DGBL as a brand new market. For this reason, they have called for more research into DGBL in order to alleviate ambiguity and incentivize venture investment. A better understanding of FL educators' attitudes toward DGBL, particularly with regard to specific functions and needs represented by the five perceived attributes of innovation, would be useful in developing more suitable materials and communicating their advantages to the FL education community. It would also inform strategies and policies for encouraging researchers and entrepreneurs to experiment with DGBL and build a knowledge base that would advance the field.

Finally, various theories of innovation diffusion and the acceptance of new technologies have been applied in order to understand the proliferation of educational technologies in the United States and other developed countries with the purpose of informing strategies to foster desirable change (Bruce & Levin, 1997; Overbay, Mollete, & Vasu, 2011; Schrum, Galizio, & Ledesma, 2011; Tetiwat & Huff, 2002). In many cases these studies have resulted in modifications and or reinforcement of the analytical tools themselves. If these theoretical

frameworks are to be useful for guiding organizational change, it is advantageous to continually develop and test them through their application in a broad variety of contexts. Since Rogers' (2003) theory has never been applied to understanding DGBL diffusion in the Japanese higher educational context, doing so may reveal valuable insights not only about circumstances specific to Japan, but also with regard to DT itself.

Summary

Thus, the present investigation encompassed two areas of exploration, DGBL and the diffusion of innovative educational approaches, in the context of formal FL instruction. DGBL is garnering attention among researchers and educators to the extent that *The NMC Horizon Report* (Johnson et al., 2012, 2013) predicts that it will become commonplace in American colleges and universities by 2017. In contrast, adoption of DGBL lags in the field of FL education in Japan. Since many educational researchers and practitioners consider DGBL potentially advantageous in formal educational settings, a failure to implement it for FL learners in Japan may leave them ill-served, and renders institutions at risk of falling behind other regions in terms of the quality of education offered.

Several explanations have been given for the lack of innovation in Japanese higher education, but most of the issues raised rely on relatively anecdotal evidence and lack a robust body of empirical data that is underpinned by a comprehensive theory. Without such data, it is difficult to identify specific obstacles to innovation and reform, thus rendering improbable the generation of practical solutions for overcoming such hindrances. In particular, DT has not been used to study the proliferation of DGBL for FL instruction in Japanese higher education. Thus, this research applied DT in an attempt to find explanations and possible solutions for enhancing the diffusion process of DGBL in FL instruction in Japan.

Chapter 2: Review of Literature

The present study sought to understand the potential diffusion of a particular innovation, DGBL, in a specific social system, FL educators in Japanese higher education. Thus, the review of literature focused on the following areas that fall within the scope of the present study. Literature was reviewed providing a comprehensive outline of DT, as well as empirical studies demonstrating application of the theory in contexts that are relevant to the present investigation, such as those involving learning technology, particularly DGBL, technology-supported tools for instructed FL, and or higher education. Furthermore, since the present study aimed at practitioners, that is, educators who enact courses of study first-hand, scholarship on teacher perceptions of innovative learning technologies was reviewed, although most of the available literature in this regard pertains to primary or secondary educational levels. Included in this chapter is a review of literature that explores FL educator perceptions of CALL materials. Finally, since the focus of the study was on FL educators in Japan, information was sought regarding the current circumstances of instructional technology and FL faculty in Japanese higher education.

Innovation Diffusion Theory

Everett Rogers (2003) summarized the field of diffusion research and laid out a theoretical framework (DT) for analyzing the diffusion of innovation. This field of research began with sociological investigations into the spread of agricultural innovations in rural areas of the Midwestern United States in the first half of the 20th century, and continues in various contexts such as the promotion of agricultural and health-related programs in developing countries, and the spread of innovative instructional technologies though educational systems in industrialized countries. *Diffusion* and *innovation*, which lie at the crux of DT, are respectively

defined as, “the process in which an innovation is communicated through certain channels over time among the members of a social system” (p. 5), and “an idea, practice, or object that is perceived as new by an individual or other unit of adoption” (p. 12). That is, this line of research is concerned with explaining the nature of new tools and information, and how their use spreads through and results in a behavioral change in a given population. The theory posits four factors that have been determined to play a role in the movement of such information, and so constitute key constructs of the model: the innovation itself, the makeup of the social system through which it spreads, the nature of the communication between members of the social system, and the duration of the diffusion process.

The nature of the innovation itself. Innovations may comprise physical objects, ideas, or, more commonly, a combination of both concrete component and associated knowledge. Rogers (2003) describes this composition in terms of *hardware* and *software* elements. Whereas the hardware may be a tangible device or instrument, the software is the awareness of its purposes and or the know-how needed to employ it successfully. In the case of DGBL, a computer or other digitized information interface device where a learner may interact with an educational game is an example of the hardware component.

Rogers (2003) offers programming code as an example of the software component of an innovation, but the present study supplants this with a more relevant concept of software, which is an overlap of technological knowledge with pedagogical and content knowledge. From an adopter’s standpoint, it is rarely necessary to understand the code that operates a software application in order to use it to carry out certain tasks. Rather, in the case of a teacher evaluating the potential benefits of a DGBL technology, the educator’s knowledge of how technology integrates with pedagogy is a more important factor influencing diffusion. Mishra and Koehler

(2006) include technical knowledge (knowing what a technology can do and how to use it) integrated with content and pedagogical knowledge as a requirement for the successful employment of an instructional application. In other words, knowing how the use of a technology satisfies certain pedagogical principles is crucial if the application is going to facilitate targeted learning objectives. Therefore, pedagogical knowledge of how to facilitate learner interaction with DGBL and of how to assist learners in optimal use of the system can be considered critical software components of DGBL as an innovation.

Also, the five attributes of an innovation defined in Chapter 1 describe the relationship between individuals and an innovation. That is, they are not actual properties of an innovation, but rather constructs attributed to it by members of a social system. As such, the attributes of relative advantage, compatibility, complexity, trialability, and observability are to a certain extent subject not only to influence by pre-existing knowledge derived from personal training and or experience, but also to social construction. For instance, individuals may base their judgment concerning the compatibility of an innovation partially or in whole on peer opinions or institutional mandates. Therefore, in the case of FL educators, professional networks that facilitate knowledge sharing and institutional policies could be factors in formulating perceptions of DGBL.

The nature of potential adopters. The purpose of DT is to account for the diffusion of an innovation throughout a *social system*, which is defined as "a set of interrelated units that are engaged in joint problem solving to accomplish a common goal" (Rogers, 2003, p. 23). Individuals, groups of individuals (formal and informal), or institutions may be placed under consideration as *units of adoption* that comprise a social system. Units of adoption can be grouped into five categories generally defined by their *innovativeness*, which is "the degree to

which an individual or other unit of adoption is relatively earlier in adopting new ideas than the other members of a system" (p. 22). Also, the relative proportion of the social system these categories occupy closely follows the distribution pattern of a bell-shaped curve. Thus, these sub-groups are characterized by the chronological order in which they adopt, and concurrently by the percentage of the entire social system for which they account. *Innovators*, who typically comprise roughly 2.5% of a given population, are the first to adopt an innovation, followed by *early adopters* at roughly 13.5%, *early majority* at roughly 34%, *late majority* at roughly 34%, and finally by *laggards* at roughly 16%. With regard to the latter term, Rogers recognizes that it has a negative connotation, but points out that any designation chosen for this latest group of adopters risks inheriting an uncomplimentary nuance because members tend to possess qualities juxtaposed to those characterizing innovators. Members of a social system with a high degree of innovativeness are associated with the various socioeconomic, personality, and communication qualities shown in Table 1.

Table 1

Qualities of Earlier Adopters

Category	Quality
Socioeconomic Characteristics	More years of formal education
	More likely to be literate
	Higher social status
	Greater degree of upward social mobility
	Represent larger sized units of adoption (e.g., farms, schools, companies)
Personality Variables	Greater empathy
	Less dogmatic
	Greater ability to deal with abstractions
	Greater rationality
	More intelligence
	More favorable toward change
	Better able to cope with uncertainty
	More favorable attitude toward science
	Less fatalistic
	Higher aspirations

(continued)

Category	Quality
Communication Behavior	More social participation
	More highly interconnected through interpersonal networks
	More cosmopolite
	Greater exposure to mass media
	Greater exposure to interpersonal communication
	Seek information about innovations more actively
	Greater knowledge of innovations
	Higher degree of opinion leadership

Note. Adapted from *Diffusion of Innovations* (5th ed., pp. 287-292) by E. Rogers, 2003, New York, NY: Simon & Schuster. Copyright 2003 by the author. Adapted with permission.

Intra-societal modes of communication. A third factor that the diffusion literature has shown to influence the rate of diffusion is the nature of *communication channels*, which are "the means by which messages get from one individual to another" (Rogers, 2003, p. 18). Communication channels can be classified as either *mass media* or *interpersonal*. Mass media channels are defined as "means of transmitting messages that involve a mass medium, such as radio, television, newspapers, and so on, which enables a source of one or a few individuals to reach an audience of many" (p. 205). They are considered effective in the early stages of diffusion because, as shown in Table 1, innovators and early adopters have greater access to mass media channels of communication. More recent communication technologies that became significant after the time of Rogers' writing, such as social media, blogs, or the like, may be included in this category, even though they may also be used to support interpersonal channels of communication. The distinguishing factor given the character of new media seems to be the nature of the relationship between the communicators. In later stages of diffusion, interpersonal channels become more important because later adopters are more likely to be persuaded to adopt based on information from a familiar and trusted source. This source may be an innovator or early adopter because not only are they likely to have more knowledge of the innovation, but also they are typically respected as opinion leaders within their social systems (see Table 1).

However, there is a common exception that pertains to the degree of homogeneity in a social system.

Another important factor in the flow of information through a social system is the level of interlocutor *homophily*, which is "the degree to which two or more individuals who interact are similar in certain attributes, such as beliefs, education, socioeconomic status, and the like" (Rogers, 2003, p. 19). Generally, the more homophilous two units of adoption are, the greater the degree of communication there exists between them. Rogers points out that the condition of homophily often acts to obstruct diffusion due to a socioeconomic disparity between early adopters and early majority adopters. As shown in Table 1, earlier adopters are more economically stable and highly educated than later adopters, a status that often creates a cultural divide or sense of heterogeneity. Trust is important for persuading later adopters and the degree of trust between units of adoption correlates to the degree of homophily that is perceived to characterize their relationship.

Process. The fourth aspect of the diffusion of innovation is *time*. Diffusion is seen as a process with two general aspects. The first is the individual process from first learning of an innovation to adopting it and altering one's pre-existing behaviors. This progression is analyzable into five stages (Rogers, 2003). The first stage is *knowledge*, when units of adoption become aware of the existence of an innovation; the second stage is *persuasion*, when potential adopters perceive enough information has been gathered to act decisively; the third stage is *decision*, when individuals make a determination whether or not to adopt; the fourth stage is *implementation*, when adopters begin to employ the innovation; and the fifth stage is *confirmation*, where successful use reinforces adoption or failed use may trigger rejection of the innovation. The five perceived attributes of innovation are factors in the persuasion stage of the

adoption process. That is, these constructs are formulated by potential adopters after they have gained knowledge of the existence of an innovation, and ultimately determine the outcome of the decision stage.

The second general aspect of time is that DT describes the process of an innovation diffusing through an entire social system. It predicts that an innovative minority will become aware of an innovation usually through mass-media communication channels. Displaying a higher degree of curiosity, they will seek out more information that will either serve to persuade or dissuade adoption. If a sufficient number of innovators and early adopters make the decision to adopt (between 13-40% of the total population), the theory predicts that interpersonal communication, trialability, and observability will be favorable such that the majority sub-groups will begin to adopt, the overall rate of adoption accelerates, and the process becomes self-sustaining. Finally, after the greater majority of a social system has adopted an innovation, the relatively small group of laggards will adopt and the rate of adoption tapers off.

DT applications pertaining to learning technology. DT has been used to examine and understand the diffusion of technology-supported pedagogical approaches in various educational contexts. These studies commonly assume two general aspects in that they either focus on social systems or on individual units of adoption. The purpose of the former is to understand the policies and or institutional norms that influence diffusion, and the purpose of the latter is to understand how such social contexts or pre-existing knowledge and personality traits influence individual perceptions of innovation attributes.

Focus on social systems. Soffer, Nachmias, and Ram (2010) tested the explanatory and predictive powers of DT by analyzing the adoption of the Internet as a teaching tool among faculty members at Tel Aviv University. Over an 8-year period, the researchers collected data on

the use of an e-learning platform that was introduced at the school for 2,500 instructors representing nearly every academic department. They found that the pattern of adoption predicted by DT was apparent in the diffusion of platform use overall, beginning with a small group of innovators. As early adopters and early majority began to use the platform, the rate of adoption increased, and then tapered off toward the end when the relatively smaller group of laggards adopted. Although variation occurred between departments, the authors attributed this to the role of the department leadership in promoting the adoption of the learning platform. For example, the Education Department, which had decided as a group on adoption of the new technology, displayed a relatively faster rate of adoption than the Humanities Department, which had no notable cohesive policies regarding the learning platform. Therefore, while the overall pattern of adoption remained consistent with the general theory, departmental policy influenced the rate at which it occurs.

In addition to being used for identifying and understanding trends on an organizational level, DT can also be used specifically as a means of informing policymaking. Moizer and Lean (2010) expanded DT with an epidemiological model to offer organizational strategies for facilitating and sustaining the use of simulations and games in higher education. A recurring issue with diffusion that is often observed in studies is a tendency to falter in the early stages. Using Rogers' (2003) model, Moizer and Lean point out a gap between early adopters and early majority when the members of a social system characterized by high innovativeness have adopted an innovation, but the remainder majority of the population fails to do so. This is typically due to a low perception of homophily between early and later adopters, as discussed previously. The authors propose an analogy to the spread of infection through a school faculty, with some members being *infectious*, some being *susceptible*, and some being *recovered*. They

suggest steps to increase exposure to *infectious* faculty members by creating opportunities to socialize in department functions. That is, they propose strategies that would leverage the interpersonal communication described by DT to enhance observability and trialability and facilitate desirable organizational change.

Smith (2012) reviewed the literature on DT to extrapolate major findings for devising strategies to facilitate the integration of learning technologies. Analyzing the data in terms of *barriers* and *facilitators*, she found that innovations have a higher probability of diffusing when there is administrative support, ample time is given for the diffusion to occur, both faculty and learners are prepared to employ the innovation, the innovation fits the context, supportive networks exist, and the proper infrastructure is in place. Based on Smith's discussion and applying the terms describing perceived attributes of innovation, a teacher's standpoint in a diffusion process can be described as follows. Administrative support entails applying rewards for adopting an innovation and or punishments for not adopting, thus providing relative advantage through policy measures. Training faculty and students in the use of an innovation facilitates its software component. That is, training increases understanding of its purpose and utility of an innovation, as well as confidence to employ it successfully, thus alleviating perceptions of complexity. Also, ensuring that an innovation is "relevant to what an institution or individual is being asked to use or do" (p. 176) increases perceptions of compatibility.

Enfield et al. (2011) tested strategies for increasing the rate of innovative diffusion with a diffusion simulation game. Their purpose was to verify seven strategies predicted by DT to increase the likelihood of adoption in a social system by examining the successful strategies of game users. The game was devised originally as a training tool for change agents, or those tasked with the responsibility for promoting the adoption of innovative methods and tools in various

organizational or cultural contexts. The authors were able to confirm the efficacy of the following three strategies through the analysis of game play.

1. Rely on information rather than mandates for persuasion.
2. Facilitate trialability.
3. Use mass media channels of communication early in the process.

In contrast, they were unable to verify four other strategies that essentially entailed identifying and forming relationships with characters possessing a high degree of innovativeness—i.e., innovators and early adopters—and leveraging the opinion leadership of these agents through interpersonal communication at later stages of the game. However, rather than attribute the inability to confirm these strategies to any fault of DT, Enfield et al. (2011) suggested that failure to verify was due to inaccuracies in the algorithms governing the game because DT "has undergone 50 years of refinement and validation," whereas the program logic of the simulation game "has never been formally verified" (p. 192).

The literature thus far reviewed has shown a use for guiding policymaking to facilitate the diffusion of innovation. Soffer et al. (2010) point out that department policy influenced the rate of adoption at Tel Aviv University, Moizer and Lean (2010) used DT to inform strategies to be adopted at the administrative level, Smith (2012) examined the DT literature to produce very carefully devised administrative strategies for fostering desirable change, and Enfield and colleagues (2011) used a simulation based on DT with the explicit purpose of testing strategies for fostering organizational change. In other words, these studies have examined diffusion from a top-down perspective in terms of what administrations can and or should do to bring about desirable change in their organizations. Additionally, DT has been used to focus on the phenomenon of diffusion from the standpoint of faculty members as individual units of adoption.

Focus on units of adoption. With a shift in focus from the social system to units of adoption, the five perceived attributes and level of innovativeness have become central concerns. Muflih and Jawarneh (2011) studied the adoption of ICT technologies for pedagogical use among the faculty members at Jordan University of Science and Technology (JUST). The researchers sampled 193 instructors that represented all departments at the university, collecting both quantitative and qualitative data through a questionnaire and interviews. They found that respondents expressed a relatively high level of confidence in the basic use of computers, but a somewhat more modest level of confidence to use computers for pedagogy. Also notable was that no differences were found in these responses based on demographic factors such as gender, years of experience, and departmental affiliation. With regard to DT concepts explored in the study, the researchers found that the faculty members placed most emphasis on relative advantage when considering the adoption of an educational innovation, followed by compatibility, complexity, trialability, and finally observability, in that order.

Interestingly, but perhaps unsurprisingly, Muflih and Jawarneh (2011) found that the population of university faculty members was biased heavily toward innovativeness. When asked to self-categorize according to descriptions of personality traits characterizing innovators, early adopters, early majority, late majority, and laggards, the majority of respondents (76%) classified themselves as early adopters and the second largest group as innovators (17%). Five percent identified with the description for early majority, and only 2.4% with late adopters. Notably, no respondents' descriptions corresponded to the least innovative group (laggards). The researchers attributed this high level of innovativeness to the fact that the population in question comprises university researcher-educators, a position that can be defined by many of the traits and characteristics associated with innovativeness in Table 1. Indeed, this finding is as expected

since university faculty members are presumably selected specifically for their willingness to conduct research (curiosity) and high level of academic achievement.

Lee, Hsieh, and Hsu (2011) used the five attributes of innovation to expand and reinforce the Technology Acceptance Model (TAM), a theoretical framework used to account for acceptance of new technology based on *perceived usefulness* and *perceived ease of use* (Venkatesh, Morris, Davis, & Davis, 2003). Given the purpose of exploring the relationship between these two theories and the five perceived attributes of innovation proposed in DT, the authors conducted a survey study of both private and public institutions in Taiwan that were using e-learning systems for their employees. They found a high degree of congruence between the theories, the strongest relationship with the TAM entailing relative advantage, complexity, and trialability. The TAM is concerned primarily with explaining the relationship between an individual user and an innovative technology, whereas DT focuses on explaining the phenomenon of innovative diffusion in a social context. Thus, Lee et al.'s study suggests that certain perceived attributes—namely relative advantage, complexity, and trialability—have an individual orientation, whereas others—compatibility and observability—are more greatly influenced by the social context of the diffusion process.

Martins et al. (2004) applied DT to understand the use of the Internet as a teaching tool in language schools in Brazil. They surveyed staff in charge of curriculum development and maintenance at 75 language schools with the intent to collect opinions framed in the five attributes of innovations. The researchers focused on the perceptions of *pedagogical managers* as units of adoption because these educators had the greatest influence on implementation of the Internet as an actual teaching tool rather than as a mere sales point for a private language school. They found that observability and trialability were reported as the two most significant factors

when the Internet was integrated into instruction, attributing this result to hands-on training and the sharing of information facilitated by a pedagogical manager.

It should be noted that in this study observability and trialability were treated as attributes from the standpoint of the individual teachers, and not the pedagogical managers. That is, the managers reported observability and trialability as key factors in fostering buy-in among classroom teachers through training in the use of the Internet as a pedagogical tool. In contrast, for the managers themselves, relative advantage and compatibility seemed to be significant factors in the decision to adopt. It is not clear from the study the extent of expertise that classroom teachers possessed, but the managers were assumed to be highly knowledgeable education professionals. The authors concluded that,

> Pedagogical managers at these schools are key components in the change process. If they are convinced of the Internet benefits, they will have a positive influence on how teachers will perceive the innovation and will supply the means for its adequate adoption. (Martins et al., 2004, p. 367)

Thus, it could be the case that the level of pedagogical knowledge an educator possesses influences the relative importance placed on each of the five attributes of an innovation.

Similarly, Kebritchi (2010) found that compatibility, relative advantage, and trialability were the most significant factors for veteran teachers. He conducted interviews with experienced K-12 teachers in the United States to gather data on their attitudes toward a digital math-learning game and its supporting website. In the interviews, the participants were introduced to the materials through a hands-on demonstration, then asked a series of open-ended questions designed to solicit opinions framed in the five perceptions of innovations: relative advantage,

compatibility, complexity, trialability and observability. Kebritchi reports the major findings thusly:

Relative advantage. Participants believed that the game should have proven, empirical results before classroom applications are implemented. This included ensuring that students would be engaged by the game, must apply their knowledge of math to complete the tasks posed in the game, and would be able to transfer what they learned in the game to real life situations. The teachers also believed that the game should be more gender-neutral, commenting that the action-adventure setting may favor boys. Finally, the participants were concerned with the presence of instructor support via the companion website (Kebritchi, 2010).

Compatibility. Participants were concerned about the time allotted for the game in their classes because of the demand to cover material specified in a standardized curriculum. Related to this, they also pointed out the need to ensure that the learning goals of the game were congruent with those of their classes, and that proper hardware infrastructure was in place (Kebritchi, 2010).

Trialability. The participants commented on the need for hands-on demonstrations before adoption. They expressed a sense of responsibility over what learners are exposed to, and so emphasized the prerequisite of a vetting process before actual classroom implementation (Kebritchi, 2010).

Complexity. The teachers indicated concern about matching the difficulty level of the game with the ability of the students. They also pointed out that it would be advantageous to configure a game configured to allow teachers to adjust the difficulty level as they saw fit. The teachers further suggested that they would most likely use the game to facilitate learning of

mathematical concepts that were too difficult to express with more static means, such as a conventional graph (Kebritchi, 2010).

Here, Kebritchi (2010) deviates somewhat from the definition of complexity adopted by the present investigation. The researcher coded teacher comments on complexity from the standpoint of the students, so it is arguably more appropriate to categorize the issues raised for consideration as they pertain to compatibility. In contrast, the present investigation interprets complexity as an attribute that directly affects a teacher—i.e., the confidence and self-efficacy of a teacher to understand the pedagogical purposes and uses of DGBL. This construal derives from Rogers' (2003) definition, which states that "*Complexity* is the degree to which an innovation is perceived as difficult to understand and use" (p. 16), and the focus of the proposal on teachers, rather than learners, as units of adoption. Be that as it may, the participants in Kebritchi's study provided highly informative comments that deserve attention.

With regard to observability, none of the participants emphasized observation of the successful use of the math game in another school as a factor that would persuade them to adopt. Rather, they claimed more reliance on opinions related by trusted acquaintances, a phenomenon of the adoption process that is predicted by DT in later phases of diffusion (Rogers, 2003). This finding suggests that collegial relations play an important role in the diffusion of innovations with the majority of a social system, as argued by Moizer and Lean (2010). Collegial relations are understood to denote typically informal interactions including knowledge-sharing between educational professionals. In the DT model, this type of communication would fall under the interpersonal channels classification.

Considered together, Kebritchi (2010) and Martins and colleagues (2004) indicate that the degree of teaching experience of an individual instructor may influence the relative

importance of the five innovative attributes. According to Rogers (2003), age has not been found to be a factor in innovativeness, so experience should be understood simply as years of service, and the relationship between this and acceptance of innovative learning technologies is likely more influenced by the level of pedagogical knowledge, or level of confidence in trusted methods. Experienced teachers appear to be concerned with the relative advantage and compatibility of an innovative learning technology, whereas less experienced teachers are more influenced by observability. The researchers suggested that the understanding of educational goals and how to achieve them are more ingrained than is the case with novice teachers. Therefore, veteran teachers may be less willing to adjust learning goals to accommodate games, but rather expect available games to conform to the curriculums they teach. For this group, which has more established routines and a clearer understanding and acceptance of established educational goals, relative advantage and compatibility are primary concerns. Organizational psychologists such as Argyris (1993) have pointed out that it is very difficult for organization members to alter routines once they have been established, and the longer a routine is followed, the more deeply ingrained it becomes. In contrast, novice teachers may be less cognizant of targeted learning methods and outcomes, and so less influenced by relative advantage and compatibility. Novice educators are still in the process of learning their trade, and perhaps less confident in their beliefs about how to help learners meet their goals. Thus, such teachers would be more influenced by observing examples of successful DGBL use, and so observability would be an attribute of greater significance. Yet, the studies do not indicate that a high level of experience necessarily precludes adoption, only that the factors of persuasion differ between veteran and novice teachers.

Thus, DT can be used to examine both top-down and bottom-up factors in the diffusion of innovation. The next section turns to a deeper examination of the individual educator's standpoint regarding technological innovations by reviewing similar studies using theoretical frameworks other than DT.

Teacher Perceptions of Instructional Innovations

Researchers have investigated teacher attitude toward new learning technology, including DGBL, using various conceptual frameworks accounting for the acceptance of innovative technology and or behaviors. The overall purpose of this line of research has generally been to gather empirical data on the role of teacher attitudes in technology integration in order to inform strategies for fostering buy-in. In addition to suggesting steps that policymakers could take to support adoption through policy mechanisms, the studies also illustrate the influence of experience and pre-existing knowledge on the persuasion of teachers to adopt an innovation. Although this line of inquiry has focused primarily on educational levels below that of colleges and universities, it remains informative because pedagogy is a central goal throughout a formal system of education, so educators at any level can be assumed to encounter related issues and harbor similar concerns.

Pre-existing knowledge. Schrader, Zheng, and Young (2006) addressed how online role-playing games should be treated in training preservice teachers, and the perceptions of games among those trainees. The authors were primarily interested in exploring whether pre-existing knowledge among educators included consideration of pedagogical applications of computer games within a social-constructivist framework. They collected data from 203 undergraduate students from three different universities in the United States. The data indicated that recreational game use was common among the population, and nearly half reported being avid players.

However, the preference among respondents was for individual gameplay, and most did not engage in online games that are characterized as being relatively social in nature (e.g., multiplayer games). The authors found that while many preservice teachers recognized an educational role for digital games, these were primarily limited to individual aspects of learning such as fostering motivation and curiosity and drilling discrete skills. Most of the respondents did not recognize a social-constructionist aspect of DGBL, indicating an influence of personal experience on concepts of pedagogical use.

Kenny and McDaniel (2011) address technological complexity as a factor influencing the attitudes of teachers toward digital games as educational tools. They hypothesized that pre-existing opinions of and experience with games for entertainment influenced the perception of educational games. The authors further hypothesized that the complexity of modern video games may be a factor in educators' opinions. They conducted a quasi-experiment with preservice teachers who were undergraduates at an American university. In the study, participants were pre and post tested with a survey instrument designed to solicit opinions towards games in general as well as educational uses for games. The intervention involved half of the participants playing a motion-sensor controlled game, the operation of which was assumed to be more intuitive than that of games played on other consoles. The authors made two notable findings. First, preservice teachers as a group are less predisposed toward digital games as a medium of recreation than the general population. Kenny and McDaniel conjectured that this could be a result of their training in prescriptive methods of knowledge transfer, which superseded positive inclinations toward discovery as a means of knowledge acquisition. Second, there was a significant increase in a positive disposition toward games as an educational tool following the experience with the motion-sensor game, indicating that perceived complexity of digital games constitutes a

noteworthy influence on teachers' opinions of DGBL. They concluded that experience with games enhances knowledge of games, which in turn lowers the probability that teachers would reject games as potential learning tools.

Can and Cagiltay (2006) investigated the perceptions of digital games among preservice computer teachers. Specifically, they focused on how teachers perceived games that could be adapted for educational purposes, as opposed to games purposely designed for learning or games purely for entertainment. The authors surveyed and interviewed university students in technology departments and found that, in apparent accordance with Kenny and McDaniel (2011), a majority of the respondents recognized some negative aspects of digital games, with nearly half regarding them as a waste of time. At the same time, respondents also recognized some positive aspects, such as stimulating learner curiosity. Overall, rather than dismissing the educational potential of games outright, the respondents also expressed an intention to learn more about the pedagogical application of games in the future. The authors attributed the desire to discover educational applications for games to the fact that the population studied were majoring in computers and had extensive experience with and interest in games. Thus, values and interests may influence pre-existing assumptions when evaluating an innovation.

Influence of policy environment. In conjunction with a comprehensive top-down policy emphasis on technology integration in the Turkish educational system, studies have been conducted to understand the impact of the training programs on teacher perceptions and use of technology-supported learning tools. Uzunboylu and Ozdamli (2011) developed and tested a survey instrument for measuring teacher perceptions of mobile learning in Cyprus. Mobile learning entails the delivery of educational content over mobile platforms such as various hand-held devices. The authors sampled secondary public school teachers and found that attitudes

toward mobile learning were positive overall. Teachers felt that mobile learning was appropriate for their subjects and materials, and that adequate infrastructure was present. They also expressed particularly positive feelings about the function of mobile technologies in removing geographic and time limitations associated with formal classes. A slight gender difference was detected in that male teachers appeared more positively disposed toward mobile learning than female teachers, but there were no significant differences between schools. The authors attributed this uniform acceptance to the Turkish education ministry's program to introduce the technology that emphasized teacher training on its implementation.

In a study directly related to FL instruction, Aydin (2012) investigated teachers' perceptions of using computers in EFL classes in Turkish primary and secondary schools. The researcher surveyed 157 instructors, roughly half of whom had attended training in computer integration, with a questionnaire designed to solicit information on computer skills, extent of classroom use, attitudes toward computers, self efficacy with regard to computer skills, and institutional support. The results showed that teachers had a high self-efficacy with regard to general and common uses of computers such as word processing, but a low level of confidence with applications that require more specialized skills such as using simulations. These confidence levels were reflected significantly in the actual use of computers in courses. At the same time, the teachers had a generally positive view of computer application in instruction, and felt that technology improves student motivation, understanding, and ultimately educational outcomes. With regard to the school contexts, teachers felt that technology-supported teaching tools were fairly common and accepted, that there was a fair amount of knowledge sharing between teachers with regard to these materials, and that there was sufficient institutional support and encouragement for their use. Aydin recognized the effectiveness of administrative policy on

fostering technology integration and recommended ongoing faculty development programs to further increase teachers' computer skills.

In another study in Europe, Demirbilek (2010) investigated the attitudes of teachers of adults toward mobile learning and DGBL to project future educational developments. The author collected 113 surveys from teachers in eight European countries. The instrument was designed to solicit information not only on current usage, but also on future intentions with regard to mobile learning and DGBL. The results indicated a high level of curiosity about educational applications for the new technologies. The majority of teachers used games of all genres—puzzles, quizzes and simulations—primarily on PCs, but they also expressed interest in learning more about mobile game applications for learning. Overall, although teachers recognized some inadequacies with the current generation of technological applications, they expressed a desire to learn more about DGBL and a strong intention to experiment with and implement suitable materials in their courses.

While the previous studies reported a relatively positive response with regard to perceptions and use of technology by educators in the Near East and Europe, Salehi and Salehi (2011) related somewhat contrasting results. They investigated classroom ICT use among primary and secondary school English teachers in Iran. Significant to this particular context is the use of the Entrance Exam of the Universities (EEU), a high-stakes test that determines entrance into the national university system. Teachers at all levels felt overwhelmingly that the need to prepare students for the exam discouraged use of ICT in their courses. In particular, they expressed perceptions of pressure from parents as well as administrators to adhere to prescribed textbooks and supplementary materials designed specifically for EEU preparation. Paradoxically, the educators generally felt positively toward ICT. They recognized positive influences with

regard to student motivation and learning outcomes, and expressed a desire to integrate technology into their instruction. However, the emphasis on test preparation meant that most teachers did not have the time to experiment with educational uses of ICT, and the provision of adequate ICT infrastructure (innovative hardware as well as software) was not prioritized. The authors concluded that the use of the EEU had a direct and negative effect on the proliferation of ICT in education. Thus, it appears that openness toward innovative technology-supported teaching approaches is dependent on the cultural and or policy context of the educational system.

Although Kenny and McDaniel (2011) found that teachers, as a group, are initially skeptical with regard to DGBL, this stance can be softened through a deliberate and well-crafted intervention. Aydin's (2012), Demirbilek's (2010), and Uzunboylu and Ozdamli's (2011) studies suggest that a successful intervention can engender fairly positive feelings towards and curiosity about DGBL. In particular, their studies were conducted in the setting of policy measures on the part of the government designed to facilitate innovative approaches to education. In contrast, Salehi and Salehi's (2011) study indicates that an adherence to a system of high-stakes testing and established approaches to test preparation discourage educational innovation. The next section addresses the perceptions of innovative educational approaches in East Asia, where a cultural tendency to favor the tell and test method has been cited as an obstacle to technological innovation in education (Thomas, 2011).

Perceptions of educational innovations among teachers in Asia. The need to emphasize test preparation at higher educational levels in Asia appears as a shared theme in the literature on teacher perceptions of innovations in education. Koh et al. (2011) conducted a cross-sectional survey study of teachers in Singapore to explore the usage of digital games in their classes. The teachers represented multiple levels of the educational system, from primary

school to junior colleges, and spanned a variety of academic subjects. They found that while most teachers did use games, the majority (59%) reported using them only *rarely*, and only a small percentage (6%) reported using them more than once a week. The low instance of game usage was notable because the study was conducted in the backdrop of an active promotion of multimedia integration by the Singaporean government. The authors also found that while most teachers felt games were useful in facilitating higher-order cognitive processes and fostering a positive attitude among students with regard to school, most also cited a lack of time and limited resources as reasons for not utilizing more educational games. The authors proposed a link between these two obstacles to broader game implementation, a shortage of time, and a shortage of resources, in that they appeared to be related to a perception among teachers of the need to strictly adhere to a predetermined curriculum. For instance, the researchers interpreted the issue of a lack of time as teachers feeling pressure (from administrators and parents) to cover prescribed topics in a prescribed manner, and a perception among teachers that games may detract from this. Similarly, the authors suggested that a lack of resources could mean that teachers had difficulty finding games with learning goals relevant to the courses of study they managed. Koh and colleagues proposed a model for encouraging more educational game usage among teachers that involves both *push factors* (administrative policies to reward and support game use) and *pull factors* (appealing to teachers own interest in games).

Notably, Koh and colleagues (2011) also found that experience appeared to influence the likelihood of educational game use in that teachers with fewer years of service were more receptive to the idea of broader DGBL use in school. The authors suggested this could be due to habit formation among the more seasoned teachers, a proposal that is compatible with findings reviewed in the previous section. Also, interestingly, they found that the higher the level of the

institution, the less likely teachers were to employ games. In other words, there was less game use in high school and junior colleges than in primary and middle school. The authors pointed to two possible explanations for less game usage in higher education. One is the perceived need to focus on test-preparation because of the importance placed on examinations at higher educational levels, and the other is the lack of games designed with learning goals and environments suitable for high schools and junior colleges.

Similar results were found by Jeon and Hahn (2006), who surveyed 228 middle and high school English teachers in Korea to collect data on their opinions of Task-based Language Teaching (TBLT). Although this method is not directly related to learning technologies per se, it is comparable to a DGBL approach to FL instruction in that many of the theoretical underpinnings are highly similar (Peterson, 2009). Also, TBLT constituted an innovative approach at the time of the study that contrasted with the conventional FL methodology in Korea. More specifically, while the dominant instructional strategy in Korea (and much of East Asia) emphasizes rote memorization, direct explanation, and mastery (as per behaviorist and cognitivist learning/teaching principles), TBLT is based more on the humanist and constructivist tenets of direct experience, learning by discovery, and student-centeredness. The authors found that while teachers at all levels understood the principles of TBLT, they did not consider the approach an appropriate fit for their teaching contexts. Among the incongruencies cited were the need to focus on test preparation and the large size of the classes, which made it difficult to sufficiently monitor multiple groups working on separate tasks.

Japanese teachers' perceptions of educational innovations. Although the researcher failed to discover any formal studies on university and college faculty perceptions of educational technologies, there have been three notable investigations into Japanese teachers' attitudes

toward educational use of innovative technologies and methods. Joshi, Pan, Murakami, and Narayanan (2010) compared the perceptions of Japanese and American teachers with regard to using computers in kindergarten education. Although this study was not concerned directly with higher education in Japan, it is informative nonetheless because teacher training in Japan occurs at the college level, as it does in the United States, and kindergarten teacher perceptions could be indicative of general trends in the institutional culture. The authors surveyed early childhood educators in both countries, targeting classroom teachers. The differences were striking. While roughly two thirds of participating teachers in the United States believed that computers and the internet can play a beneficial role in childhood education in terms of inspiring children to learn and facilitating development, only a small fraction of their Japanese counterparts shared this belief. Notably, the results indicated that experience with computers actually had a negative effect on the attitude toward educational applications among Japanese teachers. In other words, the more experience these teachers had using computers in general, the less likely they were to recognize a beneficial role for computers in educating children. The authors suggested that this trend may be due to an emphasis on direct human interaction in education, or an abnegation of mechanically mediated contact, particularly with small children.

Interestingly, Joshi and colleagues' (2010) findings were similar to those found by Schrader and colleagues (2006) and Kenny and McDaniel (2011), in that pre-existing knowledge of and experience with computer games influences teachers' attitudes toward educational gaming. There is further similarity in that these studies seem to show that, in the case of American teachers at least, more experience with games correlates positively with greater acceptance of educational applications for digital games. It is notable that for the Japanese teachers in the latter study, the exact opposite seems to be the case. This low popularity of digital games among

kindergarten teachers also seems to contrast with the findings of Koh and colleagues (2011), who found that digital game use was actually more frequent in the lower educational levels in Singapore. One possible explanation not mentioned by the authors is that gender may be a factor. Much literature has suggested that males trend toward greater acceptance of new technologies than females (e.g., Cockburn & Ormrod, 1993), while over 93% of Japanese kindergarten teachers are female (MEXT, 2012). Unfortunately, the authors do not provide detailed information on the gender representations of their samples. Furthermore, none of the other studies revealed meaningful statistical differences between male and female teachers in their attitudes toward educational games or other instructional technologies, with the exception of Uzunboylu and Ozdamli (2011), who described the disparity as *minor*. Moreover, Uzumboylu and Ozdamli did not claim that female instructors were averse to learning technology, only that males expressed a slightly higher level of enthusiasm for it. Therefore, an explanation based on gender is tenuous at best. Joshi and colleagues' (2010) own suggestion, an emphasis on direct human contact with children, is also difficult to substantiate because of the quantitative nature of their study.

One likely explanation based on the reviewed literature is that the Japanese kindergarten teachers lacked the knowledge that would be considered the software component of an innovation. The studies thus far have suggested that a lack of training intervention aimed at fostering the software aspect of instructional technology discourages its use. If the Japanese kindergarten teachers had not been trained in the theoretical and applied aspects of learning technology, there would be no reason to expect that they would express positive feelings toward its application. In any case, what is also clear from this study is that experience with computers by itself does not appear to facilitate persuasion to adopt learning technologies in the case of

Japanese educators, and that culturally or policy based assumptions and values may play a key role in the decision to adopt.

While not focused specifically on learning technology, some informative studies investigated perceptions of new methodological approaches to FL instruction. Underwood (2012) investigated the acceptance among Japanese high school English teachers of a curriculum change that incorporated communication training with grammar instruction. The new methodology differed from the conventional methodology in much the same way that TBLT differed from conventional Korean approaches in the Jeon and Hahn (2006) study. That is, rather than provide grammar rules for students to practice by rote, the instructor would provide examples of language use in authentic contexts and allow the students to infer their own rules through guided discovery. The author conducted a mixed-methods study consisting of focus groups and interviews at one school, and surveys at three others. He found that high school English teachers generally held positive views of lessons that incorporate meaningful communication because such an approach was seen as beneficial for motivating students. However, many teachers also expressed concern that grammatical accuracy would decline, which was a decisive factor because of a perceived need to emphasize preparation for university entrance examinations. In other words, the teachers believed that, for the purposes of the exams, grammatical accuracy was more important than successful verbal communication. Additionally, teachers were also concerned that the new approach would not benefit students other than the high performers, and that most learners needed the patterned repetitions of the conventional approach because they were easier to perform successfully.

Nishino (2012) compared high school teachers' attitudes toward Communicative Language Teaching (CLT) and actual classroom practice. CLT is similar to the method

investigated by Underwood (2012) in that it constitutes an innovation by incorporating more principles from Humanist and Cognitivist learning theories than conventional FL instruction in the context of Japanese high schools. The author surveyed high school teachers in a random sample, and observed and subsequently interviewed four teachers. She found that although teachers recognized the benefits of CLT, and some were even trained in the paradigm, the actual teaching reflected classroom logistics and tended to focus on preparation for university entrance examinations. In other words, in the classroom, teachers tended to favor conventional approaches in practice.

Nishino (2012) and Underwood's (2012) findings are similar to those of Koh and colleagues (2011) and Jeon and Hahn (2006) in showing that FL teachers in Asia at the secondary level feel pressure to concentrate on established curriculums and test-preparation methods, and that this demand seems to detract from interest in innovative teaching approaches. This interpretation is compatible with Salehi and Salehi's (2011) argument that high stakes tests have a negative impact on the integration of innovative educational technologies, and Marginson's (2010) portrayal of the cultural influence on the educational systems of the major East Asian countries. That is, eventual social status is determined for life based on the ranking (exclusivity) of the university attended, and entrance into a top-ranking school requires passing a competitive gatekeeper test. Given such a great importance placed on these entrance examinations, it is not surprising that preparing students to do well on them would be at the forefront of most teachers' minds, particularly at the middle and secondary school level.

FL teacher perceptions of CALL. Teacher perceptions of CALL may be informative in understanding potential attitudes toward DGBL because game-based approaches to FL instruction that are digitally mediated are considered a form of CALL in the present study.

Technology-supported tools for FL instruction have existed for decades, but integration into curricula has been sporadic at best. This has prompted several researchers to look at educator perspectives of CALL materials. Research into the use of CALL, or lack thereof, suggests that the factors that influence the adoption of technology-supported FL learning materials and methods are similar to those that influence the use of learning technology in general. That is, top-down, policy related factors, pre-existing knowledge, culturally-mediated assumptions and values, and peer opinions affect CALL implementation.

Alshumaimeri (2008) studied the perceptions of secondary school EFL teachers in Saudi Arabia. The researcher collected questionnaires from 183 male and female teachers representing various age groups, qualifications, and years of experience in education. He found that while roughly half of respondents had undergone training in general computer use, only a fifth had been trained specifically in the use of CALL systems. Notably, the teachers who had undergone CALL training had a more positive attitude toward the approach and were much more likely to recognize and understand its benefits regardless of age, gender, qualifications, or years of teaching experience. This affirmative stance with regard to CALL correlated significantly with its use in the classroom. Alshumaimeri concluded that the simple presence of hardware infrastructure does not result in actual incorporation of technology-supported approaches, and investment in training and faculty development is an essential component of programs to digitize curriculums.

In contrast, Kessler (2007) found that the extent of CALL use correlated more closely with informal knowledge sharing among peers than with formal training. The author studied 108 TESOL (Teachers of English to Speakers of Other Languages) professionals who had earned a Masters Degree at an American university. A questionnaire was used to solicit information on

the extent to which their degree program prepared them for practice, the extent to which they continued learning in their practice, and attitudes toward technology in general. Kessler found that a positive attitude with regard to CALL correlated more closely with informal learning among peers than formal training in degree programs. It should be noted, however, that the findings did not indicate an irrelevance of CALL training in educator preparation, only that subsequent knowledge sharing in a community of practice played a greater role in persuading educators to adopt CALL. Also, it is uncertain whether informal training with regard to CALL would have taken place in the absence of an initial CALL training program.

Kim (2008) conducted a qualitative investigation into the attitudes toward computers among graduate students working toward EFL/ESL qualifications in an American university. The researcher conducted qualitative interviews with nine such students and used grounded theory to investigate their perceptions of CALL. Notably, although one of the major goals of the program in which informants were enrolled was to foster skills in utilizing CALL to create more student-centered learning environments, the overall sentiment among the student-teachers indicated a preference for teacher-centered approaches to instruction. Additionally, the participants did not recognize a central role for computers in a curriculum, and only considered them as one of many optional tools available. Yet, informants did recognize a *pressure* to use technology-supported learning materials that existed in the work environment, and indicated that the major purpose of CALL training was to merely improve employment prospects.

It should be noted that in Kim's (2008) study, seven of the 10 participants were from East Asian countries (Korea, Japan, and Taiwan). As much of the previous literature has suggested, the cultures of this region tends to favor teacher-centered, prescriptive methods of instruction, likely influenced by an emphasis on high-stakes testing. This may indicate that, in the case of

Kim's informants, pre-existing knowledge and assumptions about the teaching context supersedes information accumulated in training, or that the type of training involved was insufficient for convincing teachers to rethink their assumptions.

Insufficiencies in infrastructure and inadequate administrative support also appear to be important factors influencing adoption. Maftoon and Shahini (2012) surveyed experienced Iranian EFL teachers at language schools and institutions of higher education to understand factors that inhibit the normalization of CALL use. They collected information on teacher perceptions of infrastructure, peer opinions, ease of use, effectiveness, level of familiarity, institutional support, and lack of time. The researchers found that inadequate facilities were the greatest hindrances to CALL use, which was closely related to inadequate support from the school administrators. A lack of time and perceived complexity of the materials were also strong inhibitors. While teachers remained skeptical of the usefulness of CALL and recognized this attitude among peers as well, these were the least inhibiting factors to using the materials.

Section summary. The review of literature on educator perceptions of learning technology thus far suggests that factors influencing the perception of innovations include pre-existing knowledge formed by experience, training, informal knowledge sharing among peers and policy environment. Notably, these factors seem to be more significant than the hardware aspect of IT/ICT technology. Other than for the educators studied by Kenny and McDaniel (2011) and Maftoon and Shahini (2012), *complexity*, as it is understood for the purposes of the present investigation, was not reported as a major concern by educators. Teachers did not express a debilitating lack of confidence in applying the devices associated with the technology, which likely reflects a general rise in the level of computer and game literacy predicted by Ito (2010), Prensky (2001), and other scholars, or technical improvements related to user-friendliness. The

main hardware issues that emerge pertain to the availability of infrastructure (i.e., computers, appropriate game applications, etc.). The review of literature also suggests that well-crafted policy interventions, including training programs, have a positive impact on the overlap of pedagogical and technological knowledge, and consequently on the acceptance of innovative learning technologies. The next section turns to examine whether and to what extent such interventions have been conducted in the Japanese higher educational system.

Innovation Diffusion in Japanese Higher Education

Japan has a reputation as a technologically advanced country, reinforced by images of electronic gadgets, games, and popular culture characterized by science fiction themes. However, in higher education at least, Japan lags much of the developed world in both instructional methodology and the integration of technology-supported pedagogy. The previously reviewed literature suggests that a delay in the adoption of new technologies in education may be due to a combination of a lack of administrative support and or a lack of teacher awareness of the purpose and utility of innovative methods and tools. This section of the review addresses the causes for a lagging diffusion of innovative teaching technologies in Japanese higher education first through a deeper exploration of the organizational background and recent history of reform. Following this, literature is reviewed illustrating a government initiative to integrate digital technologies (IT/ICT) with pedagogy at Japanese universities and the current status of this program. Finally, because the focus of the present study is the individual teacher as a unit of adoption, and because peer networks and social systems appear to be influential on perceptions of innovation, literature on the demographics and working conditions of university FL educators is also reviewed.

Reform of Japanese universities. Japanese higher education is a strictly regimented, top-down hierarchy centrally controlled by the Ministry of Education, Culture, Sports, Science,

and Technology (MEXT) (Kitagawa & Oba, 2009). According to MEXT (2012) there are 387 junior colleges and 780 universities comprising higher education in Japan. The ministry is one of the oldest and most influential bureaucracies of the Japanese government, being in charge of policy and funding for all the national universities, as well as accreditation and significant funding for the many private universities and colleges. Yet, despite being one of the more powerful government organs, pressure for reform from the private sector and elected officials backed by public opinion has provoked MEXT into a series of recent restructuring measures.

Calls for reform originated with a perceived inefficacy of the university system. According to Amano and Poole (2005), Japanese universities have typically been viewed as serving very few practical purposes since the 1970s in terms of research and education. Rapid economic expansion from the 1960s provided Japanese companies with sufficient resources to ensure cultural solidarity within their organizations by assuming the training of all new employees. These private corporations could also afford their own sophisticated research and development entities, enabling them to innovate technologically. This made most companies non-reliant on higher education to support the quality of their workforce or their R&D capabilities. With no educational or research roles to fulfill, universities became a respite between high school and life as a company employee, where most students were not interested in studying academic subjects, and faculty were for the most part not interested in pursuing practical research or intellectual development.

While criticisms of the system of higher education have been present since the 1970s, Meras (2012) describes a convergence of demographic, economic, and technological developments that intensified disapproval and eventually instigated major structural reforms, the implementation of which began in 2004. First, a financial crash in the early 1990s led to long

periods of economic stagnation, which prompted reforms in the labor market that put pressure disproportionately on mid and low-skilled workers (Jiyeoun, 2012). This in turn increased demands from parents to ensure the quality of the education for which they were paying. Also according to Meras, the economic downturn and accompanying loss of profits hindered the ability of many companies to expend resources on training and R&D. At the same time, globalization has had an effect on the rise of non-Japanese competitors in markets traditionally dominated by Japanese firms, and the advent of global university rankings publicizing the relatively low research and education quality of Japanese universities. These factors created the perception that the system of higher education should play a greater role in producing technical innovations for commercialization, as well as a workforce that could compete internationally. Specifically, calls for reform emphasized the need for *modernization* and *internationalization*, where the former is generally considered to denote research in technology and science, and the latter entails the preparation of graduates to work in a multi-cultural business environment.

However, Japanese institutions have proven extraordinarily resistant to disruptive change. According to Goldfinch (2006), the major reform policy that was ostensibly meant to decentralize authority in the higher education system and leverage competitive market forces between schools to improve their research and pedagogical missions has largely been in name only. The author claims that the MEXT bureaucrats, considering themselves the rightful *controllers* and *guardians* of the university system, instituted administrative reforms principally to maintain their influence in the face of calls for restructuring that threatened their control. The reforms involved reorganizing national universities into semi-autonomous and semi-private National University Corporations (NUCs), which were to take on a larger burden in providing their own funding. However, the source of funding (MEXT) essentially did not change. Prior to

the creation of the NUCs, disbursements of funds from MEXT were needs-based and relatively equitable across the higher education system. Following the reforms, the various institutions currently compete for funding in the form of grants based on research and educational outcomes. Consequently, Goldfinch argues that the new system actually serves to strengthen MEXT's dominance over the various former national institutions along with private schools because it provides the ministry with greater legal discretion over the disbursement of funds, and a means to consolidate administrative authority in the office of university presidents who are highly susceptible to MEXT influence.

The greater control exercised by MEXT has arguably overemphasized modernization at the expense of internationalization. According to Kitagawa and Oba (2009), MEXT has used its fiscal authority to channel funding from smaller, locally oriented liberal arts institutions to larger, nationally oriented research-intensive institutions. Although the selection of research grant winners is purportedly based objectively on the quality of the research proposals, the decision making mechanisms are unclear and larger schools with a technical or scientific focus receive a greater proportion of the disbursements, leaving many liberal arts and skills-based programs underfunded and marginalized. Iwasaki (2009) argues that the primary concern of the government with regard to *modernization* is to increase technological capabilities, and to transfer those to the private sector for commercial exploitation. In contrast, he claims that the rhetoric of *internationalization* is limited in motive to recruiting foreign students to replace the dwindling number of Japanese that are 18 years of age and can sit for university entrance exams, and not to increase the exposure of Japanese scholars and students to foreign cultures to cultivate broader worldviews. In fact, Iwasaki argues the reforms have had the effect of hampering intellectual activity by burdening faculty councils with extra administrative and bureaucratic work.

A significance of these developments to the present study is that FL education typically falls into the category of liberal arts, humanities, or skills. If these academic domains are marginalized at the institutional level, then it stands to reason that FL and FL educators are marginalized as well. This could have an important influence on teacher perspectives of DGBL or instructional technology in general because, as the literature of the previous two sections indicates, institutional policy plays a key role in the rate of adoption of innovations. Marginalization or funding neglect could entail a lack of concerted policy effort to promote or sustain the adoption of innovative educational approaches using technology. An absence of such top-down initiatives would make it unlikely that classroom instructors have been active in adopting innovative technology-related teaching methods.

Another possible significance is that internationalization, which evokes the impression of inter-cultural exchange and the presence of non-Japanese faculty and students on campus, does not appear to be an actual policy goal. This has possible repercussions for FL education because a significant number of the instructors in Japanese higher education are non-Japanese (Yonezawa & Ishida, 2012). Since the intent of DT is to describe diffusion of innovation in a social system, identification of the social system becomes an important prerequisite to the theory's application. Although the term *internationalization* implies relatively equitable status between Japanese and non-Japanese FL educators, the extent to which they together form a single social system is an important concern. The following two sections will address the extent to which innovative technologies (IT/ICT) have been incorporated into the pedagogy of Japanese higher education, and the extent to which internationalization as a vehicle of cultural exchange has occurred.

Modernization of higher education. It may be assumed that given MEXT's focus on technological research and innovation, educational technologies would have been successfully

implemented at a relatively rapid rate. However, this is not entirely the case. While the hardware aspect of innovative technologies (e.g., modems, cables, PCs, etc.) has been implemented successfully through various programs to improve digital infrastructure, the software aspect of these tools (i.e., overlap in technological, pedagogical and content knowledge and associated training) has been largely overlooked. Thus, the integration of innovative technology into pedagogy has been waning at best due to the marginalization of the human factor.

This oversight with regard to instructional technology software (in the DT sense of the word) is not apparently due to a lack of recognition of its significance at high levels of decision making. Sakamoto (2002) reported the policies undertaken at the governmental level to incorporate information technology in Japanese higher education. In 2001, the government enacted legislation to fund technology infrastructure in all institutes of higher learning. In addition to connecting institutions physically to the worldwide web, the author documents that the intent of the law was to modernize and improve the quality of education provided at these institutes by fostering IT skill acquisition, and also by changing the instructional paradigm from the conventional lecture based curriculum to a more interactive approach. However, although the programs clearly stated these goals and provisions, it is notable that critical human-resource related policies such as issues dealing with training and curriculum development were largely left to individual institutions and departments without ensuring access to expert guidance. In other words, colleges and universities were provided with new technological hardware with which they had little or no experience, but offered no advice on its use. In the rigid top-down hierarchical system of Japanese higher education, it seems problematic to expect individual schools and departments to act independently in the absence of clearer MEXT guidance.

Uchida (2004) describes the problems associated with efforts aimed at incorporating IT into pedagogy at Japanese institutions of higher education. She claims policymakers had incorrectly anticipated that networking the colleges and universities via the Internet would indirectly address a perceived *backwardness* (i.e., insularity) in the face of a globalizing economy. Specifically, in addition to facilitating the acquisition of technical knowledge, the government's stated intention was to improve English skills and foster communication with intellectual resources outside of Japan. To accomplish this, advisory panels for MEXT recognized the need to develop strategies and new pedagogical approaches to make the most effective use of the new technologies. However, according to the author, the actual implementation was left up to the existing faculties, which had little expertise with new teaching approaches and were already burdened with regular duties. As a result, technology in education most commonly translated into learning about, and not with, computers. Thus, despite the recognized necessity of reforming curriculums in conjunction with technology integration, the author argues that the important detail of ensuring that faculties were provided with adequate skills and training was either overlooked or ignored outright.

The lack of direction and or incentive to change the pedagogical paradigm has perhaps had predictable results. Aoki (2010) reports on the introduction of information technology in Japanese higher education in the first decade of the millennium. As described previously, MEXT invested heavily in infrastructure, ensuring that nearly all departments of all institutions had Internet access and terminals. This was done with the purported goal of improving the quality of instruction, and was accompanied with carefully constructed plans for improving outcomes in four major areas: knowledge, skills, attitude, and creative thinking. The author claims that MEXT further recognized the need for the instructional paradigm to shift from a lecture-based,

instructor centered format to a project-based, student centered approach, but the ministry mistakenly assumed that the mere presence of IT/ICT technology on the campuses would facilitate this change. She points out that, although funding provided for the hiring of network engineers, these human resources were not trained in pedagogy and therefore had no common ground on which to base communication with faculty members. In the end, a change in teaching approach did not occur, and presently where the new technological tools are used at all, it is done mainly as a medium for delivering the tell and test pedagogy via videotaped lectures and electronic quizzes. In summing up the reasons for lagging technology integration, Aoki cites a survey conducted by the National Institute of Multimedia Education in which institutions report a "lack of skills concerning the use of ICT in education among faculty members," and a "lack of understanding about the educational effects of the use of ICT" (p. 857).

Perhaps the clearest illustration of the problematic nature of technology integration in Japanese colleges and universities is provided by Latchem et al. (2008), who compared the diffusion of instructional uses of technology in Korean and Japanese higher education. The study sharply demonstrates the reasons for the lag in Japan because both systems began programs to promote IT integration at roughly the same time, yet Korea is currently far ahead in terms of normalizing IT use and reforming pedagogy. This investigation also serves to highlight the need for developing personnel with the appropriate overlap of technological and pedagogical knowledge. According to the authors, while both educational systems were advancing reform initiatives in conjunction with IT incorporation, Japan focused primarily on organizational issues and Korea emphasized research and pedagogy. For example, the MEXT reforms that brought about the creation of NUCs were only effective at the administrative and bureaucratic levels, but the authors claim, "There has been no recognition that reforming universities involves reforming

faculty" (p. 613). In contrast, the Korean educational ministry used funding to incentivize research and experimentation with teaching methodologies more suited for optimizing IT use. In Korea, departments were created to deal exclusively with learning technology, and staffed with educational technologists who were well versed in pedagogy. While the Korean government offered ample policy and material support for technology integration, MEXT "has never developed an action plan or provided the necessary follow-through or funding" (p. 617). As a result, diffusion of innovative teaching methods using technology occurred at a negligible rate in Japan. Japanese faculty did not receive the training and know-how to use IT optimally, and remain largely unaware of the pedagogical applications thereof. The authors conclude that, excluding a few exceptions among the private institutions, "The Japanese universities have never been adequately managed nor resourced for e-transformation," and "faculty have never been given training and support for this paradigm shift" (p. 624).

The most current data on technology in pedagogy at Japanese institutions of higher education seem to reflect these criticisms. The Open University of Japan (2011), a national online university partially tasked with the responsibility of promoting e-learning, published a survey report of ICT use in colleges and universities. According to the survey, only 42% of both private and public institutions reported that their departments placed *sufficient importance* on e-learning or ICT-supported education, and 47% reported that learning technology only received *partial importance* at the departmental level. Furthermore, most universities (64%) do not have the promotion of e-learning or ICT-supported education currently written in their vision statements, action plans, or mid-term plans, and only three percent responded that such mention will be included in the future. Only four percent of schools reported having a detailed plan to support the integration of ICT in education, but nearly 57% have no such plans on any level. A

large minority of schools (48%) reported having an organization, department, or section that is responsible for the campus-wide support of ICT use, whereas roughly 11% reported that they rely on individual professors or groups of faculty, and 18% report having no such entity. As for personnel staffing these support groups, most schools (60%) reported relying on non-dedicated staff to carry out ICT support. That is, those in charge of facilitating ICT use must carry out such responsibilities in addition to other teaching and or administrative duties. Roughly a quarter reported the presence of dedicated staff, but the remainder reported that no such personnel exist. When asked if they were assessing the effectiveness of ICT use on campus, the majority of schools (57%) claimed they do not conduct efficacy assessments, and 37% claimed that effectiveness is measured only through student surveys. When asked if assessments were reflected in subsequent implementation of e-learning and or ICT supported education, the majority (67%) responded negatively, some (23%) responded *somewhat*, and only seven percent responded positively. In sum, the survey data support criticisms by Aoki (2010), Latchem and colleagues (2008), and Uchida (2004). Infrastructure exists for the most part, but there are insufficient personnel with the experience and or the motivation to utilize it optimally. Also telling, there has been negligible movement in the numbers reported for 2010-2011 compared to the results of the same survey that was conducted in 2009 (the results of which were also included in the report for the 2010-2011 survey for purposes of comparison). In other words, diffusion of instructional technology in Japanese higher education appears to have stalled. Since DGBL is considered a subset of learning technologies, the fact that the educational use of IT/ICT in general does not appear to be successfully diffusing among college and university educators strongly implies that there is insignificant diffusion of DGBL in Japan.

Internationalization of FL faculty. The size and demographic makeup of FL educators in Japanese higher education is difficult to determine accurately because there has never been a detailed census. However, there are indications of its size based on membership data of academic societies and online professional networking services. According to the J-Global website (jglobal.jst.go.jp), a government-sponsored networking service for faculty researchers working in higher education, there are 7,913 scholars in the field of foreign languages and linguistics, including the theoretical areas of literature and linguistics; 1,474 of those are labeled as working specifically in the applied field of *gaikokugokyouiku* (foreign language education). Also, Read & Researchmap (resarchmap.jp), another networking service administered by the Japan Science and Technology Agency (JST; jst.go.jp), lists 5,469 researchers in the general field of linguistics, and 1,485 specifically involved in FL education. However, the extent to which these networks are inclusive is uncertain because they are opt-in services. Also, while persons registered may not be identified as FL educators, they still may be engaged in FL instruction because, in practice, many literature and linguistics researchers are also charged with language skills courses. It is also worth noting that the number results for searches on these services often fluctuate, as do the memberships of academic societies from year to year.

The Academic Association Directory (gakkai.jst.go.jp/gakkai/control/toppage.jsp), also maintained by the JST, lists 57 associations related to FL research and education. A summation of membership would not reveal an accurate approximation of the number of FL educators because of the probability of multiple memberships. One of the largest and most established associations that is directly related to FL education is the Japan Association of College English Teachers (JACET; jacet.org), which reportedly comprises 2,489 general members, 211 student members, and 33 institutional members. Obviously these numbers are not inclusive of all FL

educators both because their relevance is restricted to EFL educators and because association membership is voluntary. Similarly, the Japan Association of Language Teachers (JALT, jalt.org) has over 3,000 members (B. Green, personal communication, January 25, 2013), but the membership of this organization is not limited to those working in higher education. However, since these organizations are the largest academic societies comprised of FL educators in Japan, a lower threshold for the entire population can be assumed at between 2,500 and 3,000.

Available data may be used to calculate a rough approximation of the demographic makeup of the FL educator population in higher education, albeit indirectly and with dubious reliability. Yonezawa and Ishida (2012) found that 23% of full-time non-Japanese in higher education were engaged in FL education, and MEXT (2012) reports a total of 6,835 foreign nationals working as full-time faculty members. Calculating 23% of the data reported by MEXT yields a number of roughly 3,075 non-Japanese FL educators. Furthermore, according to Yonezawa and Ishida's data, 45% of FL educators are non-Japanese nationals, implying that there are roughly 6,800 total FL instructors in higher education. However, this number is a relatively unreliable upper threshold. Yonezawa and Ishida only targeted full-time faculty members and schools with high percentages of non-Japanese faculty. Furthermore, MEXT (2012) reports that there are 12,361 adjunct non-Japanese faculty members in Japan, which is nearly double the size of the population that was targeted in their study. Yonezawa and Ishida admit that almost nothing is known about this group, . This is problematic because a faculty member may be classified as a full-time but non-regular staffer, so Yonezawa and Ishida's data likely include an unknown representation of such employees. Also, a common practice is for full-time, regular employees of one institution to teach part-time in a non-regular capacity at another institution, so the number of non-regular employees reported by MEXT likely includes

an unknown number of regular employees. Taking these facts into consideration, it would be more reasonable to assume an upper threshold in the proximity of 7,913 garnered from the J-Global website.

What the available information indicates is that the population of foreign nationals among FL educators in higher education is not insignificant. In addition to the data suggesting that a large minority are non-Japanese nationals, MEXT guidelines stipulate that a minimum of a masters degree is required for employment at this level of the educational system (Higher Education Bureau, 2009). Thus, it can be assumed that the population of foreign faculty is highly educated, possessing either masters or doctoral degrees. However, despite comprising a substantial proportion of the total and being notably skilled, there is a question with regard to the extent that foreign nationals have been incorporated socially into college and university faculties, and whether they can be considered members of the overall social system.

An aspect of organizational culture in Japanese higher education that is directly relevant to the present study is a purported division of FL faculty that affects the informal professional relationships among educators in a community. Japan is typically viewed as a homogeneous and cohesive society, but the idea of clearly established delineation between groups is deeply ingrained in the culture (Makino, 2002). This division is reflected in an insular relationship between departments and faculties, even those within the same institutions. Since the focus of the present study is the FL educator as a unit of adoption, it is important to determine whether the label denotes a true social system as defined by Rogers (2003). However, the literature suggests that FL educators in Japanese higher education likely comprise at least two distinct social systems.

***Dichotomy based on nationality*.** Hall (1998) offers an anecdotal depiction of Japanese universities as institutions comprised of mostly inward-looking and independent-minded departments that offer little consideration to matters unrelated to in-group interests. Furthermore, he claims that most departments give hiring preference to their own graduates, further reinforcing their homogeneity and exclusivity. Hall argues that the obvious downside is a paucity of intellectual exploration and innovation. Particularly within the liberal arts departments, he reports that frequency and quality of research publication is minimal, and with little incentive to invest effort in pedagogical matters for reasons pointed out in the previous section, most non-research faculty attention is given to routine administrative duties. Such an organizational culture may also be apparent in divisions between faculty members within the same department. One of the more widely discussed manifestations of these divisions is the issue of the status of non-Japanese nationals occupying faculty positions at Japanese colleges and universities.

Hall's (1998) assessment of faculty in higher education was corroborated by McVeigh (2002), who emphasized that the insularity in Japanese culture is manifest most visibly in the treatment of non-Japanese faculty. McVeigh claims that foreign faculty members are typically hired on limited-term contracts, enjoy fewer rights as department employees, and are given little or no say in department governance matters. This contrasts with the status of Japanese nationals who have typically been granted tenure and the associated job security upon being hired. The theme of a disparity in work status between Japanese and non-Japanese staff has been reported widely in the media (Klaphake, 2010; McNeill, 2007; McRostie & Spiri, 2008), most popularly by the activist Debito Arudou, who maintains a *Blacklist of Japanese Universities* that reportedly discriminates between foreigners and Japanese nationals in hiring practices. These claims are corroborated by empirical data from MEXT (2012), which reports that a disproportionate

number of non-Japanese nationals are serving appointments as non-regular employees. Roughly two thirds of the foreigners working in higher education are filling what are termed *kenmu* (additional posts) by MEXT. This is a blanket term for the various labels that different schools use to classify adjunct faculty and limited-term (contract) work positions, such as *tokuin* (special appointment), *tokumei* (special assignment), *senin* (dedicated staff), *keiyakukyouin* (contracted teacher), and the like (i.e., non-regular employees). In contrast, only 50% of the entire higher education faculty population is filling such positions. These data appear to support claims of discrimination, but does not provide a detailed picture of the nature of the inequity.

Yonezawa and Ishida (2012) found little evidence of systematic discriminatory treatment pertaining to actual working conditions. Treatment with regard to research support and teaching load is comparable. However, as mentioned previously, the authors targeted full-time foreign nationals who would have at least nominally equitable status with most Japanese counterparts, so an inconsistency in this regard would not be anticipated. In contrast, it is notable that the authors found indications of a disparity between Japanese and non-Japanese FL educators with regard to collegial relations despite the fact that they shared equitable employment status. When asked if native Japanese faculty were included in their academic network, none of the foreign teachers who considered themselves highly proficient in Japanese strongly agreed that it did, approximately 52% agreed that it did *for the most part*, 17% were neutral, and 31% either disagreed or strongly disagreed. Of the foreign teachers who did not consider themselves proficient at Japanese, approximately 12% strongly agreed, 13% agreed *for the most part*, 25% were neutral, and half disagreed or strongly disagreed. This contrasts appreciably with Japanese nationals, 24% of whom strongly agreed, 29% agreed *for the most part*, 27% were neutral and 20% disagreed or strongly disagreed. The authors interpreted this as indicative of a delineation in

professional networking based on nationality in that Japanese instructors tend to associate professionally with other Japanese, and non-Japanese with other non-Japanese. They note that the disparity does not appear to be due strictly to linguistic barriers because the foreign nationals who considered themselves proficient in Japanese reported that they were less likely than Japanese nationals to have collegial relations with other Japanese nationals. Interestingly, this preference does not appear to be due to cultural barriers because a large majority of foreign nationals reported positive feelings toward Japanese culture and society, and a high degree of satisfaction with their lifestyles in Japan.

Although Yonezawa and Ishida's (2012) study has important limitations in that it does not address the large group of non-regular faculty members, and that it targeted institutions known for employing high percentages of foreigners, the results suggesting a dichotomy based on nationality appear to be supported by a body of qualitative research on non-Japanese faculty members. According to Whitsed and Volet (2010), a strong awareness of a dichotomy with Japanese colleagues is apparent in the writings of foreign nationals working at Japanese universities. The authors compared literature on the topic of *internationalization* from non-Japanese faculty working in Japanese higher education with writings on the same theme from authors serving appointments at institutions outside of Japan. They found that foreign faculty in Japan often use borrowed Japanese terms, such as *soto* (outside) and *uchi* (inside) to describe working conditions and relationships with Japanese colleagues. Whitsed and Volet point out that these terms have metaphorical extensions that are used to organize knowledge of culture and environment, and are commonly used to express the dichotomy between in-group and out-group in Japanese society (Makino, 2002). Moreover, the writers in Japan also tended to refer to themselves as *gaijin* (foreigner, or literally *outsider*) rather than *ex-patriot*, further indicating

awareness of exclusion and division. The authors argue that the foreign nationals have adopted these metaphors to express remoteness in their relations with Japanese colleagues.

Whitsed and Wright (2011) continued this line of inquiry by collecting data from 43 English teachers working as adjuncts at various Japanese colleges and universities in a series of focus groups and one-on-one interviews. The informants were chosen based on a high level of experience in FL education and living in Japan so that the data would offer decidedly informed opinions. The authors found that, in apparent agreement with sources such as Goldfinch (2006) and Iwasaki (2009), the informants sensed a disparity between stated and actual goals of their employers with respect to their employment. While institutions of higher education, including both MEXT and individual schools, profess internationalization and cross-cultural understanding as objectives for English instruction, the instructors, based on their first-hand understanding of their circumstances, perceived themselves as playing more of a decorative or utilitarian role. More specifically, they felt that the purpose of foreign adjuncts is to project a mere appearance of multiculturalism, most likely for student recruitment purposes. Aside from this goal, the adjunct teachers felt indifference from their employers toward both the adjuncts themselves and the courses with which they are charged. In the data, the teachers often used spatial metaphors such as *outside* and *periphery* to describe their relationship with these schools.

Another indication of the dichotomy in faculty is the expression of positive or negative emotions associated with various professional relations. Cowie (2011) studied a group of nine language teachers working as adjunct faculty in the Tokyo area of Japan. The group reported relatively close knit communities comprised of other adjuncts or ex-patriots where they could enjoy collegial relationships. The author reported that these communities are characterized by a high degree of knowledge sharing and informal learning, which constituted a rich resource for

professional development. In contrast, he claimed that the language teachers held more negative opinions of colleagues who represented the institutions at which they worked, as well as negative attitudes towards the institutions themselves. Such relations were for the most part merely tolerated and did not extend much farther than administrative or logistical routines.

However, a dichotomy in FL faculty based on nationality alone may be too simplistic an interpretation of the actual circumstances. It should be pointed out that one of the nine adjunct participants in Cowie's (2011) study was a Japanese national, suggesting that the division in FL teaching staff is by no means absolutely delineated along lines of ethnic background or nationality. Also, there is no indication that the colleagues representing institutional work sites were necessarily Japanese nationals. Rather, Cowie's interpretation is that a more relevant determiner of collegial relationships is work status as a regular (tenured) or a non-regular (adjunct or limited-term contract) faculty member (N. Cowie, personal communication, November 5, 2012). Work status as a basis for dichotomy will be explored in greater detail in the next section.

Dichotomy based on work status. A series of labor market reforms carried out in the late 1990s radically altered employment circumstances, particularly for younger workers. According to Jiyeoun (2012), the reforms that were carried out under heavy pressure by the business lobby were intended to address the need for a more flexible labor pool. Prior to the reforms, the majority of workers in Japan, including both tenured and non-tenured academics, enjoyed a high degree of job security under the national *Labor Standards Act* (1947). The unfavorable economic situation resulting from the financial crisis of the early 1990s strengthened a sense that employment guarantees for workers should be weakened to make companies more competitive. However, Jiyeoun points out that, in the case of Japan, the reforms were carried out entirely at

the expense of non-regular employees. The author claims that the legal protections enjoyed by regularly employed workers remain intact in that it is difficult for a school to lay off or terminate a faculty member without engaging in a time-consuming and costly legal process. In contrast, non-regular faculty members are typically hired on 3-5-year limited-term contracts, after which their employment ends automatically when the contracted term expires. It should be noted that this differs from the system of *tenure-track* in the case of academic employees in that no opportunity for tenure is provided, even in the case of exemplary performance of duties. According to Jiyeoun, the burdens of the reforms were placed entirely on non-regular employees because of the political influence of regular staffers, who were predominantly male and middle-aged, thus creating a division in work status along gender and generational lines.

Jiyeoun's (2012) account appears to be supported by the *FY 2011 General Survey of Schools* conducted by MEXT (2012). FL education is classified as a research field under Humanities, and the report shows that all schools are staffed by 23,144 regular (tenured) faculty members with an average age of 51.9, of which 16,585 are male and 6,559 are female. There are also 57,239 non-regular (including adjunct and those working under short-term contracts) employees with an average age of 49.9, of which 33,473 are male and 23,766 are female. While the gender and generational delineations are not absolute, the trends are clear; tenured faculty is disproportionately comprised of older males, whereas adjunct faculty is younger and somewhat more balanced with respect to gender. The data also show that humanities departments are disproportionately staffed by non-regular faculty, which would be expected if a large proportion of FL instructors were foreigners, and a large proportion of those were non-regular employees.

The discussion thus far suggests the existence of at least two distinctive groups of FL educators; a regular (tenured) group comprised primarily of older male Japanese nationals, and a

non-regular (adjunct or contracted) group consisting mostly of younger Japanese and non-Japanese with a more balanced (yet still male-biased) gender representation. However, it is not clear whether gaps in professional networking are more pronounced in the regular/non-regular or Japanese/non-Japanese dichotomy, or both. To paraphrase using DT terminology, it is uncertain whether a Japanese adjunct would perceive more homophily with a regular Japanese employee or with a non-Japanese adjunct.

Chapter Summation and Assumptions

In sum, the literature indicates that the major influencing factors on an educator's perception of innovative technology are personal or professional lived experience, training, and participation in a community of practice. Also, the literature indicates a slow rate of adoption of learning technologies for FL education in Japanese higher institutions, which implies a negligible awareness of or interest in DGBL among FL faculties. The influencing factors were referenced to consider possible answers to the research questions set forth by the present investigation.

RQ1: How do FL educators in Japanese higher education perceive DGBL? The literature provides evidence that may be used to support conflicting assumptions with regard to overall perceptions of relative advantage, compatibility, and complexity. There is sufficient reason to posit a hypothesis with regard to the response to trialability and observability. This section discusses each attribute, drawing on the literature to support assumptions.

Relative advantage.

Reasons to expect a positive perception of relative advantage. Often in the literature, teachers seemed to recognize that DGBL would be useful for fostering learner motivation, and that this effect would constitute an improvement over the status quo. The issue of learner motivation is a major one in Japanese higher education because students often lack a meaningful

reason to study, and many authors highlight the absence of learner engagement as evidence for the need to reform the mainstream pedagogical approach (Amano & Poole, 2005; Aoki, 2005, 2010). Thus, if a significant number of FL educators in Japanese higher education recognize the potential of DGBL to improve motivation among students, then a more positive perception of relative advantage may be expected.

Reasons to anticipate a negative perception of relative advantage. The literature suggests that most educators do not naturally assume a connection between digital games and educational benefits, so it is uncertain the extent to which FL educators recognize this relationship in the absence of an effort to inform them of it, or in the absence of opportunities to become self-informed. At the same time, DGBL itself is a nascent multidisciplinary field, and despite its growing popularity in Europe, Oceania, and the United States, there has been no visible effort to promote the approach for FL education in East Asia. There is also relatively little published research on the subject in the region (Hwang & Wu, 2012). Therefore, FL educators may rely on cultural norms to interpret the meaning and possible uses of DGBL, and there is no indication that computer games are commonly associated with education in Japan.

Furthermore, negligible acceptance of learning technologies in general may predict a negative perception of DGBL. According to the literature, the available technology infrastructure appears to be underutilized or left untouched, indicating a notable lack of interest. According to the DT construct of *technology cluster*, faced with an unfamiliar technology, potential adopters will typically associate it with familiar examples of similar technologies, and if perceptions of those similar examples are negative, perceived attributes of the innovation will likewise be negative.

Finally, high-stakes testing has appeared in the literature as a factor hindering interest in innovative learning approaches, and such language testing instruments have recently been growing in popularity in Japanese higher education, particularly with the Test of English as a Foreign Language (TOEFL), Test of English for International Communication (TOEIC), and the International English Language Testing System (IELTS) as measurements of English proficiency (Labi, 2010; Yoshida, 2013). If the emphasis placed on these tests has a similar effect in solidifying adherence to proven means of preparation as shown in the literature, then FL educators in Japanese higher education may perceive DGBL as offering little or no relative advantage.

Compatibility.

Reasons to assume positive perceptions of DGBL compatibility. With regard to learning goals, the literature suggests that many FL educators in Japanese colleges and universities are given a relatively broad degree of autonomy in conducting their courses, including the setting of course goals. Thus, there is no apparent obstacle to adopting DGBL with regard to compatibility with teaching goals, provided that an educator perceives relative advantage. Also, from a computer infrastructure perspective, MEXT has issued funding and guidelines to ensure that all institutions are adequately equipped with the devices that would be necessary to implement DGBL in courses of study. Finally, a large minority of educators come from countries where DGBL is actually growing in popularity, and so are not expected to be influenced by cultural norms that may conflict with the use of digital games in education.

Reasons to assume negative perceptions of DGBL compatibility. Joshi and colleagues (2010) have suggested a preference for face-to-face over machine-mediated instruction as a cultural characteristic of Japanese education. Although their study targeted K-12 teachers, these

educators may be indicative of a broader cultural view of education because they were trained in Japanese colleges and universities. If the researchers are accurate in the interpretation of their data, then a negative response to compatibility can be expected from Japanese nationals, who comprise the majority of FL instructors in higher education.

Furthermore, Amano and Poole (2005) have pointed out a resistance among Japanese faculty members to the idea of taking on the extra burden that would be required of any reform efforts, and Iwasaki (2009) claims that, following the NUC reforms of 2004, most faculty members have even less of a margin to entertain disruptive innovative changes because they are preoccupied with additional administrative work. Because DGBL is an innovation in the context of Japanese higher education, it may be obvious to potential adopters that the additional allocation of training and experimentation time would be required to implement it. In short, FL educators may determine that a disruptive innovation such as DGBL is not compatible with an environment characterized by administrative constraints on time and human resources.

Complexity.

Reasons to anticipate a positive overall perspective of complexity. The literature offers no examples of low computer literacy hindering the adoption of innovative technology-supported teaching approaches. All faculty members studied have exhibited a relatively high level of familiarity with computing devices, even though some expressed low levels of confidence in using them beyond their most common functions. Thus, the tangible aspect of implementing DGBL should not present a significant concern for faculty members of an institute of higher education in a technologically advanced country such as Japan.

Reasons to anticipate a negative overall perspective of complexity. The literature strongly suggests that many FL educators in Japan lack the overlap in technical and pedagogical

knowledge required to implement technology-supported learning solutions optimally. Governmental programs to reform pedagogical approaches have failed because they lacked a component for educating faculty members on novel digitally mediated teaching approaches. Thus, while the hardware aspect of DGBL may not pose an obstacle to adoption, a dearth of understanding its purpose and potential use may lead FL educators to perceive that the approach is fairly complex.

Furthermore, the average age of both regular and non-regular faculty members is above the age proposed by Prensky (2001) as the delineation between *digital natives*, or those who have grown up with digital technologies, and *digital immigrants*, or those who have had to adapt to the use of digital technologies post-developmentally. Prensky posits that the latter group (at the time of this writing, those over 47 years of age) will be less familiar with and less adept at using new technologies as they become available. As MEXT (2012) reports that the average age of regular employees is 51.9 and non-regular faculty is 49.9 in humanities departments, this group of digital immigrants appears to comprise the majority of faculty members in Japanese universities. Therefore, FL educators may perceive DGBL as being highly complex simply because they are not capable of responding adequately to the appearance of new technologies.

Trialability and observability. DGBL is in the nascent stages of development as a discipline, thus there are few existing DGBL applications specifically for language learning, and therefore few opportunities for experimenting with the approach even outside of Japan. For this reason, perceptions of trialability will likely be negative. Furthermore, a major premise of the present investigation is that there is no diffusion phenomenon of DGBL for FL instruction in Japanese higher education, and the literature provides no evidence to refute this assumption. Accordingly, perceptions of observability are expected to be negative. Although the DGBL

movement is gaining popularity in other countries, there is little reason to expect that faculty would be cognizant of educational trends outside of their immediate context because the culture of Japanese universities has been characterized as relatively insular (Hall, 1998; McVeigh, 2002). Even though a number of faculty members are from countries where DGBL is used, this group is in the minority. Therefore, most faculty members engaged in FL instruction will likely not have observed colleagues using DGBL, nor have they been exposed to the construct through regional conferences or published literature. Thus, the following hypothesis may be posited for this research question:

H1: Perceptions of trialability and observability will be negative overall in the population of FL educators in Japanese higher education.

RQ2: What are the differences in perceptions of attributes of DGBL based on educator demographic characteristics of experience, employment rank, term of office, nationality, research interest, and teaching objectives? As stated previously, experience, training, and community of practice may influence perceptions of DGBL attributes, and these may also correlate to demographic characteristics in the case of FL educators in Japan. A large portion of FL educators in Japan are foreign nationals, and cultural and educational backgrounds that characterize these sub-groups may contribute to a disparity in perceptions of attributes. The literature further suggests that the population of FL instructors in Japanese higher education can be divided into groups based on employment status, which appears to foster disparate working experience. In addition, both cultural background and working conditions seem to influence the formation of close professional and personal networks, which in turn influences the social construction of meaning through a community of practice. Disparate backgrounds and networking behaviors may be reflected in perceptions of DGBL attributes, particularly with

regard to the attributes of relative advantage, compatibility, and complexity. Pre-existing knowledge would not be expected to account for a significant variation with regard to trialability or observability because these perceptions are based more on actual existing conditions in an educator's working context. The literature provides sufficient support for conflicting assumptions about faculty member responses to the first three perceived attributes.

Job title. Job titles in the Japanese system of higher education are related to experience. Faculty members generally begin their careers as lecturers soon after graduate school, are promoted next to assistant or associate professors, and finally to full professors. Until recently, promotion was based almost entirely on age, but currently, accomplishments, primarily in the form of published research but also with regard to activities such as community outreach and curriculum development, have been factored into promotional criteria (Higher Education Bureau, 2009). Thus, job title may be considered a good indicator of professional experience. The literature has indicated that experience influences perceptions of innovative teaching approaches among educators. However, the manner in which job title in Japanese higher education may be associated to disparate perspectives of DGBL is less certain.

Reasons to believe that job title indicating less experience is associated with positive perspectives of DGBL. The literature has indicated that in some educational contexts in Asia, less experienced educators show greater acceptance of DGBL than more veteran faculty members (Koh et al., 2011). If practice is related to DGBL acceptance as suggested in the literature, job titles indicating lower levels of experience (i.e., lecturer), should correspond with more positive perceptions of DGBL than job titles indicating higher levels of experience (i.e., professor).

Reasons to assume that job title is not associated with perspectives of DGBL. Although the literature suggests more acceptance among younger and less experienced educators, it also

indicates that even pre-service teachers are relatively skeptical of educational uses for computer games (Kenny & McDaniel, 2011). Furthermore, there has been no indication that veteran educators are biased against DGBL or other innovative learning technologies, only that the emphasis on perceived attributes may vary. In fact, veteran educators may be more capable of recognizing the benefits of a well-designed DGBL example, assuming it is underpinned by adequate theory. Thus, there is little basis on which to assume that less experienced faculty members will express more positive perceptions of DGBL.

Employment rank. In the Japanese system of higher education, rank refers to a faculty member's status as a full-time or part-time employee. Full-time employees receive a salary, teach, conduct research, and sit on administrative committees at one school. Part-time faculty members are adjuncts who are paid based on contact hours, typically teach at multiple locations, and are not required to serve administrative functions. There is a possible relationship between rank and perceptions of DGBL, but again the nature of the relationship is unclear.

Reasons to believe that part-time faculty have more positive perspectives of DGBL than full-time faculty. The literature indicates that part-time faculty is comprised disproportionately of non-Japanese nationals and less experienced Japanese academics. FL educators who are from countries other than Japan may hold fewer cultural biases against machine-mediated education, as previously stated. At the same time, less experienced Japanese nationals may be more accepting of DGBL based on the same rationale as provided in the previous section. That is, the literature suggests that more experienced educators are relatively critical of innovative teaching approaches in general.

Reasons to believe that full-time faculty have more positive perspectives of DGBL than part-time faculty. The literature suggests that time constraints are a significant factor in

decreasing interest in innovative approaches to instruction. Qualitative studies on adjunct faculty in Japan suggest that this segment of educators in colleges and universities tend to be subject to such constraints because they typically work at multiple locations and spend a large portion of their time traveling between campuses (Cowie, 2011; Whitsed & Wright, 2011). In contrast, full time faculty members spend less time commuting and, at many institutions, are granted time in which to conduct research. In addition, full-time faculty members enjoy extended periods with no classes to supervise and reduced administrative duties during the summer and winter seasons between the semesters. As stated previously, it should be obvious to most respondents that DGBL implementation would require the time and effort to learn a new system, so the introduction of a disruptive technology may be perceived as impacting part-time faculty more negatively than full-time faculty.

Term of office. Term of office in the Japanese system of higher education denotes whether a faculty member is tenured. There is some evidence to support conflicting assumptions regarding the relationship between this demographic characteristic and perceptions of DGBL.

Reasons to assume that non-tenured faculty are more positively disposed toward DGBL than tenured faculty. The literature indicates that non-tenured faculty is comprised disproportionately of foreign nationals and younger Japanese. Thus, there is a rationale for assuming that this demographic would be more receptive to DGBL, which is the same as the rationale provided in the previous section for assuming that part-time faculty would be more receptive to DGBL than full-time faculty. That is, foreign nationals are not anticipated to hold a cultural bias against machine-mediated education, and the less experienced Japanese nationals may not be as skeptical of DGBL as more matured educators.

Reasons to assume that there is no relationship between tenure and perspectives of DGBL. Not only the Japanese system of promotion, but also the system of employment is purportedly strictly merit-based (Higher Education Bureau, 2009). Tenured faculty can thus be considered the top experts in their fields in Japan. A person with a high level of expertise in FL education and the Japanese higher educational context may be more capable of recognizing the relative advantages of DGBL over existing approaches from a theoretical standpoint.

Nationality.

Reasons to assume that foreign nationals are more positively disposed to DGBL than Japanese nationals. As previously stated, the literature has shown that Japanese educators may be culturally less inclined to view IT/ICT technology as a means to support learning when compared to Western teachers. Although the study in question (Joshi et al., 2010) focused on kindergarten teachers, the disparate attitudes toward learning technology may be indicative of training, which occurs at the university level in both Japan and the United States. In other words, Japanese kindergarten teachers may not recognize the educational potential of computers because their trainers, who are Japanese university faculty, likewise do not equate computers with formal classroom learning. In addition, because much of the DGBL discussion and many of the DGBL solutions available for trial are concentrated in English-speaking countries, Japanese nationals are put at a disadvantage with regard to trialability and observability because of linguistic and geographical barriers. In contrast, many of the foreign nationals teaching FL in Japan have been trained in their countries of origin (Yonezawa & Ishida, 2012) where DGBL is gaining popularity among faculty. Thus, they are more likely to have had exposure to the concepts of learning technology, and possibly DGBL.

Reasons to assume that there is no relationship between nationality and perspectives of DGBL attributes. The assumption that Japanese educators have a cultural preference for face-to-face instruction is supported by only one study in the literature (Joshi et al., 2010), and there may be sufficient differences to question any analogies between kindergarten teachers targeted in the study and university faculty. For instance, according to Table 1, university staff would be characterized by much more innovativeness than kindergarten teachers due to more years of formal study and a higher socioeconomic status. Therefore, arguments that perspectives of DGBL are associated with nationality are fairly tenuous because they are based on an analogous relationship that may not be relevant.

***Research interest*.** Various research areas are related to foreign language education. The DT literature provides evidence that computer-related areas of inquiry in particular may determine an overall positive or negative orientation toward DGBL, but there may be evidence to support conflicting assumptions.

Reasons to assume that CALL researchers have more positive perceptions of DGBL. According to the DT construct of *technology cluster*, rather than view an innovation in isolation, potential adopters will tend to associate it with related and more familiar technologies, and perspectives of the known technology will influence perspectives of the innovative technology. Thus, researchers and educators who have a prior interest in technology-supported learning approaches may be more accepting of the concept of DGBL simply because it is digitally mediated.

Reasons to assume that there is no relationship between research interest and perceptions of DGBL. Research interest is not an absolute categorization of an educator's values

and goals. For instance, educators in Japan who participate in formal academic society may belong to multiple associations, thus obscuring any clear delineation between research interests.

Teaching objectives. There are a variety of teaching objectives in the education of FL (Hutchinson & Waters, 1999). The literature provides evidence to suggest that teaching objectives may be associated with perceptions of DGBL particularly with regard to test preparation, but there is also evidence to the contrary.

Reasons to assume that educators engaged in test preparation have negative perceptions of DGBL. The most likely assumption that can be made with regard to teaching objectives is that test preparation influences perceptions of DGBL. The literature has shown strong evidence that the use of high stakes testing has a negative impact on interest in innovative teaching technologies. Although some authors have commented that demonstration of educational outcomes on tests is not emphasized once learners have entered a college or university in Japan (Aoki, 2010), proficiency tests such as the TOEFL, TOEIC, and IELTS have become increasingly relevant in recent years, and more schools are offering courses targeting increased scores in these measurements (Labi, 2010). Teachers at the high school level in Japan and elsewhere have commented that an emphasis on test preparation detracts from interest in innovative teaching approaches, so the same may be the case in the modern Japanese system of higher education.

Reasons to assume that there is no relationship between teaching objectives and perceptions of DGBL. There is a notable difference in the context of high stakes testing mentioned in the literature and how it may take place in Japanese universities. The studies in question primarily involved high school teachers preparing students for university entrance exams in countries where the type of university attended has profound consequences on careers

(Iran, Japan, Korea, and Singapore). Thus, the teachers were under pressure from parents as well as administrators to concentrate on reliable methods of test preparation. There is no indication in the literature that standardized proficiency tests in Japanese higher education have a comparable influence on students' lives. Additionally, while teachers in the studies indicated that innovative teaching approaches were incompatible for their particular contexts, they also often expressed recognition of the relative advantages (Koh et al., 2011). Thus, an emphasis on test preparation as a teaching objective may not necessarily result in negative overall perceptions.

Chapter 3: Methodology

This examination of the perceptions of DGBL among FL instructors in Japanese higher education took place through a concurrent mixed methods study. In the study, electronic survey data along with individual interview data was used to assess how faculty members perceive DGBL. Mixed methods was deemed an appropriate methodology as the combination of both quantitative survey data and qualitative interview data better ensured an understanding of the factors that influence the rate and success of the diffusion of DGBL and likely inform the development of strategies aimed at initiating and expanding the use of DGBL in foreign language education.

The following research questions guided the investigation:

RQ1: How do FL educators in Japanese higher education perceive DGBL?

RQ2: What are the differences in perceptions of attributes of DGBL based on educator demographic characteristics of experience, employment rank, term of office, nationality, research interest, and teaching objectives?

Research Design

The present study employed mixed-methods involving the collection of both quantitative and qualitative data. The quantitative data were collected with an electronic self-completion questionnaire, and the qualitative data were collected through individual interviews. The present investigation constitutes an exploratory study of FL educator perceptions of a possible DGBL solution. Because the study was a type of acceptability research, a major assumption was that no phenomenon existed at the time of the study to generate empirical evidence or observable data that would act as a basis upon which to formulate hypotheses or speculate outcomes, which is a

necessary stage of deductive research. Thus, the present study took an inductive stance toward the phenomenon of DGBL diffusion in the instruction of FL in Japanese higher education.

Quantitative data collection. A distance survey is useful for collecting data from a broad range of informants on a large scale because it is relatively inexpensive and easy to administer (Bryman, 2008). An online self-completion questionnaire in particular was the instrument of choice in this investigation for the following reasons. In the case of the present study, there was only one researcher, the project was unsponsored, and such a questionnaire is the recommended instrument for collecting data from a large and diverse population using limited resources. Also, Japan is a technologically advanced country with an adequate Internet infrastructure, and the literature suggests that nearly all FL faculty in Japanese higher education are connected to the World Wide Web. Furthermore, members of the targeted population are highly skilled workers in the field of education and thus assumed to be sufficiently literate in such new media applications. Thus, it was not anticipated that the use of an electronic survey instrument in and of itself would exclude a significant portion of the targeted population.

Further, the use of an electronic instrument enabled the presentation of multimedia materials that allow the provision of information relevant to DGBL so that participants could provide more informed responses. This was a critical function for the present study because of the nature of predictive research. Because there was no recognition of a noteworthy diffusion phenomenon, it was not clear that a significant number of FL instructors in Japan are at the knowledge phase of adoption with regard to DGBL. Rather, based on the literature, it was assumed that most either do not use DGBL or are completely unaware of its existence. This was problematic from a data-collection standpoint because unless informants possess at least a general cognizance of a phenomenon, it is impossible for them to report perceptions of it. In

order to conduct predictive diffusion research, Rogers (2003) suggests "Describing a hypothetical innovation to its potential adopters, and determining its perceived attributes, so as to predict its forthcoming rate of adoption" (p. 227). Therefore, it was desirable to offer a brief introductory overview or a sample of a state-of-the-art DGBL solution for language instruction, which was most efficiently accomplished in a distance survey using a multimedia channel of communication.

At the same time, there are recognized disadvantages regarding survey instruments in general, and electronic surveys in particular. Even well-designed surveys cannot guarantee that all responses are honest, and there are limits to the depth of the information that can be garnered from survey instruments (Bryman, 2008). Furthermore, distance-survey instruments have notably poor response rates; this is particularly true for questionnaires delivered via electronic means (Fowler, 2009). Thus, the present study attempted to compensate for these drawbacks by collecting qualitative data through individual interviews as well.

Qualitative data collection. It was necessary to gather qualitative data to alleviate the aforementioned disadvantages of the quantitative data collection instrument by allowing for a deeper exploration of the reasoning behind the responses to the survey instrument. Thus, an open-ended *free comment* item was included in the online self-completion questionnaire. This item consisted of a text field and invited respondents to provide any opinions, questions, or impressions after completing the survey instrument. Further, the investigator conducted individual interviews that took place asynchronously through email. This interview method relieves the burden of time and travel expense for the researcher, making the recruitment process more flexible and enhancing the ability to obtain responses. In addition, email interviews offer informants the opportunity to provide more considered and thoughtful responses (Bryman, 2008).

One drawback of this interview approach is that it may make building rapport with informants more difficult. However, in the case of the present study, informants were recruited from colleagues and peers in the researcher's professional network, so rapport was already established prior to the interview.

Sources of Data

The target population for the present study comprises FL instructors working in higher education in Japan, including those teaching Japanese as a Second Language (JSL) to students from other countries. A sample of convenience was employed in the collection of both quantitative and qualitative data. In the collection of quantitative data, the electronic survey consisted of an opt-in self-completion questionnaire, the link to which was mailed directly to FL instructors with publically available email addresses. Furthermore, in the gathering of qualitative data, informants for individual interviews were recruited from the researcher's professional network using snowball sampling.

The primary reason that convenience sampling was appropriate for collecting data from the target population was that an accurate sampling frame did not exist, nor was it feasible to create one. The statistical data reported by MEXT (2012) and Yonezawa and Ishida (2012) only provide indirect indications of the demographics of FL educators in higher education and, as mentioned previously, there is a lack of information on non-regular employees, which comprise roughly 60% of all faculty members in Humanities departments (MEXT, 2012). In addition, the instability of this portion of the labor pool (because it is non-regular), along with the fluctuating nature of the population of foreign nationals (Yonezawa & Ishida, 2012), would have quickly rendered a sampling frame unreliable even if one had been constituted.

Data Collection Strategies and Procedures

Quantitative data collection. An online self-completion questionnaire was used to collect quantitative data. The questionnaire included a brief video presentation introducing a state-of-the-art DGBL solution for FL and data-collection items soliciting opinions thereof. Permission was obtained to use the ISLET (Integrated System for Language Education and Training) promotional video presented on the YouTube channel of Alelo Inc.

The ISLET language learning game is an interactive role-playing simulation in which players interact with virtual characters in the target language to accomplish predetermined missions. The ISLET video was chosen for the presentation because the researcher deemed it optimal for informing respondents regarding the DGBL construct within the constraints of the proposed investigation. First, the system embodies the aforementioned design strategies for engaging learners outlined in the definition of terms of Chapter 1. The learning activities in which players engage have clear and quantifiable goals, have missions at various levels of difficulty along with a scaffolding mechanism to maintain a balance between player skill level and task difficulty, and provide clear and largely intuitive feedback. In addition, the nature of the system as a Role-Playing Game (RPG) with an interactive narrative provides the opportunity to engender curiosity and fantasy in players. Thus, as an RPG, ISLET represents a more complete example of the potential of DGBL for language learning as opposed to an example such as DuoLingo, which bases its status as a game almost entirely on only three design features (i.e., clear goals, levels to balance task difficulty with player skill, and ongoing feedback). Second, the ISLET video was made professionally for promotional purposes, and thus is effective in informing an audience about the aforementioned features, as well as to the expected benefits related to learner motivation, in a concise and a well-paced fashion. Additionally, the video is

designed to provide a brief but informative overview for an audience that is likely not familiar with DGBL solutions for FL instruction. As a result, technical or industry terms for game design are used minimally in the introduction of the concepts, and the explanatory voiceover should also be understandable for lay audiences. Also important, the video is described in the questionnaire as, "One example of a state-of-the-art solution of game-based language and cultural education;" thus, the respondents were informed that the ISLET system does not necessarily embody all DGBL, but is merely representative of the extent of technological possibilities with regard to learning games for FL.

The video introduces ISLET through a combination of screenshots of gameplay and expository voiceover in English. However, not all members of the target population could be assumed to be proficient in English. For example, a native speaker of Japanese who teaches Chinese or JFL may or may not be able to comprehend the voiceover clearly. Also, the researcher determined that the sound quality of the original voiceover was not optimal for non-native speakers because it is rendered with special effects to mimic a 1940s newsreel. For these reasons, the sound was redone and a Japanese version was created in the following manner. In order to ensure that both Japanese and English versions offered comparable presentations of the ISLET video, the researcher translated a script of the English voiceover into Japanese and rendered both versions with text-to-speech software. The voiceovers were then added to two separate but identical versions of the video image. Japanese captions were added to the video with the Japanese voiceover, and English captions were added to the video with the English voiceover.

The questionnaire items were authored using a form in the researcher's Google Drive account. Question types included multiple choice, check boxes, and text fields. The researcher

created two versions of the questionnaire: one in Japanese and one in English. The two versions of the questionnaire, along with matching videos, were embedded in two separate Google Sites webpages, and a parent page was created to contain links to both Japanese and English survey pages. An email for direct mailing and social media postings to solicit participation included an initial informational message in both English and Japanese, as recommended by Fowler (2009). The messages and postings additionally included a link to the data collection website. Solicited individuals were invited to click on the link and select the language of their choice upon reaching the parent page. All pages were configured so that only persons following the link were allowed to view them, and the Google form is was so that the survey could only be responded to once.

The researcher compiled a direct mailing list of FL faculty members at Japanese institutions of higher education using the Google search engine. Almost all institutions maintain websites, primarily for student recruitment purposes. Among these institutional websites, foreign language departments and faculty often maintain departmental websites that include faculty introduction pages, which will sometimes include email addresses. The researcher performed a search for sites using the following keywords: *daigaku* (college or university), *kyouin* (educator/faculty), *ichiran* (list), *shokai* (introduction), and *gaikokugo* (foreign language). Each case that the search yielded was examined for several further criteria before email addresses were recorded to ensure that the faculty member in question was an FL instructor. First, where the "classes taught" information was available, addresses were collected if course titles indicated that FL skills were central to at least some listed courses. The use of common keywords identifying such classes include *komyunikeishon* (communication), *riidingu* or *dokkai nouryoku* (reading), *raitingu* (writing), *risuningu* or *chokkai nouryoku* (listening), *supiikingu* (speaking), and *kaiwa* (conversation), or the English equivalents of these terms. Another indication that FL

skills are central in particular courses is that the course title is simply the name of a language, particularly when accompanied by an indication of course level (i.e., *eigo 2* [English 2], *furansugo A* [French A], etc.). Second, where the "research interests" information was available, addresses were collected if keywords indicated that FL educational research was included in an educator's focus. Examples of such keywords include *dainigengoshuutoku* (second language acquisition), *eigokyoiku* (English education), *ouyougengogaku* (applied linguistics), CALL, or the like. Third, where "academic society membership" information was available, email addresses were recorded if it was indicated that an educator belonged to an academic society focusing on FL education, such as JACET, the Japan Association of Second Language Acquisition (JASLA), JALT, or the like. Thus, if an educator listed Semantics as a research interest, but *English Communication* was included among the course titles, the email address was recorded. On the other hand, if an educator listed *Classical Chinese Literature* as a research interest, and the courses taught did not indicate Chinese skills classes nor did the academic societies include an association for FL education, then the email address was not recorded.

The researcher examined cases on approximately 214 Google pages until the results became noticeably redundant. After email addresses were recorded, the data were sorted alphabetically and examined for repeat recordings. When repeats were deleted, a list of 1,200 individual email addresses resulted. The email solicitation was sent out to all email addresses on the list individually, and 189 were returned due to failed delivery. Ninety-one responses were recorded over a 1 month period for a response rate of approximately eight percent. Two of the responses were excluded because the respondent indicated in Item 12 that he/she was not involved in the instruction of a foreign language, and one response was excluded because the

respondent indicated that he/she did not work in higher education. The demographic information of the participants that was provided through the questionnaire is shown in Table 2.

Table 2

Demographic Information of Online Self-Completion Questionnaire Respondents

Category	Specifier	Number
Title	Assistant/Associate Professor	36
	Lecturer	30
	Professor	17
	TA	1
	Teacher	4
	Total	88
Rank	Full-time	68
	Part-time	20
	Total	88
Term	Tenured	51
	Non-tenured	37
	Total	88
Nationality	AUS/NZ (Australia/New Zealand)	3
	Germany	1
	Japan	54
	Latin America	1
	PRC (People's Republic of China)	3
	RK (Republic of Korea)	2
	Taiwan	1
	UK (United Kingdom)	6
	USA (United States of America)	17
	Total	88

Notably, the demographic breakdown is comparable in some respects to reported statistics on FL educator population in Japan. Yonezawa and Ishida (2012) reported that 45% of FL faculty were non-Japanese nationals while targeting schools that had a large representation of foreign faculty, and 38% of survey respondents were non-Japanese. Furthermore, although MEXT (2012) reported that roughly half of humanities faculties were non-tenured, 42% of the survey respondents were non-tenured. Therefore, there is some basis on which to consider the sample representative of the FL educator population.

Qualitative data collection. Individual interviews were conducted asynchronously via email. These interviews involved providing informants with a link to the ISLET video, and having them write out responses to the questions and talking points listed in Appendix B. Informants were asked to write their responses at a minimum of a paragraph in length. After the researcher received the responses, follow-up questions were asked to seek elaboration or clarification when necessary. Seven informants cooperated in the interview, and their demographic profiles are shown in Table 3.

Table 3

Demographic Information of Asynchronous Email Interview Participants

Informant	Job title	Rank	Term of office	Nationality	Research keywords	Principal classes: keywords
1	Professor	Full-time	Tenured	Japan	Cognitive Linguistics	Listening, Basic Literacy
2	Professor	Full-time	Tenured	Japan	SLA	Teacher Training
3	Assistant/ Associate Professor	Full-time	Tenured	Japan	SLA	Conversation, Writing
4	Lecturer	Part-time	Non-tenured	Japan	CALL	Conversation, Writing
5	Assistant/ Associate Professor	Full-Time	Non-Tenured	USA	SLA	Conversation, Writing
6	Professor	Full-time	Tenured	USA	CALL	Conversation, Writing
7	Assistant/ Associate Professor	Full-Time	Tenured	USA	Learning Technology	Conversation, Writing

Instrumentation

The self-completion questionnaire was a 12-item instrument designed to solicit opinions on the perceived attributes of DGBL for FL instruction and demographic information about the respondents (see Appendix A). Items 1-5 were designed to gather data on the perceptions of relative advantage, compatibility, complexity, trialability, and observability. These items were

constructed using surveys designed within a DT framework, specifically Moore and Benbasat's (1991) and Duan, He, Feng, Li, and Fu's (2010) instruments, as idea-generation reference tools. The former was originally devised to collect data company employees' perceptions of attributes of computer workstations, and the latter was devised to collect data on Chinese students' perceptions of e-learning. As with these instruments, the items of the proposed survey followed a standard Likert response format by presenting simple statements about DGBL, and the degree of agreement expressed by a respondent is interpreted as indicating a positive or negative attitude toward a stated, theoretical, or actual attribute of DGBL. However, several key divergences from the reference instrument were incorporated.

Although the aforementioned surveys may be considered true Likert scales because each of the five perceived attributes is associated with multiple interrelated items, a more parsimonious instrument was sought for the present study. Associating several items with each attribute arguably increases interrelatedness between items and allows for the inclusion of tests of internal validity such as determining a Cronbach's alpha (Bryman, 2008). However, in the case of the present investigation, an abbreviated version was sought because the voluntary nature of participation in an opt-in online questionnaire requires that less burden be put on respondents as a strategy to increase response rates (Fowler, 2009). Therefore, the number of items was reduced by soliciting data on each of the perceived attributes with only a single item. This was not anticipated to detract from the validity of the quantitative data because the results were cross-referenced with qualitative data, and because the analysis did not seek to portray the degree of intensity of attitudes toward the perceived attributes with a high level of accuracy, as would be advisable with an experimental research design. Rather, a more central concern to the present

study was the ability to identify generally positive or negative attitudes and to relate those with certain demographic features, a purpose for which ordinal data on perceptions sufficed.

Items 6-11 solicited demographic attributes consisting of position title, rank, term of office, nationality, research interest, and teaching objectives. *Job title* refers to the labels given to faculty members such as professor, associate/assistant professor, lecturer, etc., which indicate standing in a departmental hierarchy. These titles can be associated with years of experience based on MEXT guidelines for promotion from lecturer up to professor (Division of the Advancement of Higher Education, 2006). *Rank* (full or part time) is primarily an indication of pay status, with full-time faculty receiving a salary and part-time faculty being paid based on classroom contact hours. It is possible, if not uncommon, for a part-time instructor to have a larger class load than a full-time instructor at a given institution, but adjunct faculty are generally not required to carry out administrative duties, such as serving on various committees, as are full-time faculty members. *Term of office* (tenured or non-tenured) indicates whether a respondent has lifetime employment status or is employed on a limited-term contract. This is distinct from *rank* because an educator may be employed full time but on the basis of a limited term contract. The primary purpose of *nationality* was to discover whether or not respondents were Japanese nationals. Non-Japanese nationals include representatives of many countries (Cowie, 2011). While most of those were expected to be from English-speaking countries such as Australia, Canada, the United Kingdom, or the United States, responses would have been difficult to predict accurately, so a text field was used to avoid excluding unanticipated responses and inadvertent alienation of respondents. Notably, gender was not included among the items, the reason being that no important differences in gender with regard to perceptions of innovative

technology and or teaching methodology were reported in the previously cited literature, thus none were expected in the present study.

The questionnaire included items to elicit research interests and teaching objectives. These items were intended to provide an indication of the background and sub-field of FL education in which respondents were engaged. Rather than use a text field to collect this data, the researcher determined that a multiple-choice item was more appropriate for providing responders with guidance on the level of specificity of responses. More specific responses may have resulted in a broader variety, which in turn may have rendered subsequent statistical analyses problematic (Fowler, 2009). Therefore, possible responses comprising generally accepted and broad terms denoting areas of research (e.g., Applied Linguistics, CALL, or the like) were provided in addition to an "Other" category, which respondents could use to express a different level of specificity if they so chose.

The online self-completion questionnaire included an item for eliciting qualitative data from respondents. Item 12 consisted of a large text field and a prompt inviting respondents to make comments freely. Unlike the previous 11 items, which were configured so that responses were "required" in order to complete the questionnaire, filling in the text field was made optional. The reason for this is that providing qualitative responses was determined to be more burdensome for participants, while at the same the researcher sought to devise an instrument that was fairly easy to complete as a strategy for increasing the response rate, as explained previously.

Human Subjects Considerations

The researcher completed the Basic Course in the Protection of Human Research Subjects for Social and Behavior Focus offered by the CITI Program, and conducted the research in full compliance with the Belmont Report and approval of the Pepperdine University Institutional

Review Board regulating the treatment of human subjects. The privacy of the participants was protected in the following manner. Respondents to the online survey were not asked to provide identifying demographical information such as names, phone numbers, geographical locations, affiliated institutions, or addresses (physical or email). In the survey, no information that could incriminate, slander, or otherwise harm the reputation of the respondents was intentionally solicited or reported. IP addresses recorded during data collection were stored on the researcher's website, which is password and firewall protected. The names of the interview participants were not used in the reporting of the data. Email correspondences resulting from the interviews are stored on the Google website, which is password and firewall protected, and subject to Google's privacy policy, which prohibits access unauthorized by the account holder (i.e., the principal investigator).

Means to Ensure Study Validity

With regard to the collection of qualitative data, Bryman (2008) suggests various methods to facilitate survey instrument validity that were adopted for the proposed self-completion questionnaire. First, face validity was established by further developing or revising the items based on consultation with the dissertation committee members, as well as on feedback from colleagues knowledgeable in such data collection methods, FL education in Japanese higher education, and or in DGBL solutions for FL. The questionnaire was developed in close consultation with a native Japanese speaking linguistics professor and EFL instructor to ensure that the items in both the Japanese and English versions were valid, understandable, and identical in meaning. This expert also assisted in translating the ISLET voiceover script to ensure that the versions were comparable and that one audience would not receive information or be exposed to potentially biasing rhetorical structures that the other audience would not.

An English version of the survey instrument was tested in a pilot study. The researcher posted a link to the questionnaire on the discussion board of the LinkedIn groups for CALL, Games + Learning + Society (GLS), Instructional Designers and Game Developers (IDGD), and Learning Technologies and Language Teaching (LTLT) after obtaining permission from group owners. Ten members of these groups responded to the survey, and five comments were given. The results were compatible with anticipated responses in that perspectives of trialability and observability were markedly more negative than for the other perceived attributes. Notably, there were no comments expressing confusion with regard to the purpose of the items, and no criticisms of the validity of the instrument. Finally, an education research consultant was asked to review the survey, and asserted that the items were valid and that the proposed statistical tests were appropriate (R. Franciosi, personal communication, March 23, 2013).

The validity of the qualitative data was evaluated by various measures suggested by Bryman (2008). First, data gathered in the one-to-one interview sessions were submitted to the dissertation committee for comparison with the conclusions of the research. Second, the findings were shared with colleagues in the field of FL education who have had experience in or are currently filling positions in Japanese higher education. Furthermore, it should be noted that the researcher has extended experience in the context of the investigation, having worked at three Japanese institutes of higher learning over a 10-year period. Thus, the researcher was well suited to determine the quality of relationships between direct observations and the conclusions drawn from them.

Finally, because the present study was mixed-methods in nature, convergent validity was tested by comparing the quantitative data with the qualitative data. A high degree of congruence between the data sets was interpreted as indicating a high degree of validity for both.

Analysis

Quantitative data. An analysis of the quantitative data was conducted using both descriptive and inferential statistics. Results of the survey were downloaded into a Microsoft Excel document, and imported into the researcher's NCSS 2007 software for analysis. Inferential statistical analyses used an alpha of 5. Because each attribute was associated with only one item on the questionnaire, the scales were treated as Likert-like items (ordinal data) as opposed to Likert scale data (Boone & Boone, 2012). That is, the items were analyzed as representing attribute rather than numeric data.

In order to address RQ1, *How do FL educators in Japanese higher education perceive DGBL?* descriptive statistical analyses for items 1-5 were carried out using frequency distributions for each of the five items. The results were summarized as proportions (%) in bar charts.

In order to address RQ2, *What are the differences in perceptions of attributes of DGBL based on educator demographic characteristics of job title, employment rank, term of office, nationality, research interest, and teaching objectives?* a Chi-Square test was used to examine the relationships between responses to items 1-5 and responses to items 6-11. The data were analyzed using a Chi-Square statistical model that was considered valid if no cell had an expected frequency of 0. Each of the variables of items 1-5 was compared to each of the variables of items 6-11 to test the null hypotheses.

Re-categorization of nationality variable. In conjunction with a relatively low number of responses, the data collected with regard to nationality displayed a high degree of diversity, making reliable Chi-Square tests problematic due to the appearance of expected values of 0. Therefore, the principal investigator re-categorized and tested this variable based on information

from the literature. First, since the literature indicates that learning technology in general and DGBL in particular are more popular among researchers and practitioners in the regions of Australia, Europe, and North America (Hwang & Wu, 2012), Australia/New Zealand (AUS/NZ), Germany, the UK, and the USA were collapsed into a category labeled Western Industrial Country (WIC), whereas Japan, Latin America, the People's Republic of China (PRC), the Republic of Korea (RK), and Taiwan were collapsed into the Non-Western Industrialized Country (NWIC) category. The variable of nationality based on what is commonly considered a Western or non-Western country of origin was cross-tabulated and tested against the five perceived attributes.

Furthermore, since the literature suggests a dichotomy in terms of professional networking between Japanese and non-Japanese nationals, and that Japanese academic culture is characteristically insular (Hall, 1998; McVeigh, 2002; Yonezawa & Ishida, 2012), the variable of nationality was re-categorized so that AUS/NZ, PRC, Germany, Latin America, RK, Taiwan, the UK, and the USA were collapsed into a category labeled Ex-patriot (EXPAT). The variable of nationality based on Japanese nationality or EXPAT was cross-tabulated and tested against the five perceived attributes to test five of the null hypotheses.

Re-categorization of the research interest variable. In conjunction with the relatively low number of responses, the data collected with regard to research interest displayed a high degree of diversity, making reliable Chi-Square tests problematic due to the appearance of expected values of 0. Therefore, in order to produce valid Chi-square results, various categories were collapsed as follows. Respondents reporting interest in areas related to learning technology, e-learning, instructional technology, or IT/ICT-supported instruction were included with those who reported CALL as a research interest. The reason is that the present study considered CALL

a field that intersects FL instruction and technology-supported instruction, so FL educators with a research interest in any mode of digitally-mediated learning could be considered CALL researchers.

Qualitative data. The principal investigator transferred responses to survey Item 12 and email text from the individual interviews to Microsoft Word for coding. The coding and analysis of the data followed the procedure described by Saldaña (2009), which is divided into two cycles. The initial cycle generally involves examining the structure for linguistic elements (i.e., grammar, vocabulary) to compare and contrast the data against itself. To accomplish this, the search function of Microsoft Word was used to perform various keyword searches. The keywords were chosen based on words within a particular comment that were judged to be central or representative of the topic.

The frequency of the keywords was noted as a first step in formulating the initial set of categories. As an inherent semantic function of natural languages, keywords may have synonyms or nuances that are essential in understanding the topic represented by a comment, and can only be determined by observing the words or phrases individually in context. Thus, the data were then additionally coded with meta-labels. To accomplish this, the comment function of Microsoft Word was used to *tag* various sections of the text. Meta-labels are words or phrases that add additional or emphatic topic-related information to a section of discourse. Also, because the ultimate goal was to identify higher-order categories, more general terms for describing the topics represented in the test were sought. For example, the aforementioned excerpt of discourse was related to learner literacy with regard to various types of terminal devices and could thus arguably be labeled *learner literacy*. These tags comprised the initial categorization of the discourse.

The second cycle of coding involved comparing and contrasting the provisional categories both internally and externally. That is, sections of discourse sharing the same tags were examined for additional similarities and differences in their topics. At the initial stages of this cycle, comparison of categories usually results in subsequent reshuffling and re-categorization, which may or may not entail the creation of sub-categories several levels deep. This is a holistic exercise, often described as more of an art than a science, which requires abstraction and creativity. The analysis began with an "exhaustive" set of categories that explores as many options as possible, and continued until the coder (principal investigator) was reasonably confident that the categories were "mutually exclusive" (Bryman, 2008, p. 288).

To assist the process, Saldaña (2009) recommends various "focusing strategies" (p. 186), which the principal investigator employed. One of these is to write out definitions of the emerging categories. Thus, definitions for emerging categories were formulated based on and intended to encompass as much as possible of the corpus represented in a provisional category. The act of defining categories often leads to the dissolution and reconstitution of provisional categories, and subsequent relabeling. This iterative process was carried out over a 2-week period.

Another focusing strategy suggested by Saldaña (2009) that was employed by the principal investigator was to seek out input from knowledgeable peers. The reason is that the sole coder is unavoidably informed as well as limited by individual experience and existing knowledge. Reducing the possible negative influences of partiality requires communication with other observers of the data. Accordingly, opinions were solicited from interview informants as well as two other colleagues who were long-term foreign language faculty members in Japanese institutes of higher learning. Suggestions and opinions were consistently acted upon and

incorporated into the categorizations when judged to be helpful or superior to existing classifications.

Chapter 4: Results

Overview

Data collection took place during the summer of 2013 and proceeded smoothly. Two survey respondents inquired about time limitations for responses, and two respondents reported technical problems with the Japanese version of the online self-completion questionnaire. Other than these communications, no issues or confusion were reported in the collection of quantitative data. Communication with asynchronous email interview informants took place simultaneously for approximately 1 month, and no significant misunderstandings or other issues were apparent.

Results of quantitative data collection indicated a neutral to positive perception of relative advantage, a polarized and somewhat less neutral perspective of compatibility, a generally positive to neutral perspective of complexity, and unambiguously negative perspectives of trialability and observability. A summary of response distributions is shown in Table 4.

Table 4

Response Distribution to Perceptions of Attributes

	Proportion of Responses (%)				
Attribute	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Relative advantage	7.95	29.55	48.86	11.36	2.27
Compatibility	6.28	29.55	22.73	26.14	14.77
Complexity	4.55	38.64	37.5	14.77	4.55
Trialability	2.27	10.23	13.64	38.64	35.23
Observability	1.14	2.27	13.64	50	32.95

Results of qualitative data collection indicated a major focus on topics related to the types of knowledge and skills that FL learners are targeting, as well as on the appropriate processes by which acquisition of these outcomes are achieved. Another major topic of discussion among FL

educators involved the values, norms, and interests among the learner population and what could foster motivation among them, particularly with regard to digital games.

Section 1: Quantitative Data

Descriptive statistics. After the data from the online self-completion questionnaire were analyzed in NCSS to generate frequency tables, they were transferred to an Excel file to create the following figures.

***Relative advantage*.** The response distribution indicates a generally neutral but slightly positive bias toward the proposition that DGBL has more advantages than disadvantages relative to other approaches to FL instruction. As shown in Figure 1, nearly half of respondents remained noncommittal, but more than twice as many responded positively than did negatively when responses are summarized by combining *strongly agree* with *agree* and *strongly disagree* with *disagree*.

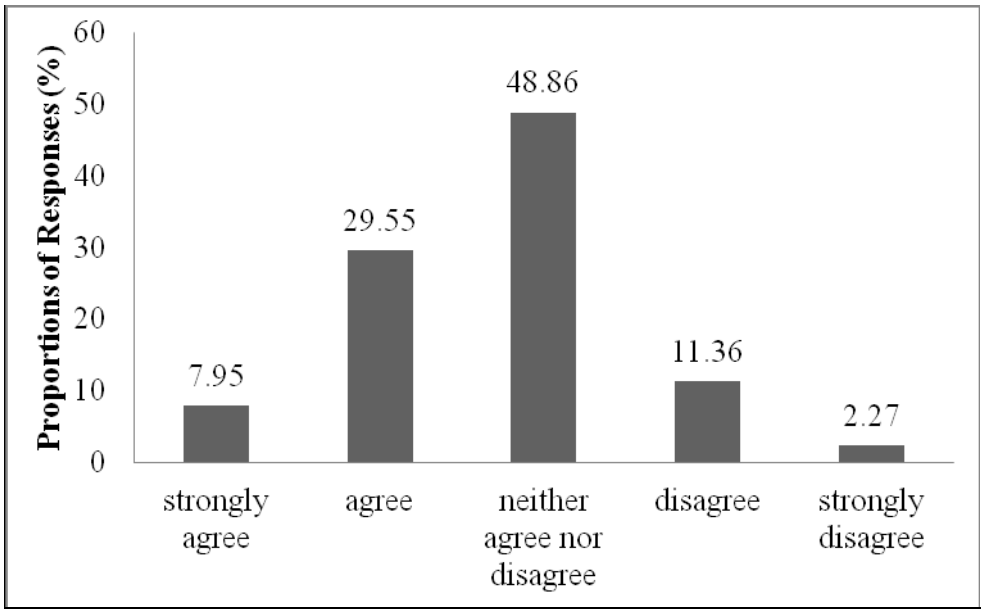

Figure 1. Frequency of responses to perceptions of relative advantage. *Note*. strongly agree, agree=positive perception; disagree, strongly disagree=negative perception

***Compatibility*.** Responses regarding perceptions of DGBL compatibility were much more polarized and less neutral than was the case with relative advantage. Only about a fifth of

respondents remained noncommittal, and although the largest minority responded positively with *agree*, the second largest responded *disagree*, and the third *strongly disagree*. When proportions of positive to negative responses are summarized they are comparable at 35.83% positive and 40.91% negative.

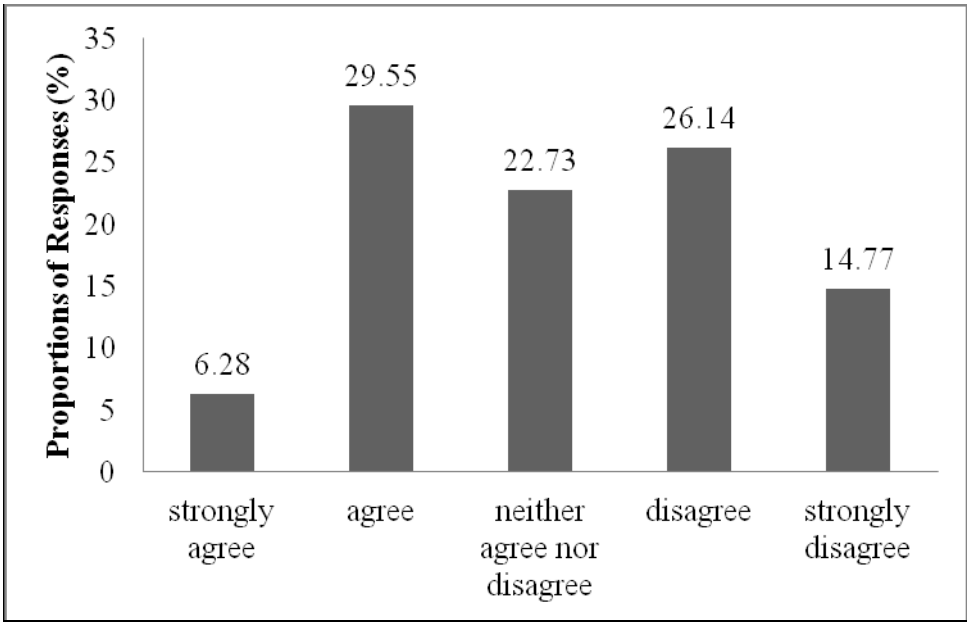

Figure 2. Frequency of responses to perceptions of compatibility. *Note.* strongly agree, agree=positive perception; disagree, strongly disagree=negative perception

Complexity. Most of the respondents either did not find DGBL technology overly complex for application or they remained noncommittal. When the proportions are summarized positive to negative, more than twice as many believed that DGBL would be "relatively simple" to use compared to those who disagreed with this proposition.

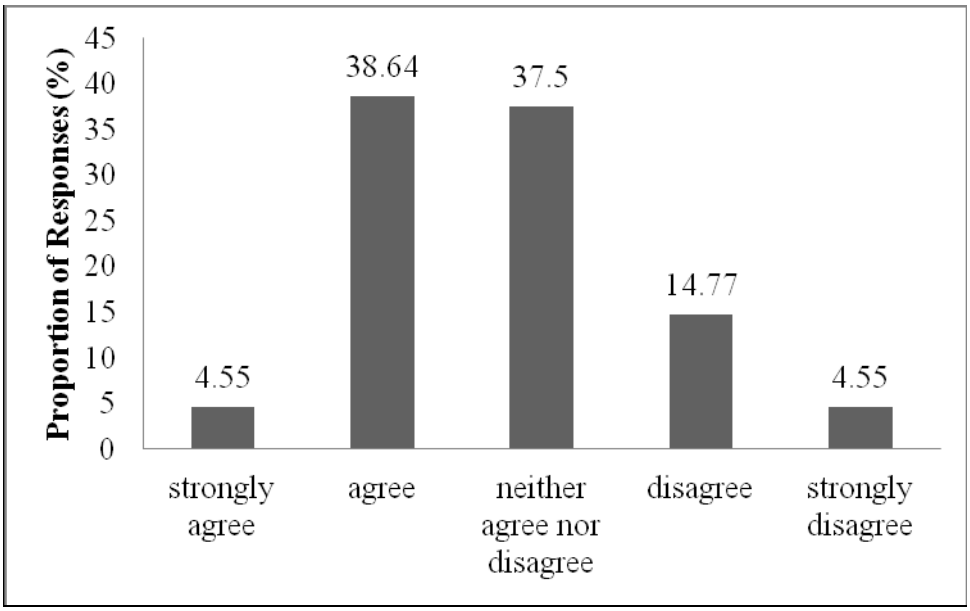

Figure 3. Frequency of responses to perceptions of complexity. *Note.* strongly agree, agree=positive perception; disagree, strongly disagree=negative perception

Trialability. The respondents were fairly unambiguous in showing a strongly negative perception of DGBL trialability, with a solid majority (73.87%) responding negatively (*disagree* or *strongly disagree*) to the proposition that there were many opportunities to try out DGBL applications. The rest either remained neutral or responded positively at roughly the same rate.

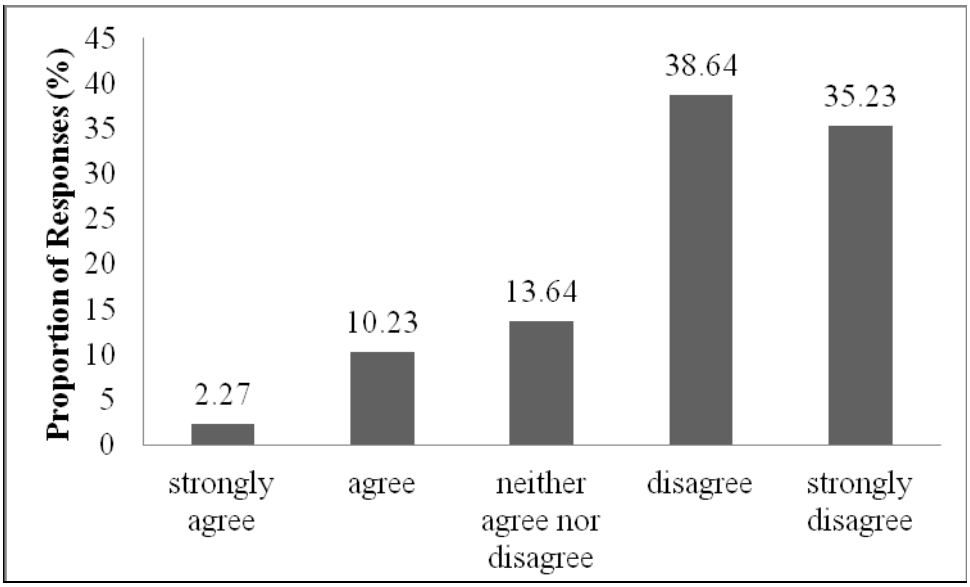

Figure 4. Frequency of responses to perceptions of trialability. *Note.* strongly agree, agree=positive perception; disagree, strongly disagree=negative perception

Observability. The response to the proposition that many FL instructors use DGBL was overwhelmingly negative. A strong majority (83%) answered negatively (either *disagree* or *strongly disagree*), very few positively (either *agree* or *strongly agree* [3.41%]), and a small proportion remained neutral. As with trialability, responses to observability displayed relatively little uncertainty.

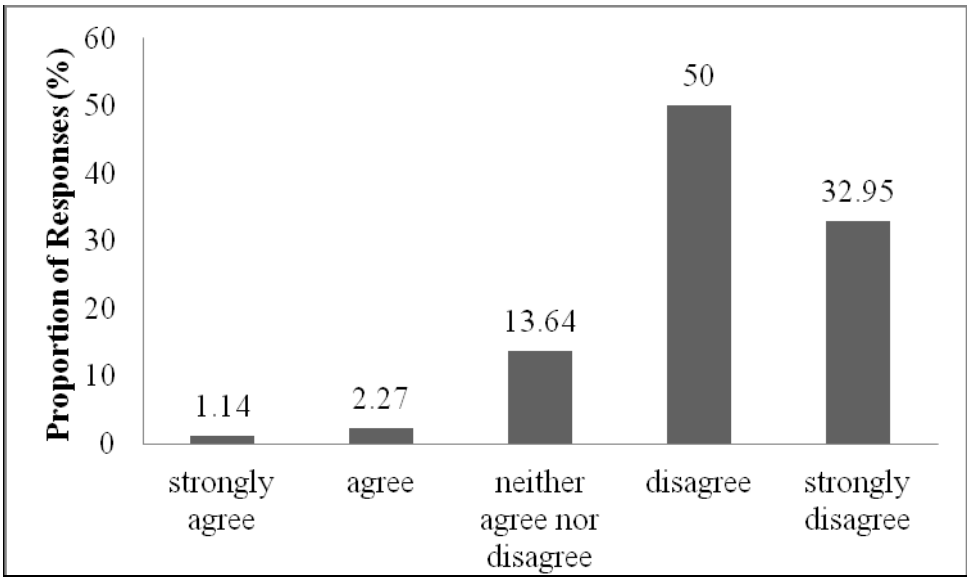

Figure 5. Frequency of responses to perceptions of observability. *Note.* strongly agree, agree=positive perception; disagree, strongly disagree=negative perception

Inferential statistics. Each of the responses to items 1-5 was cross-tabulated item-by-item with responses to items 6-11, respectively, in order to address RQ2. When the null hypotheses were tested, significant relationships ($p \leq 0.05$) were noted only if they satisfied the test of validity, which was that no cell contained an expected value of 0. Significant relationships were found between the following variables.

Region of origin and observability. A significant relationship ($p = 0.02$) was found between region of origin and observability when nationality was organized along cultural and regional lines by collapsing the variables into NWIC and WIC categories, and cross-tabulated with responses to Item 5. Although the majority of respondents from both categories had

negative perceptions of DGBL observability, and despite a very small percentage of NWIC participants responding positively, WIC respondents were much more likely to be noncommittal, and NWIC respondents were nearly twice as likely to have negative perceptions.

Table 5

Cross-tabulation of Country of Origin and Perceptions of Observability

	Proportion of Responses (%)					
Country of Origin	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
NWIC	1.6	3.3	6.6	57.4	31.1	100
WIC	0	0	29.6	33.3	37	100
Total	1.1	2.3	13.6	50	33	100

CALL and relative advantage. A significant relationship ($p = 0.04$) was found between those who listed CALL among their research interests and perceptions of relative advantage. Educators who indicated a research focus in CALL were more unambiguously positive in their perceptions of relative advantage than those who did not indicate CALL as a field of research. Those with a CALL focus in research were twice as likely to responded with *agree*, and more than three times as likely to respond with *strongly agree* than those with other research interests, a little over half of whom remained noncommittal. Notably, while a small proportion of educators with other research interests responded negatively, no educator reporting a computer-related research interest did so.

Table 6

Cross-tabulation of Research Interest (CALL or Other) with Relative Advantage

	Proportion of Responses (%)					
Research Interest	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
CALL	18.8	50	31.3	0	0	100
Other	5.6	25	52.8	13.9	2.78	100
Total	8.0	29.5	48.9	11.4	2.3	100

CALL and compatibility. A significant relationship ($p = 0.009$) was found between informants who listed CALL among their research interests and compatibility. The results, shown in Table 7, indicate that FL instructors with an interest in CALL were more likely to have positive perspectives of compatibility than respondents with other research interests. While responses of *agree*, *neither agree not disagree*, and *disagree* were comparable, CALL researchers were much more likely to respond with *strongly agree* than were other researchers, who were much more likely to respond with *strongly disagree*.

Table 7

Cross-tablution of Research Interest (CALL or Other) with Compatibility

	Proportion of Responses (%)					
Research Interest	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Total
CALL	25	37.5	18.8	18.28	0	100
Other	2.8	27.8	22.2	29.2	18.1	100
Total	6.8	29.5	21.6	27.3	14.8	100

No other significant relationships were found between the perceptions of attributes and demographic information collected. There were no differences in the perceptions of DGBL attributes according to job title, rank, term of office, or teaching objectives. Furthermore, no relationships were found between nationality and relative advantage, compatibility, complexity or trialability, and no relationships were found between a CALL research interest and complexity, trialability, or observability. Finally, no significant relationships were found between nationality and relative advantage, compatibility, complexity, trialability, or observability when the variable was reorganized by collapsing AUS/NZ, Germany, Latin America, PRC, RK, Taiwan, UK, and USA into a category labeled EXPAT and cross-tabulated with the category of Japanese nationals.

Section 2: Qualitative Data

Qualitative data collection yielded a Japanese corpus consisting of 3,803 Japanese characters from four asynchronous interview informants, and 2,570 characters from 31 respondents to Item 12. The corpus of English responses had word counts of 3,849 from three interview informants and 783 from 11 respondents to Item 12.

Of the seven informants in the asynchronous email interview, Informants 4, 5, 6, and 7 displayed an elevated level of awareness with regard to DGBL, and one reported a deep interest in and extensive use of game-based learning. Informant 6 seemed well versed in CALL, SLA, and game-related literature, often citing articles and books to support opinions with regard to DGBL, but reported no direct experience. By contrast, Informants 1, 2, and 3 (all Japanese nationals) reported a very low level of interest in or awareness of not only DGBL but also learning technology in general. In addition, many of the comments garnered from Item 12 included caveats implying that respondents had no knowledge of the existence of DGBL technology prior to viewing the video in the survey. Two Item 12 respondents wrote comments that could be interpreted as indicting experience with DGBL, but because participation in the survey was anonymous it was not possible to follow up for clarification.

Coding of the combined corpus using grounded theory yielded the categories and definitions shown in Table 8. The most common theme discussed by informants pertains to *learning practice*, which the principal investigator defined as, "The appropriate behaviors, activities or sets of conditions in which learners participate to facilitate language learning." Another major topic was *learning theory*, was defined as, "Skills or knowledge to be acquired in a particular course of study." The difference between these two categories can be considered analogous to the contrast between scientific theory, which is a hypothesis based on observations,

and scientific model, which is a framework in which to apply the theory. The emergence of learning practice and learning theory as the two major themes among FL educators is reasonably expected in a discussion of the appropriateness of an innovative learning technology and its method of use.

A third key idea among many informants was *learner attitude*, defined by the principal investigator as, "Perceptions of values, beliefs and norms among the learners." The context of this topic was often shared with *learner motivation*, which denotes the influence of DGBL on learners' impulse to engage in learning activities. Notably, this theme contrasted with *learner burden* and *learner literacy*, which displayed relatively few occurrences. The frequent emergence of topics related to hypothetical learner interaction with DGBL among FL educators is reasonably expected in a discussion on the potential impact of an innovative learning approach in a formal course of study, and is also consistent with teacher consideration of the learning population in other studies on perceptions of DGBL attributes (Kebritchi, 2010).

Other less common themes that shared contexts in discourse were administration, cost, infrastructure, and instructor burden. These topics characterized discussions related to institutions and organizational issues.

Table 8

Categories with Definitions and Number of Occurrences

Category	Definition	Occurrences
Administration	The set of organizational conditions under which an instructor must work, including the specific role that the instructor fulfills	10
Cost	The financial burden born by instructor, learner or institution	16
Infrastructure	The availability and type of physical equipment used for DGBL	17

(continued)

Category	Definition	Occurrences
Instructor burden	The cost in time and effort for the instructor to implement DGBL	15
Learner attitude	Values, beliefs and norms among the learners	23
Learner burden	The cost in time and effort for the learner to use DGBL	1
Learner literacy	The level of technical literacy among the learners	5
Learner motivation	The engaging effect of DGBL on learners	18
Learning theory	Skills or knowledge to be acquired in a particular course of study	28
Learning practice	The behaviors, activities or sets of conditions that learners participate in to facilitate learning	32
Utilization	The appropriate role that DGBL should fulfill in a course	14

Chapter 5: Discussion

Overview

RQ 1. How do FL educators in Japanese higher education perceive DGBL?

Respondents had a slightly positive perspective of DGBL in terms of relative advantage associated with a belief that the approach could have a positive effect on learner motivation. Several interview informants who were familiar with DGBL-related literature and two who had first-hand experience using digital games in their classrooms were able to cite both theoretical and anecdotal reasons explaining this view. The other interview participants and a number of respondents to Item 12 seemed to base this sentiment on assumptions about the values and norms among the learner population. The qualitative data suggest that the assumption of a beneficial impact on learner motivation is the most likely factor explaining positive perspectives of DGBL's relative advantage. The data also suggest that uncertainty with regard to learning outcomes and negative perceptions of cost, particular in terms of time, account for the largely noncommittal response.

The respondents were divided on the issue of DGBL compatibility. One factor explaining this is the diversity of teaching objectives reported among the educators, and a belief that DGBL may be effective for meeting a limited range of learning goals. Another factor indicated by the data is that access to adequate infrastructure is not consistent among schools in Japan. Furthermore, most participants suggested that DGBL would only be compatible as supplementary or self-study material. This sentiment seems to be based in part on the belief that classroom time should be devoted almost exclusively to human-mediated learning activities, and on the assumptions that (a) computer-mediated learning activities, digital games in particular,

primarily involve solitary learning; and (b) that at the current level of technology computer systems can only assist learners with repetitive drills.

With regard to complexity, the respondents did not find the technology overly complex, but there were concerns regarding the time it would take to implement DGBL in a course of study. Even informants familiar with CALL in general and DGBL in particular perceived implementation as excessively time-consuming. Despite this, questionnaire responses indicated a neutral or positive bias in the perceptions of complexity. This could be explained by the aforementioned belief that DGBL would be useful primarily as supplemental outside-of-class assignments, which implies that instructors would have little direct interaction with a DGBL system in practice.

Respondents had strongly negative perceptions of the trialability and observability of DGBL for FL instruction in Japanese higher education. Even participants who were familiar with technology-supported FL learning or DGBL reported that there are a small number of articles or academic presentations regarding DGBL, and expressed criticism of the few currently available solutions that are purported to be digital games.

RQ 2. What are the differences in perceptions of attributes of DGBL based on educator demographic characteristics of experience, employment rank, term of office, nationality, research interest and teaching objectives? Participants from non-Western industrialized countries were more likely to have negative perceptions of DGBL observability than participants from western industrialized countries. Although some evidence in the qualitative data suggests this may be due to a relationship between country of origin and a research interest in CALL, a connection could not be confirmed through an inferential statistical analysis of the quantitative data.

The quantitative data analysis suggests that educators with a research interest in CALL are more likely to have positive perceptions of DGBL's relative advantage and compatibility than educators with other research interests. The qualitative data analysis suggests that this is due to the availability of more information regarding technological capabilities and associated learning models through CALL-related literature, academic conferences, and informal professional networks.

Findings Related to Research Question 1

Several possible responses were suggested in the summation of Chapter 2 for RQ1: *How do FL educators in Japanese higher education perceive DGBL?* These will be discussed here with reference to the literature and the combined quantitative and qualitative findings of the study.

Relative advantage. Although many educators remained noncommittal with regard to the relative advantages of DGBL, there were twice as many positive responses as negative responses. According to Rogers (2003), two factors influencing a potential adopter's perception of an innovation's relative advantage include effectiveness and cost. With regard to effectiveness, Kebritchi (2010) found that salient perceptions for educators considering the relative advantage of a DGBL system include the ability to engage learners and produce concrete outcomes. A major theme that emerged from the qualitative data is that educators believed games would improve motivation among the learners, keeping them engaged in the learning process over longer periods of time. The analysis suggests that this assumption is the most important factor influencing the positive disposition in responses. However, respondents commenting on learning outcomes expressed a high degree of uncertainty, which could explain the high frequency of noncommittal responses in the survey.

Learner motivation. A perception among FL faculty members in colleges and universities of a relative advantage in motivating learners is consistent with previous studies. As mentioned in the review of literature, lack of student motivation has been a longstanding and prevalent issue in Japanese higher education (Amano & Poole, 2005; Aoki, 2005, 2010). In addition, many educators who have offered opinions of DGBL in previous studies have expressed assumptions that learners would be engaged by such materials even when these same educators eschew using digital games for other reasons (Kebritchi, 2010; Koh et al., 2011). Correspondingly, in the qualitative interview data, all informants recognized that DGBL offered at least the potential to make learning a foreign language fun and engaging for learners. Moreover, Informants 1, 2 and 3, who were unfamiliar with DGBL and ultimately expressed no intention of adopting it for their own teaching contexts, all recognized a motivation-based advantage nonetheless. A similar sentiment was also expressed by respondents to Item 12, and summarized by one (E5), who wrote, "Personally, I have never played games and do not intend to, though I can see some value in engaging the students this way."

Although the perception that DGBL would engage learners appears to be a common one, it derives from a diverse array of background knowledge. Participants who were more informed about technology-supported approaches to FL or DGBL elaborated on their opinions in greater detail, drawing on both theory and practical experience. Such comments were coded as learning theory or learning practice. In contrast, a larger group of respondents who appeared unfamiliar with games seemed to base their belief in a motivational effect on assumptions pertaining to values and norms among the learner population.

Learner motivation: Theoretical and practical perspectives. Several interview informants were familiar with DGBL through experience or through the literature. Informant 4, a graduate

student working toward a doctorate in CALL in addition to working as a FL instructor in a Japanese university, drew on theoretical knowledge to ground her opinion, stating:

> I believe that it would be easier for learners to continue learning using good games rather than other learning material. The reason is that mechanisms for keeping players interested are established in accordance with theories on gamification, which provide the psychological basis for game authoring in the game making industry. Research is currently being conducted on learner motivation in foreign language learning, but it cannot be claimed that a method has been established to practically apply the theory. In this sense, I believe that a learning methodology that utilizes games is theoretically superior to conventional educational methods.

Informant 5, who has a longstanding interest in instructional technology as well as practical classroom experience with DGBL, offered the following perspective:

> …many students get bored quickly when attempting to memorize lists of words. Computer games can help if they make this difficult task more fun, often by introducing an element of competition. Computer games can also measure progress, thus giving students a feeling of moving forward, which helps build motivation to keep studying.

Informant 6, a CALL researcher and longtime active member of various FL-related academic associations who had no direct experience with DGBL solutions, explained, "Computer games in general…are motivating and extend exposure time. Concerning RPG and related systems, it is clear from news reports that these types of games are popular, engrossing, and in some cases addicting."

Informant 7 drew on specific theoretical concepts to explain actual results from his teaching experience:

> [DGBL] creates an atmosphere of excitement and a place to play. This distracts the students and they do not think they are learning but playing a game. There is higher motivation that is student led, raising dopamine levels and enhancing learning…Games keep the ZPD [Zone of Proximal Development] of students moving, as students accomplish a task they are challenged with a more difficult one but one that is still within reach. This encourages them to keep trying and moving forward.

Thus, the four of the interview informants familiar with CALL and or DGBL drew on theory or practice to explain their belief that digital games have a beneficial impact on learner motivation.

Learner attitudes. Another major theme, and one more common than the perspective informed by literature or experience, pertained to the engaging nature of digital games that involved a perceived connection between motivation, play, and a learner demographic characterized by an affinity for digital games (a total of 16 such comments in the combined data). Informant 1, an educator and researcher with substantial experience and academic achievements but little experience with CALL or technology-supported learning, explained, "The advantage is that the generation of learners and students that has become used to games can learn as though it were a game." Informant 3, another accomplished academic with little interest in or experience with CALL, stated, "I believe that computer games in which single or multiple players can engage would be extremely motivating, probably because many young learners feel at home with them."

The presumed connection between the culture of the current generation of college-age learners and increased motivation to learn a foreign language through digital games was also a common theme among responses to Item 12. Table 9 summarizes some of this feedback.

Table 9

Comments Attributing a Positive Impact on Learner Motivation to Learner Attitude

Record	Comment
E18	As many students have now grown up with games such as this, I think it would be an ideal way of getting students motivated to learn.
J25	I felt that learning through computer games could be effective for learners and students of the younger generation in that they can learn in a fun manner at their own pace.
J37	Many young learners love games, so this kind of material is a breakthrough.
J32	In the case of Japanese language education, there are many learners who are interested in [Japanese] subculture, and many learners with an interest in games, so I think this approach is very useful.
J48	Computer games might be easy to use as learning material for the younger generation because there is already a strong interest and games are used habitually.

Note. E = English; J = Japanese

It should be noted that J32's reference to Japanese subculture (*sabukarucha*) denotes the currently popular cultural movement among the younger population characterized by Manga-influenced art, fashion, and hairstyles. This movement has a strong association with various types of digital games, and is also popular among certain populations of young people outside of Japan.

While the majority of comments on this topic assumed the popularity of games among learners, one respondent to Item 12 offered a more cautious account of learner perceptions of DGBL, suggesting that they are not necessarily prioritizing a fun or engaging experience with FL materials. E26 stated:

> I think if learners want an "adventure" they would go to the best adventure games, and a weak adventure game made for language learning would be off the mark. So, there is a false premise here that might get this project on the wrong track: "Learners want language learning to be fun so let's make a language learning role playing game modeled on adventure games!" No, learners have great role playing games already if they want fun. They want language learning to be credible and useful, then fun too. So, for a

> language learning game, they'd want credible language learning goals, not a global adventure scenario.

It should be pointed out, however, that E26 is not claiming that DGBL would fail to have a positive motivational effect on Japanese learners. Rather, the respondent is stating that learners would use it only if they believed it to be effective in achieving their learning goals, which is a different claim. Otherwise, the respondent reported being "intrigued by the potential" of using such materials for FL instruction.

Only two comments could be interpreted as challenging the notion that DGBL would have a beneficial impact on learners in general. Informant 5 pointed out that learners may have diverse communication styles: "computer-based study is not for everyone. While shy students who prefer working alone may take to computer-based study, those with more extroverted personalities may choose to interact with a human as opposed to a machine." However, this informant could not specify the proportion of students who would prefer human over machine interaction, and also admitted that even many of his outgoing students reported finding his digital game-based activities engaging and useful.

Another Item 12 respondent explained that an interest in games may not automatically translate to an interest in DGBL. E35 stated:

> One interesting thing in Japan is that even my students who play video games seem to have a negative perception of their use for learning. I have shown them examples like the one above [ISLET] but they can't seem to understand how video games can be considered learning.

This comment may be indicative of norms assumed among Japanese university students in the current educational environment that lacks awareness of DGBL. However, it should also be

noted that the respondent is only commenting on the initial reaction among learners and does not elaborate on whether his students eventually accept the idea of FL learning through digital games.

The comments by Informant 5 and E35 aside, the majority of respondents who addressed learner attitude expressed a belief that DGBL would have a positive effect on learner motivation based on the perceived popularity and familiarity of computer games in this demographic. It should be recognized that some educators concerned with values and norms among learners believe that Japanese learners may at least initially be circumspect with regard to the notion that playing a digital game would increase FL knowledge and skills. Yet, it is apparent from the responses that most faculty members believe DGBL would have a beneficial impact on learner motivation, and most of those who make this assumption base their belief on the supposition that learners in general are already familiar with and interested in digital games.

At the same time there are few indications of other possible explanations for the positive bias in non-neutral responses. Few comments were made with regard to cost and learning outcomes, and those provided spoke to unknowns or relative disadvantages. Thus, it is unlikely that positive perspectives of cost and effectiveness could explain a positive trend for relative advantage in the quantitative data. Rather, it is more reasonable to consider these perceptions as factors in the noncommittal responses.

Noncommittal perceptions. Nearly half of respondents remained ambiguous about the proposition of DGBL's relative advantage over conventional learning approaches. This is unsurprising considering that, not only is the approach largely unknown in Japan, but also it is not recognized as a fully matured educational method even in countries and regions where its popularity is growing. In addition, the qualitative data indicate that some educators have negative perceptions of the cost of DGBL in terms of both money and time.

Uncertainty about learning outcomes. The literature indicates that in the absence of well-developed policies or organizational efforts to inform educators of the uses and rationale for new technology-supported instructional methods, the educators who must implement the innovation will harbor uncertainties about its effectiveness (Alshumainmeri, 2008; Koh et al., 2011; Maftoon & Shahini, 2012). Correspondingly, there is evidence in the qualitative data that some FL instructors are uncertain or even skeptical about the effectiveness of DGBL regarding learning outcomes, but this uncertainty is not limited to educators who are less informed about technology-assisted FL approaches.

Informant 2 clearly expressed skepticism by claiming, "I think learners would get used to virtual communication, and this is unrelated to actual communication." An Item 12 respondent was also as unambiguously doubtful. E3 stated:

> I doubt that they can really improve some logical and critical thinking and reasonable communication skills through that way. Their English might be getting worse such as using super simple words or just simple arrangement of words to win games.

There were also comments that, while not absolute in their dismissal of a positive impact on learning outcomes, expressed significant doubt. Respondent J31 wrote, "Just from this video, I can't tell concretely what kind of conversation takes place in the game, so I can't judge whether or not there would be a real effect," and J17 wrote, "Whether linguistic ability improves or not is unpredictable." Two participants familiar with CALL also expressed uncertainty. Informant 6, who is well versed in the academic literature regarding technology-based FL education, summarized a lack of certainty surrounding DGBL, writing, "Some studies have claimed improved outcomes, but I do not believe that there is a general consensus on this." Furthermore, Informant 4 described other uncertainties that may influence outcomes:

There are few precedents, so there are no reports regarding the following issues:

- Whether learners will continue using a game long-term after the novelty wears off
- Repetitive drill and learning over the long term are essential for language acquisition, but can these two important components be achieved through a learning method that utilizes games?
- Is it possible to make a game that can be used for learning over the long term (five to ten year span)?

Thus, even those who are relatively well informed regarding DGBL recognized that its effectiveness has yet to be proven satisfactorily.

Cost. Informant 6 included cost as a disadvantage of technology-supported learning approaches, although he mentioned that this was becoming "less of a problem" in Japan. Informant 7 wrote, "Games are expensive, especially when you have to buy more than one copy for the students." Further, in the absence of institutional funding options, Informant 4 pointed out that the financial burden would fall to the individual instructor:

> I think that the example game I saw (ISLET) requires a server that can store student data, but instructors who are unable to use a university-provided server have to pay the server cost out of pocket, and the financial burden is probably substantial.

With regard to the cost of implementing DGBL in terms of time, all respondents addressing the issue seem to have negative perceptions. Among the six participants that commented on time-related factors, only one recognized a possible relative advantage. Informant 1 noted, "One good point is that the time-consuming work of individual evaluation is unnecessary because the computer manages learning outcomes." However, this informant also claimed:

> If one must know everything including the content, then it couldn't be used as it would take too much time. In other words, in the case of game use, if the teacher must understand the substance of the story, I think nobody would use it.

Thus, according to the evidence, factors under consideration by FL instructors include, in addition to a perceived beneficial influence on learner motivation, the cost of implementation, for which respondents indicated overall negative perceptions, and learning outcomes, for which a degree of uncertainty was indicated. All of these in combination could understandably lead many participants to give a neutral response to the proposition of DGBL's relative advantage.

Compatibility. The survey responses to the question of DGBL's compatibility were more polarized and less ambiguous than those related to relative advantage. It was suggested in the summation of Chapter 2 that factors fostering a positive perspective of compatibility could include instructor freedom in choosing or interpreting the learning goals for the courses they instruct, the availability of IT/ICT infrastructure required to utilize DGBL, and the compatibility of DGBL as a legitimate means of instruction according to cultural norms among respondents originating in countries where the approach is growing in popularity. In contrast, an emphasis on human-mediated instruction as a Japanese cultural norm was suggested as a factor that would produce a negative overall response since the majority of respondents were Japanese. The data were examined for indications of these factors, and several determinations were made.

The evidence indicates that the major factors explaining the diversity of perspectives of DGBL compatibility are variation in course objectives and disparity in the availability of required infrastructure. In contrast, cultural differences in values regarding human versus machine interaction in the classroom in and of itself could not explain a polarization in responses to compatibility. The reason is that an emphasis on human interaction during class and an

assumed role for machine-mediated learning activities outside of class time appear to characterize most FL educators regardless of demographic factors.

Learning goals. The flexibility with which instructors must interpret the learning goals of their courses notwithstanding, FL instructors in Japanese higher education are typically charged with various courses encompassing disparate learning goals, so the perception of compatibility of DGBL may then depend on the course in question. Most of the respondents to the online questionnaire reported multiple teaching objectives related to different modalities of linguistic skills. Among the 88 participants, there were a total of 177 responses to Item 10, which asked respondents to indicate the teaching focus of their principal classes. This was a multiple-choice item in which 62.5% of participants selected two or more responses. The highest frequency of items was *conversation*, at 43 occurrences, followed by *writing* and *reading* at 30 and 26 occurrences respectively. Accordingly, it was not uncommon for *conversation* to be selected along with *writing* or *basic literacy* by the same respondent. *Conversation* as a class focus entails the learning goals of acquiring or improving the speaking and listening skills required to utilize a target language in various types of oral/aural communicative acts. From the standpoint of respondents, these skills differ significantly from those emphasized in a class that focuses on a written modality of language. For educators with such duties the question of compatibility would be expected to depend on the course in question.

There is evidence in the qualitative data that instructors perceive DGBL to be more compatible for some learning goals than for others. This perception is not surprising considering the nature of the DGBL sample as an RPG with voice recognition capabilities. For example, Respondent 28 indicated an assumption that DGBL would be of primary benefit for goals related to a spoken linguistic modality when he/she wrote: “I think that this is very fruitful for students

who have few opportunities to speak and hear Japanese." Respondent J43 concurred, and added skills that he/she does not consider appropriately targeted with the system presented in the questionnaire: "It seems to me that computer games are useful for practicing conversation skills. They probably can't be used for teaching grammar or how to use a dictionary."

Furthermore, Informant 6 made a direct connection between the existence of various learning goals and the fact that one instructor must often meet multiple teaching objectives for multiple classes, and that this context would have an impact on DGBL compatibility:

> …the courses I have taught most recently were mostly content courses; the courses on tourism might have benefitted from RPGs simulating tourist-industry situations... My only language skills courses in recent years were for writing; RPGs would not have been suitable for these courses unless they had a large writing component…Finally, it is easy to imagine a RPG that could match the teaching goals of my speaking/listening classes. Even the software shown in the videos incorporates goals such as learning what to say in different situations.

In addition, Informant 5 pointed out specific sub-categories of EFL with which DGBL may be compatible. When asked if he could think of learning contexts where DGBL would appropriately be applied in Japan, he responded, "I think there would be for the world of TESP (teaching English for special purposes)…it would be great for business English, medical English, and for training tourist industry folks. The more specific, the better." Notably, the domains mentioned involve relatively circumscribed vocabulary and practical communicative skills that would not be considered applicable in other domains.

Thus, the data suggest that DGBL, particularly the ISLET system introduced in the data collection, is perceived as compatible for some learning goals, but not others. Because instructors

have a wide variety of teaching objectives to meet, the perception of compatibility of DGBL probably varies depending on which class is most salient for the instructor at the time of response.

Infrastructure. It was suggested in the summation of Chapter 2 that since MEXT had invested heavily to ensure that all schools had adequate IT/ICT facilities, the availability of devices on which to use DGBL may not be a factor in perceptions of its compatibility (Sakamoto, 2002). In contrast, it was also discovered in the review of literature that MEXT funding is inequitable; the amount of resources appropriated depends greatly on the type of institution (Iwasaki, 2009; Kitagawa & Oba, 2009), and only a fraction of schools are earnestly engaged in planning and providing IT/ICT infrastructure (Open University of Japan, 2011). Consistent with the latter view is evidence in the qualitative data indicating that not all educators enjoy adequate access to IT/ICT resources. Of the interviewees who commented on infrastructure, only Informant 6 reported that for the most part, "…availability of computers and the Internet has not been a problem." However, Informant 5 reported a contrasting situation:

> One challenge I've faced with using computers is availability. At my former job, it was difficult to book a CALL room, so I was only able to do so occasionally…Another problem has been the poor quality of the machines available (often outdated PCs running an old version of Windows) and slow Internet connections.

Similarly, one Item 12 respondent commented that, "I strongly feel that I want to use game-like contents such as ISLET, but there is no budget for it," and another pointed out that there are institutions where such facilities are problematic. J47 stated:

> It [DGBL] could not work without the devices, so it would be difficult to incorporate as a classroom activity at institutions that are not economically healthy, or at least economically sound, or only have computer labs that can be used for individual study.

These comments, together with the aforementioned comments expressing negative perceptions of DGBL economic cost, suggest that availability of infrastructure is neither adequate nor uniform across institutions in Japan. Educators working at schools where Internet access and terminal devices are not readily available would not perceive DGBL as being compatible with their teaching contexts. In contrast, in sufficiently funded institutions with suitable facilities, instructors would be more likely to consider DGBL as compatible. The evidence suggests that this variability between schools contributed to the polarized results in responses to Item 2 of the online questionnaire.

Human versus machine mediation. There was a broad sentiment among respondents that class time should be devoted to human-mediated learning activities. This focus was not linked to a particular cultural background and seemed based on the assumptions (a) that machine-mediated activities primarily involve one student working alone, and (b) that technology is limited with regard to the type of learning activities it can support. At the same time, a major theme among participants was that, even though technology-assisted FL learning activities are inappropriate for class, there is a role for them as supplemental material.

DGBL as a single-learner activity. Several participants, both Japanese and non-Japanese, reported an emphasis on human-mediated instruction during class time. Although this focus seems to be based on a variety of epistemological stances toward education and learning, a common factor associating them appears to be an assumption that digitally-mediated learning of any form primarily involves one person studying alone. This interpretation of the data is consistent with findings on educator perceptions of DGBL (Kenny & McDaniel, 2011; Schrader et al., 2006), and with FL educator perceptions of CALL materials (Kim, 2008). Accordingly, Item 12 respondent J32 wrote explicitly that, particularly in Japan," games are understood to

involve one person facing a computer screen working silently in a 'Computer vs. Person' activity, so they would be unusable in class."

An association between DGBL and single-learner activities would preclude the approach from classes where instructors emphasize human interaction. For instance, Informant 3 worried that solitary learners focusing on a computer game would detract from her preferred learning practice: "When actually used in the classroom, students would probably be engrossed in the game itself, and because of that I think that a face-to-face class could not be conducted." Thus, for educators following such an approach, DGBL is not compatible during class. Informant 3 stated:

> My current approach assumes a consistently face-to-face lesson environment, so I think a comparison would not be very meaningful…In a language learning classroom, I think that a face-to-face framework between student and teacher, and between student and student, is fundamental. So the use of computer games would not be compatible...

Only three participants expressed a willingness to use DGBL during class. Respondent J53 wrote, "If there were material like this for French, I would like to make use of it in class and at the same time as assignments for studying at home," but it was not possible to seek elaboration on the nature of the intended implementation. Informant 5 claimed that he occasionally provides some class time for computer mediated activities, but that it is not commonplace and he does so mainly when computer availability for students outside of class is problematic.

At the same time, Informant 4 claimed that she would like to use DGBL in class. She wrote, "Using computer games is highly compatible with the tenor of lessons that I want to run because not only can students learn while having fun, but also learning can continue both inside and outside of the classroom." Yet, it should be noted that Informant 4 is not implying that some

classroom time can or should be devoted to solitary human-machine activities because she also recognized the multi-player function of the showcased ISLET learning system as means to allow student-to-student collaborative learning. Informant 4 stated:

> I think that learning takes place naturally together with peers. I myself prefer studying alone, but more often than not college students find it difficult to continue learning by themselves, so I think that the capacity for team learning has merits.

Thus, she is actually expressing a desire to use DGBL to promote human-human interaction during class. Informant 4 was alone in acknowledging the multi-player function of the ISLET system.

DGBL as a tool for repetitive drill. Other informants considered DGBL inappropriate for implementation during class based on assumptions of technological limitations and on understandings of how targeted knowledge is best acquired, but considered it suitable for out of class assignments. This theme is consistent with literature claiming that most FL educators view CALL useful chiefly for repetitive drilling (Bax, 2003, 2011; Bush, 2008) For instance, Informant 1 made this assumption when he claimed DGBL is not usable in his class:

> Foreign language education entails a "learning" portion and a "practice" portion. If there is no learning, there can be no practice. I think that computer games are probably highly effective in the practice portion, but it is important to consider what happens to learning, which is the prerequisite of practice…I myself will not use computer games during class time at school because I am focusing on learning.

Informant 1 is a cognitive linguist, and in using the English terms "learning" and "practice," he is making the cognitivist distinction between *declarative* and *procedural* knowledge. Accordingly, declarative knowledge is considered to be conveyed optimally through

language-based explanations (i.e., lecturers, textbooks, and the like), whereas repetitive drills are usually prescribed to build procedural knowledge. Thus, Informant 1 is assuming that computer games are suitable for drills outside of class, but that class time should be devoted to human-led explanations.

Use as supplemental material. Most of the participants claiming that DGBL would be incompatible as part of an in-class activity also added that it would be compatible for extracurricular assignments. For example, Informant 1 concluded his aforementioned comment with the following: "However, I want to strongly recommend them provided what is taught in class can be 'used' in the game…There are possibilities in the application of computer games for supplementing classroom learning." In addition, after declaring DGBL incompatible for in-class activities, Informant 3 added: "However, I think there is plenty of room to consider it as learning material for off-campus or over long breaks." Two Item 12 respondents closely followed this pattern of first declaring incompatibility for classroom application, then concluding with a contrastive statement acknowledging a supplemental role for DGBL. Respondent J38 stated:

> College is for acquiring intellectual knowledge and an analytical mind. So-called games should not be used as teaching/learning material in university classrooms. However, I have no problem with university students trying to learn Japanese at home or in their free time while enjoying a game. Live and let live.

Respondent E15 wrote:

> It is becoming more and more apparent (as computerized / e-learning is integrated more and more into the educational environment) that students (youth in Japan) need less connected time and more face to face time. Teachers that can should spend MORE quality time face to face with their students. HOWEVER, as a supplemental tool --

> outside of the classroom environment, I can see the efficacy of such a method / tool for language acquisition. [Emphases in the original]

In addition to participants being unfamiliar with learning technology, Informant 5 expressed a belief in the non-central role of DGBL. He resembled Informant 1 in his rationale in that he assumes that technological limitations define the type of knowledge that learners may gain from digitally-mediated materials:

> I'm of the opinion that computer games can be a good supplementary tool for language learning. They can't beat direct human interaction, but they can be great ways to prepare for it. They have the potential to make some of the necessary rote learning more palatable for students who generally dislike such tasks.

Similarly, Informant 7 reported incorporating games into coursework, but assigns them for use outside of class, which is dedicated to human interaction:

> If the objective is to be able to describe a process, I have students play a game outside of class while being aware of what they are doing. In class they communicate the process they used to play the game. So class is focused on language use and acquisition while homework is playing a game with clear set objectives.

Thus, many educators assume a peripheral role of DGBL for a variety of reasons based in learning theory and practice, and assumptions concerning technological limitations. Notably, there is no indication that this assumption is related to cultural characteristics or familiarity with technology-supported learning approaches.

Demographic traits in perceptions of compatibility. The fact that many of the comments cited herein emphasizing human interaction over computer-mediated learning make reference to Japanese culture or derive from Japanese nationals seems initially to support Joshi and

colleagues' (2010) suggestion that Japanese educators in particular prioritize human relationships in education. However, it should be noted that there were no clear delineations of opinions along cultural lines noted in the qualitative data, nor were there statistical differences found between educator perceptions of compatibility and nationality in the quantitative data when the variable of nationality was collapsed into either Japanese or non-Japanese and cross-tabulated with perceptions of compatibility. If an emphasis on human over machine mediation were a cultural characteristic particular to Japan, and if this cultural norm generated a negative perception of DGBL compatibility, then this influence would be expected to produce a greater likelihood that Japanese participants would respond negatively to Item 2 of the online questionnaire. The fact that no such relationship was found suggests that a classroom focus on human-to-human rather than technology-supported learning is not a factor particular to any one cultural background among FL educators in Japan.

Because there appears to be broad consensus that DGBL is compatible with FL education only as material supplemental to the human-mediated learning activity that takes place in class, culturally-based epistemological stances toward learning practices could not explain the diversity of responses to Item 2. Therefore, the evidence suggests that the relevant factors influencing the disparate responses are differences in course objectives and availability of infrastructure.

Complexity. It was suggested in the summation of Chapter 2 that educators in Japanese colleges and universities may have sufficient computer literacy to perceive DGBL as comparatively easy to implement based on the recognition of Japan as an advanced technological country. In other words, faculty members would be relatively confident in their ability to operate the hardware aspect of DGBL, which would hypothetically entail deployment, demonstration of the basic operation and monitoring of usage. In contrast, the literature suggested that educators

would have little knowledge of the software, which is defined as an overlap of technical, content, and pedagogical knowledge regarding DGBL, and that a lack of this knowledge would result in a negative perception of complexity.

The analysis of the qualitative data revealed multiple levels of consideration of DGBL use. With regard to hardware, while there is no indication that educators lack the confidence for usage involving general computer skills, interview informants 4, 5, and 7 commented on the perceived complexity involved in creating or customizing a DGBL system. However, this did not seem to be a consideration for most educators. Rather, the major theme was that most educators lacked the overlap of content, pedagogical, and technical knowledge pertaining to DGBL, and recognized that acquiring this knowledge would take an excessive amount of time. In other words, the software aspect of DGBL was perceived as complex. This finding is compatible with literature on computer literacy among university faculties in other countries (Muflih & Jawarneh, 2011), but it potentially contrasts with the qualitative data of the present study.

The seeming dissimilarity between a positive to neutral perception of DGBL complexity in the quantitative data and indications of a negative perception in the qualitative data could be explained by the aforementioned assumption of a supplemental role for DGBL in an FL learning program. That is, instructors are assuming that implementation as homework would entail little or no direct interaction with the material and therefore little need to learn the content of the game or pedagogical approaches for implementing it as core material. If a DGBL system were used strictly as supplemental material, the extent of interaction would presumably be accessing online progress reports. This entails general computer skills for which educators have confidence, so this assumption would engender a positive view of DGBL's complexity.

Negative perception of software complexity. There was a relatively common awareness among participants that properly implementing a learning program featuring DGBL would create a significant burden on instructors with regard to cost in time. Informant 6 commented on what he feels is the, "Nature of the CALL beast:"

> Compared to previous generations of CALL games…RPGs are obviously much more complex but should not be too much of a problem to master if there is a good manual, adequate support from the seller, and hopefully an active community of users, such as the one for Moodle. Journal articles and conference presentations have been providing good insights into the best uses of CALL games, including virtual reality and RPGs, so I feel that a person with my moderate-to-advanced experience with CALL could deal with their complexity.

However, Informant 6 was alone in expressing confidence. Although other participants seemed to share his assessment of the complexity that would be involved in using DGBL, they did not appear to share his willingness to do so. Informant 5 expressed hesitation to use DGBL based on his experience with other RPG technology that he eventually abandoned due to its complexity: "The games presented in these videos remind me a bit of Second Life, which I experimented with a few years ago…Second Life had a pretty steep learning curve, and I suspect these games do too." Informants 2 and 3 also claimed that the ISLET system appeared complex because they lacked general familiarity with computer games, and Informant 7 noted, "Teachers need to adapt games to the classroom…this often makes teachers unwilling to try games in their classroom." Thus, overall there is a perception that DGBL is complex.

Confidence with use as supplemental material. There is evidence that most participants were assuming that they would have little or no direct interaction with a DGBL system if one

were incorporated into their courses. As mentioned previously, Informant 1 claimed that most educators would not use an RPG simulator such as the ISLET system if they had to take the time to "understand the substance of the story." He also pointed out the notable success of a currently popular CALL system, which he attributed primarily to the fact that, "teachers don't have to tamper with the content. It is closed within the system." He claimed that this feature was crucial, and more important than overcoming "computer anxieties" that instructors might harbor. In addition, an Item 12 respondent connected the complexity of implementation in class and DGBL use as a supplement. E31 stated:

> I do agree that language learning video games can be a nice interactive tool for language teaching; however, in the classroom it takes a considerable amount of preparation to properly implement it in a lesson or course. As of now, I view it as a side tool for learners

Attributing the positive trend in the survey results to an assumed homework role among respondents is also consistent with DT. According to the concept of *technology cluster* (Rogers, 2003), when encountering an innovation, potential adopters will rely on an analogy between the innovation and the most closely related familiar technology in order to make sense of the new technology. Accordingly, most educators who participated in the study would have been unfamiliar with DGBL as represented by the ISLET learning system, so they would rely on their understanding of CALL learning materials in general to comprehend it. CALL systems are generally treated as self-study material, and relegated to dedicated computer labs where most instructors have little or no interaction with them (Brown et al., 2008; Bush, 2008). Alternatively, educators prefer to marginalize it to maintain instructor-centered courses (Kim, 2008). This use of CALL materials is also corroborated by Informant 1 and comments claiming preference for a supplemental role discussed in the previous section. In the larger context, this treatment of

technology-mediated learning materials is also consistent with reports on how learning technology in general is treated in Japanese higher education (Aoki, 2010; Uchida, 2004). Thus, educators are likely assuming that, as with most currently available CALL materials, DGBL would simply involve assigning activities for extra-curricular work and perhaps monitoring progress through an automated online service.

Trialability and observability. Because DGBL as a discipline is still in a formative stage, and because some literature suggested that Asia including Japan is not a domain where it is growing in popularity, the following hypothesis was proposed in the summation of Chapter 2.

H1: Perceptions of trialability and observability will be negative overall in the population of FL educators in Japanese higher education.

The results of the online self-completion questionnaire strongly support this hypothesis. The responses to both Item 4 and 5 were overwhelmingly negative, and are congruent with the evidence found in the qualitative data.

Trialability. None of the interview informants reported that there were ample opportunities to try out DGBL solutions. Informants 1, 2, 3, and 7 simply stated that they were unaware of any opportunity to use any form of DGBL solution specifically for FL learning on a trial basis. Notably, although Informant 7 is familiar with DGBL and reported using digital games in his courses, he also stated that, "I have not found any games which I like that focus on language learning, so I take existing games and adapt them to the objectives of the class." That is, he does not recognize an opportunity to try games specifically developed for FL learning.

Other informants familiar with technology-supported learning materials and or game-based materials reported some opportunities to use applications purported to be games. Informant 4 claimed that she experimented with Duolingo, which she found engaging due to its

gamification aspect, but that she could not use it in class because Japanese was not supported. Informant 5 reported seeing game-like applications, "demoed at JALT conferences and the like," and reported using Quizlet, an online self-study service incorporating some game-like features. He also reported experimenting briefly with Second Life as an example of an application that more closely resembles the ISLET system, but eventually found it too complicated for practical application.

Informant 6 encountered the concept of RPGs for FL education at an academic conference and experimented with applications that resembled ISLET, but admitted that he has never seen a comparable system designed specifically for spoken language learning:

> I have tried briefly some virtual reality sites (e.g., Second Life) and may have looked at some RPG sites for language learning…I have attended conference presentations in which RPGs were discussed…However, I have had some experience with the CD ROM for Mari Noda's *Japanese: The Spoken Language*…Some of the exercises might be considered role-playing games although not at the level of sophistication of the materials shown in the video.

Among the respondents to Item 12, only two (E31 and E35) made comments that implied actual experience with DGBL, but it was not possible to follow up on their comments as their identities are unknown. Thus, few educators are aware of opportunities to gain first-hand experience with a DGBL solution on a trial basis, and trial availability seems to be limited to a few online services such as Quizlet and solutions demonstrated at academic conferences.

Observability. Again, most informants reported that aside from some online services and prototypes at conference exhibits, DGBL is not apparent in FL education. In addition, informants report that they have seen nothing resembling the showcased ISLET system. Informant 1

commented, “I know of drill-like games, but I am unaware of anything with a narrative like shown in the video,” and Informant 2 stated, “I often see instances of video materials used in courses for Teaching English as a Foreign Language (TEFL), but I have never seen a game like this.”

Informant 4 reported observing applications at conferences and online, but questioned whether they were actually games:

> I have seen computer-based educational materials at conference booths, but not all of them were patterned as games…I have seen something called “free-rice” where you can donate rice online by giving correct answers…The game on this site is actually not game-like…

Informant 6 reported somewhat more extensive exposure to RPGs, yet these instances were limited to one colleague and a few conference presentations:

> I have read several articles by [colleague] about his virtual reality learning platforms, although I am not sure now to what extent he uses RPGs strictly speaking…I have attended a few conference presentations and read a few articles about RPGs in language teaching.

Informant 7 was perhaps the most unambiguously negative in his perception of observability. He claimed, “If it wasn’t for me they’d be non-existent in the university I work in. The only places I have seen them in use is at conferences like JALTCALL but even these games leave a lot to be desired.” Thus, he echoes the sentiment expressed by Informant 4 in questioning the “gameness” of observable systems.

The comments related by the interview informants indicating negative perceptions of trialability and observability, in conjunction with the facts that responses to Items 4 and 5 in the

questionnaire were overwhelmingly negative, and no Item 12 respondent made reference to colleagues' use of digital games, lead to the conclusion that, as expected, there is no current diffusion process of DGBL in FL education in Japanese higher education.

Findings Related to Research Question 2

The literature suggested possible responses with regard to RQ2: *What are the differences in perceptions of attributes of DGBL based on educator demographic characteristics of experience, employment rank, term of office, nationality, research interest and teaching objectives?* Despite indications that job title, rank, and work status may influence perceptions of attributes, it was noted in Chapter 4 that the only significant relationships found were between region of origin and observability, and between research interest, relative advantage, and compatibility.

Region of origin and observability. The literature suggested that non-Japanese nationals may be more likely to report observing DGBL use than Japanese nationals based on literature indicating that the approach is growing in popularity among researchers primarily outside of Japan (Hwang & Wu, 2012), that IT/ICT-supported learning in Japanese higher education is lagging within the region (Latchem et al., 2008), and that Japanese have a culture-based tendency to avoid machine-mediated learning approaches (Joshi et al., 2010). However, no significant relationships were found when the responses to nationality were categorized as either Japanese or non-Japanese.

In contrast, the results to the online self-completion questionnaire showed a significant relationship between region of origin and observability when responses to nationality were collapsed into the variables WIC and NWIC. The category of WIC included AUS/NZ, Germany, UK, and USA, and NWIC included Japan, one respondent who reported an unspecified country

in Latin America, PRC, RK, and Taiwan. When these two categories were cross-tabulated with perceptions of observability and analyzed using a Chi-Square test, it was found that WIC participants were more likely to respond neutrally, and NWIC participants were more likely to respond negatively. Thus, of the studies cited in the previous paragraph, Hwang and Wu's (2012) investigation of geographic locations of research activities involving DGBL seems to be the only one consistent with the findings of the present investigation. Further, Yonezawa and Ishida (2012) pointed out that faculty working in Japanese colleges and universities tend to be educated and trained for the most part in their countries of origin. In other words, FL educators from countries or regions that Hwang and Wu report are not generating research on DGBL, such as Asia or South America, would be less likely to have observed the approach than those from countries where the bulk of research is being generated, such as the European Union or the United States. Therefore, rather than Japanese or non-Japanese nationality being a factor in exposure to the concept of DGBL, the observability of DGBL in the country of educator origin influences perceptions of this attribute.

Also, it should be noted there is some indication in the qualitative data that professional networks are influential in the perspective of observability. Informants 1, 2, and 3 did not claim a research interest in CALL and were not able to provide examples of DGBL observation. In contrast, Informants 4, 5, 6, and 7 reported encountering the construct at CALL-related conferences, and Informant 6 reported having colleagues who are currently engaged in DGBL research. The role of informal networking among colleagues in spreading information is predicted in DT (Rogers, 2003), as well as literature on perspectives of CALL (Kessler, 2007). Thus, a relationship between region of origin and observability may indicate a relationship

between region of origin and CALL interest. However, no such relationship was found in the qualitative data, and its absence remains unexplainable with the available data.

CALL research interest, relative advantage and compatibility. Although no significant relationship was found between CALL research interests and observability, respondents to the online self-completion questionnaire who included CALL among their research interests were more likely to report a positive perspective of relative advantage and compatibility than those who did not include CALL as a research interest. This finding in the quantitative data is consistent with the literature as well as with the findings in the quantitative data.

It was noted in the review of literature and has been noted several times in this discussion that innovations are often associated with other known technologies and methods. The tendency to associate positive perspectives with innovations bearing a resemblance to technologies in which potential adopters are already interested is predicted by the concept of *technology cluster*, proposed in Rogers' DT (2003). Also, it was noted that familiarity with CALL based on training or informal information sharing through peer networks fosters a positive perspective of its relative advantage (Alshumainmeri, 2008; Kessler, 2007). Correspondingly, a pre-existing interest in CALL or learning technology correlates with positive perspectives among the interview participants.

Informants 1, 2, and 3 reported being unfamiliar with or having no direct experience with CALL approaches, and also rejected the possibility of implementing DGBL in their classes, primarily on the grounds of incompatibility. In contrast, Informant 4, who is working toward a doctorate in CALL, expressed a conditional willingness to adopt DGBL, provided several conditions satisfying compatibility and complexity were met. Informant 5, who has published

papers and presented on his experiences with CALL approaches, clearly expressed his enthusiasm for the DGBL approach presented in the ISLET video even while acknowledging some drawbacks:

> …hopefully over time they (RPG language learning simulators) can be made more accessible to others…I like how goal-oriented they are: you have a mission with a set list of objectives, then some realistic-looking CGI characters to interact with…you can record your voice and have a feeling of real immersion.

Informant 6, an active presenter and attendee at CALL conferences, recognized the compatibility of such DGBL solutions as ISLET in certain classes, and also admitted a willingness to adopt provided research showed an unambiguous advantage with respect to outcomes. He acknowledged the potential for DGBL with regard to FL learning outcomes based on his familiarity with the literature:

> Some research on RPG for language learning is encouraging…although it is not clear if the benefit comes from participation in the game itself (where students often devise strategies to continue playing with minimal language practice) or from having the learners use the transcripts of the speech they used during the game as a scaffolding device to correct and improve their output.

Informant 7, who is working toward a doctorate in Learning Technologies, currently creates games or adapts off-the-shelf games for use in his classes. He reported a clear relative advantage over other materials and approaches:

> The goals of most of my classes are to use English in authentic communicative ways. Textbooks do not offer me this opportunity, they stick to simple conversations and language forms. Games offer students the chance to use English in authentic ways,

> describing what they did, helping others by giving directions, and using vocabulary/language in authentic ways…It also challenges students to think in innovative and creative ways. Instead of offering simple sentences, students need to put together trains of thought as they interact with classmates to solve complex problems.

Thus, those familiar with CALL or learning technology in general may be more aware of how the DGBL technology may potentially satisfy learning theory. Another possibility is simply that a pre-existing preference for working with digitally-mediated means of learning and interacting fosters a positive bias in perceptions of innovations supported by the same technology. Whichever the case, it is clear from the results of the present investigation that educators harboring an interest in CALL approaches to FL learning are more likely to have positive perceptions of DGBL relative advantage and compatibility.

Conclusions and Recommendations

The purpose of the present study was to explore perceptions among FL educators in Japanese higher education regarding an innovative DGBL approach to FL instruction. The significance of the study is the discovery of information on potential new areas of use for the new technology to assist the efforts of change agents who wish to promote it in this educational context. Studies on educator perceptions of new technology-supported materials and methods have been conducted both inside and outside of Japan at various levels of education. These have indicated that educator beliefs regarding new technologies and methods, including DGBL, are based in pre-existing knowledge and experience, training and or policy intervention, and informal networking among peers. However, no studies have been conducted on perceptions of DGBL for FL instruction in Japanese higher education. The literature further suggested that Japanese higher education lags in the adoption of learning technology due to ineffective policy

intervention, and that peer networking among FL educators may be delineated by cultural background or work status. In this context, a concurrent mixed-methods investigation grounded in Everett Rogers' (2003) theory on the Diffusion of Innovation was conducted to collect data from FL educators regarding their perceptions of the relative advantage, compatibility, complexity, trialability, and observability of DGBL, and to discover whether demographic factors are related to these perceptions.

Among the major findings, FL educators in Japanese higher education are uncertain about the ability of DGBL to produce real learning outcomes, but believe that it would have a beneficial effect on learner motivation, particularly for the younger generation of students who are perceived as being familiar with IT/ICT technology and having an affinity for games. Also, DGBL is considered compatible with some learning objectives and practices, such as repetitive drilling or oral/aural skills, but study participants believe that it could not replace human-to-human interaction in the classroom. Further, FL educators are sufficiently confident in their computer literacy to treat DGBL systems as supplemental material, but lack the overlap of technical, content, and pedagogical knowledge required to implement it as a core material in a learning program. Finally, DGBL is largely unknown among FL educators in this educational context. However, a research focus in CALL correlated positively with perspectives of relative advantage and compatibility, and further, observability of some aspects of DGBL is reported as present in peer networking primarily through CALL-related conferences. Cultural background does not appear to influence perceptions of DGBL.

The present investigation was predicated on the assumption that increased use of DGBL among FL educators would constitute a positive development, both improving R&D of these innovative tools and enhancing FL education in Japanese higher education. The findings of the

present investigation, in conjunction with successful diffusion programs predicted by DT, could guide a change initiative with the goal of encouraging the adoption of DGBL among FL educators in this educational context. For this purpose, the present findings should be considered with reference to strategies suggested by Enfield and colleagues (2011) to guide such efforts in the future.

The literature indicates that quality information is required for persuasion, suggesting further research with a focus on learning outcomes. The main factors that educators consider when formulating perspectives of relative advantage are effectiveness in learner motivation and learning outcomes, with motivation being a particularly significant issue according to the literature and as indicated in the results of the present study. At the same time, the present investigation shows that many FL educators in Japanese higher education already assume that DGBL would confer a positive impact on learner motivation based on assumptions regarding the learner demographic. On the other hand, instructors remain unconvinced of a beneficial impact on learning outcomes. Therefore, one focus of future research should be investigating the relationship between DGBL and recognized measurements of FL proficiency. Establishing a positive relationship between the approach and learning outcomes, if indeed one exists, would increase positive perceptions of relative advantage and probability of adoption.

The literature further indicates that the probability of adoption increases when trialability is facilitated. One strategy for accomplishing this would be to follow the example of independent (indie) game makers by providing numerous samples online that could be played and experimented with for free. Furthermore, the present findings offer guidance as to the nature of such samples. The FL educators studied varied in their perceptions of compatibility because the DGBL solution introduced in data collection was perceived as useful for meeting a limited range

of learning goals. Therefore, in addition to solutions for improving speaking and listening skills, such as the RPG showcased in the survey instrument, reading and writing modalities should also be considered in the development of DGBL tools for foreign language education. In other words, a wide range of materials appropriate for meeting a broad spectrum of learning/teaching objectives should be developed with samples placed online with which educators may experiment freely.

Another strategy for facilitating the diffusion of an innovation is to rely on mass media channels of communication early in the process because this information modality is effective in reaching innovators and early adopters. In addition, outreach efforts should be targeted at audiences that are likely to be receptive to the message. The results of the present investigation suggest that educators with a research interest in CALL or technology applications for FL education are more likely than professionals with other research focuses to perceive DGBL as having relative advantage and being compatible. Therefore, CALL-related conferences in particular, such as those held by JALTCALL or LET, offer the most receptive audiences to the concept of DGBL for FL education, and the most likely venue for recruiting researchers that may choose to focus on this particular branch of CALL.

Finally, it is worth emphasizing that no factor specific to Japanese higher education was found that would preclude the adoption of DGBL as a FL instructional tool. Digital games are not currently perceived as educational tools because instructors lack sufficient information regarding the theoretical and empirical connection made between DGBL and learning. In other words, there are no cultural values or beliefs, or endemic deficiencies with the physical infrastructure, that would render DGBL an unworkable approach in this educational context. In fact, since the issue of learner motivation is particularly salient in FL instruction in this

educational context, the attraction of DGBL is potentially high. Therefore, provided that the informational deficit is addressed adequately, and that developers and or support personnel can provide a highly user-friendly interface and guidance for instructors, DGBL could potentially enjoy considerable popularity among FL instructors in Japanese higher education.

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APPENDIX A

Perceptions of Computer Games for Language Learning

Based on your understanding of computer games for language learning from the video presentation, please indicate your level of agreement with the following five statements.

1. Computer games for language learning have more advantages than disadvantages in comparison to other teaching/learning materials.
   a. Strongly agree
   b. Agree
   c. Neither agree nor disagree
   d. Disagree
   e. Strongly disagree
2. Computer games for language learning are compatible with the teaching objectives of my principal classes.
   (*same responses as above*)
3. Computer games for language learning are relatively simple for teachers and learners to use.
   (*same responses as above*)
4. There are many opportunities to try out computer language learning games, either by myself or with my students.
   (*same responses as above*)
5. Many foreign language educators use computer games for language learning.
   (*same responses as above*)

Demographic Information

6. Job title
   a. Professor b. Associate/assistant professor c. Lecturer d. Other
7. Rank
   a. Full-time b. Part-time
8. Term of office
   a. Tenured b. Non-tenured
9. Nationality
10. Please select keywords that most closely describe your field of research
    a. CALL b. Sociolinguistics c. Cognitive Linguistics
    d. Applied Linguistics e. Phonetics f. Phonology
    g. Second Language Acquisition h. Literary research i. Other
11. Please select keyword(s) that best describe the focus of your principal classes
    a. Conversation b. Basic Literacy c. Literature d. Public Speaking
    e. Writing f. Reading g. Test Preparation h. Other

f. Free comment. Any opinions or questions are welcome.

APPENDIX B

Perceptions of Digital Game-Based Learning: Individual Interviews

Based on your understanding of computer games for language learning from the video presentation, please indicate your level of agreement with the following five statements.

1. What are the relative advantages or disadvantages of using computer games when compared to conventional learning methods and materials? Compare and contrast computer games with currently used materials and approaches. Some topics you may consider addressing are student motivation, learning outcomes, and cost.

2. Are computer games for language learning compatible with your particular teaching context? Why or why not? Some topics you may consider addressing are infrastructure, the time you have available to deal with a new approach, and the teaching goals of your principle classes.

3. How complex do such language learning games appear to you? Please relate your level of confidence in dealing with the technical and or pedagogical aspects of computer games.

4. Are you aware of opportunities to try out language learning games, either for your own personal use or for your classes? If so, please explain the nature of these opportunities (e.g., online game, sample presented by sales representative, prototype presented at a conference, etc.)

5. How prevalent are educational computer games in your area of foreign language education? Please indicate instances where you have observed them.

APPENDIX C

IRB Approval

PEPPERDINE UNIVERSITY

Graduate & Professional Schools Institutional Review Board

July 30, 2013

Steve Franciosi

Protocol #: E0613D01
Project Title: Educator's Perceptions of Digital Game-Based Learning for Foreign Language Instruction in Japanese Higher Education

Dear Mr. Franciosi,

Thank you for submitting your application, *Educator's Perceptions of Digital Game-Based Learning for Foreign Language Instruction in Japanese Higher Education,* for review to Pepperdine University's Graduate and Professional Schools Institutional Review Board (GPS IRB). The IRB appreciates the work you and your faculty advisor, Dr. Eric Hamilton, have done on the proposal. The IRB has reviewed your submitted IRB application and all ancillary materials. Upon review, the IRB has determined that the above entitled project meets the requirements for exemption under the federal regulations (45 CFR 46 - http://www.nihtraining.com/ohsrsite/guidelines/45cfr46.html) that govern the protections of human subjects. Specifically, section 45 CFR 46.101(b)(2) states:

> (b) Unless otherwise required by Department or Agency heads, research activities in which the only involvement of human subjects will be in one or more of the following categories are exempt from this policy:
>
> **Category (2) of 45 CFR 46.101**, research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: a) Information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and b) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

In addition, your application to waive documentation of consent, as indicated in your **Application for Waiver or Alteration of Informed Consent Procedures** form has been **approved**.

Your research must be conducted according to the proposal that was submitted to the IRB. If changes to the approved protocol occur, a revised protocol must be reviewed and approved by the IRB before implementation. For any proposed changes in your research protocol, please submit a **Request for Modification Form** to the GPS IRB. Because your study falls under exemption, there is no requirement for continuing IRB review of your project. Please be aware that changes to your protocol may prevent the research from qualifying for exemption from 45 CFR 46.101 and require submission of a new IRB application or other materials to the GPS IRB.

A goal of the IRB is to prevent negative occurrences during any research study. However, despite our best intent, unforeseen circumstances or events may arise during the research. If an unexpected situation or adverse event happens during your investigation, please notify the GPS IRB as soon as possible. We will ask for a complete explanation of the event and your response. Other actions also

may be required depending on the nature of the event. Details regarding the timeframe in which adverse events must be reported to the GPS IRB and the appropriate form to be used to report this information can be found in the *Pepperdine University Protection of Human Participants in Research: Policies and Procedures Manual* (see link to "policy material" at http://www.pepperdine.edu/irb/graduate/).

Please refer to the protocol number denoted above in all further communication or correspondence related to this approval. Should you have additional questions, please contact Veronica Jimenez, GPS IRB Manager at gpsirb@peppderdine.edu. On behalf of the GPS IRB, I wish you success in this scholarly pursuit.

Sincerely,

Doug Leigh, Ph.D.
Chair, Graduate and Professional Schools IRB

cc: Dr. Lee Kats, Vice Provost for Research and Strategic Initiatives
Ms. Alexandra Roosa, Director Research and Sponsored Programs
Dr. Eric Hamilton, Graduate School of Education and Psychology