

A Framework for Adopting Educational Computer Games in the Undergraduate Courses in Thai Universities for Learning and Teaching

Kowit Rapeepisarn

B.A. Khon Kaen University, Thailand

MLS. Indiana University, USA.

MA, Thammasat University, Thailand

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Western Australia

DECLARE PAGE

I declare that this thesis is my own account of my research and contains as its main content work which has not previously been submitted for a degree at any tertiary education institution.

(Kowit Repeepisarn)

ABSTRACT

Computer and video games have been developed into effective tools for educational programmes. However, the question which follows is “Can computer games really become an effective educational tool in the classroom?” Debates and discussions regarding the best methodology for classroom education have gone on for decades. Researchers in many countries are slowly gaining acceptance to the use of educational games for educational purposes in schools and colleges. However the use of Educational Computer Games (ECG) is still not popular in schools and universities in Thailand. Thus, the research on the use of ECG for educational purposes in Thailand is scarce. This may be due to the negative impression of computer games from the community. Nevertheless, according to the Thailand Reform Education Act 1999, Thai universities should adopt student-centred learning as the main focus in teaching. It is therefore important to examine the possibilities of using ECG to support this type of learning environment. It is the purpose of this thesis to investigate the feasibility of adopting ECG in undergraduate courses in Thailand. The objectives of this thesis are: 1) to investigate the factors affecting the use of ECG in the classrooms by Thai lecturers and students, 2) to examine the learning and teaching styles that benefit the use of ECG, and 3) to determine the genre of computer games which are appropriate and effective as educational computer games. In order to study the adoption of ECG for teaching and learning in Thai undergraduate courses, three main theoretical frameworks have been investigated. There are technology acceptance theories, ECG concepts and pedagogical theories.

The research strategy for this study is survey research. Questionnaires and interviews are instruments used for data collections. The thesis combined both qualitative and quantitative research. A sample size of 400 students and 40 lecturers

were selected from four Thai universities. As for the interview survey, there were 18 interviewees participated voluntarily. The results from the literature review on the theoretical frameworks have the effect in formulating the five research propositions of the study and the 20 hypotheses.

The major findings from this study are as follows: 1) every ECG acceptance factor namely Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Attitude towards Use (AU), Subjective Norms (SN), Perceived Entertainment (PE) and University Environment Support Factors (UESF) have positive influence on the behavioural intent to use ECG in teaching and learning; 2) nearly half of the Thai students have a Pragmatist Style of learning (43.5%) and a reasonable share of Thai lecturers have a Facilitators Style of teaching (41.4%); 3) when the learning style is used as a predictor of ECG adoption, every style of learning has a positive influence on the behavioural intent to use. After Analysis of Variance (ANOVA) testing, it was found that there is no statistical significant difference between each learning style. However, when using regression analysis with “enter” method to each learning style; it can be found that the Activist Style has the most positive influence on the behavioural intent to use ECG. In contrast, with ANOVA testing, different teaching styles have different intent to use ECG. By a comparison of teaching styles using Fisher’s Least Significant Difference (LSD) method, it shows that there were two pairs of teaching styles that have a statistical significant difference at .011 and .013. The first pair is Facilitator and Personal, and the second pair is Facilitator and Delegator; 4) when the respondents were asked “What is Your Opinion If the University Has a Policy of Employing ECG into the Curriculum as a Learning Tool in the classrooms?”, most respondents have positive comments on accepting this type of education technology. 82.4% of students and 65.4% of lecturers agreed with this policy; 5) there are a variety

of comments from the interviewees on the game genres they think could be appropriate for an education environment. Most of them think that all game genres can be applied to ECG (52.6%). 26.3% think that it depends on the content and subject areas. The rest recommended some other game genres such as adventure, puzzle, role-playing, simulation, and sport games. However, in order to support the research finding, further studies have been carried out based on previous research papers relating with game genre and learning theories. The papers have been reviewed, analyzed, matched, used to bridge the gap, synthesised and, subsequently the three new conceptual frameworks are proposed: 1) conceptual model of relationships between learning styles, learning activities and possible game genres; 2) conceptual model of relationships between game genre and three learning theories; and 3) three stages of adopting digital game platforms for learning in the classroom. This study provides some useful insights into the ECG adoption in the Thai undergraduate classroom

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Finally, I dedicate this thesis to my dad and mom who both have passed away and were hoping to see my Ph.D. graduation, but they never had the chance.

LIST OF PUBLICATIONS

The following papers contributed to the development of this thesis. There are nine papers, seven which were published in proceedings of international conferences. One book chapter and an article were published in an international journal. The papers are listed in ascending order of the publication year.

Book Chapter

- B1. Rapeepisarn, K., Wong, K., Fung, C., & Khine, M. S. (2008). "The relationship between game genre, learning techniques and learning styles in educational computer games." In Z. Pan, et al (Ed.), *Techologies for E-learning and Digital Entertainment* (Vol. 5093/2008, pp. 497-508): Springer-Verlag Berlin Heidelberg.

Refereed Journal Paper

- J1. Rapeepisarn, K., Wong, K., Fung, C., & Khine, M. S. (2008). "Creating effective educational computer games for undergraduate classroom learning: A conceptual model." *i-Manager's Journal of Educational Technology*, 5(2), pp.22-31.

Refereed Conference Proceedings

- P1. Rapeepisarn, K., Wong, K. K., & Fung, C. C. (2006). "Distinctions and generalities between "Learn through doing" and "Edutainment." In *Proceedings of the 7th Postgraduate Electrical Engineering and Computing Symposium, 7 November 2006*. (Murdoch University, Western Australia), 174-177.
- P2. Rapeepisarn, K., Wong, K., Fung, C., & Cole, P. (2006). "Entertainment is a form of learn through doing?" In *Proceedings of the 4th Annual International*

- Conference in Computer Game Design and Technology Workshop and Conference, 15-16 November 2006.* (Liverpool Moores University), 116-120.
- P3. Rapeepisarn, K., Wong, K., Fung, C., & Depickere, A. (2006). "Similarities and differences between 'learn through play' and 'edutainment'." In *Proceedings of the 3rd Australian Conference on Interactive Entertainment, 4-6 December 2006.* (Perth, Australia) V. 207, 28-32.
- P4. Rapeepisarn, K., Wong, K., & Fung, C. (2007). "Issues for consideration to adopt educational computer games for learning and teaching." In *Proceedings of the 8th Postgraduate Electrical Engineering and Computing Symposium, 7 November 2007.* (Curtin University, Western Australia), 73-78.
- P5. Rapeepisarn, K., Pongpankhae, S., Wong, K., & Fung, C. (2008). "A comparative study of digital game platforms for educational purposes." In *Proceedings of the 9th Postgraduate Electrical Engineering and Computing Symposium, 4 November 2008,* (Western Australia University, Western Australia), 37-40.
- P6. Rapeepisarn, K., Pongpankhae, S., Wong, K., & Fung, C. (2008). "Educational use of handheld game consoles-PSP and NDS in Thai colleges." In *Proceedings of the 7th International Conference on e-Business, 6-7 November 2008.* (Bangkok, Thailand), 58-65.
- P7. Rapeepisarn, K., Wong, K., Fung, C., & Khine, M. S. (2008). "How teaching and learning styles affect adoption of educational computer games in classroom?" In *Proceedings of the 6th International Conference in Game Design and Technology Workshop and Conference, 12-13 November 2008.* (Liverpool John Moores University, UK), 37-42.

CONTRIBUTIONS OF THE THESIS

The scholastic contributions in this thesis have been published and reported and they are described in the following perspectives:

The first part provided a review of the literature and research on educational computer games (ECG) for teaching and learning focused on the comparison between edutainment and 3 types of learning: “learning through play”, “learning through doing” and “learning through simulation”. Two main ideas of learning through play and learning through doing have been published in paper P1, P2, and P3 which are described in Sections 2.1, Chapter 2. These are papers on the state-of-the-art development of the discipline. The papers present the reason why play is so important, providing the significance of learning through doing, and providing the reasons for setting edutainment games a criteria for learning.

The conceptualization of computer games, ECG including Thai computer game industry has been investigated. Game genre classification in this thesis was selected and investigated from the standard genre categories (Bate, 2004; Burn & Carr, 2006; Wolf, 2002). The classification is also based on the research finding of Thai student game players (as mentioned in Paper J1). Game platforms and their potential use for teaching and learning are presented including the IT and digital game markets in Thailand. These studies have been published in paper J1 and P5 which have been described in Sections 2.2.1, 2.2.2 and 2.4 in Chapter 2.

ECG, as an edutainment game, is considered as a learning through doing activity. ECG also creates a student learning centre (SCL). The students can have control over

when they go and what they try within the game. SCL was introduced in Thai educational system. Hence, it makes sense to propose ECG as an educational tool for teaching and learning. As a result, the comparison of SCL features and learning through doing properties was presented. This comparison supports the idea of proposing ECG for learning in Thai classrooms. This study has been published as a conceptual model in paper P6 and it is described in Section 2.6.5, Chapter 2.

The idea of investigating the factors that impact Thai lecturers and students in their use of educational computer games in the classroom according to objective 1 of this thesis was considered in the adoption of ECG for teaching and learning. Subsequently, the theoretical use in the thesis employed the technology acceptant theories. This includes the Technology Acceptant Model (TAM), Theory of Reasoned Action (TRA) and the concept of Beliefs about Teaching with Technology (BATT). Meanwhile, according to objective 2 of the thesis, VARK Learning Style, Honey & Mumford Learning Style and Grasha & Riechmann Teaching Style were explored. This study was published in paper P4 and it is described in Chapter 3 of the thesis.

Some parts of the results of this thesis such as ECG acceptance factors and learning styles affecting the behavioral intent to use ECG were published in paper P7. These results are also described in Sections 5.2.2.1, 5.2.2.3, 5.2.2.4, and 5.3.1 of Chapter 5.

The further studies apart from the survey results of this thesis were proposed as conceptual framework propositions. These propositions were analyzed, developed, synthesized and finally published in four papers. One paper was published as a book chapter, one paper as a journal article and the other two papers as conference

proceedings (B1, J1, P6, P7). These conceptual framework propositions are described in Chapter 5 in the following Sections: 5.4.1, 5.4.2 and 5.4.3.

Summary of the contributions of the thesis is illustrated in Table 1.1

Table 1.1: Summary of the Contributions of the Thesis

CHAPTER	CONTRIBUTIONS	PAPER NO
2 (2.1)	Literature survey on Edutainment, Learn through Play and Learn through Doing	P1, P2, P3
2 (2.2.2, 2.2.3, 2.4)	Conceptualization of Computer Game, ECG and Thai Computer Game Industry	J1, P5
2 (2.6.5)	Comparison of SCL features and Learn through Doing properties	P6
4	Theoretical Framework (Issues for Consideration to Adopt ECG for Learning and Teaching)	P4
5 (5.2.2.1, 5.2.2.3, 5.2.2.4, 5.3.1)	The survey results from Thai students according to ECG Acceptance Factors and Learning Style Affecting the Behavioral Intent to Use ECG	P7
5 (5.4.1, 5.4.2, 5.4.3)	Conceptual Framework Propositions: <ul style="list-style-type: none"> • Conceptual Model of Relationships between Learning Styles, Learning Activities and possible game genre. • Conceptual Model of Relationships between Game Genre and Three Learning Theories. • Three Stages of Adopting Digital Game Platforms for Teaching and Learning 	B1, J1, P6,

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ACRONYMS

ANOVA	Analysis of Variance
ATCI	Association of Thai Computer Industry
ATSI	Association of Thai Software Industry
AU	Attitude Towards Use
BATT	Belief about Teaching with Technology
BI	Behavioural Intent to Use
CAI	Computer Assisted Instruction
DGL	Digital Game-based Learning
ECG	Educational Computer Games
EDU	New Oriental Educational Technology Group
FPS	First Person Shooter
HEI	Higher Education Institutes
ICT	Information and Communication Technology
IGDA	International Game Development Association
LSAY	Longitudinal Survey of Australian Youth
LSD	Least Significant Difference
LSI	Learning Style Inventory
LSQ	Learning Style Questionnaire
NDS	Nintendo Duel Screen
NECTEC	National Electronics and Computer Technology Centre
NII	National Information Infrastructure
NITC	National Information Technology Committee
ONEC	Office of the National Education Commission
PCLS	Perceptual Learning Styles
PE	Perceived Enjoyment

PEOU	Perceived Ease of Use
PFLS	Preferred Learning Styles
PSP	Play Station Portable
PU	Perceived Usefulness
RPG	Role Playing Game
RTS	Real-Time Simulation
SCL	“Student-Centred Learning” or “Centre for Student Learning”
SIPA	Software Industry Promotion Agency
SN	Subjective Norms
TAM	Technology Acceptance Model
TPS	Third Person Shooter
TRA	Theory of Reasoned Action
TS	Teaching Styles
VASK	Four types of learning style (Visual, Auditory, Write/Read, Kinesthetic)
UESF	University Environment Support Factors
UKCGO	The Children Go Online Survey, UK
UL	University Type
UT	University Location