

# Instructional Technology Research, Design and Development: Lessons from the Field

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## Chapter 22

# Formative Evaluation of an Arabic Online Vocabulary Learning Games Prototype: Lessons from a Malaysian Higher Learning Institution Experience

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### **ABSTRACT**

*The use of digital game-based learning is a new trend of instructional practices in different fields of knowledge. The research and studies related to this field are increasingly attracting the researchers all over the world to further explore the various aspects of educational games models, the design and development of games itself, the evaluation insights and many more. This chapter describes an experience of the formative evaluation of an online game among Arabic language learners at the elementary level in the International Islamic University Malaysia (IIUM). The mixed methods of quantitative and qualitative research approaches were utilized to investigate the usability, practicality and effectiveness of this games prototype in the real settings. This chapter also described the process and phases of evaluation throughout the responses from participants which vary from experts in instructional design (ID), subject matter experts (SME), lecturers and learners as the actual users.*

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## **INTRODUCTION**

The use of digital game-based learning with the potential of high-tech equipments is a new trend of instruction and enables the learners to immerse in a novel experience. The history of transition from traditional games to digital games began from the infants' phase of human life by playing and sucking their fingers, physical games such as leapfrog and piggyback fight, equipment or tool-based games or called as toys, and paper-based games such as crosswords and Sudoku. Later it was realized that these games were not just for fun but they could also ease the tensed atmosphere and develop skills among players. This is the origin of the idea of game-based learning evolution i.e. by combining play and learn concepts. (Hsu, Sheng-Hui, et. al.; 2008) Game-based learning (GBL) is a new model of e-learning, which has its potential in teaching and learning (Prensky, 2001; Squire, 2005, et. al). The term GBL describes the teaching and learning process by using computer games similar to other terms such as digital game-based learning (Prensky, 2001) and edutainment & 'serious games' (Tsai et. al, 2008). Somehow, 'serious games' differ from edutainment games. 'Serious games' are more advanced in design, uses latest hardware and software and rules of simulation (Michael & Chen, 2006). This chapter will describe the formative evaluation of an online Arabic vocabulary games learning prototype, using the methods of the design and development research (Richey & Klein, 2007) and ADDIE model of instructional design (College Station, 2001; Dick & Carey, 1999) with the overview of other related ID model such as *FID2GE* model (Akilli, 2004). The mentioned method was employed to produce an online Arabic vocabulary games prototype for elementary learners in Centre for Foundation Studies (CFS), International Islamic University Malaysia (IIUM). The effort to produce this learning prototype is an attempt to integrate an online game-based learning environment experience for learners, who have been

through a traditional Arabic teaching and learning methods (Muhammad Sabri & Nor Aziah, 2009; Muhammad Sabri & Mohd Feham, 2009). Their feedbacks and responses were collected and analyzed as the formative evaluation for the design and development principles. The revision and changes of 'design principles' will be discussed in this chapter in a cyclic and iterative process of formative evaluation in order to strengthen the weaknesses found during user testing sessions theoretically and practically. (Tessmer, 1993) The first step of design and development of this Arabic game prototype began in January 2009 and ended with last field user testing sessions by April of the following year. Almost thirteen-week formative evaluation for the online vocabulary games was conducted among beginner students, teachers, and experts from last week of August 2009 until the end of December 2009. The process aimed to investigate the usability, practicality and effectiveness (Tessmer, 1993) of this games prototype for Arabic language learners at Centre for Foundation Studies, International Islamic University Malaysia (CFSIIUM). This study employed a major qualitative research method together with a descriptive quantitative method to investigate and collect the data from related participants based on purposive sampling which was determined by certain criteria in order to obtain the results and findings. It concluded that this evaluation has confirmed to a certain extent the usability, practicality and effectiveness of this Arabic games prototype to enhance vocabulary learning among learners with the implications and recommendations to improve theories and practices for the future study and research.

## **BACKGROUND**

The increasing usage of online games in other field of knowledge, research and studies inspired the initial idea to design and develop an online game for Arabic language learners specifically the pre-



university learners in IIUM. Other factors relate to the lack of the multimedia and computer-assisted teaching and learning software and courseware faced by the Arabic language practitioners or lecturers in order to enhance the teaching and learning of Arabic language to be more attractive, motivating and effective. The main theories of Prensky (2001), Mayer (2001) and Nation (2001) were studied along with the conduction of a front-end analysis of the needs and constraint to design and develop an online Arabic vocabulary game, theoretically and practically. A theory-driven from the 'design principles' that were produced from the above pre-design analysis formed the basis for the design and development of a game prototype. The design and development (Richey & Klein, 2007) research methods and approaches were used to achieve the objectives of this study, which was formerly known also as developmental research (Richey, Klein & Nelson, 2004). Brown & Collins first proposed this method in the 1990s along with other well-known educational research methods (Wang & Hannafin, 2005; Markauskaite & Reimann, 2008) with the objective of testing theory and validating its practicality (Richey & Klein, 2007). The method used is also known as designed case (Reigeluth & Frick, 1999), design-based research (Reeves, 2006 & Herrington, et. al, 2007), formative research (Nieveen, 2007), and design research (Bannan-Ritland, 2003; Van der Akker, 2007).

## **RESEARCH FRAMEWORK AND DESIGN**

This project has followed the research framework and design as shown in Figure 1

The formative evaluation process conducted in this study was based on Flagg (1990), Tessmer (1993) and Heineke & Willis (2001) and divided into three (3) phases of pre-formative evaluation, formative evaluation 1 and formative evaluation

2. The selection of participants as evaluators, reviewers and users is as shown in Figure 2:

The selection and distribution of participants in this project was conducted accordingly as shown in Table 1. Below.

## **OVERVIEW OF THE RESEARCH PROJECT**

The researcher in collaboration with several colleagues of Arabic language lecturers and computer experts designed and developed this project. The learning contents were integrated with the Raptivity ® (<http://www.raptivity.com/>) e-learning authoring software to produce 34 digital games and embedded in an online learning environment. The sequencing of games was distributed accordingly based on seven categories of alphabets, words, synonyms, antonyms, grammar, phrases and sentences. Figure 3 shows the first pre-prototype built.

The researcher changed, the interface based on the suggestions and recommendations of peer lecturers and an SME expert as shown below in Figure 4.

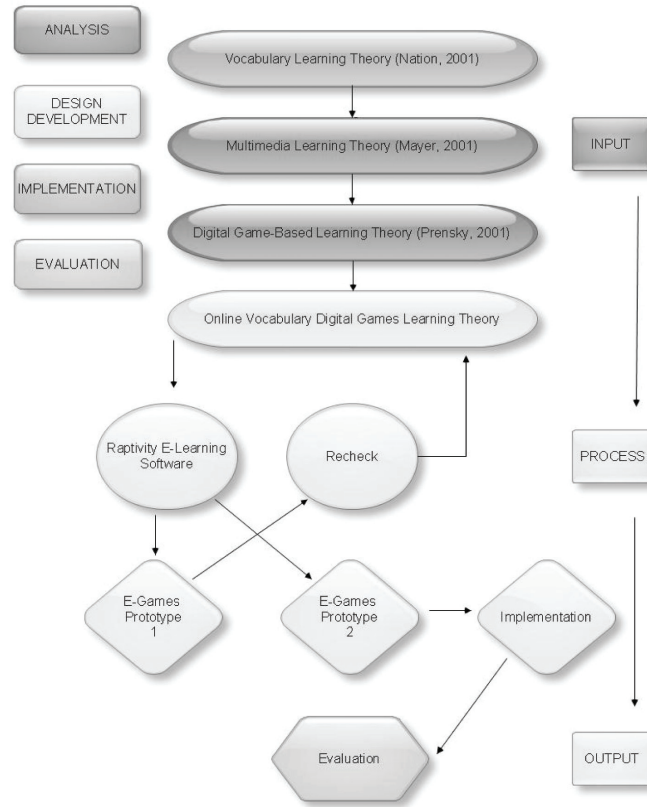
There was a slight difference in the design and development of games prototype 1 and games prototype 2, but the main interface was almost the same as shown previously. This games prototype has undergone the different phases of formative evaluation 1 and 2 among selected participants as explained in Table 2 before.

## **LESSONS LEARNED FROM THE FORMATIVE EVALUATION**

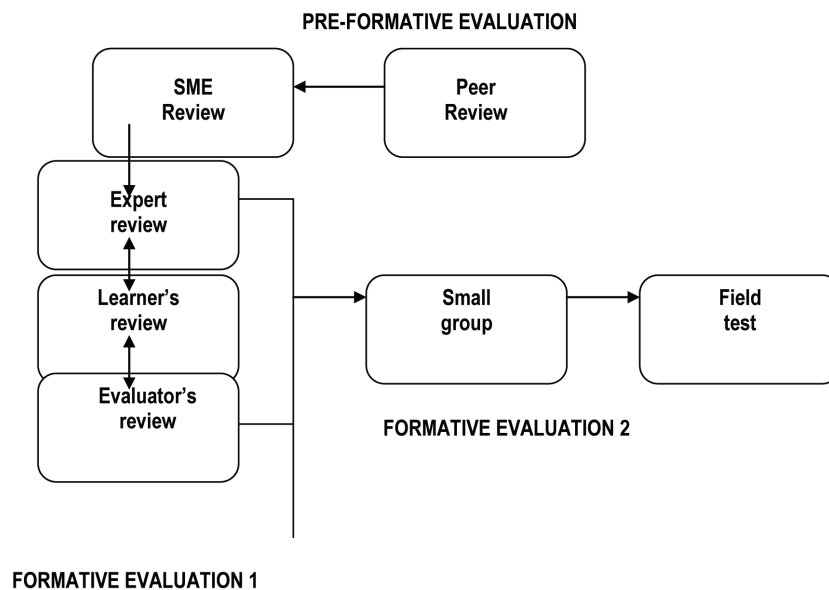
Formative evaluation as defined by Tessmer (1993, pg 11) is a judgment of the strengths and weaknesses of its instruction in its developing stages, for purposes of revising the instruction to improve its effectiveness and appeal. There are four (4) classically recognized types of evaluation, which are expert review, one-on-one evaluation

**Formative Evaluation of an Arabic Online Vocabulary Learning Games Prototype**

*Figure 1. Research framework*



*Figure 2. Framework of formative evaluation flow of sequence*



**Formative Evaluation of an Arabic Online Vocabulary Learning Games Prototype**

*Table 1. Selection and distribution of participants*

Phase	Research Question	Participant
Implementation & Evaluation	1 -To what extent will the implementation of online games learning improve learners' perception towards learning Arabic? 2- To what extent the implementation of online games learning improve learners' enjoyment, immersion and knowledge improvement in learning Arabic? 3- What are the strength, weakness & suggestions	<b>a) Pre-Formative Evaluation</b> - Peer reviews (3 lecturers) - SME in Arabic language (1 expert) <b>b) Formative Evaluation 1</b> - Experts' review (6 experts) - Learners' review (2 learners)
	on this module as perceived by the users ? 4- To what extent the changes of design principles of online Arabic vocabulary games learning have to be modified throughout the user testing sessions	- Evaluator's review (1 peer lecturer/ asst. coordinator) <b>c) Formative Evaluation 2</b> - small group testing (16 learners) - field testing 1 (33 learners) in December 2009 - field testing 2 (49 learners) in April 2010

*Figure 3. Pre-prototype of an online Arabic vocabulary game*



## Formative Evaluation of an Arabic Online Vocabulary Learning Games Prototype

Figure 4. Prototype 1 & 2 of an online Arabic vocabulary game



Table 2. Rate of formative evaluation of the design and development of an online Arabic vocabulary games for elementary learners from expert reviews (prototype 1)

Criteria evaluated (1 – 10 scale)	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Mean
1- Website Interface	6	7	8	6	5	8	6.67
2- Webpage Navigation	10	7	7	7	7	9	7.83
3- Games Interface	9	7	10	7	7	9	8.17
4- Ease of Use	8	7	7	7	6	9	7.33
5- Level of Vocabulary Difficulties	-	9	7	7	-	9	8.0
6- Arabic Language Contents	-	9	8	8	-	8	8.25
7- Adherence of Design Principles	6	9	8	7	-	8	7.60
8- Level of Motivation	8	7	8	6	-	8	7.40
9- Level of Vocabulary Improvement	-	9	9	7	-	7	8.0
10- Overall Comments on the Practicality	8	9	9	7	-	8	8.2



with selected learner, small group evaluation and filed test evaluation (pg 15). This project has undergone three evaluation phases of pre-formative, formative 1 and formative two among various participants of ID experts, SME experts, peer lecturers and learners as the actual users.

**Experts Evaluation**

Table 2 shows the rating score of formative evaluation from the expert reviews for this games prototype 1:

**Small Group Evaluation for the Usability and Practicality of Games Prototype 2**

Table 3 shows the results of formative evaluation from 10-Likert-Scale formative evaluation of this games prototype 2

**Evaluation of the Effectiveness of Games Prototype 2 towards Learners’ Perception, Enjoyment and Knowledge Improvement**

The results of evaluation and its interpretation were as shown in Table 4 and Table 5 below:

**Evaluation of the Effectiveness of Games Prototype 2 Towards Learners’ Perception, Enjoyment and Knowledge Improvement (conducted in December 2009)**

The results of descriptive quantitative statistical data of this 5 Likert-Scale questionnaire from 35 participants of LQM 1061 learners is shown in Table 6 and its interpretation as shown in Table 7.

*Table 3. Rate of formative evaluation of the design and development of an online Arabic vocabulary games from small group evaluation user testing (prototype 2)*

Criteria evaluated (1 – 10 scale)	Learner 1	Learner 2	Learner 3	Learner 4	Learner 5	Learner 6	Learner 7	Learner 8	Learner 9	Learner 10	Learner 11	Learner 12	Learner 13	Learner 14	Learner 15	Learner 16	Mean
Website Interface	8	7	6	6	8	10	10	8	6	7	8	9	8	8	10	9	8.0
Webpage Navigation	9	5	5	4	8	7	9	9	6	8	8	6	8	5	5	5	6.7
Games Interface	9	7	7	8	6	9	9	9	6	7	10	9	9	8	8	9	8.13
Ease of Use	8	10	7	5	7	8	10	8	6	5	10	10	9	8	8	9	8.0
Level of Vocabulary Difficulties	10	s	8	10	9	9	10	10	5	8	9	10	10	7	10	9	9.0
Ability to improve Learner’s Vocabulary Learning	10	10	7	7	7	8	10	10	7	8	8	8	9	10	9	9	8.6
Level of Learning Motivation	9	8	9	4	7	8	9	9	7	7	8	8	9	10	9	9	8.13

Table 4. A quantitative questionnaire to evaluate student's learning perception, enjoyment and knowledge improvement in Arabic online vocabulary games learning

No.	Interpretation Results	High					Total Score
		High	High	Moderate	High		
	Mean Score	40.9	31.7	23.9	22.8		
	Total Score	655/800	507/640	383/560	365/400		
	Learner 16	45	32	18	24		119
	Learner 15	40	30	21	25		116
	Learner 14	45	34	23	23		125
	Learner 13	43	35	26	25		129
	Learner 12	46	32	23	25		126
	Learner 11	45	40	28	21		134
	Learner 10	42	30	23	23		118
	Learner 9	35	32	24	21		112
	Learner 8	43	31	28	25		127
	Learner 7	38	26	23	21		108
	Learner 6	46	35	31	23		135
	Learner 5	36	28	18	18		100
	Learner 4	35	26	22	22		105
	Learner 3	36	29	24	23		112
	Learner 2	40	34	27	21		122
	Learner 1	40	33	24	25		122
	Perception (out of 50)						
	Concentration (out of 40)						
	Immersion (out of 35)						
	Knowledge Improvement (out of 25)						
	<b>Total Score (Out Of 150)</b>						

### Evaluation of the Effectiveness of Games Prototype 2 Towards Learners' Perception, Enjoyment and Knowledge Improvement (conducted in April 2010):

The results of descriptive quantitative statistical data of this 5 Likert-Scale questionnaire from 49 participants of LQM 1124 learners is shown in Table 8 and its interpretation as shown in Table 9.

The results show the rating score of the effectiveness of this games prototype among participating learners based on three phases of previous evaluation. The rating scores throughout the different phases and participants were same and consistent although the sample size was not very large. The saturation of results and findings in this project was also explored and investigated through qualitative research instrumentations and analysis such as open-ended questionnaires, interview protocols, think aloud methods, classroom observation and testimonials from participating lecturers.

### ISSUES, PROBLEMS AND CONTROVERSIES

The previous mentioned formative evaluations were conducted to further investigate the usability, practicality, effectiveness as well as collating comments and suggestions from the participants to improve the prototype. Based on those experiences, this chapter has concluded them into several issues, problems and controversies as shown below:

- A. Suitability of 'design principles' and its practicality
- B. Needs to fulfill users' expectations and educational principles
- C. Needs to fulfill users' expectations and technical constraints

**Formative Evaluation of an Arabic Online Vocabulary Learning Games Prototype**

*Table 5. Interpretation of composite rating score for measuring student's learning perception and enjoyment in Arabic online vocabulary games in or small group evaluation*

Criteria Evaluated	Low	Moderate	High	Actual Total Score	Actual Mean Score
Perception	(1 – 16)	(17 – 33)	(34 – 50)	800	50.0
Concentration	(1 – 14)	(15 – 28)	(29 – 40)	640	40.0
Immersion	(1 – 11)	(12 – 23)	(24 – 35)	560	35.0
Knowledge Improvement	(1 – 8)	(9 – 17)	(18 – 25)	400	25.0

*Table 6. Results of composite rating score for measuring student's learning perception and enjoyment in Arabic online vocabulary games in or field test evaluation*

No.	Perception (out of 50)	Concentration (out of 40)	Immersion (out of 35)	Knowledge Improvement (out of 25)	Total Score (out of 150)
Total Score (35 Learners)	1370	1123	799	788	
Mean Score	39.1	32.1	22.8	22.5	
Interpretation Results	<b>High</b>	<b>High</b>	<b>Moderate</b>	<b>High</b>	

*Table 7. Interpretation of composite rating score for measuring student's learning perception and enjoyment in Arabic online vocabulary games in or field test evaluation*

Criteria Evaluated	Low	Moderate	High	Actual Total Score	Actual Mean Score
Perception	(1 – 16)	(17 – 33)	(34 – 50)	1750	50.0
Concentration	(1 – 14)	(15 – 28)	(29 – 40)	1400	40.0
Immersion	(1 – 11)	(12 – 23)	(24 – 35)	1225	35.0
Knowledge Improvement	(1 – 8)	(9 – 17)	(18 – 25)	875	25.0

*Table 8. Results of composite rating score for measuring student's learning perception and enjoyment in Arabic online vocabulary games in or field test evaluation*

No.	Perception (out of 50)	Concentration (out of 40)	Immersion (out of 35)	Knowledge Improvement (out of 25)	Total Score (out of 150)
Total Score (49 Learners)	1908	1463	1124	1086	
Mean Score	38.9	29.9	22.9	22.1	
Interpretation Results	<b>High</b>	<b>High</b>	<b>Moderate</b>	<b>High</b>	

*Table 9. Interpretation rating of composite score for measuring student's learning perception and enjoyment in Arabic online vocabulary games in or field test evaluation*

Criteria Evaluated	Low	Moderate	High	Actual Total Score	Actual Mean Score
Perception	(1 – 16)	(17 – 33)	(34 – 50)	2450	50.0
Concentration	(1 – 14)	(15 – 28)	(29 – 40)	1960	40.0
Immersion	(1 – 11)	(12 – 23)	(24 – 35)	1715	35.0
Knowledge Improvement	(1 – 8)	(9 – 17)	(18 – 25)	1225	25.0

- D. Challenges of implementing online games among different background of users.
- E. Needs to keep the motivating factors influencing the users to play and learn.
- F. Challenges from other advanced educational online games.
- G. Challenges from other advanced entertainment games such as Zynga ® games in the Facebook application, and others.
- H. Pro and contra among users and its implications towards the implementation of online games in the learning environment.

**LESSONS LEARNED AND SUGGESTIONS**

Lessons learned and several suggestions are stated below.

- A. The technical limitation of this software towards Arabic writing systems and fonts should be improved and enhanced in order to make it more compatible, convenient and user-friendly with Arabic learning application.
- B. The limitation of games design templates in this Raptivity ® software also can be upgraded and enhanced with advanced features such as displaying overall scores for all players for the purpose of competition, more choices of attractive games templates, colors, buttons, etc.

- C. Future research and study on usage of game-based learning in Arabic language should include the design and development of games that employ different learning platforms from this study such arcade, console, CD-based and handheld or mobile learning games (Roslina and Azizah, 2008).
- D. Educational institutions that offer courses on Arabic language should play more active role in producing attractive and interactive teaching and learning aids. This will enhance students' motivation and attitude in the learning process and improve their achievement and performance.
- E. Arabic language teachers and practitioners should be more aware and knowledgeable of the latest available teaching technology and computer skills. Training some of them with high computer skills periodically, in cluster training for instance, will help them produce new teaching and learning aids in Arabic language.
- F. Arabic language teachers should work in cooperation with other language teachers such as English teachers, together with the instructional designers and computer experts to design and develop the advancement of effective games for teachers and learners.
- G. Other ID models may be used in the design and development of games based on the objectives, structures, expected outcome, technology or others issues based on the



suitability and purpose of games design and development.

October 2011, Indoor Nilai Stadium, Negeri Sembilan, Malaysia.

## CONCLUSION

This chapter describes an effort to design and develop an online Arabic vocabulary game learning prototype in IIUM and the evaluation process that took place upon the implementation of this learning application among real users. This project hopes to contribute to the process of teaching and learning Arabic language in IIUM as well as other institutions. It also aims to contribute to a refined set of design and development principles for an online Arabic vocabulary games learning specific to the Malaysian context and for non-native Arab speakers in general.

## AWARD AND RECOGNITION

This online Arabic vocabulary games prototype also participated in several research exhibitions in IIUM, UiTM and Malaysian national level. This games prototype won several research awards as follows:

- A. **Silver medal award:** *Invention, Innovation and Design – Special Edition (IID-SE 2010)* at Dewan Sri Budiman and Annexe, UiTM Shah Alam, Selangor, Malaysia from 12–14 Oct, 2010.
- B. **Silver medal award:** *IIUM Research, Invention and Innovation Exhibition (IRIIE) 2011*. Hosted by Kulliyyah of Engineering, IIUM on 9-10 February 2011 at Cultural Activity Centre (CAC) and KAED Gallery International Islamic University Malaysia (IIUM).
- C. **Bronze medal award:** Islamic Innovation Expo 2011 (I-inova' 2011), Universiti Sains Islam Malaysia (USIM), 14-16

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## REFERENCES

- Akilli, G. K. (2004). *A Proposal of instructional design/development model for game-like learning environments: The FID2GE Model*. Master Thesis, The Middle East Technical University, Turkey, retrieved on 15<sup>th</sup> December 2008 from <http://simge.metu.edu.tr/master/index.pdf>
- Bannan-Ritland, B. (2003). The role of design in research: The Integrative Learning Design Framework. *Educational Researcher*, 32(1), 1, 21–24. doi:10.3102/0013189X032001021
- College Station (2001). *ADDIE instructional design model*. Texas Copyright 2001 © LOT All rights reserved. L:\htmls\training\handouts\pf\_files\addie.doc. Published on 01/23/01.
- Connolly, T., & Stansfield, M. (2006). Using games-based eLearning technologies in overcoming difficulties in teaching information systems. *Journal of Information Technology Education*, 5, 463.
- Dick, W., & Carey, L. (1996). *The systematic design of instruction* (4th ed.). New York: Harper Collins College Publishers.

- Flagg, B. N. (1990). *Formative evaluation for educational technologies*. New Jersey, USA: Lawrence Erlbaum Associates. Inc.
- Heineke, W. F., & Willis, J. (2001). *Methods of evaluating Educational technology*. Connecticut, USA: Information Age Publishing.
- Herrington, J., McKenney, S., Reeves, T., & Oliver, R. (2007). *Design-based research and doctoral students: Guidelines for preparing a dissertation proposal*. In C. Montgomerie & J. Seale (Eds.), *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2007* (pp. 4089- 4097). Chesapeake, VA: AACE.
- Hsu, Sheng Hui; Wu, Po Han; Huang, Tien-Chi; Jeng, Yu-Lin & Huang, Yueh-Min (2008). *From traditional to digital: Factors to integrate traditional game-based learning into digital game-based learning environment*. IEEE Xplore, Retrieved on October 21, 2009
- Markauskaite, L., & Reimann, P. (2008). *Enhancing and scaling-up design-based research: The potential of e-research*. Centre for Research on Computer-supported learning and Cognition (CoCo), University of Sydney, Australia. Retrieved on 12<sup>th</sup> Dec 2008 from [www.fi.uu.nl/en/icls2008/343/paper343.pdf](http://www.fi.uu.nl/en/icls2008/343/paper343.pdf)
- Mayer, R. E. (2001). *Multimedia learning*. 9<sup>th</sup> edition, 2007. New York: Cambridge University Press.
- Michael, D., & Chen, S. (2006). *Serious games – Games that educate, train and inform. sE-Book edition* (pp. 30–43). Canada: Thomson Course Technology PTR.
- Nation, I. S. P. (2001) *Learning vocabulary in another language*. 4<sup>th</sup> edition, 2003. United Kingdom: University Press, Cambridge.
- Nieveen, N. (2007). *Formative evaluation in educational design research: An introduction to educational design research*. In the proceedings of the seminar conducted at the East China Normal University, Shanghai (PR China), November 23-26, 2007, 89-102
- Pivec, M., Koubek, A., & Dondi, C. (2004). *Guidelines for game-based learning*. Lengerich, Germany: Pabst Science Publishers.
- Plomp, T. (2007). *Educational design research: An introduction*. In the proceedings of the seminar conducted at the East China Normal University, Shanghai (PR China), November 23-26, 2007, pp. 9-36
- Prensky, M. (2001). *Digital game-based learning* (2007<sup>th</sup> ed.). USA: Paragon House.
- Reeves, T. (2006). *Design-based research for advancing educational technology*. Retrieved from 9<sup>th</sup> January, 2009 <http://www.it.coe.uga.edu/~treeves/EDIT9990/EDIT99909Jan06.ppt>
- Reigeluth, C. M., & Frick, T. W. (1999). *Formative research: A methodology for creating and improving design theories*. In Reigeluth, C. M. (Ed.), *Instructional Design Theories and Models (Vol. II)*, pp. 633–651). Mahwah, NJ: Lawrence Erlbaum Associates.
- Richey, R. C., & Klein, J. D. (2007). *Design and development research*. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.
- Richey, R.C., Klein, J.D. & Nelson, W. A. (2004). *Developmental research: Studies of instructional design and development*. Retrieved on 31<sup>st</sup> March, 2009 from <http://www.aect.org/edtech/41.pdf>

Sabri, M. Sahrir & Mohd Feham, Mohd Ghalib. (2009). *Employing a developmental research approach in the design and development of an online Arabic vocabulary learning games prototype in IIUM*. The 2nd International Conference of Arabic Language and Literature, hosted by Department of Arabic Language and Literature, KIRKHS, International Islamic University Malaysia (IIUM), Kuala Lumpur, 21-23 December.

Sabri, M. Sahrir & Nor, Aziah Alias, (2009). *A design and development approach to researching online Arabic vocabulary games learning in IIUM*. In Posiah Mohd Isa, et al. (Eds.), 2009. International Conference on e-Learning 2009 e-Proceedings/i-Learn Centre, UiTM. Electronic Form: 310 pages. Joint publisher: i-Learn Centre with University Publication Centre, UiTM.

Squire, K. (2005). *Game-based learning: Present and future of state of the field*. Retrieved on 31<sup>st</sup> December, 2008 from [http://www.masieweb.com/dmdocuments/Game-Based\\_Learning.pdf](http://www.masieweb.com/dmdocuments/Game-Based_Learning.pdf)

Tessmer, M. (1993). *Planning and conducting formative evaluations, improving the quality of education and training*. London: Kogan Page.

Tsai, F. H., Yu, K. C., & Hsiao, H. S. (2008). *A pilot study of comparing the effectiveness in game-based and web-based Learning*. Retrieved from National Taiwan Normal University Website on 31<sup>st</sup> of December, 2008 from <http://www.ntnu.edu.tw/acad/docmeet/96/a16/a1601.pdf>

Van der Akker, J. (2007). *Curriculum design research. - An introduction to educational design research*. In the proceedings of the seminar conducted at the East China Normal University, Shanghai (PR China), November 23-26, 2007, 37-52

Wang F. & Hannafin M.J. (2005). Design-based research and technology-enhanced learning environments. *ETR&D*, 53(4), 2005, 5–23.

## **KEY TERMS AND DEFINITIONS:**

**ADDIE's Model:** ADDIE is an acronym for Analysis, Design, Development, Implementation, and Evaluation standing for a systematic approach to instructional development synonymous to instructional systems development (ISD). (Molenda, 2003 & Dick and Carey, 1996)

**Arabic Language Learning for Non-Speakers:** The process of teaching and learning Arabic for learners whose their first language is not Arabic.

**Design and Development Research (DDR):** This design and development research (Richey & Klein, 2007), is also known as designed case (Reigeluth & Frick, 1999), design-based research (Reeves, 2006 & Herrington, et. al, 2007), formative research (Nieveen, 2007), and design research (Bannan-Ritland, 2003; Van der Akker, 2007; Plomp, 2007). It was first proposed by Brown & Collins in the 1990s.

**Digital Games:** The digital games can now be defined as non-traditional games and presented in the online environment such as web-based, or non web-based environment such as CD-based, PC-based, or other forms of virtual applications.

**Educational Games:** These games require specific knowledge in specific subject area such as mathematics, history, geography, biology, or literature, and they also require intellectual skills that are applicable in the game.

**Games Formative Evaluation:** The process of evaluation which aims at improving the design and development of games and the instructional practices among various users with various methods.

**Online Games:** The online games can now be defined as PC games that run on a cluster of servers and are played online through the internet (Holsaple & Wu, 2007).