Journal of Engineering and Science Research 1 (2): 93-100, 2017
e-ISSN: 2289-7127

DOI: 10.26666/rmp.jesr.2017.2.16

Explanation Identity of Basic Programming and Conceptual Change Through the Game Scene

May Asliza Tan Zalilah, Maizatul Hayati Mohamad Yatim and Amri Yusoff
Faculty of Art Computing & Creative Industry, Universiti Pendidikan Sultan Idris, Malaysia

Abstract: Learning through game scene is considered a game-based learning approach. Teaching and learning process using game scene is deemed interesting and effective due to the nature for this approach which seems alive with asserted activities. Students experience their own game via narration through the virtual world they undertook. This investigation is targeted towards conceptual change and explanation for basic programming theorem through navigated game scene by evaluating motivation and student experience. 55 respondents consisted of semester three students from computer software application certification a program from a community college is selected for the undertaken study. Motivation and experience surveys are reference based on intrinsic motivation inventory instrument (IMI). Findings were tabulated based on t-test statistics and descriptive to get the frequency, mean, standard deviation and percentage. Initial results reflected student acknowledgement on utilizing game scenes in terms of elaborating basic game programming key points in providing elevated learning experience.

Key words: *Game Scenes; Games-Based Learning; Conceptual Change; Basic Programming.*

INTRODUCTION

Knowledge of basic programming or computing today has become a necessity and major interest in education. Malaysia already commenced integration of lower school curriculum (KSSR) and middle school (KBSR) 2017 with computational thinking skills and computer science that will expose students with digital technology such as coding, algorithms and problem solving by Zanariah Abd Mutalib [1]. Based on past works, the programming courses offered by tertiary institutes are often considered difficult to digest by students, lack of interaction, tiresome code structure, exasperating code, time-consuming code revision, and error prone by Jenkin [2], Anthony et al [3] and Bazuri Ab Ghani et al [4]. While at the international level, nearly one-third, i.e. 32.2% of students failed their introductory computer science courses by Watson and W.B.Li[5]. Increment in diversity learning programs and education is beneficial to many students. Each basic identity programming should initialize with in-depth explanation to beginners of basic programming subjects.

Introduction to basic programming is crucial to students for understanding the basic concept of a logical programming and problem solving before proceeding with coding programs. Student understanding on foundation of the basic programming in brevity is vital in order to link and visualizing the use of the variables during the ongoing learning process. In the process of learning, imagination is a key element in understanding the foundation, which in turn next the stage metaphor by Chow et al [6]. This assists students in understanding the principles and elements of content learning aside from improve creativity with materials and different techniques. Intrinsic elaboration on basic programming and conceptual transitions through games scenes can aid from eliminating anxiety, exhuming good self-reflective qualities, induces self-expression, memory, desire, and retention rate of each student by Besgen,A [7].

LITERATURE REVIEW

Learning through Game Scene

Learning through game scene are based on innovative in-game adapting approaches. Teaching and learning

Corresponding Author: May Asliza Tan Zalilah, UPSI, Malaysia, 60175773221

process using game scene is more interesting and effective because this approach seems align with objectives of game activities provided. The student will also experience their own narration of the in-world game events. Students could easily comprehend what is embedded vie the game scenes by relaying various feelings during the course of decision making. Using games in learning strategies as learning aid advantageous towards academic achievement with Yang [8]. Exploration of learning through game scenes is useful and co-exist as a productive tools to support students in effective learning environment, as well as encouraging the interest of the ongoing class.

Conventional Learning

Conventional learning is an education methodology, which requires the concentration on memorization, enforcing exercises and teaching facilitation. Teacher be have as instruments of knowledge in relaying knowledge emphasizing on education syllabus. Conventional learning for programming subject focuses on retention and deep comprehension of basic concepts in programming, step by step hands-on on the taught materials through assignments, training and practical, be it theoretical or analytical. The curriculum is induced to improvise new alternatives in teaching and learning with content learning, practical training and applications programs. while the reflection of researchers in teaching and learning the basic concepts of programming begins with an introduction to the identity of the basic concepts of programming such as variables, constants, data type, format, control, program keywords through a description of the presentation slides, reference books and using software programs. This approach is classified as the primordial process in teaching and learning for students that involves a description and explanation of the phenomenon of empirical basis.

In the 21st century, the process of teaching and learning is further enhanced by varieties of state-of-the-art innovation in technology without requiring to eliminate the conventional learning process. Conceptual modifications and accumulation in ideas and explanations of basic programming concepts via game scenes is a good idea to diversify and improve the learning process. The combination of conventional learning and new approach is proven excelling in its purposes without major change of the primary programming concepts. Past work illustrated 63.3% of student's agreement on the use of games in understanding programming as compared to traditional learning method involving reaction movement players (95.5%) and player (81.1%) of interaction by Malliarakis et al. [9].

Explanation of Identity And Conceptual Change

Conceptual change is a learning process that modifies initial cognitive concepts in terms of beliefs, ideas and ways of thinking. The conceptual change approach serves as an effective teaching strategy in overriding misunderstandings that might occur during the teaching and learning process, especially for practical aspects with Ozkan[10]. This explanation of identity and conceptual change will existing concepts essentially is altered in the sense of replacement or increased fact inputs of working order that students adapted prior to solve similar problems, phenomenon explanation, and real-world functioning. Preconceptions and misconceptions of students in learning content identity serves as two-pronged sword in assistive learning. Conceptual changes functions to revise the initial conceptualization of students in evaluating certain facts, aside from correcting their cognitive skills to adept new resources without casting aside accumulated existing ideas. Therefore, teaching conceptual change in focus of the subject is closely related to the constructivist approach where learners take an active role in drawing up the original student's knowledge. This factor is in line with the basic conceptual changes approach by Posner et al. [11] that stems into four circumstances, namely:

i. **Dissatisfaction**: students are not satisfied with acknowledged existing concepts and realizes that there is still not enough fact intake,
ii. **Intelligibility**: new concept that are quite understandable to students,
iii. **Plausibility**: students acquiring new concepts and logic of imagination in mind, and
iv. **Fruitfulness**: new concept will efficiently solve the similar problem.

Conceptual change in teaching and learning requires ample access and time than conventional teaching methods. Characteristics of this conceptual change indirectly help students in clearly perceive ideas, thoughts and integrating the misunderstood aspects learned. This avoids students in learning the wrong facts and fix misunderstanding during teaching and learning session.

RESEARCH OBJECTIVE

This study provides a detailed view with explanations on identity of the basic programming and conceptual change through the game scenes. In particular, the objective of this study was

i. Developing a conceptual framework of the learning through game scene;
ii. Scheduling the 3-explanation identity of the basic programming through game scene (variables, constants and data types);
iii. Assessing the experience and motivation students using the game scene to understand the basic concepts of programming.

Conceptual framework of game scene

Developing an appropriate conceptual framework as a learning process in enhancing and diversifying the teaching and learning methods is the key feature of this research. Figure 1 illustrates the baseline conceptual framework of this research. The first conventional teaching methods highlight the introduction towards programming. Next step involves conceptual revisions in the previous adaptation through game scene in order to increase the students' understanding on concepts of the basic programming. Learning through games scene replicates the ability to learn, which in turn will make learning itself fun. Encouragement of imaginative skills through relating the associating characters with in-game actions enables students to blend in with the idea of certain game character, provides repertoire in terms of emotional appeal to students' motivation and achievement towards accepting new knowledge through a more relaxed setting.

Third incurred step is to receive feedback after each consecutive learning session from students where they are presumed to obtain new motivation, experience, interests in particular. The newly intake cognitive skills could be reviewed from the aspect of intrinsic or extrinsic. However, this study only takes into account on assessment for student's level of motivation and experience after collaborative learning through game scene. Included in the proposed game scene framework is five identified evaluation variable such as game's excitement scale, imaginative approach, comprehension level, emotion quotient (EQ) and absorption of knowledge. Table 1 sequences a list of items that are included in learning stages through game scenes. During these proposed learning stage, it is assumed that student ideas or misconception correction would also be reviewed.

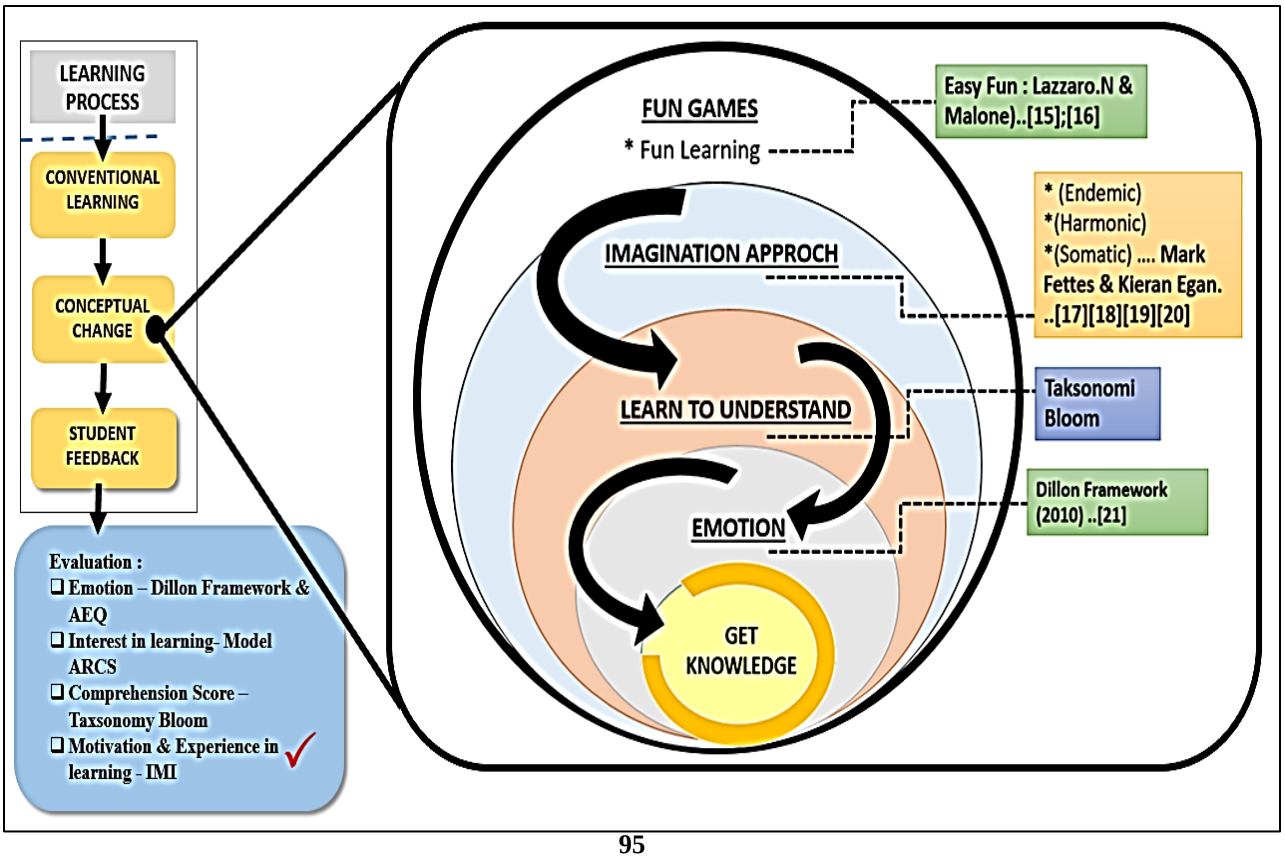

Table 1: Content of Game Scene Framework

Game Scene Content	
1. Fun Game	figure of fun learning while playing with game characters, illustration and animation in game scenes
2. Imaginative Approacha	Storytelling in the game scene will directly apply imaginative storytelling with real world contexts, while linking the basic concepts of programming
3. Learn To Understand	Learn to associate and understand identity-programming basic concepts with actual storytelling
4. Emotion And Interest	Establish interest and positive emotions
5. Get Knowledge	Knowledge access through animation, illustration within a relaxed confinement

Game Scene in the Table Views Act as an Intermediate of Explaining Theoretical and Conceptual Change

Generally, the game scene utilized in understanding serves as reinforcement for the basic concepts of programming as a method of in-house training. Currently studies involving games in education in various subjects are multiplying at a considerable rate. The scope of this study only targets on three identity including variables, data types and constants. Table 3 and 4, shows conceptual changes through game scenes from perspectives of variable, constant, and schedules respectively.

Assessing the Motivation and Experience of Students via Game Scenes

Questionnaires are applied post-study to assess the experience and students motivation in understanding the basic concepts of programming after the implementation of game scenes. The questionnaire adapts the questionnaire of intrinsic motivation inventory by Anwar [12] to assess students' motivation and experience. Design of the involved research scope includes a descriptive survey conducted in the form of statistics such as frequency, percentage, average percentages, and variables. Sample selection is applied through the random sampling method from students of computer software application (semester 3) into the playgroup. Community colleges is considered are an ideal population size study based on the syllabus offered in the lower years (beginning) that would involve theoretical and practical learning. Evaluation of motivation and experience levels is persisted of five constructs in practice; interest-enjoy perceived choice, effort-importance, pressure-tension and value-usefulness.

RESULT AND DISCUSSION

Data analysis and decision for assessing the motivation and experience of the students after using the game scene is processed through a questionnaire using the Statistical Package for Social Science (SPSS) version 20.0 and statistical analysis approaches via percentage, frequency, mean, standard deviation and *t*-test. Circulation of questionnaires by 60 sets of questionnaires is done for all the students enlisted on playgroup. Only N = 55 sets of questionnaires have been answered and replied. The following Table 2 shows the analysis of the level of student motivation and experience using the game scene. The investigation returned a high level of agreement on the approach applied. The results take into account student's motivation and experience in the deployed five constructs aforementioned; interest-enjoyment, perceived-choice, efforts-importance, pressure-tension and value-usefulness. Constructs for interest-enjoy assesses attraction, attention, and excitement level offered to students after using game scene methods. The analysis demonstrated a high level of agreement scale. The construct of perceived choice evaluates student-learning experience in terms of confidence and satisfaction with the in-game achievements. The level of perceived-choice criteria level is medium and reflects a lower than average level of interest. Only male students perceive a moderate level of agreement with game scenes (3.88). Constructs for efforts-importance reviews the efforts of the students through

the application of game scene in terms of confronting challenges and level of retention on the provided difficulty level. Results illustrated a high level of criterion that students are willing to give their efforts in and focus on learning through the scene as an important feature. This result reflects effort in learning as a vital motivation factor to maintain retention on each learning activity in order to complete the given task successfully. Constructs for pressure-tension tends to associate the anxiety levels incurred while playing. The analysis sees a high level of criterion met and a high level of excitement that improves student's interest in navigating through the learning task. Students also agreed on those features that emphasis on decision-making processes. Constructs for value-usefulness in terms of usability in learning is at high level and the scale was highly accepted during the investigation. This indicates that explanation on identity and changes conceptual the basic programming through game scenes would feed good knowledge, assist in understand the learning content and behaves as a good teaching aid. Overall results showed 78.2 percent of the students acknowledge and agree to improvise the game scene during learning sessions in explaining identity and conceptual change occurred throughout the process of understanding fundamental programming concepts.

CONCLUSION

This study demonstrates that the use of game scene in learning is beneficial in initiating teaching and learning process, as well as inducing attraction, improving motivation and students learning experience for tertiary students attempting to improve the learning process of technical subject such as Programming itself. Participating in gameplay attracts a broader target audience to meet the main goal of embedding excitement factors in learning technical subjects in particular with Bellotti et al. [13]. The final research results produced provides an insight into the benefits of how cognitive skills and assimilation of new knowledge could help improve learning experience. Elevating motivation levels could improve new knowledge intake through emotion aside from aiding to achieve the final learning outcome by Connolly et al. [14]. This directly helps increase the students' understanding of the process through visualization to understand on basic programming concepts. This does not mean that conventional learning should be discarded, however more as an adoption of new concept changes. Combination of conventional learning with learning through the game scenes can diversify teaching and learning methods.

ACKNOWLEDGMENTS

We thank the staff, lecturers and students from community's college, Malaysia who assisted in the data collection.

Table 2: Results of Motivation and Experience Student trough Game Scenes

Constructs	**Sub Constructs**	**Sex**	**Mean**	**SD**	**Level**
Interest-enjoy	Attracting Attention	**M**	4.08	0.76	High
		F	4.17	0.83	High
	Fun learning	**M**	3.96	0.98	High
		F	4.33	0.80	High
Perceived choice	Confidence to continue the game	**M**	3.28	1.02	Med
		F	3.23	1.01	Med
	Satisfaction with the in-game achievements	**M**	3.88	1.09	High
		F	3.57	0.94	Med
Effort-importance	Trying to meet the challenges	**M**	3.88	1.09	High
		F	4.20	0.66	High
	Trying to focus on a challenge	**M**	4.36	0.76	High
		F	4.33	0.61	High
Pressure-Tension	Feel excited to learn	**M**	3.88	1.20	High
		F	3.70	0.99	High
	Decision-making processes during playing session	**M**	4.08	0.81	High
		F	4.07	0.58	High
Value-usefulness	Give good input	**M**	4.29	0.61	High
		F	4.40	0.56	High
	Very useful for learning	**M**	4.28	0.68	High
		F	4.33	0.55	High
	Making sense of fun learning	**M**	4.40	0.58	High
		F	4.27	0.58	High
	Help to understand the learning content	**M**	4.40	0.65	High
		F	4.33	0.55	High
	Good learning process	**M**	4.08	0.76	High
		F	4.17	0.83	High
	Overall result (**F**=25, **M**=30)		3.94	0.39	High

Table 3: Explanation Identity and Conceptual Change of Variable

Identity	Conventional Learning	New Concept : Games Scene Instructions	Game Scene	Storytelling Games	Mechanics of Game Scene		Learning Outcomes	Difference
Variable	Description of the basic concepts of the theory of teaching using slides and distribution of notes	Find and collect KeretaAdam is KeretaMalaysia is carrying value of the redCar. **KeretaMalaysia KeretaAdam;** ↓ **int KeretaAdam;**	Relevance and understanding of the basic concepts of variables through the images in the game scene.	**What kind KeretaAdam to go to college?** **KeretaMalaysia KeretaAdam= redCar;** Collect the redCar only.	**GamePlay:**	RPG	Can identify and understand basic concepts of variables through the representative character of the game.	Imagination approach use in association storytelling game, a representative of character games and activities to understand basic concepts variables
					Game Character:	Adam		
					win:	RedCar (+10)		
					lost :	BlueCar (-5)		
					enemy :	Ghost		
					Target :	200		
					Life Game:	Ghost attack (-5) Ghost shoot (+10)		

Table 4: Explanation Identity and Conceptual Change of Constant

Identity	Conventional Learning	New Concept : Games Scene Instructions	Game Scene	Storytelling Games	Mechanics of Game Scene		Learning Outcomes	Difference
Constant	Description of the basic concepts of the theory of teaching using slides and distribution of notes	Find and collect pomegranate fruit with a value of 500, which does not change during execution **#define buahDelima 500**	Relevance and understanding of the basic concepts of variables through the images in the game scene.	Breakfast with Adam's favorite fruit. Adam just eats pomegranate fruit. Find and collect pomegranate fruit only	**Game Play:**	RPG	Can identify and understand basic concepts of constant through the representative character of the game.	Imagination approach use in association storytelling game, a representative of character games and activities to understand basic concepts constant.
					Game Character:	Adam		
					win:	P (+15)		
					lost :	Apples, guava, Strawberry (-10)		
					enemy :	bee		
					Target :	500		
					Life Game:	Ghost attack (-5) Ghost shoot (+10)		

REFERENCES

[1] Zanariah Abd mutalib (2016). Pemikiran komputasional, sains komputer akan diajar di sekolah tahun depan. Kuala Lumpur: Utusan Malaysia. (11 Ogos)

[2] Jenkins, T. (2002). On the difficulty of learning to program. In proceedinggs of the 3rd Annual Conferences of the LTSN Centre for Information and Computer Sciences. vol. 4, pp.53-58.

[3] Anthony, R., Janet, R., & Nathan, R. (2003). Learning and Teaching Programming: A Review and Discussion. Computer Sciense Education, 13(2), 137–172.

[4] Bazuri Ab Ghani, Lew Wan Ling & May Asliza Tan Zalilah. (2012). Teknik 'Jigsaw' dalam membantu pelajar SMK3 memahami dan menguasai Bahasa Java. Seminar Kajian Tindakan Kolej Komuniti Wilayah Perak, 247-251.

[5] Watson, C., & W.B.Li, F. (2016). Failure Rates in Introductory Programming Revisited. Proceedings of the 2014 Conference on Innovation Technology in Computer Science Education (ITiCSE' 14), 44(July), 0–6.

[6] Chow, K. K., Harrell, D. F., & Yan, W. K. (2015, June). Designing and analyzing swing compass: a lively interactive system provoking imagination and affect for persuasion. In International Conference on Persuasive Technology (pp. 107-120). Springer International Publishing.

[7] Besgen, A., Kuloglu, N., & Fathalizadehalemdari, S. (2015). Teaching/learning strategies through art: Art and basic design education. Procedia - Social and Behavioral Sciences, 182, 428–432.

[8] Yang, Y.T.C. (2012). Building virtual cities, inspiring intelligent citizens: Digital games for developing students' problem solving and learning motivation. Computer & Education, 59(2), 365-377.

[9] Malliarakis, C., Satratzemi, M., & Xinogalos, S. (2014). CMX : Implementing an MMORPG for Learning Programming. In 8th European Conference on Games Based Learning: ECGBL2014 (P. 346)., (October), 346–355.

[10] Ozkan, G., & Selcuk, G. S. (2015). Effect of Technology Enhanced Conceptual Change Texts on Students' Understanding of Buoyant Force. Universal Journal of Educational Research, 3(12), 981–988.

[11] Posner, G., Strike, K., Hewson, P., & Gertzog, W. (1982). Accommodation of a science concept: Toward a theory of conceptual change. Science Education, 66(2), 211–227.
[12] Anwar, H. (2016). Investigating the Effect of Pace Mechanic on Player Motivation and Experience.
[13] Bellotti, F., Kapralos, B., Lee, K., Moreno-Ger, P., & Berta, R. (2013). Assessment in and of serious games: an overview. Advances in Human-Computer Interaction, 2013, 1.
[14] Connolly, T. M., Boyle, E. A., MacArthur, E., Hainey, T., & Boyle, J. M. (2012). A systematic literature review of empirical evidence on computer games and serious games. Computers & Education, 59(2), 661-686.
[15] Lazzaro, N. (2004). Why we play games: four keys to more emotion without story. In Game Developers Conference.
[16] Malone, T. (1981). Toward a theory of intrinsically motivating instruction. Cognitive science, 4, 333-369.
[17] Fettes, M. (2011). Senses and Sensibilities. Journal of curriculum theorizing. Vol, 27(2), 114.
[18] Fettes, M. (2013). Imagination and experience: An integrative framework. Democracy and Education, 21(1).
[19] Egan, K. (2005). An imaginative approach to teaching. San Francisco, CA: Jossey-Bass.
[20] Egan, K. (2007). Teaching and Learning outside the box: Inspiring imagination across the curriculum. NY & London: Teachers College.
[21] Dillon, R. (2013). Serious games and fun: An Analysis. Vol.2, Issue 5.