

Thai Dance Training Game-Based Model

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Abstract—Since Thai dance training system has been developed as preliminary work in AniAge project, we found that this training system was still lack of learning motivation and entertainment features which could be led to the major problem such as high dropout rate. Therefore, "Thai dance training game-based model" has been proposed as a game-based learning framework which helps to promote learning motivation. The list of Thai dance instructional content, game characteristic, and a game cycle is also mentioned in this work. The combination of Thai dance and game-based learning could provide an interesting and challenging learning environment for the users.

Keywords—*Thai dance; game-based learning; game characteristic; game cycle.*

I. INTRODUCTION

Thai dance is one of valuable intangible cultural heritage in Southeast Asia region. The challenge with an intangible heritage like traditional dancing is to create the process which able to pass it to the next generation [1]. As mention, the process of maintaining and transferring knowledge of intangible cultural heritage is not easy. Generally, the knowledge of Thai dance has been passed to a student by teaching and learning activities. The student has to observe and imitate the body movement. Without their teacher and instructor, a student needs to learn and practice on their own. Thus, Thai dance gestures are archived and represented in any form such as drawings of the human figure, photographs in the textbook which able to demonstrate a posture of dancer or performer. However, the rhythm and movement cannot be expressed, and it was lack of interaction [2].

Previously, the dance training system prototype is currently developing a tool to provide the technology platform for training and learning in a context of Thai dance [3]. Student able to learn and practice about their posture and movement by interacting with the application. However, this system in prototype version is never mentioned in learning process or activity. Previous studies suggest that lack of learning motivation are causes of education problem [4].

Game-based learning is an effective method which fosters the learning motivation and learning outcome for learners [5]. Instructional content which incorporated with a digital game should encourage the learner to achieve learning objectives [6]. Therefore, the aim of this paper is to apply game-based learning as a model to promote motivation and engagement in Thai dance training system prototype.

II. LITERATURE REVIEW

A. Learning technology in Thai dance

Many scholars have been tried to incorporate technology to improve the process of learning and transferring intangible knowledge of Thai dance. For example, W. Choensawat et al. (2013) has been studied and developed the adaption of a notation system to describe Thai dance [2]. P. Munoum (2016) propose multimedia-based instruction package for training the creative dancing arts performance for the third key stage student. Her research focuses on the efficiency and satisfaction of student before and after implementing the system [7]. Meanwhile Tongpaeng Y. et al. (2017) studies the process of archive the knowledge of traditional Thai dance by using dance notation known as "Labanotation". The prototype of a tool for translate dance notation and demonstrate it as 3D animation has also proposed in their work [8]. Moreover, Oborm et al. (2017) also proposed a system prototype for Thai dance training. The system is based on Kinect-based Skeleton tracking which able to provide evaluation feedback [3]. As mention, Thai dance is based on body movement which is needed to capture. Kinect-based can be the potential technology which able to capture the posture and gestures of movement. Furthermore, previous studies have never been mentioned in learning motivation since it has been noted as a crucial factor for learning and training.

B. Kinect and previous system prototype

The brand type of interaction with computers called "Kinect" is a software-enabled device which able to capture, track and decipher body movement, gestures and voice. Recently, the appearance of Kinect also has facilitated educator to evaluate its feasibility in education. As it utilizes gesture-based technology, Kinect able to support kinesthetic pedagogical practices to benefit learners with strong bodily-kinesthetic intelligence [9]. In the past year, the dance training tool system prototype is currently developing under the project of High Dimensional Heterogeneous Data based Animation Techniques for Southeast Asian Intangible Cultural Heritage Digital Content (Fig. 1). This system framework and prototype has been proposed by Muangmoon O. and her colleagues in 2017.

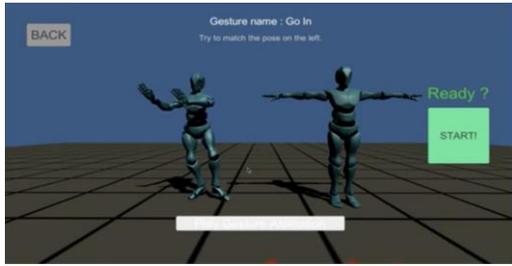


Fig. 1. Thai dance training system

The database has been contained dataset of motion gestures from the expert performer in Thai dancing. In application, when the user selected the gesture which they would like to learn, then the 3D model will appear. The system tracks skeleton of the user in real time and compares it with the chosen gestures or postures. Then over score will be analyzed and given according to the reference model and user's model. Moreover, since dataset able to demonstrate the list of joints with an overall score, the users are able to learn and improve their performance.

According to the system, the main objective is to provide the technology platform for training and learning about Thai dance posture. Student able to learn and practice about their posture and movement by interacting with the application. However, this system in prototype version cannot give appropriate advice for training: 1) the application does not mention in learning motivation or learning objective and 2) it is lack of entertainment features (fun, enjoyment, fantasy, etc.). Previous studies on the factors of learner attrition suggest that lack of motivation and engagement are the major causes of a problem like give up using or high dropout [4]. For the better user engagement and learning outcome, the application of Thai dance training system should more focus on encouraging learning motivation for the user.

C. Game-based learning

Game-based learning is an educational approach which the game concept in a learning process. Game-based learning is also an effective method for increasing the learning motivation and learning outcome for learners [5]. Cheung et al. (2008) also discover that learning material which applied digital game foster the learning outcome and helps to achieve learning objectives [6]. The reason behind the succession of game-based learning which appealing to the learner is that it incorporates with game characteristics such as fun, play, rules, goals, interactive, outcomes, and feedback, adaptive, win states, conflict, competition, challenge, opposition, problem-solving, interaction, representation, and story [10]. The Design of learning games is required the game styles and the set of appropriate elements from the game characteristic list with instructional content. Therefore, through a combination of Thai dance gestures and game-based learning could provide an interesting and challenging learning environment for the users, enhances motivation to learn, and prompts users to be active and improving learning outcome.

D. Input-Process-Outcome Game Model

According to the combination of Thai dance gestures and game-based learning, the design section should involve with a framework which able to ensure smooth game operation. The Input-Process-Outcome (IPO) game-based learning model which proposed by Garris et al. (2002) is well-known in the area of learning game [11]. Generally, IPO game-based learning is education game design which improves student's learning performance. For an instant, Ghergulescu and Muntean (2014) proposed a Motivation Assessment-oriented Input, Process, Outcome game model to design an education game [12]. Meanwhile, Hsiao and Chen (2016) combined gesture-based computing technology and IPO model to develop a gesture interactive game-based learning approach that was suitable for preschool children [13]. Kamnardsiri, T. et al. (2016) developed an intelligent game-based system for learning sign language with Kinect for students with hearing impairment [14]. Chang Y. et al. (2017) developed a Kinect-based somatosensory interface with IPO and ARCS model that enables the learner to control virtual characters by using their physical movements [15].

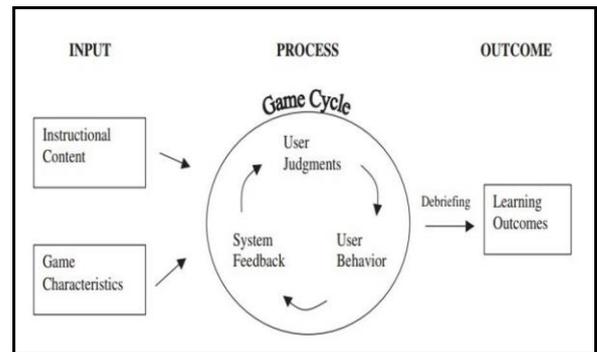


Fig. 2. Input-Process-Outcome Game model

Basically, IPO game-based learning model divides into three stages (Fig. 2). The first state is input. its objective is to design an instructional program/content that incorporates certain features or characteristics of games. The second state processes, these features trigger a cycle which involved with 3 part is 1) User Judgments is normally represented by self-reports of interest and engagement, enjoyment, and feelings of mastery. 2) User Behaviors is the effective judgments that are formed from initial and ongoing gameplay determine the direction, intensity, and quality of further behavior. 3) system feedback is the result of the whole cycle. The final state is an outcome, this engagement in gameplay leads to the achievement of training objectives and specific learning outcomes. As mention, IPO game-based learning model will be applied in the application of Thai dance training system as a model to foster motivation and learning outcome.

III. THAI DANCE GAME-BASED MODEL

In our work, the instructional content of Thai dance and IPO game-based learning model is combined to create the proposed Thai dance training game-based model (Fig. 3). The model is divided into 3 states which are based on The Input-Process-Outcome (IPO) game-based learning model.

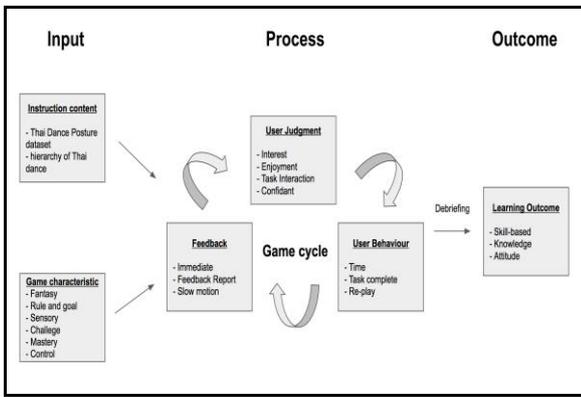


Fig. 3. Thai dance training game-based model

A. Input State

1) *Instructional Content* - the learning objectives of our study were to train Thai dance gesture and movement with the training system to a student in College of Dramatic Arts in Thailand. Our instructional content was based on a dataset which confirmed and verified by the expert who is working as a lecturer and national artist.

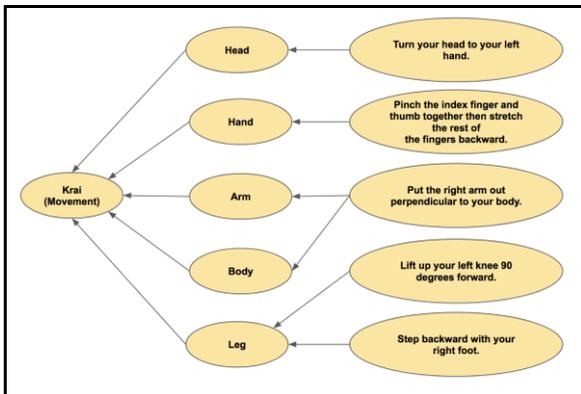


Fig. 4. Hierarchy of Thai dance content

2) *Game Characteristics* - our study employed game dimension category from [11]. According to their reviewed, game characteristics can be described in terms of six dimensions: fantasy, rules/goals, sensory stimuli, challenge, mystery, and control. Usually, any type of game can be described in terms of these six key dimensions. Moreover, they provide a common vocabulary for describing and manipulating the core elements of games for instructional purposes. Therefore, game characteristic in Thai dance training system was relied on above six dimensions.

a) *Fantasy*—Fantasies allow users to interact in situations that are not part of normal experience. The research stated that instructional content which is added in fantasy contexts leads to greater student interest and increased learning [16]. In our study, the history of Thai dance was added as fantasy story for the user to discover. Moreover, when a learner activates the Kinect device and begins the game. They were able to control animation avatar.

b) *Rules/Goals*— the goal structure of the game was presented as game rules. Motivation literature suggested that clear, specific, and difficult goals were lead to better performance [17]. To train a Thai dance, the user first needs a demonstration of the movement by 3D animation from a dataset. Then the user can imitate the movement of the animation. A score will be given depending on how well they can perform. When they met appropriate score, the next state will be unlocked.

c) *Sensory Stimuli*— Researcher found that students usually return and practice the activities which included animated graphics, sound effects, and other sensory stimuli [18]. The tradition Thai dance characteristic (Male and Female) and screen also represent in the 3D environment. The Kinect-based system will allow a user to learn by interacting with the instructional content.

d) *Challenge*— The games should involve the challenge elements such as progressive difficulty levels, multiple goals, and a certain amount of informational ambiguity to ensure an uncertain outcome. Digital badges were deployed as personal multiple goals. The individual user is able to select the goal that they need to achieve and obtain the badges. Meanwhile, the leaderboard would be an element which represents the rank of overall other user's score. Therefore, the user is able to compare their score with their friend which encouraged learning outcome [19].

e) *Mystery*— Embedding instructional content in fantasy and mystery contexts allows the user to encounter imaginary situations which differ from their knowledge. Therefore, they are able to search for information or exploration of unknown settings. In our content, Thai dance was divided into 3 levels; basic level (dance terminology), intermediate level (body language), advanced level (song/ story). For example, the user has to complete all dance task at a basic level before they unlock the game and move to the higher level.

f) *Control*— Providing the user with a control such as an ability to regulate, direct, or command something led to increased motivation and greater learning. In our prototype, a user is able to have their own personal control. The system allows a user to select the content and state of a level. Furthermore, they able to adjust the basic function such as play, pause, replay, fast, slow etc.

B. Process State

As mentioned above, the main characteristic of an educational game is that the instructional content is embedded with game characteristics. When the game has motivated the user, then they repeat cycles within a game context. Meanwhile the user repeating interaction with the game, they are expected to elicit desirable behaviors based on emotional or cognitive reactions which result from interaction with and feedback from gameplay. The motivation process in-game cycle is involved in user judgment, user behavior, and feedback.

- *User judgment*—In the early process of gameplay, the user makes their judgments based on self-reports

whether the game is fun, interesting, or engaging. The user judgment in a game process is typically related to 4 components is Interesting, Enjoyment, Task Involvement, and Confidant. Therefore, we are able to observe and measure the user opinion in this state by a quantitative method such as focus group or deep-interview and quantitative method such as survey questionnaire.

- User behavior—The experience during the gameplay is the factor which determines the direction, intensity, and behavior. The user who is motivated should more engage and persist longer in the activities that do less motivated user [20]. In brief, the user behavior is able to track and measurable. For example, the motivated user will spend more time consume in gameplay. They are more committed to continued task activity. Moreover, those who have positive judgment should return to gameplay without prompting.
- System feedback—is a critical component of game cycle. When a user gets immediate, elaborative, text-based feedback from the game, it will let to more effective learning and higher motivation [21]. Furthermore, feedback can drive the motivated performer to expend more effort, to persist, and to focus attention on the task. Visual feedback like a picture, 3D graphic, diagram, and demonstration can be provided a positive outcome for user [22] In our work, we applied three kinds of feedback in the proposed model from [23]. The first is immediate feedback such as Text-based and color (Green is good/ Yellow is fare/ Red is bad). When the user interacts with a game then get this feedback, they can notice the errors quickly and correct his/her moves. Second is score report, user able to receive overall score related to their performance. The third type is the slow-motion replay. The propose is to show the correct motion for students to learn about how and where the errors happened.

C. Outcome State

The learning outcome can be classified into three different type; skill-based, cognitive, and affective outcome [11]. In our study, Thai dance training system game-based model should provide a positive outcome in all types. The user should perform better in Skill-Based which include the development of technical or motor skills in Thai dance. They should acquire the knowledge of the facts and data required for a different kind of Thai dance posture. For example, a user is able to recognize the posture and movement more accurately than those who did not play the games. Furthermore, the user should have positive on Affective reactions or attitudes such as feelings of confidence, self-efficacy, attitudes, and preferences.

IV. CONCLUSION

In this work, we propose "Thai dance training game-based model" as a guideline framework which helps to promote learning motivation in the Kinect-based training system. The instructional content of Thai dance and list of game

characteristic, including IPO game model was mentioned in our work. We believe that the engagement of Thai dance content and specific game characteristic can trigger a game cycle that will foster learning motivation and help to achieve learning objectives. In future works, we will design the system prototype based on our framework and introduce to end-user for the testing.

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