

A GAME-BASED SIMULATION SYSTEM FOR ERP LEARNING

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Abstract:

In this ERP era, the learning of Enterprise Resource Planning Systems (ERP) has been common and popular in colleges or universities since that ERP system plays a critical role for assisting business operation and performance. However, to the student who lacks of practical experience and imagination about the real business, it is a challenge for learning and performance. This study proposes an innovative game-based simulation approach for teaching ERP and business concepts, which are composed of game-based learning, situated learning, computer-based testing. The game-based simulation system is developed by 3ds Max and Unity 3D of business situation for enhancing learners' interest and understanding the business procedures in real business, and then conducted a computer-based testing for evaluating the performance of ERP learning. The three objectives of this system are: (1) to develop a hands-on understanding of the concepts underlying enterprise information systems and business operation, (2) to experience the benefits of enterprise information integration, and (3) to develop technical skills at using ERP software. In addition, this study provides an alternative for education about business management related, and it may benefits both to academic and practice.

Keywords: enterprise resource planning (ERP), business simulation, game-based learning, situated learning, computer-based testing (CBT)

1. THE CHALLENGE OF ERP TEACHING AND LEARNING

In response to highly competitive pressures, rapid changes, and significant uncertainty in the current business environment, organizations seek efficiencies by increasingly moving toward integrating their functional processes. This widespread implementation of enterprise resource planning (ERP) systems has increased the demand for decision makers with knowledge of ERP systems and their underlying integrated processes, as well as the ability to make decisions and understand their effect in this ERP context (Cronan, Douglas, Alnuaimi, & Schmidt, 2011). Organizations perceive enterprise resource planning (ERP) as a vital tool for organizational competition as it integrates dispersed organizational systems and enables flawless transactions and production (Shaul & Tauber, 2013). With increase in affordability and need, minor enterprise is a huge opportunity for ERP product and implementation vendors today. The growth in ERP implementations had a resultant impact on the demand for ERP skills (Upadhyaya, Trainer, & Patil, 2013). And critical to successful implementation and maximizing the potential benefits of enterprise resource planning (ERP) systems are knowledgeable and skilled users.

As a result, now challenges for business schools have surfaced (Cronan et al., 2011). Business schools have traditionally delivered business education through functional-based courses, such as marketing, operations, finance, and accounting (Cannon, Klein, Koste, & Magal, 2004) using problems, lab assignments, and cases as learning tools. Criticism of this approach addresses lack of student preparation to work with cross-functional systems that are increasingly becoming common in this ERP era (Malekzadeh, 1998). In addition, effective training for the required knowledge and skills is both difficult and challenging (Cronan & Douglas, 2013). Thus, some training of ERP fundamentals has been shifted from on-job training to college or university education recently. Many universities have spent considerable time resources in modifying the curriculum to incorporate Enterprise Resource Planning Systems (ERP) (Upadhyaya et al., 2013); however most universities have struggled in this direction and the way of training about ERP. Given this ERP era, it is crucial that students acquire business analytic skills to drive decision making. In order to effectively learn cross-functional decision making, students not only need decision analytics knowledge, but they also need a multidisciplinary knowledge of business concepts and processes as well as an understanding of the underlying integrated BP in order to achieve desired outcomes (Boudreau, 2003; Coulson, Shayo, Olfman, & Rohm, 2003; Cronan et al., 2011; Kang & Santhanam, 2003).

However, ERP systems are highly complex information systems (Da Xu, 2011; Grabski, Leech, & Schmidt, 2011; Rajnoha, Kádárová, Sujová, & Kádár, 2014; Umble, Haft, & Umble, 2003), which involving dynamically activities, complex operations, serially procedures, and etc. Enterprise Resource Planning (ERP) systems are information systems that integrate all business information in organizations, providing processes control and unique informat; ERP automates and integrates the core functionality of an organization (Rajnoha et al., 2014). Usually, they are sold as software packages, which implement the best practices in the market. Organizations that implement them have to choose between implementing these practices and changing current business processes; or customizing the software to adapt to current business processes (Mendes & Escrivão Filho, 2002; Rajnoha et al., 2014; ZWICKER & SOUZA, 2003).

To those students who have never experienced real business and lack of image about practical operations, it's a challenge in learning and the ERP learning performance. On the other hand, traditional pedagogical methods are still very much the custom within higher education. Student learning remains largely based upon take out knowledge from texts and lectures, or procedures based around the metaphor of acquisition (Sfard, 1998). This style of teaching seldom gives students the opportunity to apply their newfound knowledge to actual situations, resulting in a serious time lag between students learning and applying new knowledge (Raymond, 2010). As a result many students have trouble determining the relevance of what they are being taught, and thus lacking any obvious incentive to learn fail to truly engage with the learning process (Dorn, 1989).

Hence, we want to provide an innovative "learning-by-gaming" approach for teaching ERP concepts as well as leading students to experience various real business activities. The three objectives of this ERP game-based simulation system are: (1) to develop a hands-on understanding of the concepts underlying enterprise information systems and business operation, (2) to experience the benefits of enterprise information integration, and (3) to develop technical skills at using ERP software.

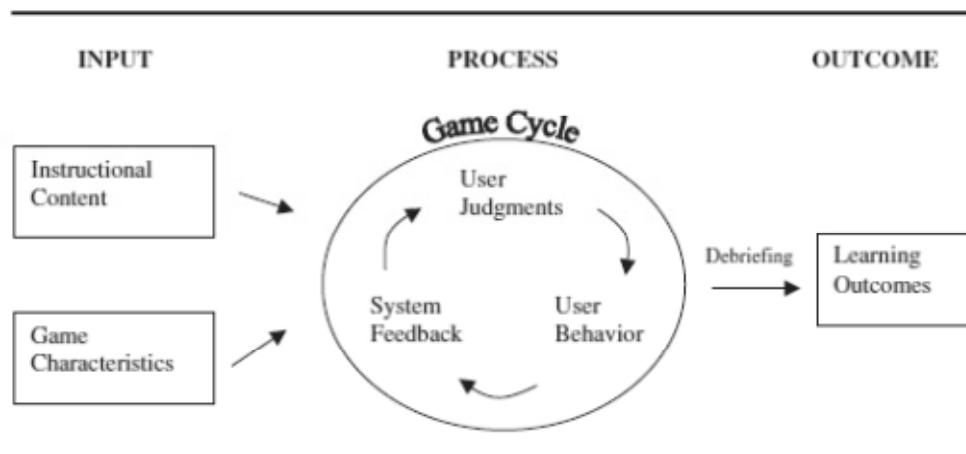
2. ERP GAME-BASED SIMULATION APPROACH TO LEARNING

In order to achieve the previous mentioned objectives, we attempt to develop a game-based simulation system for teaching ERP and related business processes, which integrating experiential simulations, game-based learning and computer-based testing (CBT) to present the complex environments and assist the ERP teaching for those learners in university or novice users.

2.1. Conceptual Model

Learning-by-gaming approach has been considered as an alternative to enhance the performance of learning since that game seem to be effective in enhancing motivation and increasing student interest in subject matter (Garris, Ahlers, & Driskell, 2002). The goal of game-based learning is to develop learner who are self-directed and self motivate both because the activity is interesting in itself and because achieving the outcome is important, various models of game and learning have been studies in previous. In this study, Input-Process-Outcome Game Model, one of models of game and learning, was adopted that because there are several benefits that this perspective offers. There is a tacit model of learning that is inherent in most studies of instructional games. First, the objective is to design an instructional program that incorporates certain features or characteristics of games. Second, these features trigger a cycle that includes user judgments or reactions such as enjoyment or interest, user behaviors such as greater persistence or time on task, and further system feedback. And thirdly, this engagement in game play leads to the achievement of training objectives and specific learning outcomes. This instructional model is illustrated in Figure 1.

Figure 1: Input-Process-Outcome Game Model



Source: Garris et al., 2002.

2.2. Feedback and Evaluation of Learning

In the past few decades, there has been incremental growth in computer-based testing (CBT) as a viable alternative to paper-and-pencil testing. Computer-Based assessment strategies are effective in evaluating students' achievement in educational technologies compared to the paper-based assessment strategy used in before. Recently, research on CBT has focused on developing models that achieve desired levels of measurement efficiency while simultaneously satisfying other important goals, such as minimizing item exposure and maintaining content validity. In addition, there has been a growing awareness among practitioners that basic CBT research using small samples or simulation studies needs to be vetted using cost-benefit analysis, as well as engineering design and implementation criteria to ensure that feasibility, scalability, and efficiency are evaluated in more concrete ways than by merely reporting a reduction of error variances for theoretical examinee scores (Luecht & Sireci, 2012).

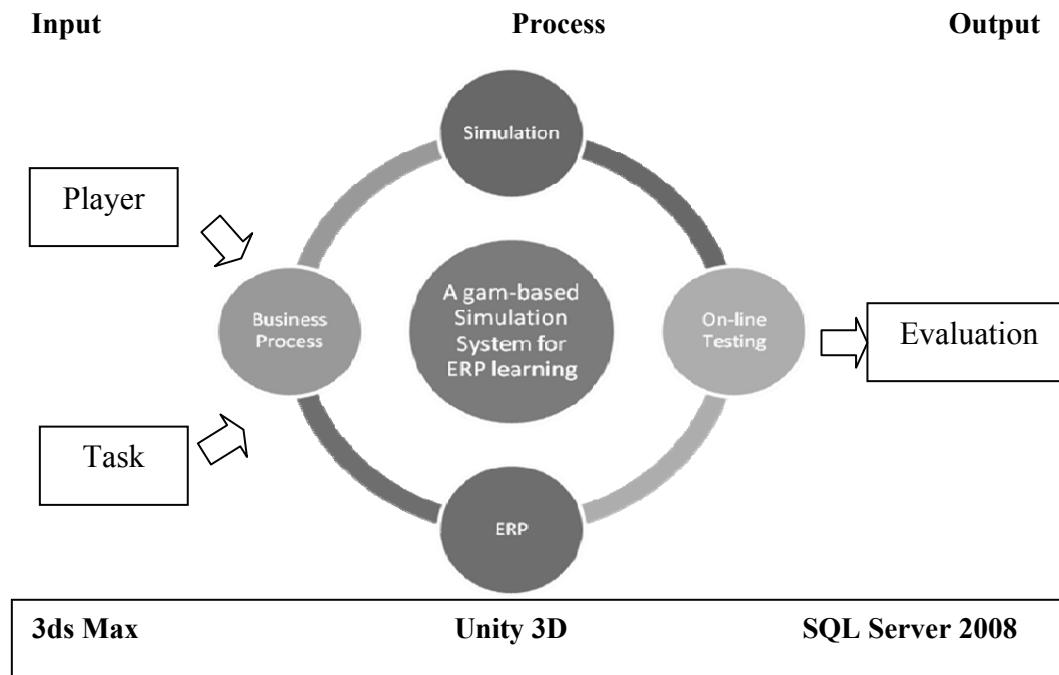
In this proposed game-based simulation system for ERP learning, the CBT concepts were adapted to improve the efficiency on testing, to enrich the presentations diversely, to reduce the measure errors and time consumer, and etc. The feedback would be a kind of personal learning information providing including the comparisons between anticipated and actual performance, and those feedbacks be able to enhance the learners' performance. Therefore, to the learners of ERP system, this mechanism of

feedback and evaluation would show their familiarity and the understanding about business process and ERP, and then obtain in reinforcing their ability on ERP usage through the feedback of CBT scoring.

3. MAKING A DIFFERENCE IN ERP LERANING

According to the previous mentioned and objectives in this article, an innovative game-based simulation system for ERP learning was constructed as shown in Figure 2 which including the related system develop techniques as below.

Figure 2: The Conceptual Model of Proposed Game-based Simulation for ERP learning



3.1. Game-based Simulation System for ERP learning

The proposed game-based Simulation System for ERP learning was mainly processed through series 3D games that describe the business contexts and tasks. Learners and (or) novices of ERP system can understand the business process through the tasks to solved in various game business scenarios, associated processes, and further learning proficiency the ERP system. The main features are described as following.

- (1) Providing simple game instructions about game rules and ERP briefly introductions that it may help the beginners can have a preliminary understanding quickly.
- (2) Designing various scripts about ERP system such as distribution module, manufacturing module, and financial module that combined with enterprise situational awareness, business process, and joyful to raise the motivation of learners.
- (3) In the proposed game-based simulation system, players are required to complete the game gradually specified tasks to solved, and then to derive the related knowledge of enterprise business process and accumulate the ability about ERP.
- (4) On-line test that combines various dynamic puzzle games of business and series questionnaires to assess user learning performance.

3.2. System Demonstration

The following will provide some game screenshots to demonstrate that the usage of our proposed ERP game-based simulation system.

Figure 1: Login to Game

Figure 2: Game Star



Figure 3: Task Acceptance



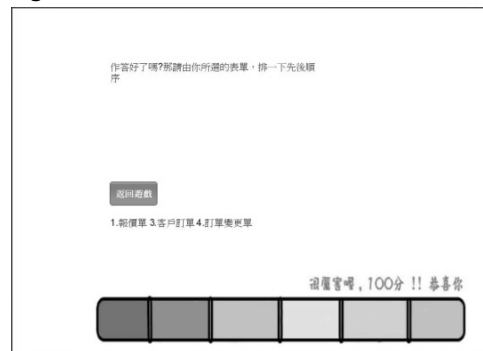
Figure 4: Error Message marked in red



Figure 7: Series Business Procedures



Figure 5: Feed and Evaluation



As the above shown, Figure 3 is a system login screen; user can get game-related instructions in this screen and plays the role of players into the game system. Figure 4 shows the simulated 3D animation business role play situations, may need to talk with the characters and get corporate mission, Figure 5 is according to mission requirements, then into different business units in order to guide the user through dialogue and familiar with the task ERP system processes and form; through task script design, corporate documents form during round-trip, this game-based simulation system will guide learners progressively business processes and tasks to complete the game. The learner can complete the assigned task enterprise process, get to know and be familiar with all types of emergencies may face problems when business operations and shown in Figure 6, marked with a red frame error handling tasks, and learn to and ERP system operations related business processes and expertise. Figures 7& 8 supplemented by computer online tests to assess the users of the ERP system processes learning. This online real test scenario can be based on the task, allowing users to first check the applicable ERP systems form, and then let the user based on the selected quiz question forms, business forms arranged in the correct handling processes to assess user learning

4. CONCLUSION AND FUTURE WORKS

The results in this study should be of interest to learners who lacks of practical experience on real business and ERP system in business schools or on-job training within corporations. In addition, it may provide an alternative approach for educators who desire their students to learn to apply analytical skills and tools into the applications of business administration and ERP system in real

business. The proposed game-based simulation system for ERP learning would be able to create an innovative alternative learning model for ERP education and training, and enhance learning interests and the effectiveness. Novices can easily assess this simulation game used for ERP learning that allows them to apply analytical tools and decision making as a strategic component of the classroom experience but also reduce their anxiety through the role switching and gaming.

The proposed game-based simulation system may provide a different perspective for describing ERP concepts, business processes and ERP systems learning. Next it will further to extend the content of game elements, enrich the content and layout of related contexts arrangements to construct a more comprehensive ERP simulation game to improve the effectiveness and efficiency of ERP education. This study provides an alternative for education about business management related, and it may benefits both to academic and practical parties.

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