# Teaching methods used for ERP – Focus on Gamification

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A B S T R A C T

A considerable share of recent upgrades in the business sector have been devoted to the adoption of Enterprise Resource Planning (ERP) to manage business processes, due to which the demand for ERP professionals has been increasing. In line with this, ERP modules have been incorporated in university teaching curricula. However, traditional methods of teaching do not really work the same way as ERP teaching as it demands more hands-on practice to handle an ERP system. A Systematic Literature Review (SLR) was carried out to identify the different types of teaching methods used for ERP and the related challenges. A more focused area of the SLR was to analyses the relevance and implications of gamification in ERP teaching.

## 1. Introduction

As a consequence to the high rate of ERP implementation in many businesses, there has been a considerable increase in the demand of ERP executives who must have a solid knowledge about ERP systems and will therefore be able to manage them effectively. Nowadays, most students do not possess an adequate knowledge of business processes in the real world, and do not have the required IT skills to use an ERP software application. (Chen, Keys and Gaber, 2015). As a result of their modern upbringing and being well versed with technology, students nowadays have a different style of learning (Benett, Maton and Kervin, 2008). The traditional techniques used for teaching are already obsolete (Hopkins and Foster, 2011). Considering the necessity of hands-on practice before becoming a good ERP professional, the main focus of this research is geared towards gamification as one possible teaching approach for "learning-by-doing". A critical literature analysis was performed on ERP teaching focusing especially on methods related to gaming approaches.

The remaining sections of this paper are organized in the following way; Section 2 highlights the key concepts of this research. Section 3 details the research methodology used for the literature review while Section 4 focuses on the findings and results of the research. Section 5 emphasizes on a discussion based on the conducted research.

## 2. Key Concepts

The key concepts addressed in this paper are highlighted in this section.

## 2.1. ERP

ERP refers to an integrated software system used to manage day to day activities and consolidates all functions of an organization into an enterprise-wide environment, thus encouraging informed decision-making and increasing efficiency at all levels (Advanced, 2019). There are several ERP vendors all over the world that cater for various modules. The most important ones are Sales, Inventory, and Procurement.

Today, small and medium-sized businesses also use ERP systems to support their businesses (Knigge et al, 2017). However, there still seems to be a lot to discover about how to teach people how to use an ERP system.

## 2.2. ERP Teaching

ERP teaching refers to any methods used in teaching an individual when and how to use an ERP system. The millennial generation is more adapted to technology than any generation before them but also has a remarkably short attention span (Tsuruta, 2020). There is hardly any specific scientific literature meant for teaching ERP to students (Knigge et al, 2017). Knowledge retention is in direct correlation with the involvement of the person with the subject at hand. According to the pyramid of learning (Finland, 2019), there are seven (7) different ways through which a person can retain knowledge. Teaching consists of delivering knowledge in one of these ways leading to the person getting to retain the concepts clearly. Traditional teaching methods include lectures and reading whereas new and modern ways make more use of hands-on learning concepts.

## 2.3. Simulation Games

A simulation game can be defined as an active learning method for solving practical problems in teams or individually (Adelsberger et al, 1999). It allows experimental and competitive learning by allowing for a "learning-by-doing" approach. Simulation games in ERP teaching refers to the simulation of an ERP system, whereby the students are acquainted with a real-time situation and actively learn how to perform transactions with the aim of learning how to use the system. They work on realistic tasks and problems in a training environment leading to increased experience and insights of realistic complex problems (Adelsberger et al, 1999). An example includes ERPSim which is closely linked to SAP - Systems Applications and Products in Data Processing (Léger et al, 2007; Léger et al, 2010; Setyono and Arnandiansyah, 2018).

## 2.4. Serious Games

Serious games refers to those that do not have fun, enjoyment, or entertainment as their sole purpose (Micheal, 2005). These games are usually meant to be used for teaching complex concepts with a view to demonstrate real life situations. Serious gaming seems to be increasing as a business option as well as a means to teach (Laamarti, Eid and El Saddik, 2014). Through the serious games, the user creates realistic objectives and works towards achieving them. The interactivity of the game creates a sense of interest in the user to continue using the game to learn about the subject. Serious games, unlike other types of games are geared more towards user involvement with respect to real life situations and therefore engages skills improvement of the student.

# 3. Methodology

A Systematic Literature Review (SLR) strategy has been used to provide a thorough analysis of existing literature (Kitchenham, 2007).The three different phases of the SLR were: 1) planning the review, 2) conducting the review and 3) reporting the review. The following sections detail each of these stages.

## 3.1. Planning the Review

Before starting the planning process, a clear and specific research question is essential for a successful review and hence, specifying the research question (RQ) is the most crucial part of any systematic review. The following RQs are therefore defined:

***RQ1: What are the different approaches used for ERP teaching?***
This question is raised to know both the different approaches that can be used to teach ERP and the associated benefits and drawbacks.

***RQ2: What are the types of simulation games used in ERP teaching?***
This question is to find out about the types of simulation games used for ERP teaching and to identify the key characteristics of each method.

*RQ3: What are the challenges faced during ERP Teaching?*

The purpose of this question is to identify the challenges faced in ERP teaching; both from a student's and teacher's perspective. Challenges related to the usage of ERP simulation games are also identified.

**Search Strategy**

The first step in planning the review is to break down the research question into individual concepts in order to create search terms. Singular/plural forms, adjectives, verbal forms, synonyms, and different spellings of the search terms will be considered while conducting the search process (Barbosa and Alves, 2011). These search terms will be used to find relevant articles within sites such as Google Scholar, Google, Emerald Insight, Research Gate, Science Direct and IEEE Xplore. The search process must identify primary studies that are related to the research question.

The inclusion and exclusion criteria included the following:

- Only papers in English were considered.
- Content relevant to the key topics of this paper only were considered. These included ERP, education, simulation and gamification.
- Duplicated papers were removed.
- Journals, web articles, research papers and analytical documents were considered.
- Thesis such as master thesis and PhD were not considered.

Different filtering levels were applied to consider most relevant articles which included:

1) Relevance of title of the article – The paper is considered by based from just reading the title
2) Relevance of abstract – The paper is considered with respect to its relevance after reading its abstract
3) Relevance of content – The paper is finally retained after it has been read completely and is deemed relevant. This is done by a quality assessment process where each paper is given a score ranging from 0-10 based on the research topics. All papers having a score of 7 or higher is retained.

The search process consisted of defining a search string to search for relevant papers and to narrow down the search to more specific results (Barbosa and Alves, 2011).

(ERP OR "Enterprise Systems" OR "Enterprise Resource Planning" or "Enterprise Information System") AND (Simulation or Game or play or gamification or mobile) AND (Teaching OR Academic OR Tutorial OR learning OR Institution OR ELearning)

The above search string was used on the different repositories to access related papers, articles and journals.

*3.2. Conducting the Review*

The initial search was made and underwent the 3-step filtering process. By relevance of the title, a total of 75 candidate papers were selected. 52 papers were then selected by the relevance of their abstracts and a final list of 24 papers were selected based on content examination.

Since all 24 papers were relevant in terms of content relevance, no further quality assessment was conducted and each paper was thoroughly investigated to get qualitative and quantitative information.

*3.3. Reporting the Review*

The findings of the SLR are reported in the next section.

## 4. Findings and Results

This section reports the main findings of the final list of papers. Summarized results are first highlighted in the next section. Remaining sections report the findings per RQ.

*4.1. Summary of papers*

**Table 1: Summary of papers**

| | |
|---|---|
| **Australia** | |
| Hopkins and Foster (2017) | Adaptation of the HEC Montreal ERPSim Game into an inter-institutional competition |
| **Canada** | |
| Leger (2006) | A "learning-by-doing" method to teach about ERP concepts concentrating on turn-based simulation games and makes use of mySAP ERP. |
| Ruhi (2016) | Combination of two or more learning/teaching methods to complement each other, eliminating loopholes in individual techniques. |
| **China** | |
| Deng, Yin and Tu (2009) | A teaching method of ERP Course by making use of extracurricular activities, internships and experiments |
| Hu and Zhou (2011) | Making use of a three-dimensional teaching mode of the principle experiment, the sandbox simulation experiment and the application test, it transforms the concept of 'teaching' into 'learning' |
| **Ecuador** | |
| Alcivar and Abad (2016) | A gamified system to improve retention rate and user satisfaction levels while making use of a game as a learning method |
| **Finland** | |
| Nisula and Pekkola (2012) | Combination of a business simulation game and a practice enterprise model thereby simulating a real life ERP system with real time transactions |
| **Germany** | |
| Schwade and Schubert (2016) | The use of Microsoft Dynamics Nav, while using the innovative concept of "The ERP Challenge". |
| Omar and Gomez (2017) | The use of mobile ERP apps to daily life activities. |
| Baumeister, Harrer and Sträßer (2011) | Makes use of blending strategies, the techniques proposed allow students to put into practice whatever they have earned using other methods. It does not impose on the student to learn about ERP concepts fully, but to have specific training and personalising their learning curves. |
| Knigge et al (2017) | Integration of serious games to enhance ERP teaching |
| Adelsberger et al (1999) | Game in SIMAN simulation language and allows the students to learn by problem solving, active thinking and experience how to deal with real-time complex problem in a system. |
| **Indonesia** | |
| Setyono and Arnandiansyah (2018) | ERPSim making a sample of 140 students to form teams and make business related decisions. |
| **Mauritius** | |
| Munogee, Moctaram and Cadersaib (2019) | The proposal and implementation of a web based simulation game. |
| **Republic of Korea** | |
| Darban et al (2016) | Simulation games with collaboration between users promoting interaction with peers. |
| **Singapore** | |
| Horng and Wu (2016) | ERPSim to teach 4 modules of SAP. |
| Rajšp et al (2017) | Use of simulation games to teach at Masters level. |
| **South Africa** | |
| Scholtz, Kapeso and de Villiers (2017) | The use and potential implementation of simulation games in training to mitigate ERP failures |
| Scholtz and Kapeso, (2014) | M-learning to teach about ERP systems. Driving factors for ERP failures discussed. |

| | |
|---|---|
| Mwalemba (2019) | The Enterprise Systems Education for Africa (ESEFA) initiative which has 3 roles: providing application and technical support, lecturers training and coordinating research and industry engagements. Run in collaboration with SAP University Alliances (UA). |
| **Spain** | |
| Utesch, Heininger and Krcmar (2016) | Use of SAP ERP to enhance study skills of students on an online platform. |
| **USA** | |
| Hwang and Cruthirds (2017) | Elimination of traditional face to face education and implementing a 3-period simulation game to teach about ERP. |
| Cronan and Douglas (2015) | Influence of technology on ERP teaching. Adoption of simulation game as a method to enhance techniques to teach ERP. |
| Paskelian and DeVries (2014) | ERPSim to teach managers about financial statements analysis. |

As shown in the above table, most of the research has been conducted in Germany, USA and Canada, which shows how developed countries are already putting into practice innovative methods to teach about ERP concepts while focusing on having better ERP professionals post-training. Developing and under-developed countries amount for a small percentage of research individually, but at the same time, this shows their growing interest in research into optimal techniques of teaching ERP. However, the small percentage of research conducted in these countries could be due to a lack of importance given to value ERP education or economic factors such as funds not being available (Mwalemba, 2019).

### 4.2. ERP Teaching Methods

To address RQ1, the selected papers were analyzed with a view to know more about the different teaching techniques used for ERP teaching. These techniques are further highlighted.

**Lectures**
Lectures are the most inexpensive and convenient method of teaching any subject (Learn about education and B.Sc. Physics, 2019). Lectures are the traditional ways to teach but "the millennial generation is more adapted to technology than any generation before them but also has a remarkably short attention span" (Finland, 2019), which means lectures are not always effective because they are in the majority of times a method of passive learning.

**Case Studies**
Case studies for ERP can be used to learn about best practices which in turn can be adapted for the successful implementation of an ERP system (Vkinfotek.com, 2019). "Business Schools around the world are prioritizing the integration of real life examples, case studies and technology into their curriculum" (Paskelian and DeVries, 2014). Case studies aim to put participants in a real life situation and make them use their decision making skills.

**Roleplay**
Roleplay refers to a method allowing participants to maximize interaction and explore real life scenarios, leading to an increase in experience and the option to try different strategies to tackle a situation (Technology Enhanced Learning at SHU, 2019). It enables the participant to be portraying both sides of the story and to learn about a topic from different angles.

**Teamwork**
Users are dependent on information from other team members to understand expectations and to develop appropriate attributes concerning their usage, behaviors and consequences (Kang et al, 2012). Users collaborate by forming teams and sharing ideas and workload together. Students are assigned business process activities and are equally responsible for the completion of the process (Grabis, Sandkuhl and Starner, 2015)

**Project-based**
Students work on a project over an extended period of time – from a week up to a semester – that engages them in solving a real-world problem or answering a complex question. The primary objective of this method is to allow students to enhance their collaborative, technical, methodological and cognitive skills on ERP systems through participation in challenging and interdisciplinary ERP projects (Gerogiannis and Fitsilis, 2005). They showcase their knowledge and skills by presenting their research or product to a real audience. Consequently, the participants develop critical thinking as well as deep content knowledge, creativity, collaboration, and communication skills. "Project Based Learning unleashes a contagious, creative energy among students and teachers" (PBLWorks, 2019).

**Simulation Games**

Teachers have a real challenge when it comes to teaching business processes, with ERP software in the classroom, since the business students often do no possess the IT skills required to operate an ERP software application (Léger, 2006; Seethamraju, 2011). The participants of a simulation game work in a training environment on realistic problems and tasks leading to experience with using an ERP. "Active learning and hands-on activities enhances the understanding of ERP systems and the role they can play in an organization" (Scholtz et al, 2017). The only noticeable drawback is that sometimes, important aspects of the learning programme are omitted. Serious games are a tool used for teaching that is authentic and student-centric. However, having these attributes may also be the main cause of diverting the students' minds away from the relevant concepts being taught. For instance, the students may be focused more on winning the game rather than learning the concepts of the game (Horng and Wu, 2016). Figure 1 below shows the number of papers considering ERPSim for the research compared to other types of simulation games.
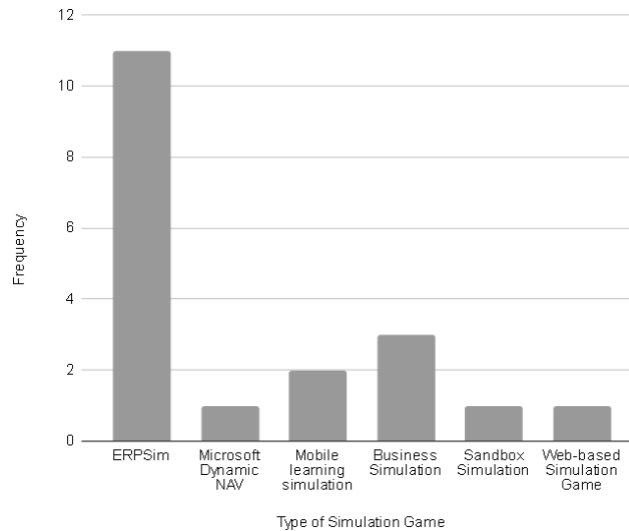


**Fig. 1 - Types of simulation game**

From the 24 papers that were retained, it was found that ERPSim has been adopted with a large margin coupled with the fact that many research classify simulation games as a very good method for ERP teaching (Leger, 2006). Furthermore, ERPSim is a commercial simulation game which is not feasible in developing and underdeveloped countries due to financial constraints.

The research suggests that the use of simulation games in ERP teaching is potentially the move to make towards having better ERP professionals in the near future. The simulation games approach focuses on hands-on practice which will greatly improve the quality of ERP education compared to traditional methods (Knigge et al, 2017).

### 4.3. Types of simulation games in ERP teaching

In this section, RQ2 will be addressed. Upon analyzing extant literature, simulation games or applications such as ERPSim, Microsoft Dynamics NAV and mobile-learning simulation applications were identified. For each type of simulation games or applications, the advantages and results were identified. Figure 2 below shows the occurrence of each teaching methods in the 24 papers analyzed.
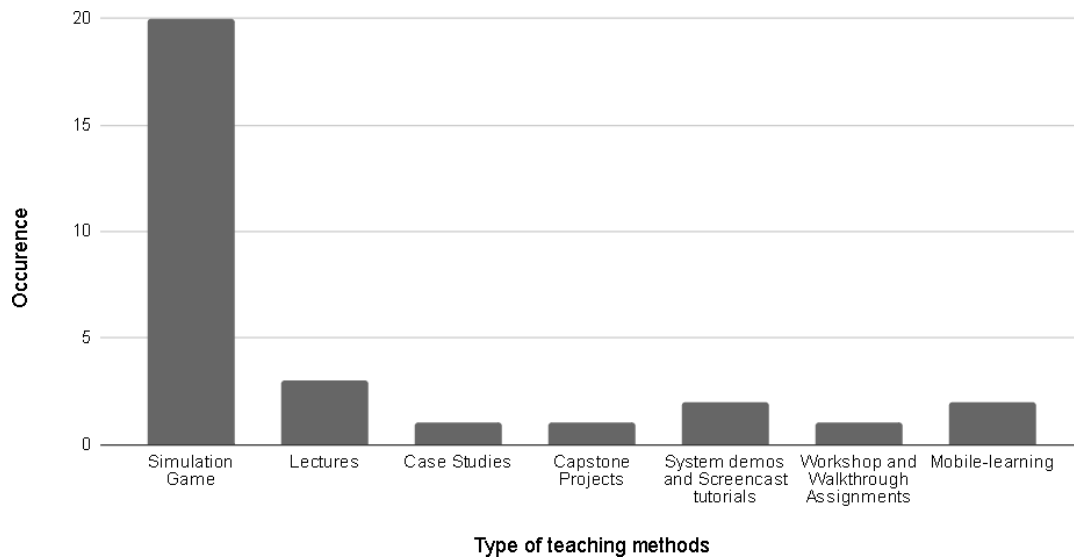
**Fig. 2 - Occurrence of teaching methods**

According to the research, it was found that simulation games remains the teaching method on which major and most research were conducted. Simulation gaming is proving to be a very effective method and is being adopted by many, with the view of increasing effectiveness in their curricula.

**ERPSim**

ERPSim is a simulation game developed by HEC Montreal in Canada. The ERP system used in ERPSim is mySAP ECC 6.0 (Léger et al, 2010). ERPSim aims to improve the understanding of the enterprise system concept, to get students used to integrated companies, and to acquire or improve expertise in using ERP software (Léger, 2006). According to (Setyono and Arnandiansyah, 2018), ERP Simulation Game is effective when used in an ERP learning curriculum. ERPSim allows students to better understand ERP concepts and at the same time allow students to work in teams which promote group decision making. According to (Utesch, Heininger and Krcmar, 2016), ERPSim can also be used as a web-based learning tool. However, there are also some barriers which obstruct the use of ERPSim as a teaching tool. The fact that ERPSim is a commercial product means it is not affordable by some institutions. Additionally, according to (Horng and Wu, 2016), the participants may divert from the primary objective of the gamification and may just be interested to win rather than understand the concepts.

**Microsoft Dynamics NAV**

A new concept to teaching called "The ERP challenge" was developed to provide students with practical experience with a real ERP system (Microsoft Dynamics NAV). The ERP challenge comprises of three aspects namely: an e-learning platform, the actual ERP system and a real world company case simulation game. The findings indicated that 93% of the participants would volunteer to invest additional work in order to obtain an official Microsoft certificate. Furthermore, the study indicated a high interest in the SAP4Students self-learning module offered by the University of Duisburg-Essen (Schwade and Schubert, 2016). However, it is important to note that Microsoft Dynamic Nav is not open sourced.

**Mobile-learning simulation app**

M-learning can be defined as a tool or service that helps acquisition of knowledge by providing educational content and electronic information independently of time and location (Oberer and Erkollar, 2013). Teaching ERP concepts using mobile devices have several benefits. "Most mobile devices have a lower cost of acquisition compared to most desktop PCs, including the overhead costs of maintenance" (Manji et al., 2015).

Factors influencing the success of m-learning of ERP systems are mobility, communication, coordination, content, which can be adapted to different devices and level of knowledge of learners and application of learning in simulated or real environments (Scholtz and Kapeso, 2014). However, according to (Scholtz, Kapeso, and de Villiers, 2017) the study showed that making use of m-learning does not guarantee success and taking into consideration the benefits of m-learning, the system needs to be properly and optimally designed. The increased rate of use of smartphones surely is a sign of effectiveness if the simulation games are implemented on a mobile platform. Nevertheless, having a good method or resource to teach about ERP concepts is usually not enough to gain an edge over traditional teaching methods if the large number of challenges faced during ERP teaching are not considered adequately and countered.

*4.4. Challenges faced for ERP Teaching*

Considering RQ3, a thorough analysis of each research paper was done to be able to learn about the challenges that are faced during the teaching of ERP. While simulation game was found to be the most effective teaching method, there are still challenges linked to this method of teaching. The challenges are categorized into three main topics namely teaching challenges, student challenges and simulation game challenges.

**Teaching Challenges**

A challenge faced during ERP teaching is to develop ERP curricula which demands a high level of planning and preparation with high technology support (Chen, Rai and Rienzo, 2011). The time and effort which is needed to create and update the teaching materials which includes technology changes is also a barrier towards ERP teaching. The difficulties faced by some universities include the installation and maintenance of ERP systems and license fees. The teaching process of complex concepts such as ERP systems requires a high level of in depth knowledge of the various functionalities and use of the system. Additionally, the problem that such systems are very difficult to install and maintain needs to be addressed. (Schwade and Schubert, 2016). The real challenges can be shortlisted as a shortage of relevant teaching resources, of faculty with relevant knowledge and a shortage of funds to set up an ERP (Mwalemba, 2019).

**Student Challenges**

Students face several challenges when it comes to learning ERP concepts. One of the challenges is lack of motivation. "Behavioral intention to use ERPSim in business process learning is positively correlated to learning outcomes" (Setyono and Arnandiansyah, 2018). When a student is willing to gain knowledge using ERPSim, the result will be positive. This means that if the student is unmotivated s/he will not be able to learn. Different students have different learning styles which can be a barrier to ERP teaching. Another challenge is the cost of the ERP course. Many students may not be able to afford the cost of ERP courses. In Africa, many students could not afford the SAP TERP10 certification. Students, previously could not afford ERP programmes such as TERP10. With the help of ESEFA, steps are being made to overcome the financial challenge (GRUNER, 2016). The ESEFA program is now available in more than 12 universities in countries such as South Africa, Kenya, Nigeria, Namibia, Zambia, Uganda, Botswana, and Mauritius (Mwalemba, 2019).

**Simulation game challenges**

Using simulation game as a method to teach ERP has several challenges. ERP simulation games require license fees. The amount of finance required to gather materials and resources to implement a course of that kind outweighs the benefits from a practical enterprise software course (Schwade and Schubert, 2016). Hence, universities will have to pay for the simulation games. Some participants may also lose focus of the primary objective of the game and only focus on winning rather than understand the concepts of ERP (Horng and Wu, 2016). Also, it is challenging when some students prefer to work alone instead of collaborating in groups. If team members decide to not collaborate and instead work individually, they are susceptible to having less communication within the team, thereby lowering the rate of productivity and causing a low level of motivation within the team members (Darban et al., 2016). This will make the understanding of ERP concepts difficult as the students are not playing as a team.

## 5. Discussion

This section is devoted to the discussion about the findings when the review was conducted and respective RQs were addressed. The advantages and disadvantages of each teaching method and challenges faced while using simulation games and different types of simulation games are listed and appraised. Table 2 below shows the pros and cons of each teaching methods.

**Table 2: Pros and cons of teaching methods**

| **Lectures** |
| --- |
| **Pros:** A large amount of materials and information can be delivered |
| **Cons:** Limited attention span of students. Learning is passive. |
| **Case Studies** |
| **Pros:** Simplification of otherwise complex concepts. Exposure to real life situations and a trigger for analytical and logical thinking. |
| **Cons:** Time consuming to teach. Difficult to find a case study relevant to study. Case studies are perceptions of one person only. |
| **Roleplay** |
| **Pros:** Encourages social skills. Prepares for real life situations. Teachers get a concrete surety of skill level of students. |

| | |
|---|---|
| **Cons:** Some students are not comfortable and restrict themselves during roleplay. Usually not taken seriously by students. | |
| **Teamwork** | |
| **Pros:** Students understand better when cooperating and sharing views with peers and students can perform better when supported by other members. | |
| **Cons:** Some members may contribute a lot while others do not. Some students are not comfortable working with groups. It is difficult to perform individual assessment. | |
| **Project based** | |
| **Pros:** Students are fully engaged. The learners retain content by memorization due to contextual nature of the learning method. | |
| **Cons:** It is time consuming and it requires dedicated and hardworking minds. | |
| **Simulation games** | |
| **Pros:** The learning process is personal to each individual. It caters for different styles and speeds of learners. It connects to real-life situations. It requires effort, thinking, reflection and spontaneous strategies which help in decision making. | |
| **Cons:** There is frequent omission of important details. | |

Findings indicate IS curricula needs to effectively meet the needs of the organizations, (Hopkins and Foster, 2011) Organizations consider traditional teaching methods as obsolete. Teaching effectiveness needs to be improved (Hu and Zhou, 2011). (Setyono and Arnandiansyah, 2018) rightly emphasized that a student should be motivated to grasp whatever is being taught. Different teaching methods were compared with their respective pros and cons. Simulation gaming was found to be very effective in terms of retention rates. According to several studies (Hwang and Cruthirds, 2017; Léger, 2006; Munogee, Moctaram and Cadersaib, 2019; Ruhi, 2016; Setyono and Arnandiansyah, 2018), simulation games are a very effective method for ERP teaching, as justified by the students developing a more positive attitude towards ERP and facilitating their understanding. In line with this, simulation games can be advantageous to encourage students to learn ERP by easing their understanding. Figure 3 below shows the types of games and how serious games stands out with their features enabling them to be used as a teaching method.
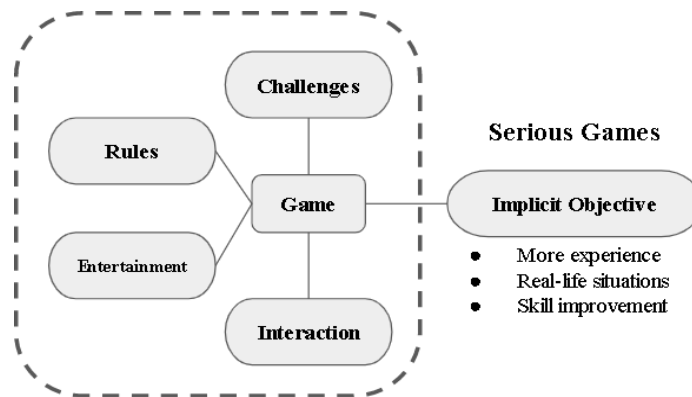


**Fig. 3 - Serious games**

Alcivar and Abad (2016) reported users using a gamified system for teaching indicates better performance and according to (Léger, 2006), students who took part in the game showed better assimilation of ERP concepts than those who did not and 93% of them got their SAP certification. SAP ERP is applied successfully to increase study skills (Utesch, Heininger and Krcmar, 2016). According to Horng and Wu (2016), teaching ERP contents using a simulation game has greater involvement rates from the pupils. Going by its plethora of advantages; its personalized learning process, its spontaneous trigger for critical and analytical thinking, the real life situation involvement and the own-pace approach catering for all levels and all types of students, it largely leaves behind the other types of teaching methods. Nisula and Pekkola (2012) concretized an environment allowing learners active learning to manage SME operations, which caters for SME employees. Based on the results from Cronan and Douglas (2015), the use of a simulation game as a training method for ERP teaching

showed a high increase in the knowledge of students about how to manage an ERP with SAP skills. "The ERP Challenge" (Schwade and Schubert, 2016) is known to be a good medium to provide ERP skills to students but the feasibility of a hosted service needs to be carefully examined.

Implementing any teaching method is no easy task, as it is linked to various challenges. Making use of a simulation game is very plausible but we cannot neglect the obvious drawbacks of this technique, represented by the fact that the majority of the time, there is a large omission of certain important aspects, as a single game cannot accommodate all details of the concept. To teach a person a concept, rigorous planning requiring lots of time and effort is needed. There is a high rate of ERP systems adoption in enterprises, therefore the use of technology in ERP teaching is a must but acquiring licenses to use several tools to facilitate teaching is costly. Implementing, using and maintaining such equipment requires a high level of knowledge about ERP systems and ERP teaching which is quite scarce. Curbing the serious issue of students often lacking motivation in class is a big challenge, and the implementation of simulation games intends to reduce this problem. Using simulation games brings out the competitive nature in a person and students will generally drift away from the main objective of the game that is learning, and tend to focus more to be on the winning side as explained by (Horng and Wu, 2016). As most simulation games require people working in a team and sharing responsibilities, some may not be comfortable with this idea and would be more agreeable to work independently. In the same context, the courses related to ERP tends to be very expensive, therefore having an open-source software simulating modules of an ERP systems is a lot more convenient for students. Nevertheless, the use of simulation games for teaching will be bringing with it some challenges. The evident license fee is already an issue that many universities refuses or hesitates to purchase. As our research determines (Table 2), most research and experimental process has been conducted in developed countries such as Germany, USA and Canada, omitting developing countries. The fact that simulation games are proprietary and the lack of adequate resources serve as a constraint where the developing countries have a hard time trying to teach about ERP concepts, especially when they are restricted to using traditional and ineffective methods. Mwalemba (2019) emphasizes on the challenges faced by most countries in Africa. Being undeveloped or developing, countries face a lack of relevant teaching resources, a shortage of experienced staff and a lack of funds to set up an infrastructure for ERP. Having an open-source simulation game will help in removing the obstacles faced by the students. An open-source simulation for the purpose of teaching and learning about ERP would potentially help immensely and the educational institutions could profit from the contribution of those developing countries as demonstrated with some students being able to afford ERP programmes within Africa (Mahanga and Seymour, 2016). Furthermore, teaching ERP concepts using m-learning has advantages such as independence of time and location and m-learning helping to provide location dependent educational content with the use of GPS and GSM technologies (Bajpai, 2011).

Evidence shows that making use of simulation games alone brings less benefits than when they are embedded as part of a course (Ely and Sitzmann, 2011). There has been limited research done on this aspect based on the studies which have been reviewed. Directions for future research can include how to combine different teaching methods and evaluate how successful they can be when embedded together. Table 3 below shows how different authors have tried to embed several teaching methods in the aim to help in ERP teaching. Therefore, further research could entail in experimenting with a number of teaching methods including serious games for ERP teaching.

**Table 3: Combination of teaching methods**

| Author and Year | Combination of teaching methods |
|---|---|
| **Deng, Yin and Tu (2009)** | Internship in software companies, Extracurricular activities Experiments in the lab |
| **Hu and Zhou (2011)** | Principle experiment, Sandbox simulation experiment and Application test |
| **Nisula and Pekkola (2012)** | ERP systems as a learning environment, practice enterprise model and business simulation games. |
| **Ruhi (2016)** | Workshops and walkthrough assignments, lectures and seminars, system demos, case discussions, capstone projects, interactive assessments and screencast tutorials. |
| **Adelsberger et al (1999)** | Simulation game embedded in existing methods of teaching |

## 6. Conclusion

After an in-depth analysis of existing works highlighting both the different ERP teaching methods and their challenges with respect to the research questions, it has been presumed that using simulation games as a teaching method is very effective and is liable to potentially reduce the present complication when it comes to ERP teaching. Other teaching methods have proven to have slightly higher success rates when it is open-source. The main challenge of ERP simulation games that was identified was the cost of license fees. It was found that commercial products such as ERPSim was used mostly by developed countries.

Potentially to address the problem of affordability, an open source simulation game can be proposed. The game should take into consideration the six levels of Bloom's Taxonomy representing an ascending knowledge retention within the student. For developing countries with resource constraints, an open source simulation game will help massively in ERP teaching. For example, a mobile-learning simulation app can prove beneficial and therefore the next phase of this study will experiment on this aspect.

## 7. References

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