ERP-based simulation as a learning environment for SME business

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A B S T R A C T

Small and medium size enterprises (SMEs) lack an adequately skilled workforce and managers, since university education generally focuses on large enterprises and their needs. Complementary skills needed by SMEs have been of lesser interest even though several approaches, methods and environments could be utilized. For example, enterprise resource planning systems, business simulation games and practice enterprise models all support the learning of complementary and practical skills the SMEs desperately need. Yet all these learning environments are problematic as they approach business phenomena from narrow viewpoints. In this paper, we present a learning environment that merges these three environments so that they complement each other, allowing the learning of the daily management of SMEs. In this way future employees are better equipped when they enter the labour market, being ready to contribute to the business of SMEs.

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1. Introduction

Small and medium size enterprises (SMEs) are major employers and contributors to the market economy (European Commission, 2010; McGibbon & Moutra, 2009). Small businesses also often drive innovation and change (Kelley, Bosma, & Amóros, 2010). Under these circumstances the SME sector has been seen as "decisive for the future prosperity of the EU" (Commission of the European Communities, 2008; see also Robertson, 2003). Such prosperity is actualized in China and its phenomenal growth led by SMEs (Li, Zhang, & Matlay, 2003).

The expanding SME sector has a need for competent management. Future SME managers and also employees, need to have

"transversal and generic skills [that] will be increasingly valued on the labour market: problem solving and analytical skills, self-management and communication skills, the ability to work in a team, linguistic skills and digital competences." (European Commission, 2008).

Management educators have also brought up the need for cross-functional integration in the business school curriculum (Crittenden & Wilson, 2006; Seethamraju, 2007). Yet it is argued that higher education institutions are not equipping their graduates with adequate skills that companies, specifically SMEs, require from their managers (Holden, Jameson, & Walmsley, 2007; Martin & Chapman, 2006).

According to Grabinger and Dunlab (1995), effective learning requires rich knowledge structures with many contextual links to help learners address and solve complex problems. They argue that it is not easy to transfer learning between people. Instead, learning is more likely to be transferred in rich, complex learning situations where learners take an active role in forming new understandings. Their learning is a collaborative process into which the learners bring their own needs and experiences. Skills and knowledge are thus best acquired within realistic contexts where the learners can rehearse and learn the outcomes that are expected of them under realistic conditions.

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A learning environment is a combination of physical surroundings, psychological or emotional conditions, and social or cultural influences affecting the learner in an educational enterprise (Hiemstra, 1991). Grabinger and Dunlab (1995) define "rich environments for active learning" as comprehensive instructional systems that promote study and investigation within authentic contexts and cultivate an atmosphere of knowledge building learning communities. Such environments utilize dynamic, interdisciplinary learning activities that promote high level thinking processes through realistic tasks and performances.

In this paper, we will present a learning environment that supports the learning of the practical management skills needed in SMEs. It is based on experiential learning theory, which assumes that knowledge cannot be transferred from teachers to learners. Instead, learning is an active social process where knowledge and meanings are created by the learners and their interpretations and experiences of the world, and by their interactions with other people. Experiential learning further views learning as a continuous cyclical process with four steps: concrete experience, observing and reflecting that experience, forming abstract concepts and generalizations from the observations, and experimentation with new hypotheses (Kolb, 1984).

Several learning environments have been utilized in business education for providing practical skills. Enterprise resource planning (ERP) systems are widely used to support experiential learning (Davis & Comeau, 2004; Hayen & Andera, 2006; Jensen, Fink, Møller, Rikhardsson, & Kræmmergaard, 2005; Johnson, Lorents, Morgan & Ozmun, 2004; Targowski & Tarn, 2006). Business simulation games are used both in conjunction with ERP systems and as separate teaching environments (Faria, Hutchinson, Wellington, & Gold, 2009). Also another experiential learning environment, the practice enterprise model, aims at teaching entrepreneurship skills through a business-to-business network where the learners run simulated SME companies (Kallio-Gerlander & Collan, 2006). In this paper we suggest that these three learning environments should be combined to support the development of practical skills needed for managing SME business processes.

The paper is organized as follows. It starts by describing a profile of industry-relevant business competencies. Next, it gives an overview of the three learning environments and their learning objectives: educational ERP system implementations, business simulation games and the practice enterprise model. The paper continues by introducing the integrated learning environment that combines the three described environments into a single learning environment. Finally, the paper presents an example where the integrated model is used. The paper ends with discussion and limitations.

2. Profile for SME business competences

Jackson (2009) has summarized industry related competence requirements for business graduates. Fernald, Solomon, and Bradley (1999) have identified the skills that SME managers need in their works. Particularly for SME, their requirements underline the importance of hands-on marketing, financial management and procurement, while accounting, international trade and human resource (HR) skills are of lesser importance. A synthesis of Jackson's and Fernald's findings is presented in Table 1.

These requirements are well aligned with the other business skill requirements (European Commission, 2010). However, there is a gap between what is expected by SMEs and what is taught by the universities. This is conceptualized to be the issue that graduates need to be productive immediately after they get their degrees, while in larger companies they can be trained. Small companies do not have the infrastructure to organize training and personal development for prospective employees, but those skills need to be provided by universities (Woods & Dennis, 2009). Hence, as Westhead and Matlay (2005) state, SMEs are reluctant to hire business graduates because of the cost and work suitability, the extensive need for assistance and supervision, and concerns regarding their lack of flexibility and practical skills.

Martin and Chapman (2006) argue for a specialized SME syllabus that would improve skills in business management, marketing, finance, production, IT and HR management. These kinds of multi-management skills would especially be needed in the micro-business sector with very limited resources. In addition to management skills, SME owner-managers emphasize attitude, communications and interpersonal skills, motivation and self-management, the ability to network, and practical experience. According to McLarty (2000), SME managers implied that

> "personal attributes took the graduate to a certain level of acceptability, but business skills made the graduate employable" (p. 621),

thus emphasizing the disciplinary expertise in Table 1.

3. Business learning environments

In this section we will review three different learning environments that address the learning objectives identified earlier.

3.1. ERP systems as a learning environment

The utilization of ERP systems in business learning began in the late 1990's (Becerra-Fernandez, Murphy, & Simon, 2000; Bradford, Vijayaraman, & Chandra, 2003). ERP systems and simulations based on them are often used in teaching supply chain management, marketing, HR, and accounting (David, Maccracken, & Reckers, 2003; Hawking, Foster, & Bassett, 2002;

Table 1
Profile for SME business competencies (adapted from Jackson, 2009 and Fernald et al., 1999).

Requirement	Description
1. Task requirements	
Application and use of technology (IT, etc)	Basic IT skills, the ability to use technology interactively
Problem solving	Using knowledge and facts to solve workplace problems
Decision management	Ability to make decisions in a business context using available information, bringing a multidisciplinary approach to decision making and making decisions under pressure
Operating in organisational environment	Understanding of corporate culture and the employee's role in the organisational environment
Multi-tasking	
Project management	
Meeting management	
Coaching	Instructive feedback, ability to help others learn
2. Core competencies (personal characteristics)	
Ethics and responsibility	Understanding of ethical and professional behaviour, commitment to professional values in practice, maintaining integrity, trust and respect for diversity
Written communication	
Information management	Capacity to access and research information, ability to use knowledge and information interactively
Operating globally	Global awareness of cultures and economics, language skills, international trade knowledge
Intellectual ability	Ability to diagnose problems, find alternative solutions
Numeracy	Ability to use numbers at an appropriate level of accuracy
Lifelong learning	Continuous professional learning, capacity for reflection on practice, willingness to learn from others
3. Disciplinary expertise	
- Marketing	Increasing sales, promoting business, market research
- Financial management	Financial analysis and control, obtaining capital, etc.
- Procurement	Obtaining contracts, inventory management
- Accounting	
- HR	
- Litigation and tax law	
- Risk management	
- Quality management	
- Integration of disciplines	
Business acumen	
Work and life experience	Understanding key drivers for business success
Professionalism, work ethic, accountability	
4. Distinguishing competencies (personal characteristics)	Effective and structured work habits
Oral communication	
Team- and interpersonal skills	
Organisational skills	
Continuous improvement management	Goal-focus, time and priority management, coordination of activities
Meta-cognition	Ability to identify opportunities for improvement and to give effective feedback
Cultural and diversity management	General strategies for learning, thinking and problem solving, self-awareness, reflection
Autonomy, self-efficacy	Ability to learn from and collaboratively work with individuals representing diverse cultures, races, ages, gender, religions, lifestyles, and viewpoints
Critical thinking	Ability to defend and assert one's rights, interests, responsibilities and needs, ability to work without supervision, to accurately understand one's own identity and personal capabilities
Leadership skills	
Adaptability & change management	
Emotional intelligence, political skill, reliability	Openness to new ideas, capacity to learn and change, flexibility
Stress tolerance	Self-awareness, social awareness, self-management and relationship management, the ability to effectively understand others and to influence others' behaviour to enhance one's personal and/or organizational objectives
Attention to detail	
Entrepreneurship	
Creativity	Vision, adaptability, persuasiveness, confidence, competitiveness, risk-taking, honesty, perseverance, discipline, organisation and understanding Demonstration of originality and inventiveness, communicating new ideas to others, integrating knowledge across different disciplines

Hawking, Ramp, & Shackleton, 2001; Seethamraju, Leonard, & Razeed, 2006; Shoemaker, 2003; Springer, Ross, & Humann, 2007; Strong, Fedorowicz, Sager, Stewart, & Watson, 2006). Many ERP system providers, such as SAP, have thus implemented university alliance programs, where they provide software and support, as well as access to materials at reasonable or no cost (Bradford et al., 2003; Nelson, 2002; Rosemann & Maurizio, 2006; Winkelmann & Leyh, 2010).

ERP systems are utilized as an integrating factor for the whole curriculum (Antonucci, Corbitt, Stewart, & Harris, 2004; Cannon, Klein, Koste, & Magal, 2004; Hayen & Andera, 2006; Jensen et al., 2005; Johnson et al., 2004). Joseph and George (2002) suggest ERP systems can be combined with learning communities, where students and faculty are organized into smaller cross-functional groups to work on specific issues. These learning communities form a learning environment that could decrease the redundancies between functional areas and enable the students to obtain a more complete understanding of business processes. Rather than being just tools, ERP systems correspondingly have the potential for more effective pedagogy and new pedagogic innovations.

The main learning objectives in ERP system learning environments are business process orientation, improved understanding of business functions and their integration, increased understanding of enterprise systems and improved IT skills (Davis & Comeau, 2004; Hawking, McCarthy, & Stein, 2004; Targowski & Tarn, 2006). This is often concretized through ERP-based simulation games, which focus on creating situations for managerial decision making (Draijer & Schenk, 2004; Hajnal & Riordan, 2004; Léger, 2006; Pittarese, 2009; Shtub, 2001; Wagner, Najdawi, & Otto, 2000). Seethamraju (2007) describes the key learning objectives of an ERP-based simulation game as the following: to develop business process orientation, to teach ERP skills, and to provide business students with an authentic and exciting student-centred learning experience that is integrative and motivates them to learn. The aim is to offer students an information-rich environment, where the graduates work in groups and make day-to-day managerial decisions.

As noted, ERP systems are found to be useful in learning business processes. For instance, learners learn IT skills that are required in business life and get a feel for the business environment (Jensen et al., 2005). The learning experience puts the learner at the centre and gives hands-on experience (Nelson, 2002; Noguera & Watson, 2004). For example, learning SAP software skills with hands-on work on industry-standard software was considered a better learning experience than a routine theoretical teaching of ERP systems (Hawking et al., 2004). Yet the complexity of large ERP systems makes it hard to understand the links between information, business processes, and managerial decisions, and further to distinguish the differences between the limitations of the software functionality and key managerial requirements (Seethamraju, 2007). This, and the fact that ERP system adaptation in SMEs is low compared to large companies (Buonanno, 2005), also shapes enterprise systems education in universities. For instance, Ask, Juell-Skielse, Magnusson, Olsen, and Päivärinta (2008) suggest that smaller mid-market enterprise systems should be used as learning environments instead of large enterprise-wide systems. This would then also support SMEs with limited resources, as their ERP systems are also smaller, cheaper and less complex than ERP systems used by large companies.

Despite the benefits of ERP systems in education, their focus on companies' internal operations, systems, and processes (Davis & Comeau, 2004) is limiting. They lack the external connections to other companies that are important for SMEs operating with limited resources. Also people skills are not emphasized in ERP system learning environments. Thirdly, learning with ERP systems is usually carried out with pre-planned cases and exercises (Bradford et al., 2003). Learning situations tend thus to be static and predictable, not mirroring the dynamics of real-life business situations.

3.2. Business simulation games

Business simulation games are open-ended evolving situations that have many dependable variables. The goal for all participants is to take a role and react to emerging situations. As these are games, their objective is to win (Gredler, 2004).

Business simulation games have built-in rules and roles that support the learning of real-life-like situations without real-life risks (Leemkuil, de Jong, & Ootes, 2000). The learner is a functional component of the game and takes responsibilities in a fluid situation. Business simulation games are simplified mathematical abstractions of business situations or sequential decision making exercises of different business operations, some focussing on top management decision making. They are based on business administration theories (Goosen, Jensen, & Wells, 2001).

Business simulation games can be classified as 'top management' games, functional games and concept simulations (Wolfe, 1993). 'Top management' games approach business operations as management activities. They emphasize strategy formulation and management decision making rather than learning the day-to-day activities on a practical level (Faria et al., 2009). Functional games focus on specific business functions on a tactical and operational level, while concept simulation games cover only a few business operations. Fortmüller (2009) lists the general learning objectives for business games:

1. the ability to use already acquired specialized knowledge in specific problem situations
2. the ability to combine activities acquired separately into a systematic sequence of action
3. the ability to reconstruct basic correlations and processes, and
4. the ability to assess the interactions and consequences of an individual's and others' activities.

These objectives correlate with the competences described in Table 1: problem solving, decision management, operating in an organisational environment, information management, intellectual ability, critical thinking, emotional intelligence, and creativity. Additional objectives are business ethics (Teach, Christensen, & Schwartz, 2005), stress tolerance, and time management (Lainema, 2003).

The main challenge of business simulation games is their complexity. In fact, in order to introduce uncertainties, risks and reality, they need to be complex. On the other hand, when the level of complexity increases, they become difficult to manage

and play. Thus, a balance between these has to be found, though the simulations often tend to be overly simplified models of reality (Goosen et al., 2001). Also, business simulation games contain pre-planned scenarios that are based on some business theories. The choice of which theories the simulation game is built on may thus give different learning outcomes (Goosen et al., 2001).

Business simulation games simplify the management of time. Instead of focussing on a continuous flow of events, there are "business episodes" where the decisions are made. Activities may take place "once a month", which does not resemble the ideal of "react to the existing situation" (Lainema & Makkonen, 2003). Also, several years might be compressed into a few months. On the one hand, this kind of fast-tracking puts pressure on the learners. On the other hand, it reduces the feeling of reality. From this perspective, the games should adapt the day-to-day character of continuous processing and decision making.

In many business simulation games, the learners and their businesses are competing instead of having mutual business transactions. Here, the interactions mainly take place with the game engine. Interactions take place within one team but rarely between the teams, thus decreasing the chances for irrational and unexpected events triggered by human behaviours.

3.3. Practice enterprise model

A practice enterprise (also known as a practice firm, training firm, virtual enterprise, virtual business) is a mixture of experiential learning and role-playing. Its central concept is a virtual company that resembles a real one in its form, organization and function, but without monetary transactions or exchange of physical products. The enterprise trades with other enterprises and manages its internal activities and processes (Europen, 2010; Gramlinger, 2004; Miettinen & Peisa, 2002).

Practice enterprises are run by a team of learners and guided by an instructor. The instructor cooperates with the practice enterprise centre that provides the infrastructure (banks, tax office, electricity providers, etc.). The learners and instructors create learning situations dynamically. For example, the instructor can utilize the infrastructure provider to create unexpected situations such as customer reclamations to student companies, expecting appropriate reactions and responses (Collan, 2006; Kallio-Gerlander & Collan, 2006).

The practice enterprise model aims at understanding SMEs and entrepreneurship in general (Costea, 2010; Gramlinger, 2004; Santos, 2006). The model gives the learners an opportunity to apply their knowledge in practice, and take responsibility for finding solutions to emerging problems (Peltonen, 2008). Human interaction within the team and between the teams aims at developing interpersonal skills (Kallio-Gerlander & Collan, 2006). Practical issues such as running the business operations enable learning not only about different disciplines and business processes, but also how they are integrated (Costea, 2010). Emerging unpredictable events illustrate risks and how they are managed as well as practice problem solving and stress tolerance (Kallio-Gerlander & Collan, 2006).

Yet the practice enterprise model also has its challenges. It is highly dependent on the participants and their skills and activity levels. The amount of trading varies both in quality and quantity (Gramlinger, 2004; Santos, 2006). Consumer markets and raw material markets are missing, making most practice enterprises business-to-business companies that trade with each other (Miettinen & Peisa, 2002; Tramm & Gramlinger, 2002). Due to the lack of action, the network starts to lose momentum, reducing the learners' motivation.

The infrastructure lacks credibility. This is because infrastructure providers do not have enough resources to support extensive, realistic business environments. The learners lose the sense of reality and serious engagement with the work. They know that they are playing, being free to make unconstrained solutions.

The practice enterprise model also presents challenges to the instructor. Since the company operations are carried out manually, the instructor has to rely on the information that is reported by the learners. Those reports mirror the learning situation and what has been learnt. They do not necessarily correspond with the reality as they illustrate the learners' stories and their interpretations of the actual situation. Those stories might be genuine or fake, depending on the learners' motivations and intentions. This discrepancy may, for example, lead to a situation where the company sells goods that it does not possess or provides services without an adequate workforce.

4. ERP-based business learning environment

Learning with ERP systems tends to be software-centric, and focuses only on the company's internal processes. Business simulation games interact with an (artificial) outside world, but their interactions are quite limited and the dynamics of day-to-day business operations are missing. The practice enterprise model provides a network of other companies run by real people, but lacks both the momentum of business simulation games and the visibility of learner actions that are provided by ERP systems and business simulation games. Table 2 illustrates the relationship between the learning objectives of these environments and SME business skills.

Consequently, an improved learning environment can be formed by combining the best features from these environments (Nisula, 2012). This aggregate is presented in Fig. 1. The external layer of the learning environment presents a fictitious market area with a bank, wholesalers, infrastructure providers and government authorities operated by a systems administrator. This is represented through the web pages. Teams of learners operate simulated "student companies" in this environment. They trade with each other and with the administrator-run companies. The "student companies" manage their finances in an online bank and their internal operations in a small scale ERP system which forms the internal layer of the environment. The

Table 2

ERP, business game and practice enterprise and their learning objectives compared to the SME skill requirements.

	ERP	Business game	Practice enterprise
Task requirements			
Application and use of technology	Increased understanding of enterprise systems and improved IT-skills (Davis & Comeau, 2004; Jensen et al., 2005)		
Problem solving		Ability to use already acquired specialized knowledge in specific problem situations (Fortmüller, 2009)	Ability to resolve problems (Kallio-Gerlander & Collan, 2006) "[Ability] to supply adequate and coherent solutions for the needs of real companies" (Costea, 2010)
Decision management	Day-to-day decision making (for ERP-simulation game in (Seethamraju, 2007)	Decision making on enterprise or functional level (Goosen et al., 2001)	
Operating in organisational environment	Knowledge and understanding of business processes (Noguera & Watson, 2004)	Understanding company and industry's problems and opportunities (Lainema, 2003)	A more substantial understanding of business processes (Deissinger, 2007)
Multi-tasking			"[Ability] to decide and take on daily responsibilities in the finding of solutions for real day-to-day problems" (Costea, 2010)
Core competencies			
Ethics and responsibility		Sense of moral rectitude (Teach et al., 2005)	
Information management	Understanding how enterprise information is processed (Noguera & Watson, 2004)		
Operating globally	Understanding of the business processes and transactions that are carried out in the global business cycle (Jaeger, Rudra, Aitken, Chang & Helgheim, 2011)	International business (Thorelli, 2001)	
Intellectual ability, numeracy		Ability to combine activities acquired separately to a systematic sequence of action (Fortmüller, 2009)	Ability to resolve problems (Kallio-Gerlander & Collan, 2006)
Disciplinary expertise - Marketing - Financial management - Procurement - Accounting - HR - Litigation and tax law - Risk management - Quality management - Integration of disciplines	Several functional examples presented in the book Enterprise education in the 21st century (Targowski & Tarn, 2006)	A functional simulation's objective is to learn about a specific business function such as marketing, production or finance. (Faria et al. 2009)	Economic, business and technical skills (Gramlinger, 2004). Overview of the various departments, performing the tasks that each job requires (Costea, 2010)
Business acumen			"Understanding the final cohesion between means and ends" (Costea, 2010)
Work experience, life experience		Ability to reconstruct basic correlations and processes (Fortmüller, 2009)	Attitude towards work, job-readiness (Gramlinger, 2004)
Distinguishing competencies			
Team- and interpersonal skills		Ability to assess the interactions and consequences of an individual's and others' activities (Fortmüller, 2009)	Ability to work in groups (Kallio-Gerlander & Collan, 2006). Behavioural skills, whether inside the practice firm, or in dealings with other practice firms (Costea, 2010)
Organisational skills	Capability to see beyond the individual process or problem and view the issue holistically (Jensen et al., 2005)		Arganisational abilities and skills (Gramlinger, 2004). Ability to manage work (Kallio-Gerlander & Collan, 2006)
Cultural and diversity management		International business skills (Thorelli, 2001)	Social skills (Gramlinger, 2004)
Autonomy, Self-efficacy			"Students as groups are responsible for their own success." (Collan, 2006)

Table 2 (*continued*)

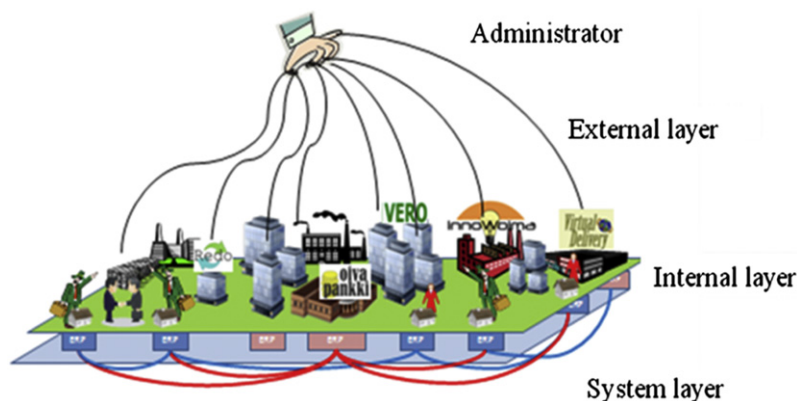|	ERP	Business game	Practice enterprise
Critical thinking		Ability to reconstruct basic correlations and processes (Fortmüller, 2009)	
Leadership skills		Social relationships (Lainema, 2003)	Social and organisational abilities and skills (Gramlinger, 2004)
Adaptability & change management		Ability to reconstruct basic correlations and processes (Fortmüller, 2009)	Ability to work under uncertainty (Kallio-Gerlander & Collan, 2006)
Emotional intelligence; Political skill, reliability		Social relationships (Lainema, 2003)	Social and organisational abilities and skills (Gramlinger, 2004)
Stress tolerance		Time management, working in today's dynamic world (Lainema, 2003)	Ability to work under uncertainty (Kallio-Gerlander & Collan, 2006)
Entrepreneurship			Entrepreneurship skills, entrepreneurial attitude (Kallio-Gerlander & Collan, 2006)

instructor may monitor the student companies' activities and business success through the reporting tools in the ERP system. The internal layer also contains a business game element that creates momentum by generating consumer demand. The system layer consists of the data traffic caused by transactions between the companies.

The above-described environment resembles a practice enterprise model which is running on an ERP system. Yet it does not guarantee a sufficient number of activities. The learner dominated business-to-business network thus necessitates a consumer market. This is provided by a business game element that creates automated consumer demand. Optimally, the automated consumer demand launches a sequence of events in the student companies' value chain. For example, a game-generated order of printed T-shirts makes the printing company order T-shirts from a retailer, which in turn needs to buy the shirts from a clothing factory, which buys the material from a textile factory. This kind of chain of routine business operations forces the participants to repeatedly go through a concrete, experiential learning cycle.

Our proposed learning environment differs from a traditional business simulation game, as there are no pre-planned scenarios. The learning situations are built by the instructors and administrators. In addition to the routine operations, they create exceptional or unexpected situations, problems or other decision points. They may start an experiential learning cycle with a practical situation that requires action. Based on the student company's reactions, the instructor can decide on further steps. The instructor facilitates the learning cycle by observing and reflecting and forming abstract concepts and generalizations for students. Finally, he/she has the possibility to create a completely new situation where the learners can test the hypotheses created in the experiential learning cycle. The instructor has the freedom to utilize the learning environment in a way that best fits with the curriculum and the learners' abilities and interests.

5. Practical example: TAMK business curriculum

The learning environment described above is brought into action through the following example. The first version of the learning environment was piloted in Tampere University of Applied Sciences (TAMK) school of business and services in 2010–

Fig. 1. The combined model.

2011. Before the pilot, the practice enterprise model had been in use since 2005. The pilot was run with 170 business students in 17 simulated companies. Twelve teams were first-year BBA students and five teams second-year BBA students.

The student teams were given a business sector, where they were expected to start their business-to-business company. They created a business plan and negotiated funding for the business with the cooperation of bank credit managers. The students operated their simulated companies for an academic year. In addition to other business courses, they worked 4–8 h a week with their simulated companies. The curriculum was created, scheduled, and synchronized so that the courses in different disciplines were integrated into the life cycle of the simulated companies. Each team had an instructor who coached and mentored them in the learning environment.

The learning process followed Kolb's experiential learning model. The simulated student companies were divided into three departments of 3–4 students: marketing, logistics and accounting. Each student worked in a department for a period of time to gain practical experience. They were guided by their instructor to reflect on their experiences. They also followed lectures, which helped them to conceptualize their experiences and related it to literature. At the end of each period, the department roles were switched. The students had to brief each other on the tasks of their new departments. This made them test their skills in new situations, which, again, completed Kolb's learning cycle. Each student worked in all the departments during the academic year. This gave them a full overview of a company's business processes.

The learning environment was evaluated by measuring the learning outcomes of two groups: the 2009 class used the practice enterprise model while the 2010 class used the SME business learning environment (Nisula, 2012). The groups were given three tests during the academic year: a pre-understanding test to see whether the classes are comparable, a mid-term test and an end test. The end test was given at the beginning of the second school year in order to test the long term learning effects. The tests contained open-end and multiple choice questions that measured declarative knowledge in disciplinary expertise.

Fig. 2 shows the distributions of the scores with the pre-understanding test and the end test. The pre-understanding score distributions are approximately the same for both groups. They are similar also in the mid-term test. However, there is a significant difference in the end test: low and average students performed better in the simulation group than the practice enterprise group. It thus seems that the low and average students benefit from the new learning environment.

Also feedback on the learning environment was collected from both the students and the teachers (Nisula, 2012). The experiences from the pilot were generally considered good. The students appreciated the practical, hands-on approach, combining theory with practice and intensive teamwork. Criticism was directed towards the uneven distribution of work load, challenges in terms of simplification versus reality, technical problems and communication challenges. However, the university decided to continue using the learning environment after the pilot year.

6. Discussion

Our new learning environment answers the criteria for the "rich environment for active learning" (Grabinger & Dunlab, 1995). It puts the learners in an authentic context of a SME business. There, they become active participants of the learning process. They go through Kolb's experiential learning cycle with realistic, practical tasks. The cycle is repeated constantly so the learners may reflect their experiences and lessons learnt the next time the same situation comes up. The participant teams act as knowledge building learning communities that coach each other in the learning process.

In addition to simple task delivery, the learners are faced with unexpected, instructor created problems that do not always have simple solutions. Unlike business simulation games, which apply algorithms that are based on business administration theories (Goosen & Jensen, 2001), the environment facilitates specific learning situations that are derived from the instructor's or teacher's requirements. The learners need to apply what they have learnt in the courses in practical situations. This enhances their critical thinking and creativity. The instructor can train the learners' multi-tasking skills and stress tolerance by creating several simultaneous problems that need to be solved.

These skills meet the skill requirements in general business management and particularly in SME business. The basic business processes are similar. Problem solving, critical thinking, social skills and other competences are required in both SMEs and large companies alike. The learning environment can thus be utilized in learning management skills, regardless of the company size.
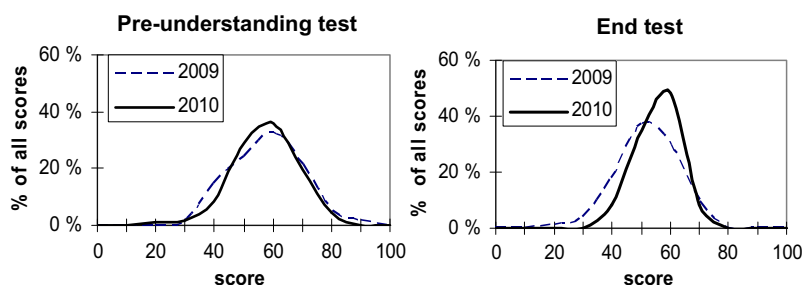
Fig. 2. The distributions of the scores with the pre-understanding test and the end-test.

7. Limitations and further study

The learning environment has not yet been thoroughly evaluated. Yet this challenge is also shared by other learning environments. For example, Anderson and Lawton (2009) argue that there has still been little objective research and information about what the students really learn from business simulation exercises. The same challenges exist with the ERP system learning environments and the practice enterprise model. The evaluation of the learning outcomes is an evident direction for future research.

Implementing this kind of broad learning environment changes the teachers' and instructors' roles and practices. They not only need to learn to use the technical environment but also adapt their didactic methods to it. Even though automation can be used to minimize manual work, the instructors should not be seen as mere operators of the system. Their focus should be in facilitating the learners' experiential learning cycle. In order to succeed, the learning environment relies heavily on the instructors' and teachers' cooperation. Even though the example of TAMK School of business and services had several years of experience of integrated teaching, these changes were still formidable. The new learning environment requires new skills from the whole faculty: in addition to the teachers' functional knowledge and coaching skills, they also need to learn a new mind-set. To study these changes and impacts on the teachers' and instructors' work are obvious topics for further research.

The learning environment has a similar risk of under-utilization as in a typical ERP system (Botta-Genoulaz, 2005). There is a lot of functionality, but the organization needs to have the motivation and the resources to put them to good use. How to do this is still a major question.

8. Summary

The SME business sector lacks an adequately skilled workforce. University education provides knowledge only of large enterprises. Operating a small company requires specific, more generic skills. This kind of practical part of business has been of lesser interest in universities.

Enterprise resource planning systems, business simulation games and the practice enterprise model have all been used as experiential learning environments to address this issue. However, they each have challenges, as they approach business phenomena from a specific, limited perspective. In this paper, we have presented a conceptual learning environment that merges these three environments. They complement each other, giving learners a rich environment for actively learning to manage SME operations. This equips students with practical skills that add value to their theoretical knowledge. When employed by SME companies, they will be able to contribute to the business from day one.

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