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UNIVERSITY OF EASTERN FINLAND

Itä-Suomen yliopisto

JOENSUU
Yliopistokatu 2
PL 111, 80101 Joensuu

KUOPIO
Yliopistonranta 1
PL 1627, 70211 Kuopio

SAVONLINNA
Kuninkaankartanonkatu 5-7
PL 86, 57101 Savonlinna

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Right to Pursue Doctoral Studies

On the proposal of the Doctoral Programme in Science, Technology and Computing 7 September 2016 the Dean of the Faculty of Science and Forestry has granted the following applicant the right to pursue doctoral studies and to complete the degree of Doctor of Philosophy (set in the Decree 794/2004) in the Doctoral Programme in Science,Technology and Computing in the Faculty of Science and Forestry.

Last name, First name(-s) and date of birth	Pelser-Cartsens,Veruschka 2 Sept 1976
Main subject	Computer Science
Placement unit	School of Computing Joensuu Campus
Title of the PhD thesis	Development of a Digital Board Game for Accountancy Students in South African Higher Education
Main supervisor	Dr Carolina A. Islas Sedano, Ubium Oy
Supervisor	Professor Markku Tukiainen, UEF
Supervisor	Professor Seugnet Blignaut (North West University, South Africa)

In case the research plan or supervisors change an approval to the modifications has to be applied from the Faculty.

The student shall register for postgraduate studies within one month after reception of this decision at the Student and Learning Services of the University (http://www.uef.fi/en/studies, on Joensuu campus Aurora building, Yliopistokatu 2 or on Kuopio campus Canthia building, 2nd floor, Yliopistonranta 1 C). When the registration for postgraduate studies is done for the first time it shall be done by using the form on the website http://www.uef.fi/en/opiskelu/lomakkeet. Instructions for registration are on the website http://www.uef.fi/en/studies/registration-and-right-to-study.

If the student is not satisfied with this decision she/he may make a written request for rectification to the Board of Appeal of the University of Eastern Finland as advised in the attached instructions. The request for rectification is to be delivered to the Registry Office of the University of Eastern Finland no later than 27 September 2016 by 3 p.m. The result of the selection shall not be altered to disadvantage of anyone who has been selected.

Elina Oksanen

Vice-Dean Elina Oksanen

For information of
Student
Supervisors
Doctoral programme

School of Computing Joensuu Campus
Student and Learning Services

Appendices
Personal study plan
Research plan
Instructions for making a request for rectification

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TEMPLATE FOR A PERSONAL STUDY PLAN – COMPUTER SCIENCE

Transferable Skills Studies, 8 ECTS

Course name	**SCOPE (ECTS)**	**Planned completion time**
1145011 Scientific Writing Skills	2	**2016**
1145015 Scientific Presentations Skills	2	**2016**
1155003 Research Ethics	1	**2016**
1145010 Research Supervision	1	**2017/2018**
8010053 Speech Communication for Post-Graduate Students	2	**2016**

Studies in the Discipline and Field of Research, 23 ECTS

Course name	**SCOPE (ECTS)**	**Planned completion time**
3621773 State-of-the-Art Technologies in Education	5	2017/2018
3621771 Other Postgraduate Studies of Computer Science: Orientation to the IMPDET-LE Studies	4	2017/2018
3621543 ICT for Development	5	2017/2018
3621513 Research Methods in Computer Science	6	2018/2019
3621711 Postgraduate Research Seminar	3	2018/2019
Total ECTS	**23**	

ABSTRACT

Accountancy teaching professionals should consider various factors when involved in Accounting Education. These factors include a new generation of students as well as a myriad of evolving changes in the business environment which in turn demand changes in the skills required from novice accountants entering the workplace. Accountancy teaching professionals often resist change to embark on new teaching and learning practises. It is therefore of the essence to think creatively in order to find practical solutions for the challenges facing Accountancy teaching professionals.

When thinking creatively about Accounting Education, a methodology whereby students' interests are enhanced in a stimulating environment, should be applied. Researchers argue that it is necessary to develop an augmented methodology for Accounting Education, addressing the shortcomings and criticism in a practical manner, and keeping the specific teaching-learning environment in mind.

Researchers suggest that games, especially board games, could creatively address many of these shortcomings. Teaching and learning techniques, such as the use of games in the classroom, could encourage, empower, inspire and motivate learners. This implies that Accountancy teaching professionals should act on opportunities to directly involve students by encouraging them to become more reflective, meta-cognizant, and effective in their learning. Addressing the following questions, may guide the Accountancy teaching professional to a teaching learning method applicable to unlocking course content through an activity, such as a board game:

- Does the Accountancy teaching professional know the students and their preferred teaching and learning method?
- How will the Accountancy teaching professional adapt or accommodate?
- What is the balance between the Accountancy teaching professional and student perspectives?
- How does the Accountancy teaching professional engage students in the classroom?
- How can active learning and curiosity be integrated into the classroom?

Each of these elements will be investigated during the research in order to identify factors from literature that could be included in an improved teaching methodology.

Students, in the School of Accounting Sciences, at the North-West University (NWU), are often unable to conceptualise the bigger picture of how law subjects, such as Entrepreneurial Law, fit into the accounting curriculum, resulting in a negative attitude towards the law subjects. The interaction between Accountancy teaching professional and student is primarily via the content where the lecturer teaches the content and the learner learns the content. There is, however, also a non-content based relationship (expectations, perceptions and motivation) between the lecturer and student that may influence the learning process. The interaction between student and Accountancy teaching professional via the content (curriculum, course, and program) takes place by means of the methodology (which includes the teaching methodology and assessment methods).

Students who study Entrepreneurial Law courses within the accounting curriculum, needs assistance in obtaining required soft skills and technical knowledge (how to apply theory). These students are unable to conceptualise the bigger picture of how law courses fit into the accounting curriculum, resulting in a negative attitude towards the law subjects. Developing a board game, to use in teaching Entrepreneurial Law within the accounting curriculum, will not only assist students, but also Accountancy teaching professionals to achieve the required outcomes.

1 INTRODUCTION

1.1 Identification of a relevant and solvable scientific problem

Debates over accounting education reform "are rarely debates at all" (Gray & Collison, 2002:797) because they fail to challenge the traditional tenets of the discipline and continue to prioritise the perceived technical needs of professional practice. The desire to produce rounded graduates with a broad range of general skills has largely been side-lined (notwithstanding a number of successful individual efforts). Moves to accept students from more diverse backgrounds into accounting studies have resulted in little practical change (Andon *et al.*, 2010:254). Academics retain considerable influence over setting course and subject structure, syllabus and curriculum design, selection of texts and materials, and implementation of teaching and assessment strategies including the setting and assessment of students' work (Boyce, 2004:566). Truly active learning can only exist if education is related to real life (Gramsci, 1971; Weil *et al.*, 2001). Within the accounting education environment, this means that students should be given the opportunity to develop their abilities to articulate clearly different perspectives, views, ideas, and concepts. Ultimately, students should be equipped to develop their personal and collective positions on issues, and to discover possibilities for activating those positions through praxis. These are aspects that find a foothold in the law courses within the accounting curriculum.

Text books used in the accounting curriculum deal with technical aspects, rules and regulations and not necessarily with the practical application of the subject matter in a dynamic business environment. A gap exists between the theory and the practice and it is up to the Accountancy teaching professionals to attempt to bridge the gap (Fouché, 2006:1)—a challenge for even experienced Accountancy teaching professionals.

There are various factors that Accountancy teaching professionals should consider during Accounting Education. These factors include a new generation of students (Boyce, 1999; Chen, 2010), as well as a myriad of evolving changes in the business environment which in turn demand changes in the skills required from novice accountants entering the workplace (Fouché, 2006:3). Accountancy teaching professionals resist change (Fouche, 2013:138). It is therefore of the essence to think creatively in order to find practical solutions for the challenges facing Accountancy teaching professionals

Demands on Accountancy teaching professionals and students in the Accountancy field are constantly increasing. Fouché (2006:7) explains that this stems from factors such as the ever-changing corporate world, students insufficiently prepared for the various skills required from higher education, Accountancy teaching professionals resisting calls for change in Accounting Education, and the need for continuing professional development. Research in the field of improved methodology, subject content, and needed skills are readily available (Coates & Radloff, 2013). Responses from the business world and the profession indicate that research does not indicate practical application (Kavanagh & Drennan, 2008:280). However, Tucker and Lowe (2014:416) posit that increased criticism indicates that current Accountancy teaching practices do not fulfil the needs of the profession.

1.2 Background: Connection to literature

1.2.1 Creative accounting education

Onuebunwa (2012:101) explains that "*teaching has to do with helping individuals acquire knowledge, skills and attitudes in different areas of learning.*" Onuebunwa (2012:101) further explains that teaching is "*guiding, facilitating and motivating learners*" and the "*aim of teaching is not only to transmit information but also to transform passive students into active receptors of knowledge and constructors of their own knowledge.*"

When thinking creatively about Accounting Education, a methodology whereby students' interests are enhanced in a stimulating environment, should be applied. Fouché (2006:7) argues that it is necessary to develop an augmented methodology for Accounting Education, addressing the shortcomings and criticism in a practical manner, and keeping the specific teaching-learning environment in mind. He is of the opinion that games, especially board games, could creatively address many of these shortcomings. This opinion is also prominent in the study of Moizer *et al.* (2009) who are of the opinion that teaching with games can used across various subject areas. Ramani *et al.* (2012:670) posit that students for longer remain engaged in board games, even when played after multiple sessions.

There are strong indications that most Accountancy teaching professionals are generally unaware of research about teaching and learning techniques—especially those which encourage both heads and hands-on learning (Treher, 2011:1). Research on this ignorance

dates back to the 1960s and the indication is that the issue could lead to student apathy, discouragement, and even a waste of resources (Hartley & Cameron, 1967).

Teaching and learning techniques, such as the use of games in the classroom, could encourage, empower, inspire and motivate learners. This implies that Accountancy teaching professionals should act on opportunities to directly involve students by encouraging them to become more reflective, meta-cognizant, and effective in their learning (Kreber & Kanuka, 2013:114). Furthermore, providing opportunities to students to become involved as research assistants on pedagogical inquiry projects to allow them to develop not only content and research expertise within their discipline, but also knowledgeable about what it means to teach the discipline at higher education level. This truth stretches across all areas of education, even where the learning content comprises complex and technical material (Treher, 2011:1).

Using games as a strategy during teaching and learning is gaining popularity as it receives recognition as one of the most exciting current developments in education (Bellotti *et al.*, 2013:1). Games and videos are two of the primary ways that students learn outside of their schooling. Games are cited specifically for their applications in developing inductive reasoning skills (Johnson *et al.*, 2015:15). Despite these gains, many still do not appreciate the value of board games during the learning process.

Educational gameplay fosters engagement during critical thinking, creative problem-solving, and teamwork—skills that lead to solutions for complex social and environmental dilemmas (Johnson *et al.*, 2015:15). Furthermore, educational games are seen as engaging platforms that spark curiosity, instil a sense of urgency and gravitas, while rewarding students in meaningful ways (Johnson *et al.*, 2015:15). Randel *et al.* (1992:269) examined 68 studies on the use of games, including board games, as to conventional instruction in the classroom. Their findings indicate that in twelve of fourteen studies, students reported elevated interest in the game activities when compared to conventional classroom instruction. Taking this into account, an argument can be made that board games have the potential to become important tools to link pedagogical practises to activity-based teaching (Fallon *et al.*, 2013). Games create an engaging environment where students and lecturers are joined to reinforce and apply specific learning outcomes where the game provides a non-threatening, playful and interactive learning environment. This stimulates a competitive element in the learning proses as students learn to use the visual metaphor and gaming element to engage problem solving techniques in a team context. Together, students can discuss, interact and wrestle with complex questions and

situations posed by the board game. Students learn to think and apply what they have learned to obtain a common goal (Treher, 2011).

1.2.2 The teaching-learning environment in Accounting Education

Teaching and learning demands constantly increase on both Accountancy teaching professionals and students in the field of Accounting (Adler *et al.*, 2000; Opdecam & Everaert, 2012). Much research is available on how Accountancy teaching professionals and students can improve methodology, subject content, and required skills (Apostolou *et al.*, 2013; Ramsden, 1987). However both business and the profession indicate that this research has not yet found the much valued practical application in the classroom (Weil *et al.*, 2001:125). It is thus necessary to develop augmented methodologies for accounting education, address shortcomings and criticism in a practical manner, yet promoting the teaching-learning environment (Fouché & Visser, 2008; Howieson, 2003). Kavanagh and Drennan (2008:18) maintain the expectations of students and the requirements of employers require that *"a much higher level of attention needs to be given to the skills and attributes being prioritised and delivered in accounting programs if accounting graduates are to survive in today's global business environment."*

1.2.3 Accounting Education and the relation of the research proposal to the IMPDET-LE program

This study focus on Entrepreneurial Law which is a course within the Accounting Education environment in South Africa. Entrepreneurial Law aims at dealing with the law governing the main forms of business, i.e. partnerships, business trusts, close corporations, and companies. The aim of this course is to equip the students with thorough basic and practical knowledge of the law relating to the different forms of business. Entrepreneurial Law is a course that finds favourable interest with an international audience as the course outcomes include, but are not limited to student who must be able to:

- demonstrate a practical knowledge of principles on how to form partnerships, business trusts, close corporations and companies
- demonstrate an ability to give advice on the choice between the different forms of business to be used in practice
- analyse case studies and to suggest solutions in this regard
- act ethically sound in transposing their Entrepreneurial Law knowledge to business level.

A board game will be developed as a teaching tool in Entrepreneurial law. The board game will include a digital component and therefore this study will address design science research in educational technology and the design of interactive learning technologies. Students in higher education (North West University, Vaal Triangle Campus, South Africa) will be the main group of participants, but the study will also address the education environment of Mexico and Finland. This study will therefore be performed within the IMPDET-LE (International Multidisciplinary PhD Studies in Educational Technology and Learning Environments) study programme which offers doctoral education in the fields of educational technology and ICT for Development.

1.2.4 Digital Game creation

The field of instructional technology has witnessed tremendous growth in research and development of interactive multimedia learning environments in recent years, especially computer-based environments (Rieber, 1996). Digital game-based learning is a research field within the context of technology-enhanced learning that has attracted significant research interest (Panoutsopoulos & Sampson, 2012:15). Digital game-based learning research investigates, among others, methods of integrating digital games into existing teaching practices with the purpose to facilitate the achievement of standard curricula educational objectives, increase students' motivation, and develop positive attitudes toward specific subjects and/or school education in general (Panoutsopoulos & Sampson, 2012:16).

1.2.4.1 Digital Components in game creation

Susi *et al.* (2007:6) states that when using games for educational purposes, it is important to clearly define the problem or need that is being addressed, as well as the gaming or game technology (digital component) solution involved. It is important that the use of the technology or the digital component of the game is not only sound in its development and delivery but it is also engaging, enjoyable, and easy to use.

In this study the digital components that will be used in the creation of the digital board game will include:

a) The Raspberry Pi Zero and fitted screen (Mundy, 2015)

In this study, the Raspberry Pi Zero and fitted screen, will not only be used as a digital component but also as a component used for assessment. These two digital components will enable students to upload answers to questions posed in the digital board game which can be

assessed by the lecturer on the student learning system of the North West-University, Vaal Triangle Campus. The digital board game can thus be used in the class contact session (with immediate feedback between students) or in the students free time (with assessment on the student learning system).

b) *Diceplus* (King, 2013)

Diceplus is a six-sided die that connects to digital board games via Bluetooth in order to turn it into a virtual game board. In this study this digital component will be used as an element of fun and enjoyment for social interaction.

1.3 Literature review

1.3.1 Principles of good pedagogy and parallels in a game environment

An aim of modern teaching pedagogy is to promote student centeredness. A student-centred teaching approach demands that students be given ample opportunity to process information and solve problems themselves (Onuebunwa, 2012:104). Games should not be viewed as merely for their entertainment value, but also as tools for learning as they comprise the necessary elements to ensure pedagogical soundness and student centeredness (Oblinger, 2004). Various authors are of the opinion that games and value to teaching and learning and pedagogical practices (Tables 1 and 2).

Table 1: Integrated description of the value of games in teaching and learning at higher education level

Authors	Integrated description of the value of games in teaching and learning at higher education level
Franklin *et al.* (2003)	The authors suggest that there is substantial literature on the use of non-conventional approaches to promote learning, such as games and crosswords. The results of their research, into whether first year biology students used card game discussions and crosswords provided, to help them in their learning indicated positive response. They therefore suggest and encourage the development of games in the teaching and learning environment.
Squire and Jenkins (2003)	The researchers suggest that games are beneficial in the teaching and learning environment as game are a versatile pedagogical medium as games include elements of urgency, complexity, learning by trial-and-error and scoring points. Furthermore games are supportive to active learning, experiential learning and problem-based learning. They posit that games can be used to understand information in context as games are inherently learner-centred and games provide immediate feedback.
Antunes *et al.* (2012)	The researchers argue that the potential of games in the teaching and learning environment is not limited to a tool for teaching, but games can

Authors	Integrated description of the value of games in teaching and learning at higher education level
	be seen as artefacts from which students can learn and study. Furthermore games create effective and motivational learning experiences that allows for problem solving, failure, reflection, repetition, enquiry and a link to practice. Students also gain soft skills such as critical thinking skills.
Anyanwu (2014)	The researcher identified certain negative factors such as fear, loss of concentration and interest among students in the study of anatomy. These are factors most often provoked by the unusually large curriculum, nature of the course, and the psychosocial impact of dissection. As a palliative measure, Anatomy Adventure, a board game on anatomy was designed to emphasise student centred and collaborative learning styles, and add fun to the process of learning while promoting understanding and retention of the subject. To assess these objectives, 95 out of over 150 medical and dental students who expressed willingness to be part of the study. A 20-item questionnaire rated on a three-point scale to access student's perception of the game was completed by the students. The students in their feedback noted in very high proportions that the game was interesting, highly informative, encouraged team work, improved their attitude, and perception to gross anatomy. The researcher therefore argues that the use of a board game adds value to the teaching learning environment.

Table 1 indicates that many authors are of the opinion that students are motivated to learn subject matter when it is required for successful game play as the games inspire players (students) to seek out information in order to be successful at the game. The subsequent recognition and respect that comes from a successful game play also fuels participation and students approach their studies with a new motivated freshness (Oblinger, 2004:16). The players own their newly acquired learning as they participate in the gameplay which has social value as peers' acknowledge each other's skills and potential. This serves as motivation, even greater than the motivation brought by marks and grades awarded by the lecturer (Herz, 2002:187).

Prensky (2002:9) suggests that when the Accountancy teaching professional begins to think about learning from a gameplay point of view, "*there is no end to the ways one can inject more gameplay—active engagement at every second—into traditional education.*" O'Dea (2011) compiled a framework on gameplay for the pedagogical design of educational games which suggests that the narrative component of gameplay has a significant role to play both in learning how to play the game and in the learning of its content. Oblinger (2004), Squire and Jenkins (2003) and Herz (2002) (Table 2) indicate that the use of games support sound pedagogical principals in the teaching learning environment.

Table 2: Principles of good pedagogy and parallels in a game environment

Principle	Description	Application in Games
Individualisation	The needs of the individual student e are kept in mind when the learning design is planned.	Games are created to complement the individual students' level of knowledge
Feedback	Feedback is immediate and contextual. This improves the learning of the student and furthermore reduces the student' uncertainty.	When games are created within specific subject and learning outcomes the student receives immediate feedback when playing the game.
Active learning	Class contact sessions should be planned in such a way that learners can be engaged in active discovery and construction of new knowledge.	When creating games for students as part of the active learning environment, games can enhance the students learning. Games can be seen as a method that leads the student to discover the learning content.
Motivation	Students are motivated when presented with a class contact session or learning environment that connects subject content with meaningful and rewarding activities.	Games can be seen as activity to engage students in pursuit of a goal.
Social	Learning is social and students can participate in groups when presented with learning activities.	Games can be played in groups.
Scaffolding	Lecturers can design the students learning in the form of building blocks. Learning outcomes can build on one another and increase in difficulty	Games are created and built with multiple levels. Students can only move on to a next level if the previous level is completed successfully. The next level of the game then builds on the previous level.
Transfer	Students develop the ability to transfer learning from one situation to another and see the subject and learning content as a whole.	Games allow students to transfer information from different subject and learning outcomes.
Assessment	Opportunity is given to students to assess and evaluate their own learning and compare progress.	Gameplay allows evaluation of acquired knowledge and skills as students compare progress.

Source: Adapted from Squire and Jenkins (2003); Herz (2002) and Oblinger (2004).

The main objective of applying games in higher education is to engage learners in complex problem spaces that mimic real world situations, without importing unwanted constraints and risks of the real world. Learners are challenged to develop relevant knowledge representations and the associated reasoning and problem-solving strategies (Westera *et al.*, 2008:420).

1.3.2 Educating a diverse student population

Diversity in classrooms include aspects like ethnicity, race, gender, class, language, region, religion, exceptionality, level of education and other diversities which define individual students. Identifying the variation of diversity within the classroom is kingpin to recognise diversity in his/her classroom. Embracing the reality of diversity through such identification is critical in creating an environment for equitable learning (Brown-Jeffy & Cooper, 2011:65).

1.3.3 Diversity and developmental appropriateness

Brown-Jeffy and Cooper (2011:71) explain that developmental appropriateness includes the concepts of learning styles, teaching styles, and cultural variation in psychological needs (motivation, morale, engagement, collaboration). Brown-Jeffy and Cooper (2011:72) posit that in addressing developmental appropriateness, Accountancy teaching professionals should be interested in what is appropriate or relevant to diverse students in their classrooms because developmental appropriateness focus on the implementation of activities designed to meet the cognitive, emotional, social and psychological needs of students, as well as to integrate students teaching styles and learning styles.

1.3.4 Student needs

Lecturers face challenges of adapting their teaching methodology and teaching philosophy while accommodating a new generation of students. The Net Generation and Millennials, who are now entering universities, have learning expectations, styles, and needs different from past students. Skiba and Barton (2006:1) are of the opinion that this new generation of students is challenging the traditional teaching paradigm in higher education. In order to accommodate the Net Generation, it is important to devise learning activities that align with their learning styles and expectations. Skiba and Barton (2006:1) hold the opinion that it is also important to remember that one should start with the content to be mastered and then devise a strategy for teaching and learning methods which could enable activity.

Addressing the following questions (adapted from (Sivan *et al.*, 2000), Carlson (2005), Sweeney and Carlson (2005) and Skiba and Barton (2006)), may guide the Accountancy teaching professional to a teaching learning method applicable to unlocking course content through an activity:

- Does the Accountancy teaching professional know the students and their preferred teaching and learning method?
- How will the Accountancy teaching professional adapt or accommodate?
- What is the balance between the Accountancy teaching professional and student perspectives?
- How does the Accountancy teaching professional engage students in the classroom?
- How can active learning and curiosity be integrated into the classroom?

Oblinger (2004:104) states that learning is advanced when the lecturer shows an understanding of the diverse needs, expectations and values of all of students.

1.4 Motivation of Topic Actuality

1.4.1 The lecturer in Accounting Education

Accounting Education change should encompass the content and practice of classroom activity, but it also requires change to the self-consciousness of all actors involved (Boyce *et al.*, 2012:47). Sound pedagogy is more than just teaching the content information; what is important is to teach students so that they are able to learn and to transfer such learning in various environments (Brown-Jeffy & Cooper, 2011:80).

2 PROBLEM STATEMENT

Students, in the School of Accounting Sciences, at the North-West University, are unable to conceptualise the bigger picture of how law subjects fit into the accounting curriculum, resulting in a negative attitude towards the law subjects. Lecturers experience this in other curriculums and courses as well (Anyanwu, 2014) (Table 1). Students are unable to apply the acquired theory in practice. The Accountancy teaching professional, student and content are set in the specific classroom environment and thus influenced by it (Ames, 1992:261). For learning to take place there must be a Accountancy teaching professional, learner and content irrespective of the milieu which includes atmosphere and institution (Ames, 1992:261). The interaction between Accountancy teaching professional and student is primarily via the content where the lecturer teaches the content and the learner learns the content (Zhang *et al.*, 2004). There is, however, also a non-content based relationship (expectations, perceptions and motivation) between the lecturer and student that may influence the learning process (Fouché, 2006:15). The interaction between student and Accountancy teaching professional via the content (curriculum, course, and program) takes place by means of the methodology (which includes the teaching methodology and assessment methods).

2.1 General overview of studies that have addressed the problem

2.1.1 Deficiencies in earlier studies

In spite of various research studies on this matter it seems, however, that little practical application has been made in the teaching methodologies of lecturers in Accounting Education. With this in mind it is anticipated that the development of a teaching tool, such as a board game in Entrepreneurial law, for the accounting curriculum would address the practical implementation of these competencies. This study focus on the course Entrepreneurial Law as part of the accounting curriculum. Entrepreneurial Law is a 1st year course. Courses in the 2nd and 3rd year build on this fundamental course. For future research, the board game can be developed to include other courses from the accounting curriculum as well. This study details, all-encompassing[1], the development of a board game for the School of Accounting Sciences, North West University, Vanderbijlpark to address difficulties students and lecturers regularly face regarding soft skills, activity based teaching and learning methodologies and curiosity. The name of the board game will hereinafter be referred to as SCHOLASTICUS[2].

2.2 The purpose, significance and the applicable audience of the study

Students who study Entrepreneurial Law courses within the accounting curriculum, needs assistance in obtaining required soft skills and technical knowledge (how to apply theory). These students are unable to conceptualise the bigger picture of how law courses fit into the accounting curriculum, resulting in a negative attitude towards the law subjects. Developing a board game, to use in teaching Entrepreneurial Law within the accounting curriculum, will not only assist students, but also Accountancy teaching professionals to achieve the required outcomes. In the School of Accounting Science the prescribed syllabus and set outcomes of the CIMA and SAICA (professional bodies) are followed.

Students from the North West University, Vaal Triangle Campus, South Africa will be the applicable participants in this study. However, to realise the specific objectives of this study, as

[1] Phase one of development included:

- a board;
- question cards;
- avatars;
- money;
- dices and a set of rules.

For phase one, meetings were scheduled with the Tax and Auditing lecturers. These lecturers where consulted to gain an understanding of the difficulties they face within the classroom contact sessions and with regards to the course content and skills (soft and technical). These courses also build on the Entrepreneurial Law course. These lectures were willing to participate in phase one by supplying questions and answers from their specific courses. Law and Tax (questions and answers) formed part of phase one of the study and is refer to as the pilot study. A minimum of two students and a maximum of 8 students can play on one board at the same time. For phase one- pilot study four boards were constructed. *The second phase of the board came will only focus on Entrepreneurial law as a course within the accounting curriculum.*

[2] SCHOLASTICUS is derived from the Latin word Scholasticus which means-Educational.

set out in § 3.1, the education environment of Mexico and Finland will also be addressed in this study. South Africa and Mexico are both viewed as developing countries (Holtz, 2008). However, the education system of Mexico is ranked at number 39 (middle performer) in the world wilts South Africa's educational system is ranked at number 75 (poor performer).

The educational system of Finland is seen as one of the best in the world (Tables 3 and 4). Finland is regarded a 1st World Country (Simola, 2005).

Table 3: Top twenty educational countries for 2014 and 2012

2014 Top educational countries	2012 Top educational countries
1. Japan	1. Finland
2. United Kingdom	2. South Korea
3. South Korea	3. Hong Kong
4. Finland	4. Japan
5. Netherlands	5. Singapore
6. Norway	6. UK
7. Denmark	7. Netherlands
8. Belgium	8. New Zealand
9. Canada	9. Switzerland
10. USA	10. Canada
11. Singapore	11. Ireland
12. Russia	12. Denmark
13. Ireland	13. Australia
14. New Zealand	14. Poland
15. Israel	15. Germany
16. France	16. Belgium
17. China	17. USA
18. Germany	18. Hungary
19. Portugal	19. Slovakia
20. Sweden	20. Russia

Source: Stumke (2015:34)

Table 4: Bottom ten Educational Systems in the World for 2014

Ranking	Country
76	Ghana
75	South Africa
74	Honduras
73	Morocco
72	Oman
71	Peru
70	Botswana
69	Indonesia
68	Qatar
67	Columbia

Source: (Anon, 2015)

The World Economic Forum (WEF) released its Global Information Technology Report in 2015, which ranked South Africa last in the quality of mathematics and science education. South Africa also finished close to last—139 out of 143 countries—when looking at the overall quality of its education system (Anon, 2015).

The educational system of Mexico is seen as a middle performer and the South African educational system is seen as a poor performer even when both these countries are developing countries. A question that needs to be addressed is then why one developing country performs better than the other and how can the developing countries meet the standards as set by countries such as Finland. This question is addressed in specific objective (§ 3.1). The applicable audience is therefore an international audience in science and technology education (§ 1.2.3).

3 RESEARCH OBJECTIVES AND QUESTIONS

3.1 Primary objectives

The *primary objective* of this study is to: *Develop a digital board game for teaching Entrepreneurial Law in Accounting Education* which will assist students and Accountancy teaching professional in obtaining more of the required soft skills and technical knowledge required by the contemporary accounting environment in an effective and fun way. The *specific objectives* required to achieve the primary objective are:

i. To identify and gauge a balance between preferred teaching and learning methods of students and Accountancy teaching professionals
ii. To inquire how Accountancy teaching professionals could adapt to a preferred learning environment through the use of active learning and the stimulation of curiosity
iii. To develop a digital board game that can be used to engage students in the classroom
iv. To examine how the use of digital games in the classroom can assist in active learning and stimulate students curiosity in teaching Entrepreneurial Law in Accounting Education
v. To examine how the educational system of developing countries (Mexico and South Africa) and the education system of one 1st World Country (Finland) differs in teaching students soft skills and technical knowledge.

Technical knowledge, for the purpose of this study, relate to:

- Critical problem solving skills
- Oral and written communication skills
- Technical competencies within a subject field
- Analytical abilities
- Summarising skills
- Logical argument formation.

Soft skills, for the purpose of this study, are:

- Group work
- Motivation and self-management
- Interpersonal communication
- Problem solving.

4 RESEARCH QUESTIONS

The following research questions are set to accomplish the research objectives. Each question is set from a different paradigm as indicated in the research of Burrell and Morgan (1979) (§ 5.1):

i. What is the current preferred teaching and learning methods of students and Accountancy teaching professionals in higher education and can a balance between students and lecturers preferred teaching and learning methods be achieved?

ii. How can Accountancy teaching professionals adapt to a teaching and learning environment that is inductive to active learning and the stimulation of curiosity?

iii. How can a digital board game, as developed for higher education, be used to engage students in the classroom in an enjoyable and cognitively stimulating way?

iv. How can the use of games in the classroom assist in active learning and stimulate students' curiosity in Entrepreneurial Law in Accounting Education?

v. How can the educational system of developing countries (Mexico and South Africa) learn from the education system of a 1st World Country (Finland)?

5 CONDUCTING THE RESEARCH STUDY: AN OUTLINE OF THE RESEARCH DESIGN

5.1 Research paradigm, research design, research method and research methodology

Conducting a research study should be started off by considering how the researcher views the observed social phenomena, which leads to the dominant research paradigm to be applied. The choice of a research paradigm leads to a relevant research methodology (Figure 7).

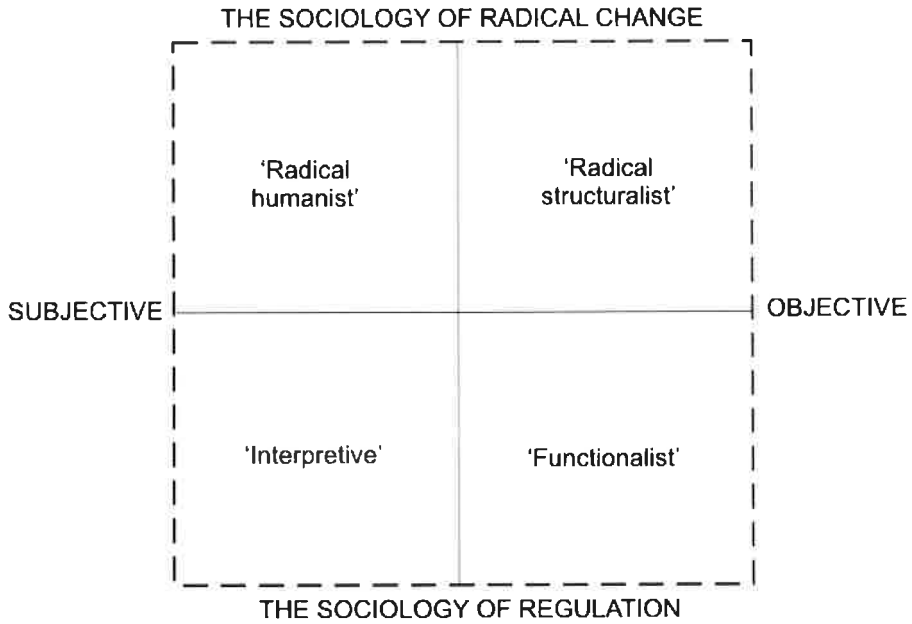

Figure 7: Research paradigms address the philosophical dimensions of social sciences (Burrell & Morgan, 1979).

5.1.1 The research paradigm

A research paradigm is a set of fundamental assumptions and beliefs as to how the world is perceived which then serves as a thinking framework that guides the behaviour of the researcher (Jonker & Pennink, 2010:23). Research (Maree, 2007), emphasise that it is important to initially question the research paradigm to be applied in conducting research because it substantially influences how one undertake a social study from the way of framing and understanding social phenomena. In this study the research paradigm includes both ontology and epistemology.
The research questions set out above, in § 4, as well as the questions to guide the lecturer to a teaching learning method applicable to unlocking course content through an activity, as indicated in § 1.3.4, will be addressed in five articles. Each article will also focus on a different research paradigm.

Article one addresses the research question, *How can a board game, as developed for higher education, be used to engage students in the classroom in an enjoyable and cognitively stimulating way?*

This article also addresses the results of the pilot study as referred to in § 2.1.1. The pilot study relates to Phase 1 of the development of the board game. This pilot study gauged the development of a board game that would assist students and lecturers to require technical and soft skills to link the different Accounting subjects encompassed in the Accounting Education programme in an enjoyable and cognitively stimulating way.

The preliminary results indicated that: (i) the board game created and supported a favourable teaching and learning environment as the students seriously engaged with the board game, even though games are associated with fun and not learning; (ii) learning with the board game was effective as the students were of the opinion that the board game enhanced their technical competencies, and also enhanced their soft skills; (iii) the learning experience also increased students' interest in the Law and Tax subjects; (iv) the students indicated that they remembered what they had learnt; (v) the unstructured learning environment incorporated practical experiences which required more than knowledge replication; (vi) it gave students the opportunity to work with and learn from their peers—an aspect which they enjoyed. Overall, the evaluation indicated that the teaching and learning experience was very positive. The objective of the pilot study to gauge the development of a board game that would assist students and

lecturers to obtain soft skills, as well as link different accounting subjects within the accounting environment in an effective and fun way was met.

This article is close to finalization and will be submitted soon.

5.1.1.1 The research paradigm: radical humanist

Four research paradigms, are established, based on the subjective-objective nature of reality and the radical change-regulation aspect of social order Burrell and Morgan (1979). Each of the paradigms purports a different set of assumptions about social reality and social order, and each one incorporates metaphors and research tools consistent with these assumptions (Putnam, 1982:193). The radical humanists and radical structuralists assume a critical stance in their common perception that individuals are oppressed and constrained by dominating forces within society (Burrell & Morgan, 1979). From a radical humanist view, reality is subjectively and socially constructed: hence society is dominated by ideological factors that individuals create and maintain (Putnam, 1982:202). Within this paradigm, research is viewed as anti-human (Ardalan, 2016:5).

5.1.1.2 The research paradigm: radical structuralist

In the radical structuralist paradigm, society becomes an objective phenomenon, and materialistic forces are imposed upon the lives of individuals (Putnam, 1982:194). The radical structuralist paradigm assumes that reality is objective and concrete, as it is rooted in the materialist view of natural and social world (Ardalan, 2016:6).

5.1.1.3 The research paradigm: interpretivist

Burrell and Morgan (1979) posit that the interpretive paradigm assumes that reality is socially constructed through the subjective experiences of its members. Research within this paradigm aims to discover, synthesize, and interpret the role of symbolic forms in constructing and maintaining an orderly reality. The interpretive paradigm supplements the functionalist view, particularly in its conceptualization of communication as a process of organizing (Putnam, 1982:193). This paradigm is interpret to see the social world as a process which is created by individuals (Ardalan, 2016:5).

5.1.1.4 The research paradigm: functionalist

Functionalists view society as objective and orderly; behaviour is concrete and tangible, and society has a real and systematic existence (Putnam, 1982:194). The functionalist paradigm seeks to provide rational explanations of social affairs and generate regulative sociology. It assumes a continuing order, pattern, and coherence and tries to explain what is (Ardalan, 2016:4).

In this study the applicable research paradigm is seen as mainly interpretivist with links to the radical humanist and functionalist paradigm because game board design in higher education is a multidisciplinary project that cannot be isolated into one paradigm (Betz, 1995; Westera *et al.*, 2008:421).

5.1.2 The observed social phenomena: activity theory

The theory in this study links to the qualitative and quantitative approaches used as well as the research objectives. Development of theory is a central activity in research and traditionally researchers have developed theory by combining observations from previous literature, common sense, and experience (Eisenhardt, 1989:532). Activity theory defines context as the activity itself and comprises all the elements of the activity system: subject, object, tools, rules, community and division of labour. Context is thus not an external container but it is rather constituted through the enactment of an activity (Nardi, 1996:70).

According to (Leontiev, 1978), the concept of activity entails a complete system of human practices (observed social phenomena). Engeström (2001) conceptualised a representational model to portray the various elements of an activity system. This was done by creating an activity triangle model. The activity triangle model representing an activity system combines the various components into a unified whole (Figure 8). The primary actors in an activity system are subjects interacting with objects to achieve desired outcomes. Human interactions with each other and with objects are mediated through the use of tools, rules and division of labour. Mediators represent the nature of relationships that exist within and between participants of an activity in a given context.

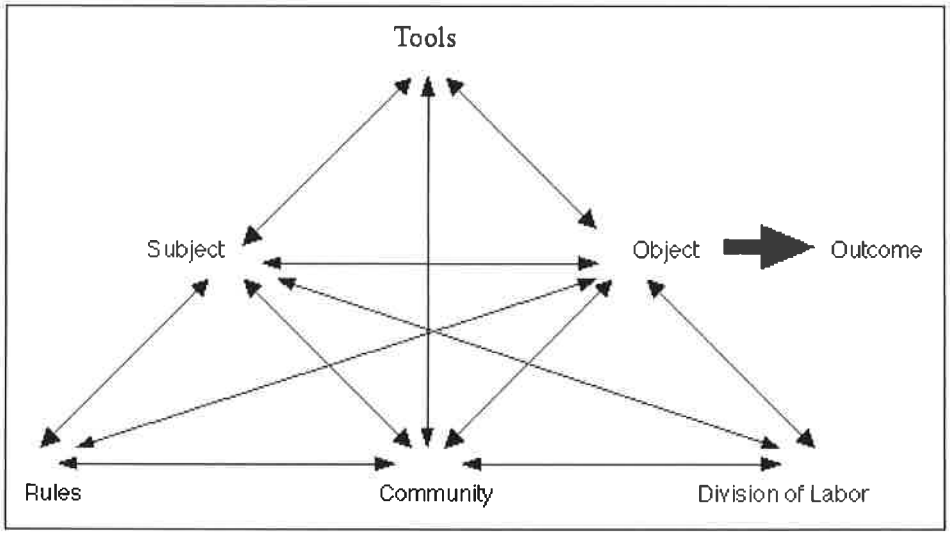

Figure 8: Key components of an activity system

In this study the activity theory finds application in the development and use of SCHOLASTICUS.

5.1.3 The research methodology

Analogically, a methodology is a domain or a map, while a method refers to a set of steps to travel between two places on the map (Jonker & Pennink, 2010:17). A methodology refers to a model to conduct a research within the context of a particular paradigm. In this study the research methodology is a combination of quantitative and qualitative methodologies—indicating a mixed method design.

5.1.4 The research design and the research method

Creswell (2013:20) and Yin (2012) explain that research purpose and research questions are the suggested starting points to develop a research design because they provide important clues about the substance that a researcher is aiming to assess. Swart (2013:8) argues that the research design relates to the logic of the study, while the research methodology includes the process of data collection. Furthermore, Swart (2013:9) posits that the conclusion that may be drawn from the above is that the first step in solving the research problem is to perform a literature review while the second is to perform an empirical review for analysing and interpreting the collected data.

Creswell (2013:12) points out that the research design relates to the *"types of inquiry within qualitative, quantitative, and mixed methods approaches that provide specific direction for procedures in a research design."* Welman *et al.* (2005:8) concur, stating that research design relates to the *"plan according to which we obtain research participants and collect information from them."*

Swart (2013:10) states that in investigating a suitable research design it is important to consider the expectations and elements identified in the literature review. A research method however consists of a set of specific procedures, tools and techniques to gather and analyse data. Swart (2013:8) also explains that to determine the most appropriate data collection method for a study, the research previously undertaken must be taken into account and the factors identified in the literature review must be used to assist in developing the research methodology. This was also done in this study. The mixed method approach was used to obtain the relevant data from participants.

Collins *et al.* (2006:67) demonstrate that mixed-method research may be applied in various disciplines. The research indicated that in at least thirteen fields; for example, management and organisational research, library and information science research, law, and programme evaluation, have been identified in literature where this method was applied. Onwuegbuzie *et al.* (2007:125) point out the mixed method involve qualitative and quantitative approaches where the major focus is on qualitative results.

The literature above draws attention to the importance and relevance of the mixed method for this research, which consists of both quantitative and qualitative methods. Swart (2013:9) explains that a literature review should include scholarly work by other researchers that is relevant and could contribute to the research. Creswell (2013:28) argue that new as well as historical literature may be applied to support the relevance of the topic and to identify the gap or flaws in literature.

5.2 Empirical research

In realising the objectives of the study, both published and unpublished literature was examined. The evaluation of the phase one board game development was done by means of questionnaires. As such, a quantitative research technique was used. Participation in phase 1

and in the completion of the questionnaire was voluntary. A verbal explanation and consent, with confidentiality and anonymity of the results guaranteed, was given to the participants.

5.2.1 Target Population and Sampling Frame: Phase one

The pilot group included fifteen second year Accountancy students, forty Certificate in the Theory of Accounting students and ten lecturers from the Vaal Triangle Campus of the North-West University. From the 55 students who participated, only nineteen students completed the questionnaire. Eight of the ten lecturers who participated completed the questionnaire.

Maree (2007:156) contends that questionnaires could be used as a form of data collection. Previous research undertaken on the use of games in Accounting Education also made use of questionnaires. Maree (2007:156) point out that there are several methods that may be used to collect data; the method should be selected by the researcher. In this study, empirical research was based on a questionnaire prepared on the Likert scale. The content of the questionnaire was categorised and coded. The questionnaires was used and verified in a study done by Fouché (2006). Permission was obtained to use and or adapt these questionnaires for this study.

Ten of the nineteen students who participated are male. Seven of the nineteen students indicated their mother tongue as English, five as Afrikaans and seven as an African Language. The board game is currently only available in English. The official language of instruction at the North West University, Vaal Campus is Afrikaans and English for 1st year students. In the 2nd year class contact sessions are conducted in Afrikaans and English with preference given to English.

5.2.2 Target Population and Sampling Frame: Phase two

Phase two is the PhD study. The main target population and sampling frame will be the students of the North West University, Vaal Triangle Campus, South Africa. Comparisons will however be drawn between the education systems of Finland, Mexico and South Africa (§ 2.2; 3.1).

5.3 Summary of phases/steps

Table 4: Research plan and time table

Research plan and timetable	**Year One 2016/2017**	**Year Two 2017/2018**
Articles:	Article one: Pilot Study	(1) Article two (§ 3.1, 4) (2) Article three (§ 3.1, 4)
Transferable Skills Studies: *Through MOOCS or as available through the North West University*	(1) Scientific Writing Skills (2) Scientific Presentation Skills (3) Research Ethics	(1) Research Supervision (2) Speech communication for post-graduate students
Course Work:	Not applicable	(1) State of the Art Technologies in Education (2) Other Postgraduate Studies of Computer Science: Orientation to IMPDET-LE Studies (3) ITC for Development
Other:	Board Game creation	Board Game creation
Research plan and timetable	**Year Three 2018/2019**	**Year Four 2019/2020**
Articles:	(3) Article four (§ 3.1, 4) (4) Article five (§ 3.1, 4)	
Transferable Skills Studies: *Through MOOCS or as available through the North West University*	Not applicable	Not applicable

Research plan and timetable	Year Three 2018/2019	Year Four 2019/2020
Course Work:	(1) Research Methods in Computer Science (2) Postgraduate Research Seminar	Not applicable
Other:	Board Game creation	(1) Front and back matter (2) Board Game creation

5.4 Summary of research settings and participants

The main participants will be the students from the School of Accounting Sciences, North West University, Vaal Triangle Campus, South Africa. However the study will also focus on the education system of Mexico and Finland (§ 2.2; 3.1).

5.5 Potential limitations

The limitations are few and are set out as:

- Only one course (entrepreneurial law) is covered within the Accountancy curriculum.
- Only students from the North West University, Vaal Triangle Campus, would be directly involved (playing the board game during the period of concluding the PhD study).
- Scrutiny in term of literature (literature review) will not be the same as the scrutiny of the technology used in the development of the board game.

6 ETHICAL CONSIDERATIONS

The Nuremburg Code states that: "The voluntary consent of the human subject is absolutely essential. This means that the person involved should have legal capacity to give consent; should be so situated as to be able to exercise free power of choice, without the intervention of any element of force, fraud, deceit, duress, over-reaching, or other ulterior form of constraint or coercion; and should have sufficient knowledge and comprehension of the elements of the

subject matter involved as to enable him to make an understanding and enlightened decision" (Code, 1949).

The Nuremberg Code is supported by the Helsinki declaration (Singer & Benatar, 2001) and the Belmont report (Beauchamp, 2003). These documents state that participants in research/study should be informed about the nature, duration, and purpose of the research/study. Furthermore, the participants must be informed about the method and means by which the research/study is to be conducted. The duty and responsibility for ascertaining the quality of the consent rests upon each individual who initiates, directs or engages in the experiment. It is a personal duty and responsibility which may not be delegated to another with impunity.

According to the North West University (University, 2015), the issue of ethical consideration deals with confidential information.

Phase 1 – Pilot study

Information gained was reported on an aggregated and not on an individual level. The questionnaires did not infringe any human rights. All participants participated on a voluntary basis and were not forced to participate nor victimised if they decided not to participate in answering the questionnaire. Permission was obtained to use their responses as part of this study from all the said participants, prior to them taking part in the study. As stated, individual information was not reported on and was presented in aggregate.

Phase 2- Creation and implementation

All ethical aspects are taken into consideration during the execution of this research. Permission is gained from the School director of Accounting Sciences, North West University, Vaal Triangle Campus, to ensure that the participants understand that their participation is voluntary and that the confidentiality of the information obtained will be maintained.

Voluntary participation

Greater effort is made to ensure that participants understand the importance of this study furthermore, the participants are well aware of the fact that their participation is voluntary and that they will not be forced to partake in this research.

Confidentiality

A guarantee is made to participants that the information provided by them during the research will remain confidential and anonymous.

7 EXPECTED FINDINGS AND IMPLICATIONS

It is expected that the study but also the board game will be a success, because of the international collaboration. Furthermore, the focus of the board game, entrepreneurial law, opens prospect for marketing and business opportunity. The board game is also suitable for electronic conversion (for example in the form of an App).

8 FUNDING PLAN

Funds are available as follows and student, with the help of the Co-Study Leader, Prof Seugnet Blignaut, is in the proses of application:

- The Faculty of Economic Sciences and IT as well as the School of Accounting Sciences (Co-Study leaders and student are part of this Faculty) have funds available for International and National Conferences.
- Furthermore, the National Research Foundation, Department Science and Technology, Republic of South Africa, provides funding in support of doctoral candidates. The aim of the funding instrument is to contribute towards increasing the number and quality of South African postgraduate students and fellows as well as provide support for doctoral; candidates to pursue studies abroad.
- The National Research Foundation, Department Science and Technology, Republic of South Africa, also provides funding in the form of a Travel Grant.
- Funds are also available, and awarded to student, from the North West University, Vaal Triangle Campus. Student is a Scholarship of Teaching and Learning Grant holder.

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