HAAGA-HELIA
ammattikorkeakoulu

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SOFTALA –
a framework for coaching the students of software development to acquire sales and service skills required in small software companies

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Licentiate thesis submitted for official examination for the degree of Licentiate in Technology

Aalto University
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Contents

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1. Introduction

1.1 The background of the research

In the sector report of Software Business published by MEE Business Sector Services in Finland, (MEE, 2012) customer-orientation, sales and service development are said to be very important to the success of a starting software company.

Open source software (OSS) and free software foundation (FSF) models have had an important impact on software businesses and entrepreneurship paradigm among software developers. OSS and FSF have challenged software companies to reconsider their business strategies. Selling licence-based software is not very easy anymore and software companies need to find new income opportunities. Service development and service-based products are increasingly important for the success of small software companies, which are more and more forced to find new pricing models and new ways of working in relation to OSS and FSF (Cusumano, 2008). Consultative selling and customer relationship management are also becoming ever more important for software companies, especially for small software companies (Butaney, 2007). It is very much true that IT buyers are still experiencing longer buying cycles, so IT vendors need to ensure they are setting their sales up so that they will manage in a competitive sales environment (ICD, 2012).

Selling is a process that has a strong linkage to the delivery of the product and in order to succeed; company's processes need to be improved. In the study made by Sulayman and Mendes (2010), it was found that the issues important to the business operations in software development and software process improvement were very closely related to the knowledge transfer and management strategy of the company. The need for a process and a common understanding are essential for the survival of small software businesses (Bhat & Gupta & Murthy, 2006; Cusick & Prasad, 2006). Marcus (2005) reports in his study about the facts that have an impact to the success of the company. According to him, those facts are agility, discipline and focus.

Nevertheless, there is research showing that in small software companies process improvement, whether or not it is about improving software or selling processes, is not considered to be so important (Kivihalme & Valsta, 2010; Kivihalme & Valsta & Kauppinen, 2011). Small software businesses like to practice agile methodologies because they are considered to give a quick answer to the ad-hoc changing customer requirements and constantly changing business environments (Cao & Ramesh, 2008). A study made in Ireland indicated that process improvement is considered to be too expensive investment for small companies which do not see or do not want to see it as a profitable effort (Coleman & O'Connor, 2008).

Also, it was discovered that the educational background, experience and know-how of the technical management had a lot of influence on the willingness to commit to best practices (Coleman & O'Connor, 2008). In a study made in Vietnam, it was revealed that a company's size and age matter (Niazi & AliBabar & Katugampola, 2008). For small organizations, the most important issue was the lack of resources and for bigger ones, in addition to the previous aspects, the lack of communication, the commitment of the management and the timetable pressure was identified as obstacles (Niazi & AliBabar & Katugampola, 2008). A Finnish study about the agile future organization showed, in turn, that an organization needs multitalented people and that agility needs to be part of the business operation strategy (Kettunen & Laanti, 2007).

In order to help small software companies right from the start, it is important that educational institutions coach students to face these issues already during their studies. The technological knowhow is just not enough anymore. The basic programming skills are of course still very important but there are lots of other aspects that need to be integrated to the curricula of software development and engineering. The need for skills related to business, sales, marketing, legal issues and creating customer-oriented service concepts is obvious. For a software company, the question is about the entrepreneurship attitude of the owners and also of the employees hired first in a company.

Entrepreneurship is not only about the personality of the entrepreneur, like the traditional way of seeing entrepreneurship might suggest, rather, it is a process. As Schumpeter has written, the entrepreneurship and the attitude toward entrepreneurship are very important factors for the economic growth and success of companies – the innovativeness and boldness are what is needed (Shumpeter, 1934). In their view of entrepreneurship education Brand and Wakkee (2007), showed that if a process view of entrepreneurship is adopted, students will not only learn to found a business – which is a rather short-term view – but also how to manage,

develop and grow their venture. This is especially important considering the limited managerial experience and knowledge of non-business students. Furthermore, growing organizations are generally more productive than simple start-ups.

There are studies showing that graduates with an entrepreneurship as a major are more likely to start a new business and they have stronger entrepreneurial intentions than other graduates (Kolveredi & Moen, 1997). Peterman and Kennedy have showed in their study that entrepreneurship education still significantly changes the entrepreneurial intentions of participants (Peterman & Kennedy, 2003). Rasmussen and Sörheim argued in their study that the students participating in entrepreneurship education are, however, most likely to be recruited among people initially motivated to become entrepreneurs, so a high start-up rate could be expected independent of the education programme (Rasmussen & Sörheim, 2006).

Changes in the entrepreneurship attitude and sales functions involve skills in negotiation and analysis; deeper product and service knowledge and systematic problem solving. This all requires a motivated, capable and efficient sales force from a variety of academic majors (Murray & Robinson 2001). Indeed, these attributes of successful sales professional are transferable to other positions within the organization (Luthy, 2007; Levenburg, 1996). It is very common for many college graduates to have a negative perception of sales as a profession (Wilkes & Spiro, 2004; Michaels & Marshall, 2002; Peterson & Devlin, 1994; Weilbaker & Merrit, 1992). Yet the most likely career opportunity for all college graduates from 2002 through 2007 was either sales or management trainee position (NACE, 2009). Academic students also seem to think selling and sales work rather negatively. It appears that sales as a career track has a major image problem (Hawes & al., 2004; Cengiz &Yazici & Erdal, 2010).

1.2 The objectives and the scope of the research

When teaching software engineering and project management to students, the teacher has to be able to include the following elements in the course: project planning, budgeting and scheduling as well as business ethics, negotiation skills, requirement assessment, design and coding, code inspections, integration, test planning and system testing. It is not

an easy task to include all these concepts in a one-semester course or in a course lasting one intensive week. (McDonald, 2001)

In project-based learning (PBL), complex real-life projects are used to motivate students and to provide them with deeper learning experiences (Detmer & Li & Dong & Hankins, 2010). These kinds of learning methods have been found to be motivating, for example, when dealing with bored students (Markham, 2003). It has also been noticed that students tend to work harder in these kinds of projects (Buckely, 2004; Gorka 2007). Another interesting issue to consider is a report about the dropout rates in a team-based learning –course (TBL) compared to a lecture-based course. The results showed that the dropout rate was smaller in the TBL-course than in the lecture-based course (Lasserre & Szostak, 2011). Another interesting point raised by this study is that after participating in the TBL-course and then participating in a traditional lecture-based course, the dropout rate was bigger for those students who had taken the TBL-based course earlier (Lasserre & Szostak, 2011).

There are several studies about some specific social, engineering or science PBL-courses (Buckley, 2004; Fernandes 2003; Gorka, 2007; Ruud,1999; Sikkel,1999). However, there are not that many studies regarding the whole curricula where the aim is to apply PBL to as many courses as possible and, furthermore, at the same time, link these courses to entrepreneurship and software business related issues such as selling and service providing.

The objective of the research is first to find out what is important to take into account when creating the learning environment for the software development, when enhancing especially the entrepreneurial and also the sales and service attitude as part of the students learning experience. Secondly, the objective of this research is to design and implement a framework (which we call Softala) to support these goals. And finally evaluate the framework to help estimate the value and meaning of the framework.

The research problem is as follows:

> Can the Softala framework help students to be more prepared to meet the sales and service competences required in modern small software companies so that even the students' willingness to start their own businesses is strengthened during their studies?

Behind the creation of the Softala framework, there are learning theories like Kolb's (1984) experiential learning and theories of Dewey (1938),

Lewing (1951) and Piaget (1971). The Softala framework is developed to help universities of applied sciences in Finland and other countries to create such an environment that will encourage students to start their own businesses among software development and be more prepared to work in such a company being both technologically and business oriented at the same time.

The evaluation of the curricula can be done, for example, according to the method "Evaluating Training Programs: The Four Levels" developed by Kirkpatric (1998). Kirkpatrick's four levels are reaction (students' feedback), learning outcomes, behaviour (changes in behaviour) and results after training (for example cost evaluation versus potential benefits). The last two of the method are more difficult to evaluate. However, because the Softala framework is based on several project-based learning experiences, it is possible to evaluate behaviour and result in this research.

1.3 The structure of the thesis

The thesis consists of seven chapters: introduction, literature study, research design, students' conceptions before studying in the Softala environment, the Softala framework, findings and conclusions and discussions.

Chapter 2 presents the results of the literature study, concerning literature about software business, software development and software process improvement, entrepreneurship and education, sales and service education and ends with the discussion of the learning theories that the Softala framework will address.

Chapter 3 focuses on the research design. First, the research questions are presented. Secondly, the research approach is described. The chapter ends with the discussions of the research methods and data analysis.

Chapter 4 presents the results of the preliminary study about the students' conceptions of entrepreneurship and sales work before studying in Softala framework. These results are used to give guidelines for the construction of the Softala framework.

Chapter 5 presents the constructed framework. First, an overview is given and then the structure of the framework is described. In addition, the chapter includes the discussion of the applications of the framework.

Chapter 6 presents the results of the research. First, the research design and the link between the preliminary study presented in Chapter 4 and the questionnaire of the effectiveness of the Softala framework are

discussed. Then the data collection process is described and the results of the SPSS analysis are presented.

Chapter 7 concludes the thesis by discussing the results. First, a summary of the results is presented by research question at a time and then conclusions are drawn. Finally, the contribution of the research and its limitations are presented. The chapter ends with discussions and suggestions for future research.

2. Literature study

This chapter discusses first software development and software development education, software business and software process improvement in general, concentrating, however, on issues relevant to the research problem. Then the concept of entrepreneurship and especially entrepreneurship education are discussed, concentrating on issues important for the research problem such as sales and service perspective. The rest of the chapter discusses learning theories in order to build the foundation for the Softala framework and its evaluation.

2.1 Software development

Software Development can be seen as a process that starts from designing the software and ends to implementing and maintaining it. If we want to look at it with more open eyes, we can see similarities with playing a co-operative game according to Cockburn (Cockburn, 2007). In the idea of thinking software development as a co-operative game, it can be assimilated to team playing having a common goal and working together with every decision thus moving the team towards the target.

It is common to think software development as an engineering process, as well. But what exactly does engineering mean? In a dictionary, we can find out that engineering is "The application of science and mathematics by which the properties of matter and sources of energy in nature are made useful to people." (Merriam-Webster, 2003). The basic intuition derived from that definition is that engineering is about mathematics and sources of energy that are important. If we really think about e.g. computers, they do have mathematical background and their main purpose is to help people in their everyday life.

The act of engineering can also be seen as a process of creativity to create a 'tool' to help people to achieve a certain goal. However, industrial engineering goes beyond this; the aim is to develop a manufacturing plan to a product using as many of these tools in the cheapest manner possible. For example, the original description from the 60's emphasizes the use of

sound engineering principles in order to obtain economical software that is reliable and works efficiently (Naur & Randell, 1968).

Ian Sommerville, in his book of Software Engineering, describes software engineering to be an engineering discipline that concentrates on all aspects of software production from the early stages of systems specification all the way through to the maintenance of the system (Sommerville, 2001). In Pfleeger's book of software engineering, the emphasis is more on understanding computers and computing in order to be able to solve problems (Pfleeger, 2001).

Yet another perspective towards software engineering is given in the books of Ghezzi, Jazayeri and Mandrioli: Fundamentals of Software Engineering and of Bjorner and Dines: Software engineering 3, Domains, Requirements and Software Design. The emphasis on these books is on the fact that software systems are so large or so complex that they are built by a team or even teams of engineers (Ghezzi & Jazayeri & Mandrioli, 2002; Bjorner & Dines, 2006).

According to literature, software engineering can be seen as a process in which teams are creating solutions to solve problems. When creating solutions, people often first build a mental model of the proposed solution to the problem and then, by mentally executing the model, they try to see if the model is working and after sufficient sample inputs have passed the test, people assume that the model is suitable for use in software engineering work. This idea is also supported by cognitive research (Johnsons-Laird & Byrne, 1991) and it is heavily used in software design process as a part of a very well-known incremental and iterative process models. The idea is that by doing things bit by bit, you can spot the mistakes in an early phase and make the corrections as early as possible. The idea behind the process is to help to achieve better quality with less cost. Software development process improvement can also be seen as a way of rationalizing the activities in an organization. It is very important for the organization to be able to handle the uncertainty and instability. "Chaos is often a sign that the implementation process is on its way and that you are about to receive valuable information helping you succeed." (Börjesson & Mathiassen, 2004).

2.1.1 Role of communication in software development

Software development is as much about communication and knowledge sharing as it is about the technologies as discussed in the previous section. People observe background information at the same time they are

reading, writing and even talking. If we hear someone saying something interesting in the background, we can join the conversation and get immediate feedback for our questions or ideas. This kind of information can be formulized as an osmotic communication. If people work closely together, the time they need to exchange ideas is far less than if they were working even in the other side of the building, not to mention a different time zone. This can be even seen as a way to slow a project dramatically down if a programmer has to wait for a long time before he or she can get an answer. The other side of the coin here is that if you are a person willing to work rather privately, your concentration might be lowered by the background noise and, even worse, people you would not need to meet every day, might be bothering you with irrelevant questions. These issues should to be taken into account in companies' software development process and environment. (Cockburn, 2007.)

According to Dixon (2000), there are five different types of knowledge transfer: serial transfer, near transfer, far transfer, strategic transfer and expert transfer. Serial transfer occurs when knowledge is gained from one project or team activity and the same group then transfers it to the next project or activity. In near transfer, the knowledge the team has gained from frequently repeating tasks will be used by different teams in similar activities. In far transfer, the team has gained tactic knowledge (not routine knowledge) by doing certain tasks and this knowledge is transferred to a similar work in other parts of the organization. In strategic transfer, the collective knowledge of the organization is used to accomplish a strategic task, which occurs infrequently but is critical to the organization. In expert transfer, a team is facing a question beyond the scope of its own knowledge and they seek for the expertise of this kind of knowledge in any part of the organization or even in different organizations.

For the knowledge transfer and knowledge management to succeed, an organization needs to define what activities and operations they will have and choose their knowledge transfer and management strategy accordingly (Mathiassen & Pourkomeylian, 2003). In a study made by Sulayman and Mendes, it was found that the issues in software development and software process improvement which were important to the success in business operations were very closely related to the knowledge transfer and management strategy of the company, as well (Sulayman & Mendes, 2010).

What about open-source communities and knowledge transfer? In an open-source community, the idea is to have enough eyes, minds, fingers and time to create very good designs and very good-quality code even with a thin line of communication. In an open-source community, there

is an unlimited number of people involved and interested in contributing to the community and there is no particular market to hit within a particular time frame to gain competitive advantage. The rewarding process is different, as well: colleagues of the community will give the reward. In an open-source team, anyone can contribute to the code, but there is a designer gatekeeper in the centre to protect the code base. The gatekeeper has to be a good programmer and he has to have a good eye for quality and be good with people. In the centre, there are few good programmers to take care of the code and, eventually, new good beginners can enter the centre level. In addition to these few people, there are a lot of other people contributing to the patches and code suggestions, detecting and reporting bugs and writing documents. (Cockburn, 2007).

The open-source community and their working methods have an impact on the software business at the communication level, as well. For example, in a survey made for software developers about the web 2.0 tools it was found out that web 2.0 tools have already changed the way software developers in software business communicate with each other, for example, as for testing, marketing and developing (Black & Jacobs, 2010).

2.1.2 Role of documentation in software development

It the early OO-paradigm days, it was very common to see software development as a model building (Jacobson, 1992; Rumbaugh, 1991). For example, for the customer, the user interface and user experience are very important aspects of a software product and, as such, they should not be considered lightly in the developing process. Use cases (Jacobson, 1992) have been around for a long time already and still they do have their place in development processes. To some extent, however, use cases are considered to be a little too heavy especially in agile development where the slogan says, "Working software over comprehensive documentation." (Agilemanifesto.org, 2013).

Ambler et al. (2002) in their book, list the fundamental issue of documentation to be communication (Ambler & Scott & Jeffries, 2002). Ambler also says in his writings about agile documentation that the strength of documentation is in its capacity to deliver knowledge and fulfil the communication needs, not necessarily to reflect the most current, complete and accurate reflection of the systems it describes. Especially noticeable is that the source code can be seen as documentation, as well.

The role of documentation is to help a team to communicate with each other during the development phase and, moreover, after the active

development phase. If the team is small and everybody knows what is going on, the need for documentation is not so crucial, but still the tricky question even in this setting can be compared to the mimicry of the game. Does the team have enough documentation to be able to transfer the knowledge to another team with slightly different players or to a game with slightly different game settings? If everybody is very familiar with the current setting, there might even be enough information without documentation, but what if this is not the case? And what happens if you are resuming the game after having played different games for one year? You most likely want to read the instructions first or you want someone to explain the rules of the game to you again. But what happens if there is nobody who knows the game anymore? Then you surely need documentation. (Cockburn, 2007.)

2.1.3 Software development education

Teaching software development isn't easy. In addition to the technical agenda the teacher needs to include other elements like project planning, negotiation skills, communication and co-operation to the software development course. In a particular software development course different group work and problem-based learning methods have been used for years to emphasize especially the importance of co-operation, communication and documentation (McKinney & Denton, 2006; Buckely, 2004; Fernandes, 2003; Gorka, 2007; Ruud, 1999).

Group-projects encourage students to be more active learners and to spend more time with other students. This is important for motivation, confidence, collaboration and self-study ability of students (Guo, 2009). Collaborative learning method is useful in the early stage of curriculum as it is at the end of the curriculum, for example, in a capstone course. Collaborative learning method used in the early stage, coaches the students for teamwork and gives them successful collaborative experience (McKinney & Denton, 2006). In the capstone course long-term co-operation between the industry partner and the university is important. For the teacher the variety of skills the students have in the capstone course requires them to take a key role in team building to ensure that teams are treated equally. (Neymem & Benedetto & Chacon, 2014).

The studio-based education, especially used in studying the arts, can also be suitable for software development. According to the research of Bull, Whittle and Cruickshank (2013) the most important aspect for the participant of the studio-course was "The people in the space". Neither

the physical environment nor the digital technology was mention to be as important. In addition the classic example of "monitor vision" was present, the students were sometimes hiding behind their monitors, when solving the problems instead working together in the studio environment. (Bull & Whittle & Cruickshank, 2013).

Agile methods present also an interesting approach to the problem of teaching software development. The study made by Hazzan and Dublisnky presented ten convincing reasons why software engineering programs should teach agile software development (Hazzan & Dublinsky, 2007). The reasons include increasing wide adoption in industry, educating for teamwork, dealing with human aspects and providing a single teachable framework. One of the challenges in study made by Lu & DeClue (2011) is the fact that students are working with several courses at the same time, which makes it difficult for them to handle the scheduling according to the agile process. Teachers also experience agile method to be more challenging, because it's more individualistic and it requires coaching instead of traditional teaching.

2.2 Software process improvement and small software companies

Small companies are not just scaled-down versions of large companies. They normally have a rather thin organization and free management style that encourage entrepreneurship and innovations (Richardson & Wagenheim, 2007). There are several standards and models for software process assessment and improvement, for example, CMM, CMMI and SPICE (Laryd & Orci, 2007; Spice, 2007). Small companies often see these models too expensive and time consuming and rather focus their efforts on everyday business (Richardson & Wagenheim, 2007; Dangle & Lasesen & Shaw & Zelkowitc, 2005; McCaffery & Taylor & Coleman, 2007).

Agile methods are nowadays popular empirical processes requiring frequent inspection and adaptability from both the team and the customer. The role of the customer is very important for the agile process to succeed. Small software businesses are keen on practising agile methodologies because they are considered to give the answer to the ad-hoc chancing customer requirements and constantly changing business environments (Cao & Ramesh, 2008). Agile and traditional methodologists have earlier often argued about the nature of agile development. But it is important to notice that planning can and should be done in agile development,

as well (Cockburn, 2007). Alfred Marcus, for example, reports in his study about the companies that have stayed successful across the changes, having three common characteristics: agility, discipline and focus (Marcus, 2005). Focus to tell where to go, discipline for getting also unpleasant things done and agility for being able to change the direction quickly, if necessary (Marcus, 2005).

The need for a process and a common understanding are essential for the survival of small software businesses (Bhat & Gupta & Murthy, 2006; Cusick & Prasad, 2006). But why aren't small companies very willing to make the effort? In a study (Coleman & O'Connor, 2008) made in Ireland, the target was to figure out why small companies are reluctant to use the best-known practices in their activities. It was found that process improvement is considered to be too expensive an investment so that small companies do not see or do not want to see it as a profitable effort (Coleman & O'Connor, 2008). Small software companies have most likely adapted principles of lean thinking and the question raised by them is whether the customer is willing to pay for this kind of work or not. However, there is a potential conflict here because there is evidence of customers especially wanting to see proof of quality and stable working habits from the small and especially young companies (Kivihalme & Valsta, 2010).

The Irish study also showed that start-up companies saw the formal software process improvement as an obstacle to flexibility, innovation and creativity. From their viewpoint, it was not at all about improving the process, but instead, a set of strict instructions forcing them to follow the given process and blocking innovation, creativity and flexibility. Also, it was found out that the educational background, experience and know-how of the technical management had a lot of influence on the willingness to commit to best practices. (Coleman & O'Connor, 2008).

A similar study (Niazi & AliBabar & Katugampola, 2008) was made in Vietnam focusing on the obstacles of applying process models and software process improvement. In this study, it was found that company size and age matters. For small organizations, the most important issue preventing them from applying process models and software process improvement was the lack of resources. For bigger organizations, in addition to the previous issue, the lack of communication, the lack of the commitment of the management and the timetable pressure were identified as obstacles. When these findings were compared to the research made in the UK, it was found out that the timetable pressure was identified as the key issue in the UK. The conclusion was that, in Vietnam, the lack of resources meant that the process improvement was not actually really happening

at all, whereas, in the UK, it was, but there still were problems related to the resources in the form of timetable pressure. In addition, the staff members in the Vietnam case were quite young compared to the staff in the UK. The conclusion was drawn that young inexperienced managers did not see process improvement so important that they would have allocated resources for such initiatives. (Niazi & AliBabar & Katugampola, 2008). A Finnish study (Kettunen & Laanti, 2007) about the agile future organization showed that an organization needs versatile talented people and the agility needs to be part of the business operation strategy, as well. Software development alone cannot be agile if the business around it is not. In addition, an agile process framework is needed for teams to be able to tailor their process for a particular situation. (Kettunen & Laanti, 2007).

2.3 Software business in transition

Recently, companies' revenues have increasingly shifted from selling products to selling services. Before the year 2002, companies got more profit from products and after that, the ratio for services and product have been around 50% for both. The growing importance of services goes back to 1990, when free software (FSF) and open source software (OSS) movements started to drive down software prices together with the internet boom. A new era started in the trend of services compared to product and licensing based software businesses. Companies were forced to find new pricing models and new ways of working in relating to OSS and FSF. (Cusumano, 2008.)

Is this the question about the life cycle or is it a strategic choice? The life-cycle idea suggests that software product companies start out generating most of their revenues from product license fees, but, over time, shift to a mixture of products and services and eventually to mostly services. Firms might want to continue with the idea of reducing the marginal cost to 1 %. If we consider the cost for just another software product to be near zero, this kind of business will end up to 99 percent gross margin compared to IT services were the margin can be near 30 %. This is the decelerating factor for the service-based businesses. (Cusumano, 2008.)

However, new ways of thinking have started to emerge. What if you can deliver automated services and make more profit? Even now we already have several types of new business models compared to the old license-based-models. We have, for example, subscription- (monthly etc.), advertising- and transaction-based models.

Old software product sellers are moving to services, too, because they cannot sell very many new products (licenses) anymore and the OSS and FSF movements force them to change their line of business. What this means to common IT service companies, such as Accenture, is that they have to start competing over the same customers with companies like Oracle, IBM and Microsoft – as these companies might be moving toward the concept of selling services.

One way for the software business is to "productize" the services, as well and try to make the purchasing as automatic as possible. In fact, a company offering fully automated services should be able to generate the same level of gross margins as a traditional software product company.

This is what, for example, Google is doing as we speak. They are transferring the cloud services developed for private customers to a product service delivered to companies worldwide with help of their partners. In this process, Google is taking the service fees of using their product and the partners are taking care of the integration part with low profit consultant fees. (Lampela, 2012.)

Nevertheless, it is the same for all the companies; they need to spend a fortune on sales and advertising as well as product development (Cusumano, 2008). The current selling environment for IT vendors is difficult in several aspects. First, IDC has predicted lower IT spending growth rate since 2012. Secondly, customers have larger buying-teams, meaning that there are more people to "sell" to. According to IDC's annual Buyer Experience Study, the number of the members in these buying teams increased from 5 people in 2010 to 5,9 people in 2011 and to 7 people in 2012. Moreover, IT buyers are still experiencing longer buying cycles. In this tough environment, IT vendors need to ensure that they are setting their sales up for success to compete. (IDC, 2012.)

IDC defines sales methodologies as a consistent set of sales processes that are executed by individuals and sales teams across the organization. This process needs a metric enabling tracking of the success of the process and continuous improvement of the process. The ultimate objectives of the sales methodologies and the underlining sales processes are to maximize the quota attainment for sales teams, optimize sales productivity, and maximize the revenue and profit for the company. The key process components of a sales methodology include demand generation and management, account planning, channel management, forecasting, opportunity management, sales management and coaching, selling skill sets, sales call planning, territory planning sales enablement and win/loss analysis and the delivery of the product successfully. (IDC, 2012.)

As software systems evolve, so do licenses. Although software licenses have gained prominence in the media, thanks, for example, to the work of the Free Software Foundation (FSF), the licensing evolution has received only little attention from researchers despite its many potential harmful consequences to software reuse and software business. The critical situation may arise when there is a need to update a component, but its license has changed and its new license prevents its distribution, requiring completely re-thinking the way the software package is put together. Consequently, developers must carefully analyze the overall licensing compatibility of all the included components. This compatibility analysis is usually done manually, or semi-automatically, by verifying that all bundles, source files and binaries have been released under compatible licenses.

2.4 Entrepreneurship

Schumpeter has provided one of the most famous and accepted theories of the importance of entrepreneurship to economic growth as early as in 1911 (Schumpeter, 1911). Later on, there have been more and more empirical results supporting the positive linkage between entrepreneurial activity and economic outcomes such as economic growth and innovation (VanPraag & Versloot, 2007). Entrepreneurs seek more profit opportunities and therefore introduce "new combinations" and innovations (VanPraag, 1999).

Van Der Veen (2004) has developed a model of the entrepreneurial process according to which entrepreneurship begins with the development of an idea which needs to be developed into an opportunity for business (opportunity recognition), which, in turn, needs to be prepared for exploitation, which, in the end, leads to value creation. This process is driven by the entrepreneur but strongly affected by the network. Gartner (1988), for example, argues that trait- or personality-based approaches explaining entrepreneurship have been unfruitful and behavioural approaches would be a more productive perspective.

The role of opportunity (Shane 2003; Shane & Venkataraman, 2000) has been included in entrepreneurship research and many factors outside the individual have been recognized equally important for entrepreneurship as the personality-based approaches earlier. For instance, the role of culture (Muller & Tomas, 2000), teams (Kamm & al, 1990), networks (Burt, 2000; Grandi & Grimaldi, 2003), resources (Bermann & Lichtenstein & Brush, 2001) and environmental conditions (Johannisson, 1990; Malecki, 1994) are very important. Hence, entrepreneurship is nowadays

seen as a complex process where the outcome is only partially dependent on the characteristics of the entrepreneur.

2.4.1 Entrepreneurship and education

The term of entrepreneurship education can be interpreted in two ways: either learning about entrepreneurship as a phenomenon or learning useful skills to become an entrepreneur. In this study, the emphasis is on learning useful skills to become an entrepreneur.

In literature, there can be found at least three different types of entrepreneurship courses (Gartner, 1985):

a. The first one typically uses standard textbooks like Bygrave (1994), Dollinger (2003), Kuratko and Hodgetts (2001). These books define entrepreneurship as a process, but narrow it down to the discovering of ideas and process of opportunity evaluation, writing a business plan, accessing resources, setting up a start-up and managing growth.
b. The second type of entrepreneur education focuses on entrepreneurship as a process of pursuing opportunities that may take place in different contexts, only one of which is a start-up. (Horsby & Naffziger & Kuratko & Montago, 1993; Horsby & Kuratko & Montago, 1999; Brush & al, 2003).
c. The third category consists of entrepreneurship courses focusing on small business management. Whereas the other two approaches are more concerned with the early stages of the entrepreneurial process, this third approach is more related to managing the existing firm and managing growth. (Scarborough & Zimmerer, 2006.)

The opportunity view has few advantages compared to other approaches: the focus is on the process of entrepreneurship instead of on the entrepreneur as a person. So focusing on the process rather than the person, entrepreneurship is no longer seen as something a person has to be born with, but rather as something teachable and thus attainable for a large group of interested individuals. (Bygrave, 1994).

Although there is a high variation in topics taught, Laukkanen (2000) claims that the dominant pattern of education has been based on an individual-centred mindset. This strategy of individualistic entrepreneurship education aims to give general education to individuals on how to

become an entrepreneur. Laukkanen (2000) proceeds by suggesting a parallel strategy in entrepreneurship education, i.e. the business generation strategy, which aims at giving specific training as for setting up a business in a given context, not just setting up a business and managing it. Focusing on the opportunity rather than the start-up, students can learn to benefit from their prior knowledge (Shane, 2000). This domain-specific knowledge is highly developed in non-business students through their major field of study.

In their view of entrepreneurship education, Brand and Wakkee showed that if a process view of entrepreneurship is adopted, it becomes possible to develop or evaluate programs and courses in such a way that all relevant subject areas are covered and that a program is directed towards the specific needs and capabilities of this specific target group. Further, by focusing on the entire process, students will not only learn to found a business – which is a rather short-term view – but also how to manage, develop and grow their venture. This is especially important considering the limited managerial experience and knowledge of non-business students. Furthermore, growing organizations are generally more beneficial than simple start-ups. (Brand & Wakkee, 2007.)

The process view to entrepreneurship makes it possible to look at the entrepreneurship not only from the perspective of personal attributes students already pose. The process view gives the possibility to consider entrepreneurship as something that can be developed rather than it being an inborn characteristic. (Brand & Wakkee, 2007.)

The question that can be raised when considering the entrepreneurship education is whether or not entrepreneurship should be taught in maze or radiant manner? In the maze manner the entrepreneurship courses are developed and taught by one (central) department, usually a business school or entrepreneurship centre. In the radiant model individual faculties or departments offer entrepreneurship courses to the students. Both these models have their own merits and drawbacks and a choice for either one of these models is likely to be influenced by structural factors like how the curricula is financed. (Brand & Wakkee, 2007)

2.4.2 Teaching entrepreneurship

Currently, universities are expected to play an important role in society. In addition to research and teaching, they should start a new mission of economic development. This development has been apparent at several

US universities for decades already and is currently gaining ground in Europe, as well.

Universities can contribute to entrepreneurship by many different ways, for example, indirectly through educating candidates and directly by commercializing research and creating incubators for new ventures for both staff and students.

There are already research showing that graduates with an entrepreneurship as a major are more likely to start new business and they have stronger entrepreneurial intentions than other graduates (Kolveredi & Moen, 1997). Peterman and Kennedy (2003) showed in their study that entrepreneurship education significantly changes the entrepreneurial intentions of participants. Hence, in addition to the direct effects through new start-ups, the participants may repeat the entrepreneurial process many times during their entire working career by starting new companies, new business areas in existing companies, by running their businesses more competently, or by assisting other entrepreneurs. Rasmussen and Sörheim argued in their study that the participants in entrepreneurship education are, however, most likely to be recruited among people initially motivated to become entrepreneurs, so a high start-up rate could be expected independent of the education programme. Hence, the qualitative longitudinal studies might be an important tool to add new understanding to this phenomenon. (Rasmussen & Sörheim, 2006.) Nevertheless, the importance of a network is surely remarkable (Etzkowitc, 2003). Etzkowitc (2003) has noted that "although some persons may not be willing to become entrepreneurs individually, they are able to do so collectively."

On the other hand, in a study, where several European entrepreneurship university programmes were measured, it was revealed that, with some exceptions, the students' ideas have rather a limited commercial potential. It could be questioned whether launching a one-person consulting business helps a student to develop the skills necessary for founding a high-growth venture later. Giving the students the opportunity to work with highly potential ideas might provide them with education, which is more relevant for building high-growth businesses. The schools with the most extensive entrepreneurial programmes, according to the study, can, however, show both the number of new companies created and the considerable growth in these companies. (Rasmussen & Sörheim, 2006.)

In a study, Student-Mini-Company, made in a college, it was found that entrepreneur programme did not actually have the intended effect, which was to promote entrepreneurial thinking. In fact, the effect was significantly negative. The result can possibly relate to the fact that the students obtained a more realistic perspective both on themselves as well

as on what it takes to be an entrepreneur. This study was done only in one school, so more studies are needed to carry out. (Ofsterbeek & Praag & Ijsselstein, 2010.) In this experiment, the students sold stock, elected officers, and they produced and marketed products or services. In addition, they kept records and conducted shareholders' meeting. The aim of the program was to put the theory in practice and to understand what entrepreneurship is about. This study can be criticized about the fact that students did not have a real context in which to start their business and the students did not have enough knowledge, which can create uncertainty towards entrepreneurship among some students.

2.5 Sales and services education

Consultative selling and customer relationship management is becoming more and more important to software companies, especially to small software companies (Butaney, 2007). There is a shift towards customer-centric marketing, which encourages collaboration with the customer and requires a salesperson and other personnel act as knowledgeable partners in strategic decisions, utilizing empathy and persuasion rather than using aggressive selling techniques (Sojka & al, 2000).

Changes in the sales functions require skills in negotiation and analysis, deeper product and service knowledge and solid problem solving methods, which will, in turn, require a motivated, capable and efficient sales force from a variety of academic majors (Murray & Robinson, 2001). Indeed, these attributes of a successful sales professional are transferable to other positions within the organization, as well, and, in fact, they often contribute to career advancement, too (Luthy, 2007; Levenburg, 1996).

The majority of practitioners rank salesmanship the highest on their list of all marketing skills since sales skills are not only an integral part of any organization's marketing, but they are also required when selling one's ideas within the company (Leisen & Tippins & Lilly, 2004). A curriculum that reflects the current demand of the marketplace to prepare students for their future roles in the workforce is highly appreciated by companies (Kelly & Bridges, 2005).

Many college graduates generally have a negative perception of sales as a profession (Wilkes & Spiro, 2004; Michaels & Marshall, 2002; Peterson & Devlin 1994; Weilbaker & Merrit, 1992). Yet the most prevalent career opportunity for all college graduates in the USA from 2002 through 2007 was either sales or management trainee position (NACE, 2009). University students, too, tend to see selling and sales work rather

negatively. It appears that sales as a career track has a major image problem centred on the ability to avoid ethical compromise. Sales work falls short of recognition as a profession due to its lack of public confidence and due to its lack of commonly accepted and widely recognized ethical code (Hawes & al, 2004; Cengiz & Yazici & Erdal, 2010).

Several studies have shown that the instructor has a major impact on the students' attitude towards their coursework (Curran & Rosen, 2006; Parket & Pettijohn & Luke, 1996; Cengiz & Yazici & Erdal, 2010; Newberry & Collings & Tyler, 2010). In a study where 20 ethical problems such as offer a monetary bribe to a buyer; force take-home samples on a reluctant buyer; spy on competitors; and steal form a competitor at a trade show were measured, the conclusion was that the instructor has a significant effect on the students' perspective regarding ethical issues in controversial marketing practices (Cengiz & Yazici & Erdal, 2010).

In a research made by Sojka, two groups of students who tend to have a more positive perception of sales were identified: marketing majors and those who had taken two or more sales courses. The study suggested that those educators who accurately reflect the reality of the attributes, challenges and the opportunities of sales positions, have a stronger influence on students' perception of sales as a possible career track. In this study, the faculty relating the closest to sales got the most positive evaluation toward the sales profession. (Sojka, 2000.)

In a study made in South-Africa about direct selling practices and work intergraded learning, it was discovered that the impact of the process depended on the profile of the students who had been admitted to the academic programme. The biggest impact it had for the students having the ideal profile for sales work already. (Wati, 2011.) The method used in the research was self-directed search questionnaire, which is based on Holland's occupational theory (Holland, 1985). Holland developed the questionnaire from his theory of career choice and the questionnaire is now used in career guidance. Gevers (1992) states that this questionnaire is seen worldwide as one of the most effective occupational interest questionnaires.

2.6 Learning theories

Sharing social knowledge has had a very important role in education. It has an impact on every-day life and culture and it has associations to the improvement and development of certain actions in real-life context. One of the famous learning theories, Kolb's theories (Kolb 1984) of experiential

learning, is based on the idea of the existing reality and the experiental information a person already possesses and the connective process between these two areas. Kolb's theory of experiential learning is developed from the following three mainstream educational theories:

1. Dewey (1938), in his theory emphasized that learning is an active process, meaning that active experience and teaching has a strong relationship. Dewey's theory was mainstream for quite a long time and, later on, it was found out that learning is something that people do all over again – the concept of life-long-learning raised from these ideas.
2. Lewing (1951), in his theory, indicated an important connection to social psychology. His innovative method combines personal charisma and intellectual leadership. This methodology has been used for a long time in social communications, relationships and leadership education.
3. Piaget's (1971) research shows that there is a connection between learning and doing. Reading only theory did not give the right learning outcomes, but something else was needed. At the same time, the connection between intellectual development and experience was established in education research. Because of this, action-based learning was emphasized as one important factor of successful learning.

According to Kolb (Kolb, 1984), experiential learning has four stages:

1. A concrete experience (feeling)
2. Reflective observation (watching)
3. Abstract conceptualization (thinking)
4. Active experimenting (doing)

The relationship between the stages is illustrated in the Figure 1. In the cycle, learning starts with the concrete experience by feeling it and then continues to reflective observation by feeling and watching and then to abstract conceptualisation by thinking and watching and to active experimenting by thinking and doing and finally to fulfil the cycle by going back to concrete experience by doing and feeling. The process of learning is a conversational process, in which the learner learns new pieces of information and the process gives a possibility to learn by experimenting and solving problems.

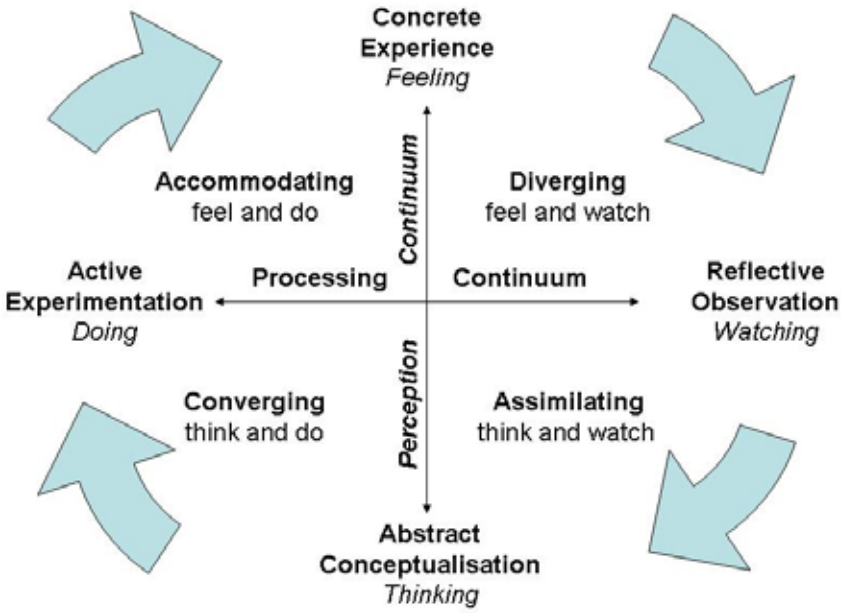


Figure 1. The Experiential Learning Cycle (Kolb, 1984)

The framework for experimental learning can be used in any kind of degree programme having the target of changing the existing practices. In order to create a learning experience that has an impact on the learners, deep professional experience of the subject and the learning process are needed. This is certainly a challenge for teachers, as well.

2.6.1 Learning view theories

When building the educational framework, it is important to understand different learning views and their impact on the learning process of an individual. It is traditional to divide learning views into four categories (Rauste-von Wright, 2003; Schunk, 2011):

- *Behaviourism:* Learning is about stimulus-reaction pair, and the right reaction will be rewarded to strengthen the learning process. The learning means storing information as it is for the future use, and the information will be transferred from the teacher to the student as it is. The information is stable and not changing. The student is a passive receiver of the information.

- *Humanistic:* The foundation is in humanistic psychology. The process is creative and aims for the mental growth and the characteristic features are activity, experience, community, openness and self-guidance.
- *Constructivism:* Learning is active and requires actions in which the learner interprets new information according to his/her previous knowledge, experiences and understanding. Experimenting, problem solving, cognition and understanding are the key elements of the successful learning process.
- *Cognitive:* The inner processes of a learner's mind are important for the formation of knowledge. Learning has goals and it is an active process and the learner is an independent thinker and information finder.

2.6.2 Variation theory

Variation theory is developed from phenomenography and it is a theory about learning and learning experience. Variation theory includes conditions and restrictions influencing the learning process (Marton & Booth, 1997; Marton & Runesson & Tsui, 2004; Runesson, 2006).

According to Marton and Booth (1997), the human way of experiencing a phenomenon depends on how an individual's consciousness is built. Variation theory is based on the dynamic structure of consciousness. The individual is constantly aware of the large number of cases. An item must first be detected and distinguished from the background. A concept or an object can be observed only when there is variation, for example, leafy tree compared to evergreen tree. Consciousness can also be affected by experiences from previous events and situations. These experiences and situations can be compared to the current learning moment.

In variation theory, learning is always intentional and it has a certain target. When observing the target, we can notice different characteristics of the object. Students do not normally pay attention to the same structures and, therefore, they form different conceptions of the subject. Changing the conception is possible when students experience the target from different angles than before. Students should, therefore, become aware of the critical aspects of a particular phenomenon in order to interpret the situation correctly. (Marton & Booth, 1997; Marton & Runesson & Tsui, 2004; Runesson, 2006.)

According to variation theory, if a particular aspect is to be varied or held constant, learning can be stimulated or prevented by this varied

feature. There are reports of the learning outcomes, for example, in natural science. A group of students who could experiment with the weight aspect when using a pulley to explain the phenomena did better than the group not being able to experiment with the weight when explaining the feature in a natural scientific manner. (Hakkarainen, 2007.)

The presence of variation creates a noticeable contrast within one or more features of a phenomenon. Variation theory describes this noticing as being related to several key processes and concepts that define learning, including awareness, discernment and simultaneity. When experiencing the phenomena, people are unable to be aware of all the aspects of the phenomenon. Instead they are only able to attend to certain aspects of the phenomenon. These particular features brought into focal awareness form the basis of the knowledge for that experience. (Marton & Booth, 1997). In order to be aware of certain aspects of the phenomenon, learners must first discern those aspects from their environment. Discernment is build from direct experience in opposite of being told. Variation theory emphases exactly learner's directly experiencing the variation (Bussey&Orgill&Crippen, 2013). In addition to being aware of the critical aspects, learners must be simultaneously aware of multiple critical features of a concept.

In variation theory it is common to study an object of learning from three different angles: intended, enacted and lived objects of learning. The intended object of learning is something the teacher has been preparing for the students. The enacted object of learning is what actually was presented in the classroom. The lived object of learning is that object of learning, which is often in focus of educational research. What did the students actually learn? (Bussey&Orgill&Crippen, 2013).

Marton and Runesson (2003) list four significant patterns of variations that can happen when experiencing the phenomenon: contrast, separation, generalization and fusion (combination of the above). Generalization could happen, for example, by showing students a variety of reports and then asking them to identify common factors in reports. Contrasts could be detected instead, for example, by searching for different types of reports in order to find out how they differ from each other. The combination of these would be the fusion, where the differences and similarities would be searched for in the reports.

2.6.3 Learning theories in action

In software development and software project management education, Team-Based Learning (TBL) and Project-Based Learning and Problem-Based Learning have all been used as instructional methods. All these methods can be seen as an application of Kolb's experiential learning theory and they all support the constructivist and even cognitive learning views.

Problem-based learning is a student-centric education method where students learn about a subject through experiencing a problem solving process (Hmelo-Silver, 2004). Problem-based learning is active learning, where working in groups, students identify what they already know, what they need to know, and how and where to find the new information needed. The role of the instructor (known as the tutor) is to facilitate learning by supporting, guiding, and monitoring the learning process. (Schmidt & Rotgans & Yew, 2011.)

Project-based learning uses complex, real-life projects to motivate learning and provide learning experiences. Project-based learning builds a relationship between people educating the students and people hiring them. Successful project-based learning experiences have been reported for various social, engineering and science courses (Buckley, 2004; Fernandes, 2003; Gorka, 2007; Ruud, 1999; Sikkel, 1999). PBL in the following paragraphs refers to Project-Based Learning instead of Problem-Based Learning.

Team-based learning is an educational method that is based on the idea of developing high performance learning teams that can enhance student engagement and the quality of student learning in almost any course (Michaelsen & Watson & Cragin & Fink, 1982). Team-based learning can also be important for developing skills and abilities that are useful in business where many projects and tasks are performed by teams (Hills, 2001).

PBL provides an opportunity for students to develop, improve and apply communications, teamwork, leadership and problem solving skills needed in real-world projects. Active learning involves students in doing things and analysing things at the same time. Students learn more and they will retain the information longer. This kind of learning method has been found to motivate especially bored students (Markham, 2003). Students seemed to be more self-motivated to engage in active learning although they might not learn as broad a variety of topics but what they learn, they learn in-depth (Detmer & Li & Dong & Hankins, 2010). It has been noticed that students tend to work harder in these kinds of projects because someone else - the customer - is depending on their team to

get the project done and the results will have a real impact on the world outside the classroom (Buckely, 2004; Gorka, 2007).

On the other hand, in a PBL class, students can experience more pressure compared with the traditional class – most students can even feel uncomfortable with the idea of finishing a real-world project by the end of a certain semester. To help the situation, the student teams must be able to meet the customer as early as possible, project requirements need to be very well-defined in the beginning and it is important to have a very good estimation on how much work this kind of course really requires. (Detmer & Li & Dong & Hankins, 2010.)

From the teacher's viewpoint, a project-based class is more challenging to teach than a traditional class. But in some pilot cases, nevertheless, the instructors felt that the excitement and sense of accomplishment displayed by the students far outweighed the feeling of uncertainty that sometimes occurred during the project. Instead of always being the authority, the instructor did not always know all of the answers to students' questions. (Detmer & Li & Dong & Hankins, 2010.)

When delivering software development courses by PBL, there are several aspects to consider. Almost every real-world project deals with the web-based interface and that makes them suitable only for the senior project-courses. One important aspect is the evaluation of the possible project because they have to fulfil certain technological criteria and they should last one semester. Another important question is, what if the result does not meet the expected standards and who will eventually be responsible for the testing and deployment. And, finally, what about the legal issues, more specifically, who owns the result of the project? (Detmer & Li & Dong & Hankins, 2010.)

Another interesting issue to consider is the effect of team-based learning on dropout rates and grades of computer science courses. In a report about the dropout rates and grades in a TBL-course compared to a lecture-based course, the results showed that there was a trend for the final grades to be higher in the TBL-courses than in the lecturer courses. The dropout rates were smaller in TBL-courses than in the lecture-based courses. (Lasserre & Szostak, 2011.) One interesting point raised by this study is that after participating in a TBL-course and then participating in a traditional course (lecture-based), the dropout rate was bigger for those students who had taken the TBL-based course before (Lasserre & Szostak, 2011).

2.6.4 Evaluating training programmes

The evaluation of curriculum or training programme is a continuing process throughout the development lifecycle. There are several evaluation approaches that can be used. One of the famous methods used in training programme evaluation is Kirkpatrick's method: "Evaluating Training Programs: The Four Levels" published in 1998 (Kirkpatrick, 1998). Other relevant methods are, for example, the stakeholder-based evaluation (Bryk, 1983), Dick and Carey's model (Dick & Carey, 1996) and Marshall and Shriver's model (Marshall & Shriver, 1994).

Dick and Carey, in their research, introduced an evaluation process with different types of evaluators (experts, individual, group of evaluators) to evaluate various aspects of learning and curricula. Dick and Carey proposed four different methodologies: 1) subject matter expert review 2) one-to-one evaluation 3) small group evaluation and 4) field trial (Dick & Carey, 1996). Marshall and Shriver, in their model, include five evaluation layers, which are the following: the teacher, the educational material, and the design of the course curriculum, the units' curriculum and knowledge transmission (Marshall & Shriver, 1994).

Kirkpatrick, on the other hand, mentions the following reasons for evaluating training programs: a) decide whether to continue offering a particular training program b) improve future programs c) validate your existence and job as a training professional. Kirkpatrick's four levels are reaction, learning, behaviour and results. In the table below, there are some implementation guidelines for using Kirkpatrick's evaluation program.

Table 1. Kirkpatrick's four levels of evaluating training (Kirkpatrick, 1998)

Level 1: Reaction

- Determine what you want to find out.
- Design a form that will quantify reactions.
- Encourage written comments and suggestions.
- Attain an immediate response rate of 100%.
- Seek honest reactions.
- Develop acceptable standards.
- Measure reactions against the standards and take appropriate action.
- Communicate the reactions as appropriate.

Level 2: Learning

- Use a control group, if feasible.
- Evaluate knowledge, skills, or attitudes both before and after training.
- Use a paper and pencil test to measure knowledge and skills.
- Use a performance test to measure attitudes.
- Attain a response rate of 100%.
- Use the results of the evaluation to take appropriate action.

Level 3: Behaviour

- Use a control group, if feasible.
- Allow enough time for a change in behaviour to take place.
- Survey or interview one or more of the following groups: trainees, their bosses, their subordinates, and others who often observe trainees' behaviour on the job.
- Repeat the evaluation at appropriate times.
- Consider the cost of evaluation versus the potential benefits.

Level 4: Results

- Use a control group, if feasible.
- Allow enough time for results to be achieved.
- Measure both before and after training, if feasible.
- Repeat the measurement at appropriate times.
- Consider the cost of evaluation versus the potential benefits.
- Be satisfied with the evidence if absolute proof isn't possible to attain.

At the first level, the aim is to measure the reaction of trainees to the training program. The purpose of measuring reaction is to ensure that trainees are motivated and interested in learning. At the second level, the aim is to measure the knowledge acquired, skills improved or attitudes changed as a result of the training. Application of the new knowledge, skills, or attitudes is not measured at this level. At the third level, the aim is to measure the transfer of training and to see if trainees are applying

the new knowledge, skills or attitudes on the job. At the fourth level, the aim is to measure the result of training as it relates to factors such as sales, productivity, profit, costs, employee turnover and product or service quality.

2.7 Summary of the literature and motivation for this research

This chapter presented a literature review about learning software development and engineering while concentrating on entrepreneurship and software businesses. The summary of literature review is presented in Figure 2. The literature review showed that there are lots of studies and experiments of one particular TBL or PBL course and its effect on studying software development, but there are not very many systematic studies and experiments about integrating many TBL/PBL –courses together and linking them with the entrepreneurship and software business related issues like selling and service providing.

To be able to create and describe useful learning framework for learning software development in conjunction with entrepreneurship and business related issues, we need first to understand the student perspective toward those issues. Secondly, we need to create the framework and evaluate its impact on students' attitudes and learning outcomes. The aim of this research is to create a learning framework and gather more information about these topics by applying the framework.

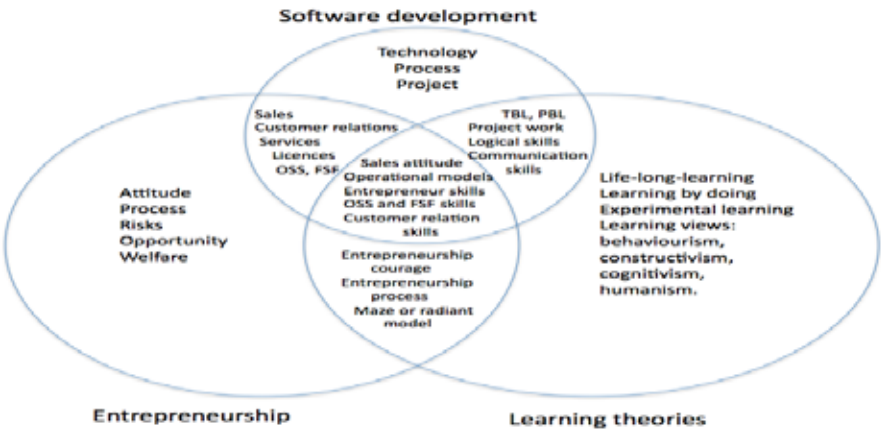


Figure 2. Literature summary

3.
Research design

The research design is based on Kirkpatrick's training program evaluation (Kirkpatrick 1998) because of its relevance to evaluating training programs in adult and corporate training (Galloway, 2005; Lemminkäinen, 2010). Kirkpatrick's evaluation model has been used in many organizations for over forty years and still it is valid tool for measuring training programmes (Bates, 2004). Kirkpatrick's model addresses the need of training professionals to understand training evaluation in a systematic way and it has provided straightforward language for talking about training outcomes in order to evaluate whether or not certain objectives have been reached (Bates, 2004). Kirkpatrict's model focuses the evaluation process on four classes of outcome data that are mostly collected after the training has been completed.

The research problem and the Softala framework to be built will simulate the corporate training in such a way that the learning environment simulates working in projects in real life. This makes the use of Kirkpatrick's evaluation model appropriate. The four levels of evaluation are presented in the Figure 3 below. Theory-driven and data-oriented approach is used in the reaction part of the evaluation. The issues of particular interest are presented in the figure with clouds (process, entrepreneurship, etc.). Reaction/pre-study part leads to developing the Softala framework (described in more detail in chapter 5). After the creation of the Softala framework, Kirkpatrick's learning, evaluation/behaviour and result levels are followed by the evaluation of the impact of the Softala framework.

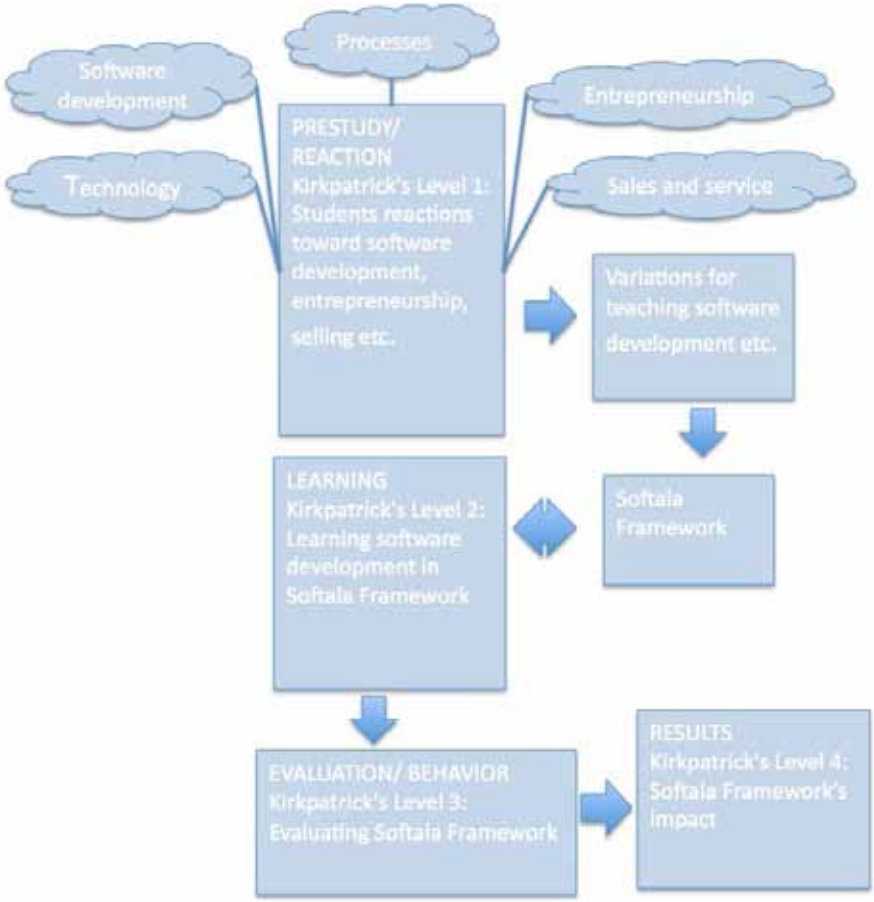


Figure 3. Research design

3.1 Research questions

The research problem is the following:

> Can the Softala framework help students to be more prepared to meet the sales and service competences required in modern small software companies, so that even the willingness to start their own business is strengthened during their studies?

The research problem can be divided into the following sub-questions:

- **RQ1:** How do the students view software development and entrepreneurship before studying in the Softala framework?
- **RQ2:** What are the implications of students' views for teaching?
- **RQ3:** Does the studying in the Softala framework have an impact on the students' attitudes towards selling, sales work and sales process improvement?
- **RQ4:** Does the studying in the Softala framework have an impact on the students' attitude and willingness to become an entrepreneur in the near future?
- **RQ5:** Does the studying in the Softala framework have an impact especially on those students having a negative attitude to entrepreneurship in the first place?
- **RQ6:** What kind of impact does the Softala framework have on the learning process of a student not committed to studies – a potential dropout student?

3.2 Research approach

The Softala framework is built on the basis of the results of the study presented in Chapter 4 (RQ1 and RQ2), the learning theories and other related literature (Chapter 2).

In the Softala framework, sales and service attitude, legal and business issues, project management and customer-oriented software development are melted together to create an innovative environment to learn. In the creation process of the Softala framework, the data- and theory-driven content analysis inspired by variation analysis described in more detailed in Chapter 4 is used to expand the learning experience. The Softala framework created after the pre-study (RQ1 and RQ2) is then presented more closely in Chapter 5. In Chapter 6, the findings of the evaluation of the Softala framework are presented and, finally, Chapter 7 ends the research with conclusions and discussions.

3.3 Research methods

In order to get a better starting point for understanding students and their perspective towards entrepreneurship and sales, an open questionnaire (attachment 1) was delivered by email to the students taking an obligatory software development course in the autumn of the year 2011. Data- and

theory-driven content analysis inspired by variation analysis is then used to analyze the data.

In the second phase of the research, the impact and effectiveness of the Softala framework was studied by using the questionnaire with Likert-scale questions (attachment 2). With the Likert-scale questionnaire, it is possible to study attitudes and motivation and perspective toward certain aspects, feelings etc. So it suits very well in this kind of research. The Likert-scale often has 5 or 7 steps and it is possible, for example, to anchor the scale in the end to "Totally agree" and "Totally disagree" claims.

The post-then-pre technique was chosen because by doing this, it could be ensured that everyone starting in the Softala framework had the same basic knowledge when they answered the questionnaire. If the questionnaire had been conducted by using pre-then-post technique, the studies and teachers at previous levels would have had more significant impact on the results. The entire questionnaire follows the same pattern; this way it is possible to collect the data during one semester for several levels. All the students studying in Softala during the winter semester 2013 were asked to answer the questionnaire. Several teachers also commented on the questionnaire before it was used. The questionnaire was tested before using it for real. Because the Softala framework consists of several project courses, every student in the Softala framework studies all the three courses. This way it is possible to analyze the impact of several project courses instead of only one course. This study will reveal what the impact of systematic and long-term project-based-learning environment on students is.

The post-then-pre questionnaire is a very popular way to assess a learner's self-reported changes in knowledge, awareness, skills, confidence, attitudes and behaviour. It takes less time and, as for self-reported change, it avoids pre-test sensitivity and response shift bias that result form pre-test overestimation or underestimation. The post-then-pre was proposed in the late 1970's as a way to control response shift bias in the traditional pre-post design (Howard, 1980). A response shift occurs when a participant uses a different frame of understanding about a question between the pre- and post-periods. This can create a problem when assessing self-reported change (Rockwell & Kohn, 1989). Participants may not accurately assess their pre-program knowledge or behaviour. Then, at the end of the program, participants' new understanding of the program content may affect their response regarding the post self-assessment. They are actually responding based on two different frames of reference. In the post-then-pre design, both before and after information is collected at the same time. After the educational program,

students are asked to rate their current knowledge, skill, attitude and behaviour after the program. Then, they are asked to reflect back and rate that same knowledge, skill, attitude and behaviour before participating to the program.

3.4 Data analysis

Theory-driven and data-oriented approach is used when analysing the gathered data from the open-ended questions in the pre-study. With the content analysis, it is possible to make observations and remarks and analyze them systematically. The content analysis can be divided into choosing the analysing unit; getting to know the data; categorizing the data, interpreting the relations of the categories and evaluating the reliability (Hardesty, 1986). All these phases in this research are described in more detail in chapter 4. By analysing the data collected from the students having not studied in Softala yet, it is possible to identify the critical aspects of learning software development. By doing this, it is possible to determine the corresponding aspects of variations to be used in the Softala framework later on. Students should become aware of the critical aspects of the phenomenon so that they can interpret the situation correctly thus being able to acquire deeper knowledge (Marton & Boot, 1997; Marton & Runesson & Tsui, 2004; Runesson, 2006).

There was no selection process involved when choosing the sample for the first questionnaire, but using e-mail to deliver the questionnaire was not the best choice. The response rate turned out to be less than expected. Nevertheless, the response rate was 52 % (33 respondents), which is acceptable for the preliminary study. During the content analysis, the data is read several times before the subcategories are formed to improve the reliability of the research.

The second questionnaire was organized to take place during the lecture hours in order to get as good response rate as possible. To improve the validity and reliability of the questionnaire, some motivation is useful before gathering the data (Cohen & Manion & Morrison, 2011). Before questionnaire 2 both teachers and the researcher motivated students to take their time and answer as profoundly as possible.

In the questionnaire conducted with the Likert-scale variables, it is also common in the social sciences to make a computable variable, especially if the variables in the equation correlate with each other. In these cases, Cronbach alpha can be used to calculate the internal consistency of the sum variables (Cohen & Manion & Morrison, 2011). Because the

variables in the questionnaire 2 are mainly following the ordinal scale, the Spearman correlation will be used in the correlation analysis.

In the social sciences, it is also common to see that a Likert-scale variable can be used because it is possible to think of the Likert-scale variable as an interval scale variable (Vigderhous, 1977; Jakobsson, 2004; Allen & Seaman, 2007). In this research, the non-parametric Mann Whitney U test is used to ensure the appropriate statistical treatment for the data (Cohen & Manion & Morrison, 2011).

Table 2. Research design summary

Research questions	Data collection	Data analysing	Validity and reliability
RQ1- RQ2	Questionnaire I, 2011 Delivered by email to all participants in obligatory software development course.	Theory-driven and data-oriented approach was used in analysing the gathered data from open-ended questions.	No selection. Some experimental mortality. Data was read several times before the subcategories were formed.
RQ3 - RQ6	Questionnaire II, 2013. Answering the questionnaire was organised to take place during the lecture hours to ensure a good response rate. The researcher motivated students before answering the questionnaire.	Post-then-pre test to ensure that students are answering with the same basic knowledge frame. No control group. Ethically and financially using the control group is not possible. However, the students at different levels of the Softala framework can be seen as a control group to each other.	Using appropriate statistical treatment for the data gathered. - Spearman correlation - Mann Whitney U test

4. Student perspectives before studying in the Softala framework

4.1 Data collection and analysing methods

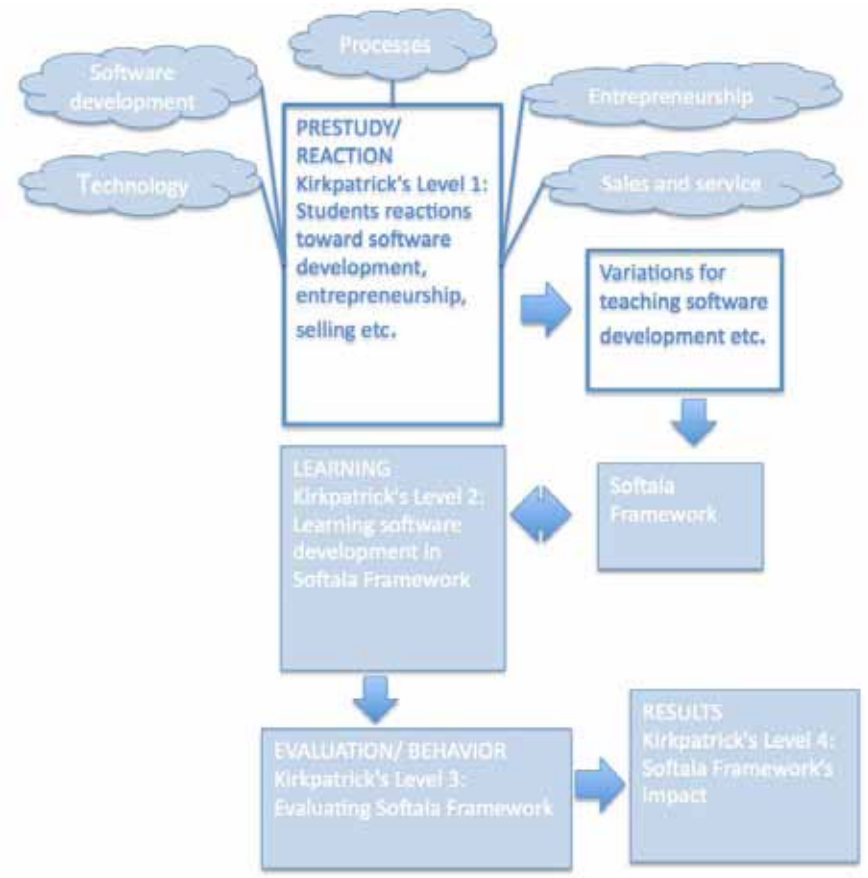


Figure 4. Research design, prestudy and variations for teaching

Software development has mostly been studied from the perspective of programming and teamwork according to agile or more traditional waterfall model to find out what is important to include in the educational programme for software developers (Robins & Rountree & Rountree, 2003; Marton & Pang, 2006; Kaczmarczyk & Petrick & Pears, 2010; Puhakka & Ala-Mutka, 2009; Bourque & Dupuis, 2004; Daniels & Cajander & Pears, 2010; Layman & Cornwell & Williams, 2006; Rico & Sayani, 2009). The aim of the curricula is to prepare students for their future careers. In software development research, it is still relatively new to investigate students' perspectives and experiences toward sales, service creation and their attitudes to entrepreneurship before they actually become software development professionals. Having a goal of improving software development education and students' attitude towards entrepreneurship and business-oriented thinking in universities of applied sciences, it is important to first find out how students experience their studies and these objectives of interest. The aim is to understand and specify how students see these matters based on their own conceptions and experience.

This part of the thesis presents the preliminary study of the student perspective on software development, sales work, service creation and innovations and the students' attitude to entrepreneurship. In this chapter, software perception categories of the students and their relationships are presented and the idea is given of what should be emphasised in creation of the Softala framework (described more closely in the next chapter) to support an entrepreneurial attitude.

The research questions in this preliminary study are as follows:

- **RQ1:** How do the students view software development and entrepreneurship before studying in the Softala framework?
- **RQ2:** What are the implications of students' views for teaching?

To find answers to above questions, the first questionnaire was made in the autumn of the year 2011. The questionnaire is translated in the attachment 1 at the end of the thesis and all the students' quotes later on are translated from Finnish to English. The questionnaire was delivered to all the students participating in the obligatory software development course in their third semester. The questionnaire was sent by e-mail to 60 students. The response rate was 52 % with 33 answers, which is acceptable for the preliminary study. In the questionnaire, there were first background questions and then questions about the students' willingness to consider entrepreneurship as a potential future career and a question

whether or not the student is considering to choose software development as his or her area of specialization.

After these background questions, there were open thematic questions about studying software development e.g. how they would describe software developer's work according to their own experience and what they think about issues like entrepreneurship, sales work, innovation, processes and technology. These areas of interest were chosen because the aim is to develop an educational framework to support entrepreneurship and entrepreneurial attitude and a business-oriented mind-set of the software developer students as early as possible during their studies.

Both theory-driven and data-oriented approaches were used in analysing the qualitatively gathered data from the open-ended questions in the questionnaire. The data was read several times before the subcategories were formed so that the reliability could be guaranteed. The data was then classified based on the content and weighted up regarding the identified subcategories. The main categories were found in the literature and the subcategories were extracted from the collected data.

4.2 Background information

The students (33 persons) answering the questionnaire were mostly relatively young. The median age was 24 and the majority of the students had started their studies shortly after graduating from the upper secondary school. 24 students out of the 33 students had passed their matriculation examination[1].

However, some students were more experienced – the ages varied form 20 to 52 and there were a few exceptions as for their prior degrees like the ones from some other university of applied sciences or university (master's degrees). Every student was studying for the second year in the 3,5 years' bachelor's program in business information technology. Two of them were over 40 years old. The gender distribution was 67 % male and 33 % female students.

1 The matriculation examination in Finland is the same as A-levels and it gives a qualification for applying for academic studies. In Finland, it is also possible to start studying in a university of applied sciences without the matriculation examination if you have a suitable secondary level vocational education.

4.3 Students' conceptions of software development and entrepreneurship (RQ1)

Professional perspective on software development was used as a major guidance for interpreting the material and forming subcategories and describing the relationships between the categories. Students were soon to get their first real jobs where the aspects such as team work, communication, selling, marketing, budget limits, time frames and negotiations would be part of their daily work environment. It is very important to acquire more comprehensive knowledge on how the students themselves see these issues of interest and what their perspective toward software development is. The codes established earlier were chosen because of their relevance to the research questions in this prestudy (Johnson & Christensen, 2012). The thematic open-ended questionnaire was organised according to these codes, as well. Subcategories were derived from the answers to the open-ended questions in the questionnaire. These categories and their subcategories with some quantitative information about the frequencies are illustrated in Table 3.

Table 3. Categories of students' experience and understanding of software development [2]

Category	Subcategories
A: Software developer's profile	Complex modelling and problem solving **Teamwork and social skills** **Self-discipline**
B: The work of a software developer	**Timetable** Documentation Customer relations and business skills
C: Technology	**Technical evolution** Concepts
D: Entrepreneurship	**Risks** Business instinct
E: Selling	**Customer needs** Sales team
F: Processes	**Project & process relationship** Quality aspects
G: Innovation	Courage **Imaginativeness**

2 In the table 3, those subcategories that at least 50% of the participants mentioned are highlighted in bold.

Category A: Software developer's profile

From students point of view, the ideal software developer is tolerant, patient, conscientious and precise. Technical competences such as programming in many languages and the ability to be aware of technical progress and evolution are, of course, very important, as well.

> "Technical competence. I don't see it necessary for the software developer to handle any other stuff than his own area. I think that the students' personality is the most relevant factor. If software developer understands the whole area of his work to the perfection, I don't think that he has problems in working." *(Student number 32, Example of subcategory: Complex modelling and problem solving)*

A good software developer is also able to work in teams - even in many teams at the same time and he possesses good interaction and communication skills both spoken and written in his/her mother-language as well as in the English language.

> "Social interaction, ability to work in groups and with different people, accuracy, conscientiousness, helpfulness, good concentration ability, ability to learn new things and willingness to self development and motivation for the subject and ability to handle stress." *(Student number 12, Example of subcategory: Teamwork and social skills)*

A good software developer is also logical and able to create a program that solves the problem. When it comes to students' personal experience and understanding themselves, they mainly see themselves precise, conscientious and skilled problem solvers who are capable of working in teams. They see that self-improvement is needed in the areas of programming, concentration and prioritizing. In addition, stress management and social skills are mentioned as a target to improve, but the emphasis was on the programming area for the majority of the students involved in this survey.

> "In my opinion, software developer has to have good nerves and he is not supposed to get nervous easily. He has to have good concentration ability; I myself don't have that ability. Conscientiousness and accuracy are, of course, always welcome when you need to read programming code." *(Student number 22, Example of subcategory: Self-discipline)*

Category B: The work of a software developer

Students felt that it is very important to follow the timetable for teamwork to function and they saw that it is extremely important for everybody to engage in the project and be on time when it comes to attending meetings.

> "Conscientiousness, obeying working hours because by doing that you respect your team members. Because if even one team member is away (not sick), it will make it more difficult to progress the project if a team member just doesn't bother to be present; he just doesn't care about his team mates." *(Student number 4, Example of subcategory: Timetable)*

> "Striving to achieve the agreed objectives by following generally accepted principles and schedules." *(Student number 9, Example of subcategory: Timetable)*

The majority of the students felt that it is interesting to learn what is involved in the work of a software developer and they enjoyed studying it. Many of the students saw that the work of a software developer is still rather boring, but they were starting to believe in their own ability to learn the subject and they were eager to learn more.

Some of the students felt that there was too much documentation and too many other irrelevant issues involved preventing them from spending their time on more important concepts such as programming. Those irrelevant issues were business related conversations and discussions and documentation in the normal teacher-led class settings.

> "In the beginning, there was too much theory of scrums and too many flipcharts and stuff like that, which I myself understand only after three weeks of studying when we got the chance to start programming." *(Student number 5, Example of subcategory: Documentation)*

> "Software developers work includes a lot of documentation and there is too little programming." *(Student number 30, Example of subcategory: Documentation)*

Students relating positively to both entrepreneurship and to software development as a future career felt that working together was very important part of software developer's working profile. These students also

emphasized the importance of technological competences on the expense of other competences. These students were exactly the ones thinking that there were lots of irrelevant issues - meaning business related conversations and discussions – these being not so important or interesting for software developers.

An interesting observation was that the students not relating positively to entrepreneurship and not considering software development as a future career felt that project work, business related issues and a process-oriented approach were positive experiences and well planned working habits seemed to fit them better than to the students relating positively to entrepreneurship.

> "Communication skills and the ability to understand the customer are important because, obviously, software developers very often work together with the customer." *(Student number 12, Example of subcategory: Customer relations and business skills)*

> "If a software developer acts as a negotiator, he has to have knowledge about financial management, business administration and legislation." *(Student number 32, Example of subcategory: Customer relations and business skills)*

Category C: Technology

One of the big concerns for the students was that they feel it is hard to keep up with the constantly changing technology. This is indeed very much understandable because the students are learning the real software development for the first time and they are starting to see how much work it does involve and how many, for example, different mobile ecosystems there are which they probably end up maintaining. They are even a bit intimidated about this situation.

> "There are many technologies and they all evolve so fast and you should try to keep up with them and other new things that come up so quickly." *(Student number 1, Example of subcategory: Technical evolution)*

> "All the time there will be new technologies and software developers need to keep up with them."' *(Student number 5, Example of subcategory: Technical evolution)*

Another important issue for the students is the ability to understand and learn the basic development environments and programming structures so well that they are content with being able to learn the various aspects of the constantly evolving technology.

> "You need to understand the basic development environments and programming languages." *(Student number 17, Example of subcategory: Concepts)*

> "If you understand the basic technological concepts and theories, it's ok to become a software developer." *(Student number 18, Example of subcategory: Concepts)*

Category D: Entrepreneurship

Entrepreneurship was the area, which divided the opinions very clearly. Part of the students saw that it is, indeed, very much possible for them to start their own business and some of the students saw that it is definitely not possible for them at all. 20 students out of 33 reacted positively to entrepreneurship and the rest reacted negatively. The students who related positively to entrepreneurship, experienced establishing their own company and starting their own software development business as a good idea, but only after they would have gained more experience of the area of software development. Especially mobile applications and games were often mentioned as possible business ideas.

> "Entrepreneurship is one possibility for me. Some kind of small mobile software company might be nice. I haven't yet thought about it much, but that might be nice." *(Student number 2, Example of subcategory: Business instinct)*

> "Entrepreneurship, yes as soon as possible. I was planning on starting my own business already with my friend, but he was too lazy and he uses all his time in his intimate relationship and all sorts of odd jobs." *(Student number 9, Example of subcategory: Business instinct)*

> "If you are ready to work long-hours and you have enough business ideas and ability to take responsibility, why not?" *(Student number 19, Example of subcategory: Business instinct)*

Interestingly, the students who related positively to entrepreneurship and who did not consider software development to be their future career were more bold and daring in relation to the entrepreneurship. Students relating positively toward software development and entrepreneurship were more concerned about the risks of entrepreneurship.

> "I'm not ready to take risks which are involved in entrepreneurship. I prefer to be my own boss, for example, as a project manager, but I'm not willing to lead the company. This is mainly true because I'm not so interested in the business issues." *(Student number 10, Example of subcategory: Risks)*

> "Interesting indeed, but there are risks and I don't know if I'm capable of doing all things needed at the same time, like marketing, innovating and implementing." *(Student number 3, Example of subcategory: Risks)*

Category E: Selling

When students were asked to describe their own views and experiences about sales work and selling, it is definitely possible to see the splitting of the opinions regarding this subject. Some students saw sales work and selling very positively and they think they are important concepts for a software developer, as well. In their opinion, the software you are about to create has to fulfil the needs of somebody who is willing to pay for the software and for the work of the developer. These students were mainly students who related positively to entrepreneurship, as well. They probably did not see themselves as a person going to sales negotiations, but the idea of being part of a sales team was not so far-fetched.

> "Software developer should know how to present the products convincingly, especially because he is the specialist of his product. Anyhow, from the sales point of view, there are specific professionals who should be involved when a product is going for a broader delivery." *(Student number 11, Example of subcategory: Sales team)*

> "A software developer is anyhow a very good person to work with a sales professional, for example, when the customer has detailed questions about the product." *(Student number 12, Example of subcategory: Sales team)*

For some of the students, understanding of customer and customer requirements stand out to be important but, on the other hand, part of the students related rather negatively to sales work and selling.

> "I'm discussing with the customer, for example, at lunch and I'm trying to find out if there is anything the customer needs, something that I could sell to give the customer more value and create more sales to our company." *(Student number 4, Example of subcategory: Customer needs)*

> "A software developer has to think the selling aspect all the time: what you do, you do for selling." *(Student number 2, Example of subcategory: Customer needs)*

> "I don't want to do sales work, but I think it is still important; nobody buys your software if someone is not selling them." *(Student number 6, Example of subcategory: Customer needs and sales team)*

> "No thank you, I think the sales man sells and programmers write code." *(Student number 14, Example of subcategory: Sales team)*

In addition, some of the students saw that sales work is not appropriate for a software developer because it will ultimately narrow the technical competence.

> "If sales are part of a software developer's work, it means that the technical competence will evidently suffer and more complex projects will be difficult to implement. It is, however, a good idea to give more knowledge about sales to the employees in the IT sector, but it really means that the technical knowhow will diminish." *(Student number 29, Example of subcategory: Sales team)*

Category F: Processes

When it comes to studying processes, some of the students weren't especially interested in them and studying them along with software development. They felt that it is not even possible to create an environment in which the experience would be real enough, so it is better not to spend time for them at all.

> "You can learn and see process really only when you go to work to a certain firm. The things you learn during a course don't always match the reality." *(Student number 2, Example of subcategory: project and process relationship)*

> "Oh yeah, processes - the horror pictures about flipcharts and designing documentation in class come to mind." *(Student number 3, Example of subcategory: project and process relationship)*

On the other hand, some of the students thought that it is important to understand processes, like any other subjects during their studies. These students felt that processes split the work into more understandable units and processes will ultimately reduce mistakes and minimize risks even in the studying phase of software development.

> "Processes are as important for software companies as to any other companies doing systematic work. It is easy to structure the company's functions and support the software development work." *(Student number 6, Example of subcategory: Quality aspects)*

> "Processes help to make the work more routine. If processes are well defined, the risks of failure will be smaller." *(Student 11, Example of subcategory: Quality aspects)*

At this phase of their studies, it seems like the students' experience about processes is relatively thin and there is even a potential misunderstanding among some of the students about the relationship of a process and a project - meaning that it is not clear for the student to know whether or not it is the process or the project the teacher or the material is talking about.

> "Process – artificial word. An artificial thought on how to work in a certain project and transaction. In practice, just the normal way of life." *(Student number 13, Example of subcategory: project and process relationship)*

Category G: Innovations

When it comes to innovation, students saw that innovation is something that is closely related to the employer or to entrepreneurship. Some of the students thought that innovation is possible for everybody and, upon

these great ideas, new software and new features will be created to benefit the employer.

> "Innovations are the fuel for a software company." *(Student number 17, Example of subcategory: Imaginativeness)*

> "Ability to think outside the box, ability to create new solutions and ideas." *(Student number 14, Example of subcategory: Imaginativeness)*

> "I'm interested, yes. It would be nice to be able to develop and invent a new product or service, but I don't trust my own imagination that much that I could consider living on that for the rest of my life. One good idea doesn't get you far yet." *(Student number 13, Example of subcategory: Imaginativeness)*

Some of the students felt even timid about the idea of going with the flow of innovation and starting their own career as an entrepreneur. They feared that they are not imaginative enough to earn their living working as an entrepreneur.

> "Surely everyone has innovations, but do you have enough energy to go forward with your ideas to see whether or not your ideas will eventually become concrete to support a successful business?" *(Student number 3, Example of subcategory: Courage)*

> "You need a business idea for your company to make a profit. I myself have lots of unfinished small software projects and I do believe that many of my ideas might make it. But my skills and courage are not enough to establish my own company or pitching my idea in the StartUp School." *(Student number 7, Example of subcategory: Courage)*

> "This Gyro Gearloose invents all sorts of stuff, but he is not able to get anything ready." *(Student number 19, Example of subcategory: Courage)*

4.4 Summary of students' views on software development (RQ1)

According to the data collected with the questionnaire, technology has a great impact on a software developer's work. The work of a software developer has an impact on the profile of the developer. The students considering a software developer's profession seem to have a certain way of relating to entrepreneurship. They are not that brave to consider entrepreneurship as their future career in software engineering business, at least not right away. Sales and innovations are seen mainly to be included in entrepreneurship and business orientation. Processes were seen slightly connected to software developer's work, but mainly that was something the students were not interested in or they didn't consider that to be important. So, the connection line in the picture is marked with a dashed arrow. In Figure 5, the relationships are presented.

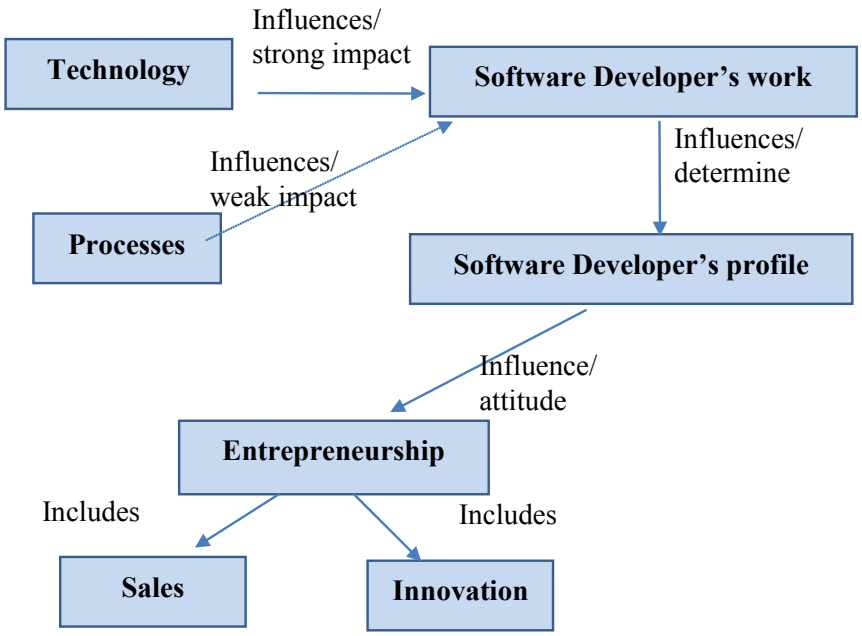


Figure 5. Category relationships

4.5 Implications for teaching according to the students' view (RQ2)

By analyzing the data collected from the students not yet studied in Softala in the previous section, it is possible to identify critical aspects of learning software development and then determine the corresponding variations to be used in the Softala framework later on. Thune and his group report in their study about the successful results from a pilot study that used the suggested variations and assessed the learning experiences (Thune & Eckerdal, 2000).

In order to get a rich understanding of complex phenomena in general, it is important to help the learner to be aware of the critical aspects involved in understanding the phenomena and find out how these aspects interact with each other. In Table 4 below, the critical aspects of variations based on the previous section's subcategories are presented

Table 4. Critical aspects for learning

Category	Critical aspects for learning
A) Software developer's profile	Ability to learn complex technical models Teamwork and social skills as a part of professional growth Self-discipline such as concentration, prioritizing and stress management
B) The work of a software developer	Team work and following the timetable Documentation as a part of software development process Creating customer relationship and business understanding
C) Technology	Keeping up with the march of technology Understanding the basic concepts
D) Entrepreneurship	Economical risks Having business instinct
E) Selling	Understanding customer needs Being a part of a sales team
F) Processes	Understanding the need for processes Understanding the relationship between a project and a process Understanding the quality aspects related to process management
G) Innovation	Encouraging imaginativeness

4.6 Discussion of critical aspects

It is important to create variation to teaching as convincingly as possible. In the educational environment, it is easy for teachers and students to just be satisfied by the project work in which you create as an authentic environment as possible. Still this environment is not real. There lies the challenge in education: we need to be able to create a framework in which real customer communication can happen and real problems are being solved right from the beginning and in different environments giving the necessary variations for learning to happen. This might not be easy, but it is extremely important. Students will probably, in the beginning, be against this kind of learning because it requires more from the student than the traditional learning.

To bring the entrepreneurship and innovation to education is an important issue of variation. The problems of the real world don't present themselves as well-formed structures - rather like messy, indeterminate situations. This kind of variation should be created with the pressure of financial risk and timetables, if only possible. The financial risk is something that is the most difficult to create because if the risk is not your own, you can outsource yourself from it more easily. By creating a real start-up company to face this challenge with innovative ideas will give an opportunity to practice being an entrepreneur before committing yourself to it. In the survey, it can easily be seen that this risk is just what many students are really afraid. If we create an environment where students can innovate and test their ideas during their studies, they are more ready for the real world of software business later as a new entrepreneur or as an employee. Understanding the importance of sales work and selling as parts of business skills can easily be neglected in software development education.

It is very easy in software development education just to concentrate on very important issues like programming, teamwork, communication, but if there isn't a customer willing to pay for your software or service, you can't really earn your living by doing software. This is quite an important aspect to be taught to students and as important as it is for them to understand it, as important it is for small software companies in the future to get employees who understand sales work and are willing to do that among their other probably more interesting areas of work. Selling is about opening doors and closing deals by negotiations and trust, and this variation needs to be included in teaching software development for the future.

To vary the ways of teaching, process-orientation is extremely important for a student of software development if the small software company where the future developer is heading is ever going to grow bigger and if the developer is considering to apply for a job in a bigger software company later on. This area is important because of the attitudes students seem to have toward processes and because of the reality that exists in small software companies concerning the willingness to improve their software processes (Kivihalme & Valsta, 2010; Kivihalme & Valsta & Kauppinen, 2011).

By taking part in many projects already during their studies, the students understand the relationship between a process and a project clearer, step-by-step and as a part of the educational framework. Non-technical issues, such as taking a customer's viewpoint into consideration, are parts of software development, which do not explicitly concern the program code. And this is sometimes very difficult to teach to students who may be expecting purely technical content. Nevertheless, these are very important aspects for the future developer to realize and it is not always the case that our students have this understanding or even willingness to have the understanding.

Teaching technical competence is the easiest one at this point. Students are willing to learn technology. The challenge is to make them independent from the teacher. Many students wait for the teacher to pour the information straight into their mouths, even at the university of applied sciences level. This is a challenge we need to tackle in the variations of teaching technological issues. Students need to rely on themselves and their ability to find the answer and ability to learn new concepts within the rapidly evolving field of technology.

By paying attention to all these critical aspects presented above, it is possible to create the educational framework and environment to make the future software developers more ready to face the customer and to be even bolder when it comes to starting their own business as a software business entrepreneur. These critical aspects listed above were among the building blocks, together with the Kolb's experiential learning theory, when creating the Softala framework, which is presented, more closely in the following chapter.

5
The Softala framework

Creating the Softala framework was actually a part of the reformation of the curriculum for the Degree Programme in Business Information Technology in HAAGA-HELIA University of Applied Sciences. The target was to create such an curricula and environment, where the students would really be able to live true their studies as if they were working in an IT company and at the same time not forgetting the theoretical knowledge base needed to be able to learn complex structures such as programming.

The professional growth of a student in the curriculum is encouraged by down-to-earth assignments, close co-operation with the business life and work placement as a part of the studies. The knowledge base of a future IT-professional is built during the first semesters with compulsory courses such as co-operation and communications skills, programming, databases, data networks, security and operating systems. During the latter part of the degree, the students will deepen their knowledge of their chosen specialization area. To really reform the curriculum, something new was needed to deepen the learning experience. The Softala framework was developed to fulfil this need.

The Softala framework is based on technological competences, but the overall target is to create such a learning environment in which the students' entrepreneurial attitude is encouraged and their ability to see the importance of other aspects beside the code and technology is strengthened.

5.1 Agile software development and the Softala framework

Learning by doing and learning by co-operative game or simulation has been very popular among many areas of studies (Cockburn, 2007; Garris & Ahlers & Driskell, 2002; Malone, 1980, 1981, 1987; Papastergious, 2009). According to Cockburn (2007), building software can also be seen as a co-operative game. Software development is a process that starts from designing the software and ends with implementing it. The teams

in software development are made up of different types of people. The theory that people generally work better with something concrete, such as examples and stories, is supported by cognitive research (Johnsons-Laird & Byrne, 1991). This is very much true in software development, where, for example, use cases and user stories are used to communicate the requirements between developers and customers.

The principals of agile software development and agile manifesto (www.agilemanifesto.org) are very much part of the Softala framework. Interaction between individual is very important for software developers, as it is important for people learning together. Software development is as much about communication and knowledge sharing as it is about technologies. Communication happens all the time when people are observing the background information and, at the same time, they are reading, writing or even talking. When working and, at the same time, being part of a team, people can hear something interesting in the background and join the conversation whenever they choose and they get immediate feedback for their ideas. This kind of information can be formulized as osmotic communication. (Cockburn, 2007)

This is important in the Softala framework, as well - working together and emphasising customer collaboration over contract negotiations, as it is said in the agile manifesto. Nevertheless, negotiations, contracts and licenses are crucial parts of the software business.

Working software over comprehensive documentation is an important issue, as well. The purpose of a project is to deliver working software and not to draw models, but it is very important that the other side of the coin is discussed, as well. The mimicry of a game is quite good in this context, too. The question is whether we have enough rules documented to be able to play the game. If everybody is very familiar with the current setting, there might even be enough information without documentation. But the tricky question is whether we have enough documentation for the next game, with slightly different players involved with slightly different settings, as well. (Cockburn, 2007) This is something that we emphasis in the Softala framework to the students who very much like to concentrate on the code willing to leave the documentation behind.

5.2 Softala's operational model

Softala is a learning environment based on learning theories and, at the same time, simulating the operations of a small software company, where both teachers and students work and learn together with the customer.

Softala's operational model is described in Figures 8 and 9 at the end of this section (5.2).

5.2.1 Competence criteria map for Softala projects

The Softala framework aims to integrate processes, innovations, selling, services and technology together in a seamless learning environment for students specializing in software development. Softala is actually a combination of many PBL- & and TBL-courses building the knowledge and experience on top of each other. For every customer project to be accepted as a Softala project, certain criteria need to be met. By doing this, it is possible to ensure that, in every Softala project, students will learn something new and their experience of working in software projects are deepened during their studies. The competence maps of Softala projects (I-III) are mainly built upon SWEBOK (Bourque & Dupuis, 2004). In the Figure 6 below, there is a competence criteria map for Softala projects.

Softala project I, II, III - Competence criteria map

Learning outcomes

The course is organized as a project. Students are divided into project groups on the basis of prior knowledge and interests. Each project team implements a result following the requirements of the client. The result may be an application, a prototype application or service. The project team members sign a project contract. Project agreements may differ from each other.

Contents

Students form a project team agreeing on responsibilities. The project manager is one of the students in the project team. The project team decides on the methods and tools together with the customer. The project team installs all the necessary tools needed in the developing process. The project team prepares a project plan and negotiates with the customer if necessary.

Learning topic according to SWEBOK	Learning topics in Softala projects SP I = Softala project I, SP II = Softala project II, SP III = Softala project III
Business strategies	
Problem domain	SP II, SP III
Process modelling	SP II, SP III
Computing Essentials	
Computer science foundations	SP I
Construction technologies	SP II
Construction tools	SP I
Formal construction methods	SP I
Mathematical and Engineering Fundamentals	
Mathematical foundations	-
Engineering foundations for software	-
Economic foundations for software	SP III
Professional Practice	
Group dynamics, group psychology	SP I, SP II, SP III
Communication skills	SP I, SP II, SP III
Professionalism	SP I, SP II, SP III
Software Modelling and Analysis	
Modeling foundations	SP II
Types of models	-
Analysis foundations	SP II
Requirements foundations	SP II
Eliciting requirements	SP III
Reqs specification and documentation	SP II
Reqs validation	SP III
Software Design	
Design concepts	SP I, SP II
Design strategies	SP III
Architectural design	SP II
HMI design	SP II, SP III
Detailed design	SP I
Design support tools and evaluation	SP I
Software Validation and Verification	
V&V foundations	SP I
Reviews	SP II, SP III
Testing	SP II, SP III
HMI UI testing and evaluation	SP II, SP III
Problem analysis and reporting	SP III
Software Evolution	
Evolution processes	-
Evolution activities	-
Software Process	
Process concepts	SP I, SP II
Process implementation	SP II, SP III
Software Quality	
SW quality concepts and culture	SP II, SP III
SWQ standards	-
SWQ processes	-
Process assurance	-
Product assurance	SP II, SP III
Software Management	
Management concepts	SP I, SP II, SP III
Project planning	SP I, SP II, SP III
Project personnel and organization	SP I, SP II, SP III
Project control	SP I, SP II, SP III
SW configuration mgmt	SP III

Figure 6. Competence Criteria Map for Softala projects I-III

5.2.2 Softala's customers

Every semester, Softala organizes an event where students demonstrate their knowledge, the acquired skills and prototypes they have built during the ongoing projects. This gives a good opportunity for students, already during their studies, to network with software companies and other companies that need software development services. At the same time, Softala seeks for projects by advertising itself to the former customers and to HAAGA-HELIA's partner networks in order to find interesting and suitable projects. If customers are really interested in starting the co-operation with Softala, they are required to specify their projects to a certain level before they can be officially nominated as potential customers for Softala (Figure 7). This has proven to be rather difficult for many of the potential customers because small companies are not very experienced buyers of software. This actually enables the learning to happen together with the student and the customer with the help of the teacher coaching both the students and the customers in creating the documentation and negotiations needed to make the contract in the first place.

The teacher team of Softala selects the customers and projects to courses after Softala's scope manager (a member of the teacher team) has analysed the nominated projects and made a suggestion about what projects would fit in to a certain Softala project (I, II or III). The teacher team finally decides together which projects are accepted to be certain level Softala projects. It is important that the accepted projects are in accordance with the course contents and that they fulfil the competence criteria map for the course.

1. DESCRIPTION OF THE BUSINESS ACTIONS
1.1 OPERATIONAL OVERVIEW
1.2 STAKEHOLDERS
1.3 BENEFITS
1.3.1 Processes
1.3.2 Users
1.3.3 Links to other activities
1.3.4 Boundary conditions for operations
1.3.5 Safety and quality issues
1.4 BUSINESS CONCEPTS
2. REQUIREMENTS
2.1 OPERATIONAL REQUIREMENTS
2.1.1 Solution Overview
2.1.2 Use Case Descriptions

2.2 Data/information to be stored
2.2.1 Use of data/information
2.2.2 Preliminary screens and prints
2.2.3 Processing Rules
2.2.4 Interfaces to other systems
2.3 PERFORMANCE REQUIREMENTS
2.3.1 Look and feel requirements
2.3.2 Usability Requirements
2.3.3 Safety and quality issues
2.4 DESIGN CONSTRAINTS AND ENVIRONMENTAL REQUIREMENTS
2.5 OPEN QUESTIONS
3 DATA DIRECTORY
4 REFERENCES AND APPENDIX

Figure 7. Requirement specification for Softala project

5.2.3 Students and Softala projects

The students participate in one Softala project at a time during one semester. It is not appropriate to participate in too many Softala projects at the same time because, in one project, the student learns the technical framework that is normally build on top of another framework and the former Softala project.

The students study in Softala for 1,5 years at least a total of three project courses. At the same time, when the students are taking a Softala project course, they are also taking so called traditional courses such as .NET, PHP, JavaEE and Transactions courses. These courses are either one-week short courses or 8 weeks' courses. The target is that the students participating in a certain Softala project can acquire new knowledge or deepen the existing knowledge needed in the project at the same time the project is under way.

Moreover, it is possible for the students to develop their own ideas. To do so, they need to deliver the same kind of documentation and have the same kind of negotiations as any other company in order to be accepted as a Softala customer. These student teams get help from the university's Start-up School and they are treated as standard customers. This way, it is possible for the student teams to have an opportunity and their ideas tested at the same time they are starting the entrepreneurship-related procedures in the Start-up School.

5.2.4 Learning experience in software projects

The project contract is signed between the customer, university and students. In this negotiation, the license-related issues are discussed and the most suitable contract type is chosen for the project. Contracts are designed together with the university lawyer. Discussion sessions are organized with the students to ensure that everybody knows what has been agreed on. When developing for customers, it is possible to use open source technologies, but it is also possible to develop proprietary software. In both cases, it is essential that the customers and students understand the restrictions in both the cases. Negotiating the contracts and potential NDAs are very important parts of the learning experience for the students.

The project team consist of 4-5 students. The team decides together the roles for each student in the team. The teachers are, of course, supervising the process of forming the project team. When the studying in Softala starts in Softala project I, there are 2-3 teachers to coach the student teams. Coaching and control are reduced from Softalaproject I to II and III, meaning that the amount of the students' own responsibility increases along the way.

The customer and the student group will meet on a regular basis using agile software development methods. At the end of the semester, the project results are presented in a Softala event, which also serves as a forum to enhance and create networking for students, university staff and both already existing and potential customers for Softala.

Working in the Softala framework is very demanding for the teacher because there are so many issues that need to be covered simultaneously. The students demand good technological knowhow from their teachers and they especially value technical competences over more versatile competences. The challenge for the teachers is to integrate these other concepts to the learning process so that the students will get more out of the studying experience than just learning how to write code and how to design software. In Softala, creating a multi-talented team of teachers who work closely together solves this challenge.

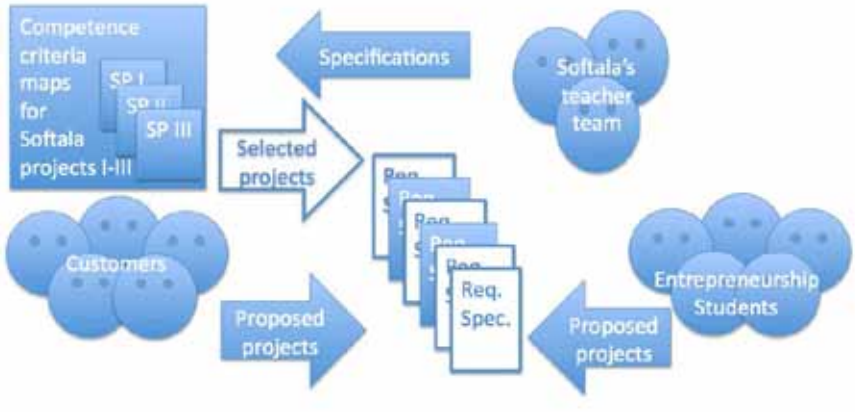


Figure 8. Project selection process

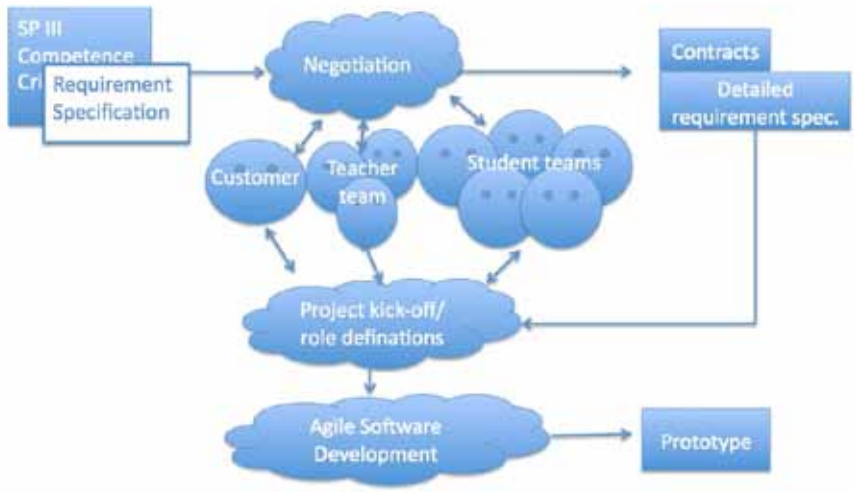


Figure 9. Learning experience in Softala

5.3 Learning theories and teaching variations behind Softala

5.3.1 Learning theories

Kolb's experiential learning and constructive and cognitive learning views are behind the Softala framework. Individual learning is build upon absorbing new information structures and by fitting them together to form an entity in which personal attitude, habits and behaviour are affecting strategically to achieve a certain goal (Piaget, 1971). In the Softala framework, the target is to get the learner to have a significant inner experience (abstract conceptualization), which will affect, with the help of associations and individual knowledge construction, the habits, attitudes and ethical perceptions of the learner. New practices and applying them (active experimentation) will eventually affect the behaviour of the learner. In Softala, the foundation for life-long learning (Dewey, 1938) is build for the students and the psychological issues of personal charisma is experienced. Social psychology and personal charisma have had an impact, for example, on leadership education (Lewing, 1951).

These issues are important to future entrepreneurs and project managers in software companies. In Softala, the students get to act in different roles and, moreover, they get to change their roles during their studies because the learning period in Softala is longer then just one semester for each student. In Softala, every student will participate in at least three Softala project courses. In the Figure 10, the Softala framework after Kolb's experiential learning cycle is presented.

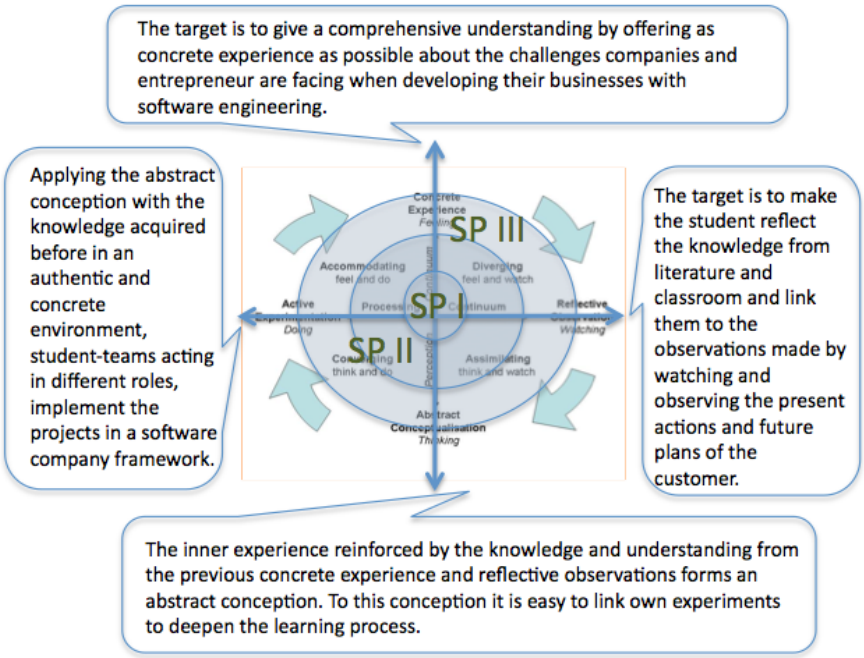


Figure 10. Softala Framework (after Kolb, 1984)

Working with a real company gives the feeling of a concrete experience at the beginning of the circle. The experience includes business-integrated aspects like analysing the sales and service potential of the customer's software prototype. Communication with the customer gives the real experience of negotiation and communication through the development process. Every student has a chance either to work with their own business idea or with some newly created start-up to have a concrete experience of entrepreneurs' challenges when working with software or creating a new software service.

From the concrete feeling of experience the next step in the learning cycle is the reflective observation by watching. This is provided in the Softala framework by involving everybody in the projects and giving everyone the opportunity to watch the work of the customer company. From the reflective observation, the next step is the abstract conceptualisation by thinking. This is made possible in Softala by using different exercises and theoretical framework and discussion groups to stimulate thinking.

The next step, after the abstract conceptualisation, is active experimentation by doing the work and then the circle start from the concrete

experience again. By repeating these steps (SP I, SP II, SP III) all over again, it is possible to create an environment where it is possible to learn the work of a software developer in the future software company, where the need for versatile and multi-talented personnel is the key issue to guarantee the success of the company.

5.3.2 Teaching variations

When analyzing the data collected from the students who have not yet studied in Softala, it is possible to identify critical aspects of learning software development as a business itself or as an enabler of the business. In order to get a good comprehension of the complex phenomena, it is important to help the learner to understand the big picture. This can be accomplished, for example, by introducing carefully selected teaching variations for the learner (Marton & Booth, 1997).

In the next table (Table 5), the teaching variations are presented according to the critical aspects of learning described more precisely in chapter 4. Variations are discussed in the context of the Softala framework. For every category, learning experience and teaching variations in Softala are discussed.

Table 5. Aspects of teaching variations in Softala Framework

Category	Aspects of teaching variations in the Softala framework
TECHNOLOGY	Aspect of keeping up with the technological evolution Aspect of understanding the basic concepts **Variations used in Softala for keeping up with the technological evolution** • deepening and widening the technological competences through different customer experiences - small companies, start-ups, software companies and other businesses (for example, insurance, banking, industry etc.) • teaching others as part of the studies • working together with customer's systems specialists in order to solve the deployment problems for the customer

Variations used in Softala for understanding the basic concepts

- learning by trying to solve the problem first
- learning by exploring the theory first
- finding information and giving presentations alone, in pairs and in groups

Technology variations as a learning experience in Softala

Students learn certain technology in Softala projects I and II and teachers coach or even teach during these projects more. In the Softala project III, the responsibility of learning is more and more the student's own. The technology can even be rather new for the teacher, as well, and the framework used and even the technological coach can be from the customer's side in some cases. On the other hand, the customer might not know almost anything about the technological issues and the teacher team and the student team must learn together. In the Softala project III, every student has to make him/herself familiar with at least one new technological area and give a lecture about the area. By doing this, we ensure that students learn self-studying and learn to communicate to other software developers in a professional manner.

ENTREPRENEURSHIP AND INNOVATION

Aspect of economical risks
Aspect of having business sense
Aspect of encouraging imaginativeness

Variations used in Softala for economical risks

- an opportunity to participate with other students in a start-up business as a shareholder or an employee
- evaluating (similarities and differences) the challenges different customers (small companies, start-ups, software companies and other businesses) have in organizing their work in relation to the complexity of the software to be built
- evaluating the customer's business idea and assessing potential competitors as a part of the application development
- identifying different financial solutions for start-ups
- setting up a business together with other students or alone

Variations used in Softala for business sense

- participating in different innovation workshops
- evaluating business ideas alone and in groups
- an opportunity to participate with other students in a start-up business as a shareholder or an employee

Variations used in Softala for encouraging imaginativeness

- participating in different innovation workshops
- setting up a business together with other students or alone

Entrepreneurship and innovation variations as learning experiences in Softala

In Softala, the aim is, exactly, to create an environment where the entrepreneurship as a process and an attitude is learnt by experiencing the challenges start-up companies and customer companies are facing and, at the same time, utilising and deepening the students' domain specific knowledge about software development. In Softala, the emphasis is on learning useful skills to become an entrepreneur. When it comes to applying maze or radiant model of teaching entrepreneurship in Softala, the aim is to take the best parts of both systems. In Softala, we teach software company related issues and if the student is willing to really go for the entrepreneurship, he/she can establish a company alone or with friends and the university's Start-up School will help the students with establishing the company and Softala will coach the new start-up. University's Start-up School organizes innovation camps where students can pitch their ideas and find a sponsor to support their idea.

SELLING

Aspect of understanding customer needs
Aspect of being part of the sales team

Variations used in Softala for understanding customer needs

- observation of the needs of different types of customers – similarities and differences
- event organization and participation in the event marketing
- an opportunity to participate with other students in the start-up activities as a stakeholder

Variations used in Softala for being part of the sales team

- acting in different roles in the customer interface, such as, technical support, customer manager, project manager, contract negotiator and evaluating the similarities and differences between different customers.

Selling variations as a learning experience in Softala

One of the key targets in Softala as for selling and sales work learning experience is to encourage the students to see selling as any other very important profession among other important issues for a software company.

In Softala, the target is to create many personal experiences concerning the sales work starting from the Softala

framework sales attitude – every student as well as every teacher is a salesman of Softala and themselves. Working in tight collaboration with the business, it is possible to practice sales and service attitude among daily work. Handling the customer relationship and communication is the responsibility of the student team and the students very well know this.

Organizing a Softala event is an important part of the learning experience and the students participate in at least one Softala event during their 1,5 years of studying in the Softala framework.

The student and even teachers might not be so familiar with the concepts of licences. Many companies have free licences for universities and other educational institutions and when you are not doing the project for the commercial use, you don't need to worry that much about the licenses whether or not you are the teacher or the student of software development. In the university, there are other people to handle contracts etc.

The scenario gets more difficult when we look at a small software company: lawyers are expensive and they might not even be so familiar with the license issues, especially in OSS or FSF communities. This is certainly a challenge to software development professionals and it is an issue that needs to be covered at least in some details during the studies. In Softala, the contracts and negotiations with all the parties ensure that the students learn by handling the licence and contract issues with different customers during Softala projects.

PROCESSES

Aspect of understanding the need for a process
Aspect of understanding the project and process relationship
Aspect of understanding the quality aspects related to process management

Variations used in Softala for understanding the need for a process

- evaluating (similarities and differences) the challenges different customers (small companies, start-ups, software companies and other businesses) have in organizing their work in relation to project management
- acting in different roles in a project

Variations used in Softala for understanding the project and process relationship

- observing and evaluating the differences between customer projects and improving the process on the basis of experiences in different projects

- acting in different roles during the project and evaluating the customer relationship differences depending on the student's role in the project

Variations used in Softala for understanding the quality aspects related to process management

- observing and evaluating the differences between customer quality requirements in different projects

Process variations as a learning experience in Softala

In Softala, the target is, by being part of many software projects already during their studies, give the students the real experience of the software company which is improving working processes at the same time they are applying or even learning technologically interesting new framework in their customer projects.

The key issue here is the fact that we are able to repeat the process all over again. The experience the students get is deeper than just being part of one project and one course. The group of students grow together like they would if they were working for the same company longer than for just one semester.

SOFTWARE DEVELOPER'S PROFILE AND WORK

Aspect of ability to learn complex technical models
Aspect of teamwork, social skills and following the timetable
Aspect of self-discipline (concentration, prioritizing, stress management)
Aspect of documentation
Aspect of creating customer relationship understanding

Variations used in Softala for the ability to learn complex technical models

- deepening and widening the technological competences through different customer experiences - small companies, start-ups, software companies and other businesses (for example, insurance, banking, industry etc.)
- finding information and giving presentation alone, in pairs and in groups
- working with the customers' environment instead of the school's environment
- Variations used in Softala for teamwork, social skills and following the timetable
- acting in different roles in the customer interface such as technical support, customer manager, project manager, contract negotiator, ict-architect, software designer, software programmer, user interface designer and evaluating the similarities and differences between different customers in teamwork and scheduling

- working with different team mates and customers during SP I, SP II and SP III
- working with customer's environment instead of school's environment

Variations used in Softala for self-discipline (concentration, prioritizing, stress management)

- acting in different roles in the project and taking responsibility of one's own actions.
- evaluating similarities and differences and taking responsibility of the timetables and customer relations during the project in different customer settings

Variations used in Softala for documentation

- observing and evaluating the differences between customer project documentation and improving the process and the documentation on the basis of experiences in different projects
- acting in different roles during the project and evaluating the customer relationship differences depending on the student's role in the project
- working with the customer's environment instead of the school's environment
- different customers with an existing product - different types of documentations and experiences

Variations used in Softala for creating the understanding of customer relationships

- observation of the needs of different types of customers – similarities and differences
- an opportunity to participate with other students in a start-up business as a shareholder or an employee
- event organization and participation in the event marketing

In all the various phases, the students studying in Softala learn complex technical issues and they work in teams giving presentations to each other, customers and potential customers in the Softala events. They learn self-discipline, prioritizing and stress management by working in real projects with real timetables and real customers. By working in several projects during their studies, their knowledge is deepened and their ability to understand the big picture is enhanced.

The work of a software developer can easily be seen monotonous and even boring as some of the students in the pre-study reported. However, by creating an environment where the students grow and deepen their knowledge from project to project by acting in different roles during their journey to become a professional multi-talented software developer, it is possible to establish a learning experience

where the student communicate, deliver services and even create and maintain sustainable customer relationships at the same time learning the technology needed to fulfil the customer needs.

Every variation in the previous categories enhances the profile and work of a software developer. Different types of customers give the variations – every case is different from another, but still there are similarities.

To end this chapter, the Softala slogan invented by the students of Softala:

" Talkative nerds of the future – and proud of it!"

6. Findings

6.1 Introduction

In the Softala framework, sales and service attitude, legal and business issues, project management and customer-oriented software development are blended together to create an innovative environment to learn software development. The purpose of this part of the study (Figure 11) is to determine the effectiveness of the Softala learning framework described in more detail in the previous chapter.

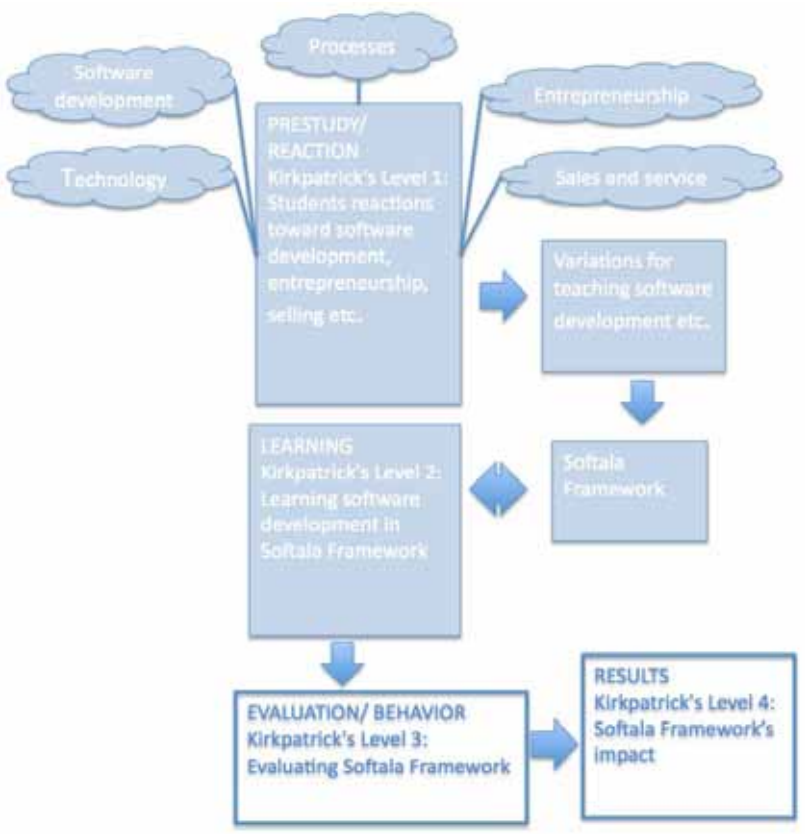


Figure 11. Research design. Evaluation, behaviour and results

The research questions for evaluating the effectiveness of the Softala framework are:

- RQ3: Does the studying in the Softala framework have an impact on the students' attitudes towards selling, sales work and sales process improvement?
- RQ4: Does the studying in the Softala framework have an impact on the students' attitudes and willingness to become an entrepreneur in the near future?
- RQ5: Does the studying in the Softala framework have an impact especially on those students having negative attitude to entrepreneurship in the first place?
- RQ6: What kind of impact does the Softala framework have on the learning process of the students not committed to their studies - potential dropout students?

To find the answers to the above questions, a second questionnaire was made in the spring of the year 2013. The questionnaire is translated into English in the Appendix 2 at the end of the thesis. The questionnaire was delivered to all the students participating in the softala project courses I, II and III. In order to get as good response rate as possible, the answering to the questionnaire was organised to take place during the lecture hours. By doing the answering like this instead of sending the questionnaire by email, it was possible to ensure that as many students as possible answered to the questionnaire. The response rate was 73 % (44/60).

In the questionnaire, there were first background questions and then questions about issues related to studying in Softala, issues related to software development and software services, entrepreneurship, sales work and selling. In each section, there were reflective questions about the changes in the student's personal ability and attitude based on the student's own experience.

In the following subchapters, the results of the statistical analyses are presented. First, in the section 6.2, the background questions and their distributions are presented. Then statistical key figures for the variables measuring Softala's effects in the section 6.3 and in the section 6.4 the Mann-Whitney U test analysis are presented and finally in the section 6.5 there are the correlation analyses.

6.2 Students' background

The questionnaire was answered by 44 students: 8 women and 36 men. The majority, 27 students, had passed their matriculation examination; 13 students had a vocational degree and three students had completed both the matriculation examination and vocational degree and one of the students had a university degree.

The distribution of the students' parents' educational background (Figure 12) was such that two mothers had a postgraduate university degree; eight mothers had a master's degree; three mothers had a bachelor's degree and the rest had vocational degrees. Three fathers had completed a postgraduate degree in a university; eleven fathers had a master's degree; six fathers had a bachelor's degree and nine fathers had a vocational degree. Two fathers had no degree at all and as many as 13 fathers' educational background was not known by the student.

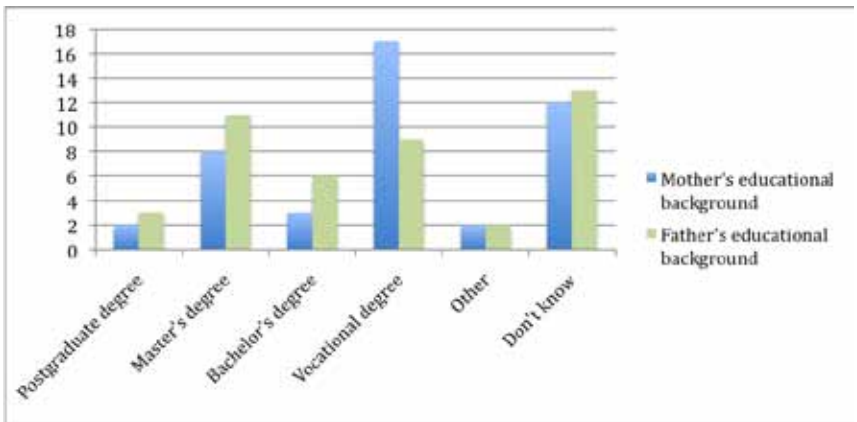


Figure 12. Parents' educational background

Students were divided into softala project I-III courses as shown in the illustration below (Figure 13). For the softala project II, there were the least respondents. This is probably due to the fact that the survey was conducted in the afternoon just before an extended holiday weekend.

ECTS credit points (Figure 13) correlate directly with the courses SP I, SP II and SP III, as the courses are carried out in consecutive semesters. The course credits the students have completed are around 60-200 credits. The number of ECTS credit points indicates, however, that some of the students have not completed prior studies because if the student is progressing according to the normal schedule, he/she should have at least 90 credit points when participating in the SP I course.

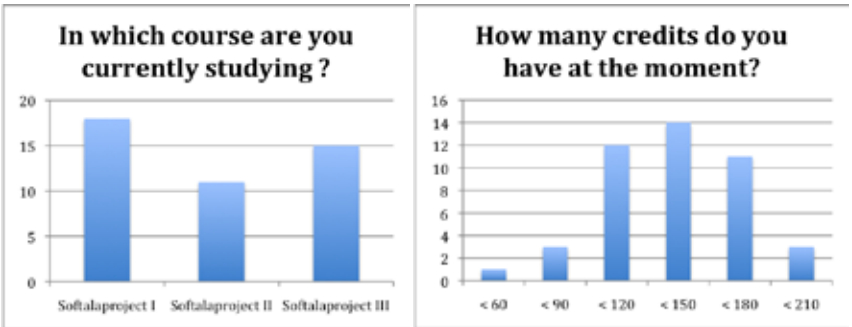


Figure 13. Softalaproject I, II and III distribution of credit points

Exactly half of the students reported working alongside their studies. When asked about working especially in software industry, the number of students working dropped slightly to 18 students. When asked about the number of hours, it ranged from 10 to 22.5 hours per week.

Eleven students had considered dropping out from the studies and 32 of them had not had these kinds of thoughts. When asked for the reasons for considering dropping out, the students said that they feel that the education was not giving them anything at the moment and they feel like they were studying for the teacher not for themselves. The students who had thought of dropping out had had lack of motivation and they felt that there were too many presentations included to their curricula and that at some point the studying didn't feel like their line of work, but the thoughts changed later on.

When asked about their leisure-time activities related to information technology and IT sector, 27 students reported that they could say that IT and computers had been more or less like a hobby for them before studies and 17 students said that they had not been interested in computers before studies. For those students having had IT as a hobby, it had been anything between building their own computers, programming for fun and using all sorts of online games and being the helpdesk for their friends and relatives. The building of web pages was mentioned, as well. After they had started their studies, there were, at the time of the survey, 33 students who were considering computers to be a hobby and it included, for example, playing computer games with their children, video editing, programming, and business start-up preparations among those other things mentions before.

The background questions about the entrepreneurship showed that there are 13 parents who were working as an entrepreneur and 31 who

were not. When asked to specify whether the mother or father was an entrepreneur, the answers distributed fairly evenly between mothers and fathers. Two students reported that they were entrepreneurs already (Figure 14). 22 students reported that they could consider becoming an entrepreneur in the near future and 21 didn't (Figure 14).

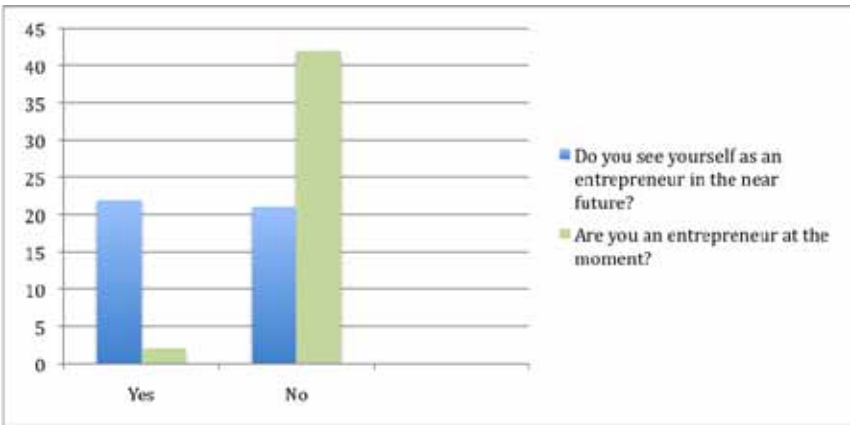


Figure 14. Entrepreneur distributions

The background questions about sales and sales work indicated that among the students' parents only six are in sales, and 38 aren't. When asked about how this was divided between the mother and the father, it was a tie - three fathers and three mothers. When asked more precisely what kind of sales work the parents had, the answers showed that entrepreneurs were considered to be working in the sales area (restaurant, hair salon, IT-company). For the rest, there were different sales manager positions - key account manager, marketing manager, catering manager, etc., but also grill kiosk sales person and shoe store clerk were mentioned.

When asked about whether or not the students themselves had been working in sales, the outcome was that 17 students had worked in sales and 27 had not. The work in sales had mainly been regular salesperson work in department stores etc. and some mentioned having worked as a sales representative in some specialty shop. Telemarketing was mentioned few times, as well.

When asked to think about whether they could see themselves entering the software industry as a salesperson, 16 students felt that this was possible for them and 26 did not (Figure 15). When the question was extended in such a way that students were asked whether or not they could consider being part of a technical sales team, we received two positive answers more (Figure 15).

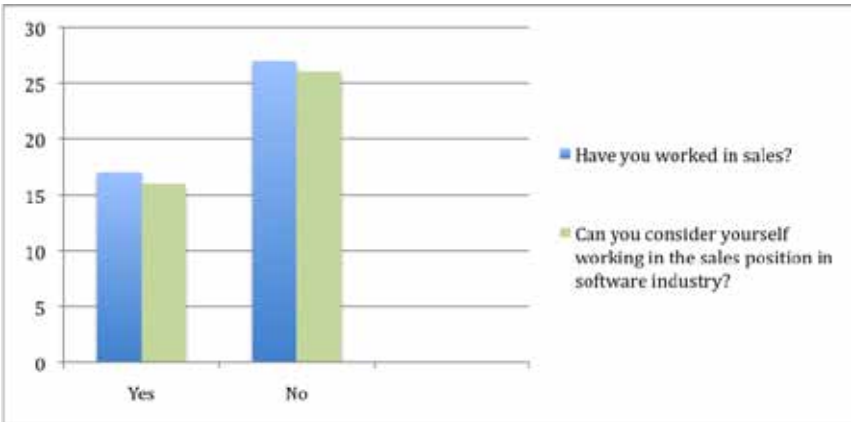


Figure 15. Working in sales, distributions

6.3 Statistical key figures for the variables measuring the effects of Softala

In this section, the variables measuring the effects of the Softala framework are presented. The scale for the variables is from 1 to 7, where one is anchored to "Strongly disagree" and 7 to "Strongly agree". The variables having at least a median five are presented (Table 6 and Table 7). When considering the effects of the Softala framework according to the statistical key figures, we can argue that there have been some effects on the students' attitudes. On the other hand, it is noteworthy that the standard deviations are quite large in this material and the range of the first two variables is 1-7. In the fourth variable, the range is 3-7, which indicates that almost all students had experienced a change to the positive direction. In the first three variables, on the other hand, there were opposite views, as well. To examine the phenomena in more detail, the Mann-Whitney U test and correlation test are used later on.

Table 6. Statistical key figures for Softala evaluation

	Because of Softala studies: I understand better the current contractual practices.	Because of Softala studies: I understand now better the operations of a software company.	Because of Softala studies: I see the service design to be much more important than before.	Because of Softala studies: I think the software developer's job description is much broader than I expected.
Median	5	5	5	5,5
Std. Deviation	1,67	1,424	1,153	1,284
Minimum	1	1	2	3
Maximum	7	7	7	7

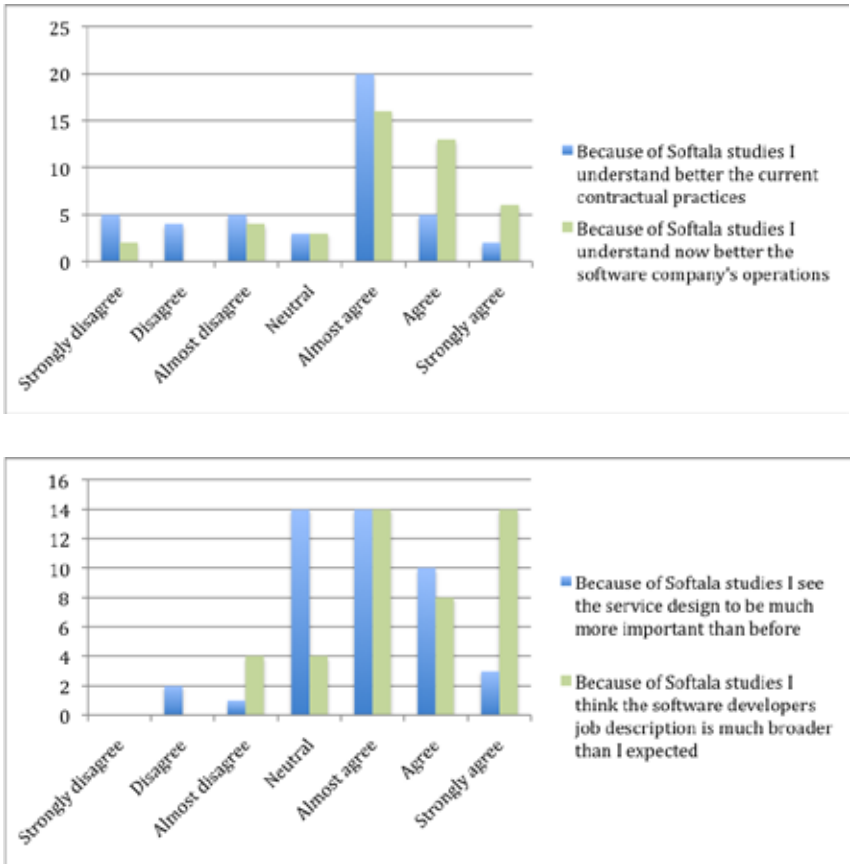


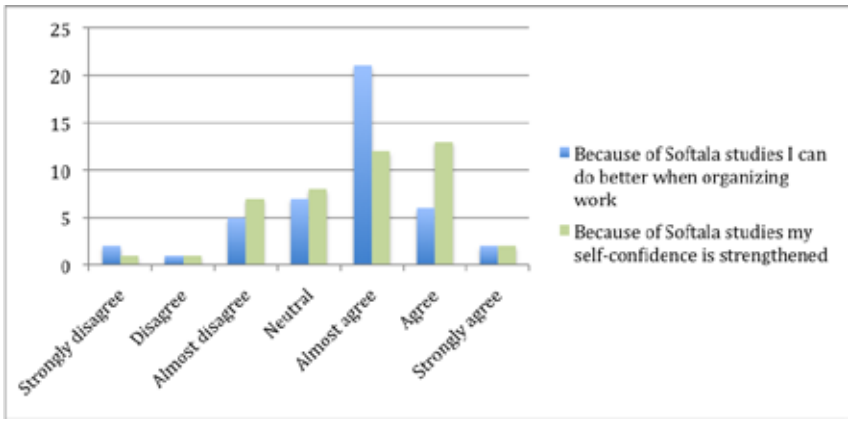
Figure 16. Distribution for the variables evaluating Softala's effects in Table 6

Table 7 shows the effects of the Softala framework for the variable measuring the internal entrepreneurship of the student. All the variables having a median at least 5 are presented. In these variables, the standard deviations are rather large, variables values rancing from 1 to 7. This indicates that some of the students had experienced that the Softala framework had had an influence on them and some hadn't.

	Because of Softala studies: I can do better when organizing work than before.	Because of Softala studies: My self-confidence is strengthened.	Because of Softala studies: I now know better what I want.	Because of Softala studies: My desire to be a respected worker and the leader of my own job has strengthened.
Median	5	5	5	5
Std. Deviation	1,317	1,353	1,355	1,3
Minimum	1	1	1	1
Maximum	7	7	7	7

Table 7. Students' internal entrepreneurship

For the other variables measuring the effectiveness of the Softala framework, the median is 4, which can be interpreted in such a way that the Softala framework does not have a particular effect on the students. To examine the phenomena in more detail, the Mann-Whitney U test and correlation test are used later on.



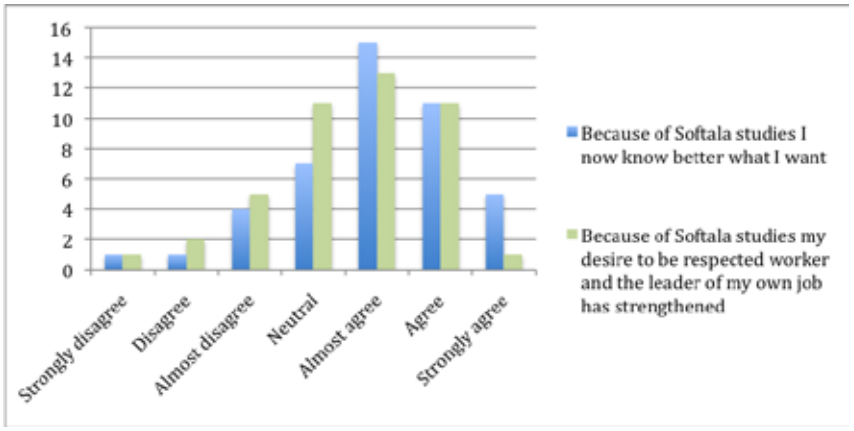


Figure 17. Distribution for the variables evaluating Softala's effects in Table 7

6.4 Evaluating the Softala framework using the Mann-Whitney U test

The purpose of this section is to determine the effectiveness of the Softala learning framework in particular toward entrepreneurship, sales and service attitudes. Studying in Softala begins with the Softala project I and continues with Softala projects II and III. In Softala project I, the customer is one of the university's departments. In Softala projects II and III, there are real external customers. In Softala project I, the projects are still real projects with real results to be used by the university. In these projects, the personnel of the university is acting as a customer. Because of this, it makes sense to recode the data into two groups: the students participating in Softala project I and the students participating either in Softala project II or III.

The results of all the relevant Mann-Whitney U tests and distributions between the target groups having statistical significant differences are explained in more detailed in the appendix 3. The results of all the tests are in Tables 8, 9 and 10 for all the variables measuring the effectiveness of the Softala framework. All variables having significant statistical differences are marked with blue background in the tables.

When examining the variables measuring the effectiveness of Softala using Mann-Whitney U test, there was only one factor differing between Softala project I and Softala project II & III groups. Between the groups who had studied longer (Softala project II and III) in Softala compared

to those who had just started, there were significant statistical difference in understanding better the current contractual practices (U = 327.5, p<0,018), according to Mann Whitney U test (Table 8a, 8b). This is quite natural, since the contractual practices will be better highlighted in the later study units. On the other hand, one would have expected differences in other variables, as well. However, this result gives some answers to RQ3 because studying in the Softala framework deepens the students' understanding in contracts and negotiations, which are very atomic parts of the sales work in software business.

In the following section, the target is to find out whether other background factors have an impact on the effectiveness of the Softala framework. The Mann-Whitney U test was used in the following groups: the students willingness to become an entrepreneur in the near future; the students' experience in sales work (Tables 8a, 8b); parental background in entrepreneurship and sales positions (Tables 8a, 8b); the students' working experience in software business; students considering dropping out school; students' IT hobbies prior studies (Table 9) and; finally, students' and parents' educational background (Table 10).

6.4.1 Students' willingness to become an entrepreneur in the near future and experience in sales work

Between the students who related positively toward entrepreneurship in the near future compared to those who related negatively toward entrepreneurship, there was a significant statistical difference in understanding better a software company's functions (U = 151.5, p<0,045), according to the Mann Whitney U test. The Mann Whitney U test showed, interestingly, that the appreciation of the sales work and the sellers have increased among those students not relating positively toward entrepreneurship (U = 326.5, p<0.014). This result gives ideas of interpreting the answer to RQ5.

Between the students who had worked in sales compared to those who hadn't, there was a significant statistical difference in importance of service design in software industry (U = 128.5, p<0,011), according to Mann Whitney U test. The distribution graph shows that for those who had worked in sales before, the impact of the Softala framework was more positive. These results, presented in the Tables 8a and 8b, contribute to finding the answer to the RQ3.

Table 8a. Mann Whitney U tests for Softala projects and entrepreneurshi

	SP I/ SP II-III	**SP I**	**SP II- III**	**Entrepre-neurship, Yes/No**	**Yes**	**No**
	p-value	Mean ranks		p-value	Mean ranks	
Software business						
Understanding Contractual practices	0,018	17,31	26,10	0,147	24,57	19,31
Understanding licence practices	0,114	18,92	24,98	0,492	23,25	20,69
Having received info about company agreements	0,094	18,72	25,12	0,841	21,64	22,38
Understanding software company operations	0,747	21,78	23	0,045	25,61	18,21
Service design importance	0,153	25,69	20,29	0,065	25,32	18,52
Software developers job description broader	0,52	23,94	21,58	0,199	24,32	19,57
Entrepreneurship						
Organizing work better	0,28	20,14	24,13	0,836	22,36	21,62
Handling several thing better	0,292	20,14	24,13	0,545	20,91	23,14
Self-confidence strengthened	0,432	20,72	23,73	0,591	22,98	20,98
Knowing what I want	0,873	22,86	22,25	0,754	21,43	22,60
Respected worker and leader of my own job	0,98	22,44	22,54	0,599	21,05	23,00
Willingness to take risks	0,902	22,78	22,31	0,94	22,14	21,86
Tolerate more disappointments	0,23	25,22	20,62	0,478	20,70	23,36
Attitude toward entrepreneurship more positive	0,519	21,06	23,50	0,072	25,25	18,60
Social status is less important	0,339	20,47	23,9	0,259	20,07	24,02
Want more security	0,94	22,67	22,38	0,107	19,14	25,00
Sales						
Understanding sales and customer relationship management	0,23	23,11	22,08	0,728	21,36	22,67
Seeing sales work more positive	0,854	22,08	22,79	0,144	19,34	24,79

Salary is more important	0,82	18,64	25,17	0,092	19,00	25,14
Variety and diversity of job important	0,478	20,89	23,62	0,61	22,93	21,02
Job in sales work more likely	0,135	25,85	20,17	0,429	20,57	23,50
Understanding sales work challenges	0,75	23,22	22,00	0,592	21,02	23,02
Understanding sales team activities	0,64	23,56	21,77	0,871	22,30	21,69
Appreciating sales work and seller more	0,649	21,50	23,19	0,014	17,66	26,55
Having learnt sales skills	0,744	23,22	22,00	0,777	22,50	21,48

	Parents working in sales	**Yes**	**No**	**Having worked in sales**	**Yes**	**No**
	p-value	Mean ranks		p-value	Mean ranks	
Software business						
Understanding Contractual practices	0,777	24,00	22,26	0,514	21,00	23,44
Understanding licence practices	0,374	27,00	21,79	0,36	20,32	23,87
Having received info about company agreements	0,934	23,00	22,42	0,279	19,94	24,11
Understanding software company operations	0,493	19,08	23,04	0,1	26,35	20,07
Service design importance	0,803	23,83	22,29	0,011	28,44	18,76
Software developers job description broader	0,274	28,00	21,63	0,25	25,21	20,80

Entrepreneurship						
Entrepreneurship						
Organizing work better	0,628	24,92	22,12	0,599	21,29	23,26
Handling several thing better	0,078	31,17	21,13	0,97	22,59	23,44
Self-confidence strengthened	0,605	25,17	22,08	0,176	25,71	20,48
Knowing what I want	0,677	20,42	22,83	0,921	22,26	22,65
Respected worker and leader of my own job	0,451	18,75	23,09	0,412	24,44	21,28
Willingness to take risks	0,855	23,42	22,36	0,673	23,50	21,87
Tolerate more disappointments	0,027	33,08	20,83	0,128	18,88	24,78
Attitude toward entrepreneurship more positive	0,605	25,17	22,08	0,871	22,88	22,26
Social status is less important	0,098	30,58	21,22	0,543	21,15	23,35
Want more security	0,582	25,33	22,05	0,838	22,03	22,80
Sales						
Understanding sales and customer relationship management	0,122	30,17	21,29	0,712	23,38	21,94
Seeing sales work more positive	0,036	32,58	20,91	0,243	19,74	24,24
Salary is more important	0,96	22,83	22,45	0,37	20,41	23,81
Variety and diversity of job important	0,559	25,42	22,04	0,19	25,62	20,54
Job in sales work more likely	0,005	35,67	20,42	0,671	21,50	23,13
Understanding sales work challenges	0,036	32,17	20,89	0,786	21,85	22,91
Understanding sales team activities	0,113	30,25	21,28	0,486	24,15	21,46
Appreciating sales work and seller more	0,726	24,33	22,21	0,319	20,21	23,94
Having learnt sales skills	0,043	32,25	20,96	0,829	22,00	22,81

6.4.2 Parental background in entrepreneurship and sales positions

There were not statistically significant differences between the groups whose parents were entrepreneurs and who's weren't. Having had parents in sales work positions, instead, showed five statistically significant differences between the student groups. First, in tolerating more disappointments than before ($U = 50.5$, $p<0.027$); secondly, in seeing sales work now more positively than before ($U = 53.5$, $p<0.036$); thirdly, in considering sales work more likely now than before ($U = 35.0$, $p<0,005$); fourthly, in understanding now better the challenge in sales work ($U = 53.0$, $p<0.036$); and, finally, in seeing sales skills as something that can be learned and having a feeling of learning sales as part of the studies already ($U = 55.5$, <0.043). For all of the variables, the positive impact was for those students whose parents had worked in sales. These results, presented in the Tables 8a, 8b, contribute to finding the answer to the RQ3.

6.4.3 Working in software business, dropping out of school and IT hobbies prior studies

Between the students who had worked in software business compared to students who hadn't, there were significant statistical differences in the attitude towards sales work ($U = 331.5$, $p<0.007$), according to the Mann Whitney U test. The impact of the Softala framework seems to be more positive for those who had not been working in the software industry during their studies. These results, presented in the Table 9, contribute to finding the answer to the RQ3.

Between the students who had considered dropping out of school compared to those who hadn't, there were significant statistical difference in willingness to take a risk ($U = 225.5$, $p<0,025$) and understanding the meaning of customer relationship management for the company ($U = 253.0$, $p<0,032$). Those who had considered dropping out, had not experienced Softala studies very effective. These results, presented in the Table 9, contribute to finding the answer to the RQ6.

According to the Mann Whitney U test, between the students who had had IT as a hobby compared to those who hadn't had, there were three statistically significant differences. First, the difference in thinking that a software developer's job description is much broader than they expected ($U = 319.5$, $p<0,024$); second, the difference in being able to organize work better then before ($U= 319.0$, $p < 0,022$); and, third, the

difference in being able to handle several things at the same time better then before (U = 328.5, p<0,013). Examining the distributions shows that the bigger change in these attitudes is for those students not having had IT as a hobby before studies. These results, presented in the Table 9, contribute to finding the answer to the RQ3.

Table 9. Mann Whitney U tests for working in software business, IT as a hobby and drop-out

	Work in software business while studing?	**Yes**	**No**	**Having IT as a hobby?**	**Yes**	**No**	**Drop-out**	**Yes**	**No**
	p-value	Mean ranks		p-value	Mean ranks		p-value	Mean ranks	
Software business									
Understanding Contractual practices	0,753	21,33	22,48	0,294	20,98	24,91	0,519	19,86	22,73
Understanding licence practices	0,586	20,81	22,86	0,72	21,96	23,35	0,631	20,36	22,56
Having received info about company agreements	0,14	18,78	24,32	0,691	21,91	23,44	0,18	17,59	23,52
Understanding software company operations	0,411	20,22	23,28	0,598	21,72	23,74	0,691	20,68	22,45
Service design importance	0,868	21,64	22,26	0,744	22,98	21,74	0,092	16,45	23,91
Software developers job	0,6			0,024			0,483		
description broader		20,86	22,82		19,17	27,79		19,64	22,81

Entrepreneurship									
Organizing work better	0,257	19,58	23,74	0,022	19,19	27,76	0,555	23,95	21,33
Handling several thing better	0,08	18,19	24,74	0,013	18,83	28,32	0,466	19,59	22,83
Self-confidence strengthened	0,889	21,69	22,22	0,392	23,78	20,47	0,154	17,32	23,61
Knowing what I want	0,78	22,61	21,56	0,95	22,41	22,65	0,794	22,86	21,70
Respected worker and leader of my own job	0,446	23,67	20,80	0,691	23,09	21,56	0,466	19,55	22,84
Willingness to take risks	0,157	18,89	24,24	0,901	22,69	22,21	0,025	14,77	24,48
Tolerate more disappointments	0,714	22,81	21,42	0,226	20,69	25,38	0,773	23,00	21,66
Attitude toward entrepreneurship more positive	0,693	21,14	22,62	0,54	23,41	21,06	0,631	20,41	22,55
Social status is less important	0,677	22,86	21,38	0,308	21,07	24,76	0,816	21,23	22,27
Want more security	0,688	22,86	21,38	0,146	24,61	19,15	0,816	22,77	21,73
Sales									
Understanding sales and customer relationship management	0,421	20,22	23,28	0,796	22,11	23,12	0,032	15,00	24,41
Seeing sales work more positive	0,09	18,28	24,68	0,7	21,93	23,41	0,902	21,55	22,16
Salary is more important	1	22,00	22,00	0,23	20,74	25,29	0,087	27,59	20,08
Variety and diversity of job important	0,384	23,92	20,62	0,853	22,22	22,94	0,88	22,55	21,81
Job in sales work more likely	0,007	16,08	26,26	0,558	23,37	21,12	0,592	20,18	22,62
Understanding sales work challenges	0,64	20,97	22,74	0,521	21,54	24,03	0,23	18,05	23,36
Understanding sales team activities	0,929	21,81	22,14	0,921	22,35	22,74	0,146	17,23	23,64
Appreciating sales work and seller more	0,067	18,18	24,84	0,25	20,83	25,15	0,711	20,77	22,42
Having learnt sales skills	0,085	18,31	24,66	0,799	22,19	23,09	0,356	18,91	23,06

6.4.4 Students' and parents' educational background

The background education was recoded to a variable "Graduate and postgraduate degree/Others", in order to obtain more meaningful groups. Five statistically significant differences were found in relation to students' background education, according to the Mann Whitney U test. First, the difference in understanding better the contracting practices (U = 129.5, p<0.01); secondly, the difference in having received information about agreements during their studies (U=97.0, p<0,001); thirdly, the difference in understanding better licensing practices (U= 126.5, 0,011); fourthly, the difference in being better in organizing work now than before (U=129.0, p<0,010); and finally, the difference in considering the salary to be more important than before (U=142.5, p<0,028). The distributions show greater impact on the graduate degree students. These results, presented in Table 10, contribute to finding the answer to the RQ3.

As for the mother's and father's educational background, there were also statistically significant differences. The mother's educational background influenced the appreciation of the salary (U = 114.5, p<0.019) and sales work (U=129.5, p<0,050). These results contribute to finding the answer to the RQ3. What comes to the father's educational background, it influenced the risk taking (U=157.5, p<0,045) and tolerating disappointments (U=134.0, p<0,010). The distribution in both cases show that the impact of Softala is greater on the students having parents with higher education. Because mother's and fathers's educational backgrounds correlate (r = 0,639, R*R*100% = 41%), it is possible that this has some influence to these results as well.

Table 10. Mann Whitney U tests for students' and parents' educational background

	Student's education	**Grad.**	**Other**	**Mother's education**	**Higher**	**Other**	**Father's education**	**Higher**	**Other**
	p-value	Mean ranks		p-value	Mean ranks		p-value	Mean ranks	
Software business									
Understanding Contractual practices	0,01	26,20	16,62	0,199	18,88	24,02	0,54	21,28	23,52
Understanding licence practices	0,011	26,31	16,44	0,731	21,50	22,92	0,699	21,70	23,17
Having received info about company agreements	0,001	27,41	14,71	0,842	23,08	22,26	0,817	22,98	22,10

Understanding software company operations	0,547	23,39	21,09	0,486	20,50	23,34	0,873	22,18	22,77
Service design importance	0,726	21,38	23,33	0,925	22,23	22,61	0,961	22,60	22,42
Software developers job description broader	0,708	23,06	21,62	0,364	19,88	23,60	0,463	21,00	23,75
Entrepreneurship									
Organizing	0,01			0,967			0,452		
work better		26,22	16,59		22,38	22,55		24,00	21,25
Handling several thing better	0,054	25,35	17,97	0,173	26,42	20,85	0,315	24,55	20,79
Self-confidence strengthened	0,133	24,74	18,94	0,56	20,81	23,21	0,275	24,75	20,62
Knowing what I want	0,082	25,09	18,38	0,811	23,19	22,21	0,07	26,22	19,40
Respected worker and leader of my own job	0,314	24,00	20,12	0,065	27,85	20,26	0,087	26,02	19,56
Willingness to take risks	0,201	24,41	19,47	0,551	20,77	23,23	0,045	26,62	19,06
Tolerate more disappointments	0,578	21,67	23,82	0,356	25,19	21,37	0,01	27,80	18,08
Attitude toward entrepreneurship more positive	0,652	23,17	21,44	0,304	19,54	23,74	0,334	24,48	20,85
Social status is less important	0,701	23,04	21,65	0,471	20,54	23,32	0,526	23,72	21,48
Want more security	0,646	23,07	21,44	0,149	26,58	20,75	0,921	22,30	22,67
Sales									
Understanding sales and customer relationship management	0,685	23,11	21,53	0,591	24,88	21,84	0,971	22,58	22,44
Seeing sales work more positive	0,535	23,43	21,03	0,121	27,00	20,61	0,337	24,48	20,85
Salary is more important	0,028	25,72	17,38	0,019	29,19	19,69	0,545	23,72	21,48
Variety and diversity of job important	0,207	24,39	19,50	0,329	25,35	21,31	0,961	22,60	22,42
Job in sales work more likely	0,583	21,69	23,79	0,69	23,65	22,02	0,558	21,30	23,50
Understanding sales work challenges	0,429	23,69	20,62	0,097	27,35	20,47	0,299	24,65	20,71
Understanding sales team activities	0,931	22,63	22,29	0,307	25,44	21,26	0,846	22,90	22,17
Appreciating sales work and seller more	0,371	23,80	20,44	0,05	28,04	20,18	0,532	22,75	21,46
Having learnt sales skills	0,703	23,06	21,62	0,489	24,46	21,68	0,611	23,52	21,65

6.5 Correlation analyses

A correlation analysis is used to find the factors that contribute to the effectiveness of the Softala framework. The variables are mainly following the ordinal scale, so the Spearman correlation is a natural choice for the correlation coefficients.

Sum variables are often used to merge Likert-scale questions into more meaningful variables. It is common to use these kinds of variables in the situation where the target is to find out respondents' attitudes, perspectives or even opinions towards a certain matter. These attitudes, perspectives or opinions are compressed into one variable.

In a single study, the same theme can be measured by several questions. This makes it possible to form several different sum variables indicating different important aspects of the study.

Measuring the same phenomenon with a variety of questions can be seen to improve the reliability of the research. By doing this, the effect of random errors is reduced. However, it is not possible to define generally how many variables are needed to form a sum variable. The selection of variables to be included in the sum variable can completely be based on the content of the questions, but it can also be justified by the mutual correlations Cronbach's Alpha being more then 0,60.

The factor analysis can be used in the selection of a single variable into the sum variable. In this case, it is also essential that the merged variables are content wise consistent. It is important to pay attention to the fact that they are not overlapping either. In this research, the use of the factor analysis is not justified because the sample size of the factor analysis should be at least 50, preferably 200 (Comrey & Lee, 1992). Because of this, the calculation by content was selected. Prior to the formation of the sum variables, correlations between variables used in the sum variables were examined to ensure that the sum variables were justified. Table 11 lists the sum variables used with the corresponding Cronbach's Alpha.

In Tables 12-15, the correlation results are presented for all informants, students relating positively and negatively to entrepreneurship and finally students considering dropping out of school. The results are presented with explanations of mutual variations (r*r*100%).

Table 11. Sum variables for correlation analyses

Sum variable	**Calculation formula (from questionnaire)**	**Cronbach's Alpha**
Integration to Softala	proud + glad + importance + being part of the community	0,89
Interaction with teachers	attitude + contacts + genuine interest+ opportunity to meet	0,85
Interaction with students	friendship + attitude + contacts +being part of the student community	0,79
Interaction with customers	interesting + positive development + motivation + career possibilities + growing understanding of software business	0,87
Inner entrepreneurship/character	organization + handling several issues + decision making + self-confidence + knowing what I want	0,83
Inner entrepreneurship/responsibility	inequality in the world + Earth's natural resources + carbon footprint + ethics of the product	0,72
Inner entrepreneurship/challenge	risks (loan) + success + ideas + entrepreneurship instead of unemployment	0,58
Characteristics of sales work	persistence + teamwork +sales process improvement	0,63
Sales work stressfulness	stressful + management mainly by financial results + exhausting mentally and physically	0,60
Sales work requirements	attitude + communication skills + demanding specialist work + problem solving	0,65

6.5.1 Commitment to Softala, interaction with teachers, students and customers - all informants

Comparing the variables measuring the Softala framework's effectiveness to the variables in Table 11, interesting results can be found. There are positive correlations between the Softala integration and understanding contractual and license practices and having received information about agreements during studies. When looking at the sales variables, there are positive correlations found between the integration to Softala and the sales variables, for example, understanding better sales and the importance of customer relationship management for the company; seeing sales work more likely and positively than before; and especially understanding the challenges in sales work and understanding sales teams. The statistically significant correlation between the interaction with teachers and the Softala integration is obvious. The interaction with Softala also correlates slightly with the strengthened self-confidence and knowing what the student wants and being more willing to take risks. The involvement of customers can be seen in the variable "the importance of variety in my work", which correlates strongly with the interaction with the customer. Working together with other students also increases the ability to confront disappointments.

All this means that if a student is experiencing the Softala learning framework meaningful and he/she is feeling that he belongs to Softala, his/her attitude toward sales work is strengthened. If the integration is loose, the attitude toward sales work is more negative. These results, presented in Tables 12a and 12b, contribute to finding the answer to the RQ3.

Table 12a. Correlations between Softala and the interaction with students

	Integration to Softala	**Explains mutual variation**	**Interaction with students**	**Explains mutual variation**
Software business				
Understanding Contractual practices	0,442**	20 %	0,139	
Understanding licence practices	0,471**	22 %	0,302	
Having received info about company agreements	0,551**	30 %	0,164	
Understanding software company operations	0,067		-0,074	
Service design importance	0,128		0,038	

Software developers job description broader	0,131		0,161	
Entrepreneurship				
Organizing work better	0,178		-0,243	
Handling several thing better	0,298		-0,096	
Self-confidence strengthened	0,338*	11 %	0,162	
Knowing what I want	0,377*	14 %	-0,034	
Respected worker and leader of my own job	0,365*	13 %	0,117	
Willingness to take risks	0,305*	9 %	0,329*	11 %
Tolerate more disappointments	0,098		0,432**	19 %
Attitude toward entrepreneurship more positive	0,281		0,122	
Social status is less important	-0,078		-0,122	
Want more security	0,206		-0,117	
Sales				
Understanding sales and customer relationship management	0,45**	20 %	0,04	
Seeing sales work more positive	0,324*	10 %	0,192	
Salary is more important	0,237		-0,19	
Variety and diversity of job important	0,277		0,047	
Job in sales work more likely	0,331*	11 %	0,265	
Understanding sales work challenges	0,525**	28 %	0,023	
Understanding sales team activities	0,443**	20 %	-0,04	
Appreciating sales work and seller more	0,244		0,056	
Having learnt sales skills	0,379*	16 %	-0,034	
Integration to Softala	1		0,330*	11 %
Interaction with teachers	0,557**	31 %	0,162	
Interaction with students	0,33*	11 %	1	
Interaction with customers	0,308		0,197	
Inner Entrepreneurship	0,244		0,345*	12 %
Inner Entrepreneurship resp.	-0,049		0,086	
Inner Entrepreneurship chall.	0,122		0,147	
Sales work character	-0,017		0,121	
Sales work stressfulness	0,306*	9 %	-0,137	
Sale work requirements	-0,087		0,051	

** Correlation is significant at the 0,01 level

* Correlation is significant at the 0,05 level

Table 12b. Correlations between Softala and the interaction with teachers and customers

	Integration to Softala	Explains mutual variation	Interaction with teachers	Explains mutual variation	Interaction with customers	Explains mutual variation
Software business						
Understanding Contractual practices	0,442**	20 %	0,388*	15 %	0,281	
Understanding licence practices	0,471**	22 %	0,426**	18 %	0,367*	13 %
Having received info about company agreements	0,551**	30 %	0,376*	14 %	0,307*	9 %
Understanding software company operations	0,067		0,132		0,173	
Service design importance	0,128		0,143		0,004	
Software developers job description broader	0,131		-0,004		0,193	
Entrepreneur ship						
Organizing work better	0,178		0,014		0,054	
Handling several thing better	0,298		0,145		0,129	
Self-confidence strengthened	0,338*	11 %	0,329*	11 %	0,377*	
Knowing what I want	0,377*	14 %	0,26		0,253	
Respected worker and leader of my own job	0,365*	13 %	0,32*	10 %	0,119	
Willingness to take risks	0,305*	9 %	0,312*	10 %	0,237	
Tolerate more disappointment	0,098		-0,094		0,145	
Attitude toward entrepreneursh ip more positive	0,281		0,075		0,26	
Social status is less important	-0,078		-0,087		0,238	
Want more security	0,206		-0,02		0,11	
Sales						
Understanding sales and customer relationship management	0,45**	20 %	0,324*	10 %	0,166	
Seeing sales work more positive	0,324*	10 %	0,012		0,191	
Salary is more important	0,237		0,069		0,154	

Variety and diversity of job important	0,277		0,135		0,402**	16 %
Job in sales work more likely	0,331*	11 %	-0,0467		0,07	
Understanding sales work challenges	0,525**	28 %	0,245		0,131	
Understanding sales team activities	0,443**	20 %	0,269		0,04	
Appreciating sales work and seller more	0,244		0,032		0,225	
Having learnt sales skills	0,379*	16 %	0,105		0,071	
Integration to Softala	1		0,557**	33 %	0,308	
Interaction with teachers	0,557**	31 %	1		0,218	
Interaction with students	0,33*	11 %	0,162		0,197	
Interaction with customers	0,308		0,218		1	
Inner Entrepreneurship	0,244		0,374*	14 %	0,055	
Inner Entrepreneurship resp.	-0,049		-0,056		0	
Inner Entrepreneurship chall.	0,122		0,3		0,064	
Sales work character	-0,017		-0,171		0,105	
Sales work stressfulness	0,306*	9 %	0,314*	10 %	0,009	
Sale work requirements	-0,087		0,199		-0,161	

** Correlation is significant at the 0,01 level

* Correlation is significant at the 0,05 level

6.5.2 Students relating positively towards entrepreneurship (N = 22)

The integration with Softala correlates positively with understanding contractual and licensing practices and understanding the customer relationship management. In addition, the integration with Softala correlates with understanding the challenges in sales work and with being able to learn the skills needed in successful sales work. There is also a positive correlation between the integration with Softala and the opportunity to start sales work.

There is some correlation between the entrepreneurship variables with the students relating positively towards entrepreneurship in having, for example, more positive attitude towards entrepreneurship than before; knowing what the student wants; and being more willing to take risks and having one's self-confidence strengthened. The integration with Softala and the inner entrepreneurship variable correlate strongly, as well. This suggests that Softala does encourage the entrepreneurship attitude at least as for the students relating positively to entrepreneurship. These results, presented in Tables 13a and 13b, contribute to finding the answer to the RQ3 and RQ4.

Table 13a. Correlations between Integration to Softala and students as for students relating positively to entrepreneurship (N=22)

	Integration to Softala	Explains mutual variation	Interaction with students	Explains mutual variation
Software business				
Understanding Contractual practices	0,440*	19 %	0,01	
Understanding licence practices	0,456*	21 %	0,258	
Having received info about company agreements	0,596**	36 %	0,257	
Understanding software company operations	0,12		-0,127	
Service design importance	0,179		-0,02	
Software developers job description broader	0,03		0,183	
Entrepreneurship				
Organizing work better	0,169		-0,312	
Handling several thing better	0,25		-0,072	
Self-confidence strengthened	0,455*	21 %	0,188	
Knowing what I want	0,504*	25 %	0,041	
Respected worker and leader of my own job	0,369		0,1	
Willingness to take risks	0,535*	29 %	0,314	
Tolerate more disappointments	0,331		0,520*	27 %
Attitude toward entrepreneurship more positive	0,485*	24 %	0,047	

Social status is less important	-0,081		-0,289	
Want more security	0,156		-0,14	
Sales				
Understanding sales and customer relationship management	0,556**	31 %	-0,087	
Seeing sales work more positive	0,4		0,165	
Salary is more important	0,293		-0,241	
Variety and diversity of job important	0,540*	29 %	0,246	
Job in sales work more likely	0,474*	22 %	0,265	
Understanding sales work challenges	0,524*	27 %	-0,085	
Understanding sales team activities	0,388		-0,122	
Appreciating sales work and seller more	0,134		0,031	
Having learnt sales skills	0,436*	19 %	-0,175	
Integration to Softala	1		0,304	
Interaction with teachers	0,491*	24 %	0,122	
Interaction with students	0,304		1	
Interaction with customers	0,460*	21 %	0,362	
Inner Entrepreneurship	0,578**	33 %	0,630**	40 %
Inner Entrepreneurship resp.	-0,022		0,055	
Inner Entrepreneurship chall.	0,318		0,279	
Sales work character	0,036		0,37	
Sales work stressfulness	0,401		-0,401	
Sale work requirements	-0,165		0,043	

** Correlation is significant at the 0,01 level

* Correlation is significant at the 0,05 level

Table 13b. Correlations between Softala, teachers and customers as for students relating positively to entrepreneurship (N=22)

	Integration to Softala	Explains mutual variation	Interaction with teachers	Explains mutual variation	Interaction with customers	Explains mutual variation
Software business						
Understanding Contractual practices	0,440*	19 %	0,306		0,35	
Understanding licence practices	0,456*	21 %	0,326		0,521*	27 %
Having received info about company agreements	0,596**	36 %	0,402		0,287	
Understanding software company operations	0,12		0,085		0,373	
Service design importance	0,179		0,213		0,233	
Software developers job description broader	0,03		-0,105		0,177	
Entrepreneurship						
Organizing work better	0,169		-0,156		-0,127	
Handling several thing better	0,25		0,041		-0,01	
Self-confidence strengthened	0,455*	21 %	0,328		0,506*	26 %
Knowing what I want	0,504*	25 %	0,234		0,179	
Respected worker and leader of my own job	0,369		0,369		0,072	
Willingness to take risks	0,535*	29 %	0,404		0,214	
Tolerate more disappointment	0,331		-0,031		0,174	
Attitude toward entrepreneurship more positive	0,485*	24 %	0,234		0,361	
Social status is less important	-0,081		-0,134		0,18	
Want more security	0,156		0,027		0,224	
Sales						
Understanding sales and customer relationship management	0,556**	31 %	0,313		0,186	
Seeing sales work more positive	0,4		0,1		0,153	
Salary is more important	0,293		0,275		0,045	
Variety and diversity of job important	0,540*	29 %	0,393		0,535*	29 %

Job in sales work more likely	0,474*	22 %	0,043		0,115	
Understanding sales work challenges	0,524*	27 %	0,225		0,2	
Understanding sales team activities	0,388		0,199		0,075	
Appreciating sales work and seller more	0,134		0,113		0,174	
Having learnt sales skills	0,436*	19 %	0,181		0,126	
Integration to Softala	1		0,491*	24 %	0,460*	21 %
Interaction with teachers	0,491*	24 %	1		0,327	
Interaction with students	0,304		0,122		0,362	
Interaction with customers	0,460*	21 %	0,327		1	
Inner Entrepreneurship	0,578**	33 %	0,439*	19 %	0,293	
Inner Entrepreneurship resp.	-0,022		0,071		0,071	
Inner Entrepreneurship chall.	0,318		0,308		0,334	
Sales work character	0,036		-0,422		-0,002	
Sales work stressfulness	0,401		0,416		-0,021	
Sale work requirements	-0,165		-0,32		-0,173	

** Correlation is significant at the 0,01 level

* Correlation is significant at the 0,05 level

6.5.3 Students relating negatively towards entrepreneurship (N = 21)

Understanding licence and contractual issues, understanding sales work and sales teams all correlate positively with the integration to Softala. There is a positive correlation between appreciations of sales work and interaction with the customers. Variables "desire to be a respected worker" and "self-confidence has strengthened" both correlate positively with internal entrepreneurship.

This indicates that the effects of Softala are positive also for those students having a negative attitude towards entrepreneurship. With Softala, it has been possible to strengthen the students' self-confidence at the same time when they have learned the importance of sales work and grown to appreciate the work of sales people. These results, presented in Tables 14a and 14b contribute to finding the answer to the RQ5.

Table 14a. Correlations between Integration to Softala and students as for students relating negatively to entrepreneurship (N=21)

	Integration to Softala	Explains mutual variation	Interaction with students	Explains mutual variation
Software business				
Understanding Contractual practices	0,625**	39 %	0,358	
Understanding licence practices	0,499**	25 %	0,354	
Having received info about company agreements	0,403		0,009	
Understanding software company operations	0,103		0,047	
Service design importance	0,156		0,137	
Software developers job description broader	0,27		0,198	
Entrepreneurship				
Organizing work better	0,144		-0,117	
Handling several thing better	0,29		-0,113	
Self-confidence strengthened	0,235		0,138	
Knowing what I want	0,153		-0,149	
Respected worker and leader of my own job	0,284		0,103	
Willingness to take risks	0,126		0,369	
Tolerate more disappointments	-0,206		0,322	
Attitude toward entrepreneurship more positive	0,131		0,317	
Social status is less important	-0,08		0,121	
Want more security	0,14		-0,162	
Sales				
Understanding sales and customer relationship management	0,334		0,25	
Seeing sales work more positive	0,217		0,194	
Salary is more important	-0,019		-0,131	

Variety and diversity of job important	-0,008		-0,283	
Job in sales work more likely	0,144		0,272	
Understanding sales work challenges	0,508*	26 %	0,21	
Understanding sales team activities	0,505*	26 %	0,108	
Appreciating sales work and seller more	0,422		0,044	
Having learnt sales skills	0,405		0,208	
Integration to Softala	1		0,439	
Interaction with teachers	0,659**	43 %	0,186	
Interaction with students	0,439		1	
Interaction with customers	0,202		-0,027	
Inner Entrepreneurship	0,042		0,173	
Inner Entrepreneurship resp.	-0,112		0,221	
Inner Entrepreneurship chall.	0,228		0,084	
Sales work character	-0,013		-0,119	
Sales work stressfulness	0,143		0,137	
Sale work requirements	0,097		0,111	

Inner Entrepreneurship		
Self-confidence strengthened	0,501*	25 %
Respected worker and leader of my own job	0,507*	26 %

** Correlation is significant at the 0,01 level

* Correlation is significant at the 0,05 level

Table 14b. Correlations between Softala, teachers and customers as for students relating negatively to entrepreneurship (N=21)

	Integration to Softala	Explains mutual variation	Interaction with teachers	Explains mutual variation	Interaction with customers	Explains mutual variation
Software business						
Understanding Contractual practices	0,625**	39 %	0,543*	29 %	0,296	
Understanding licence practices	0,499**	25 %	0,465*	22 %	0,187	
Having received info about company agreements	0,403		0,315		0,333	
Understanding software company operations	0,103		0,135		0,006	
Service design importance	0,156		0,03		-0,089	
Software developers job description broader	0,27		0,088		0,381	
Entrepreneur-ship						
Organizing work better	0,144		0,281		0,355	
Handling several thing better	0,29		0,316		0,417	
Self-confidence strengthened	0,235		0,368		0,303	
Knowing what I want	0,153		0,349		0,396	
Respected worker and leader of my own job	0,284		0,293		0,233	
Willingness to take risks	0,126		0,189		0,299	
Tolerate more disappointments	-0,206		-0,144		0,08	
Attitude toward entrepreneurship more positive	0,131		-0,226		0,145	
Social status is less important	-0,08		-0,013		0,311	
Want more security	0,14		-0,039		-0,049	
Sales						
Understanding sales and customer relationship management	0,334		0,355		0,201	
Seeing sales work more positive	0,217		-0,119		0,337	
Salary is more important	-0,019		-0,172		0,368	
Variety and diversity of job important	-0,008		-0,223		0,24	

Job in sales work more likely	0,144		-0,234		0,049	
Understanding sales work challenges	0,508*	26 %	0,251		0,116	
Understanding sales team activities	0,505*	26 %	0,338		0,078	
Appreciating sales work and seller more	0,422		0,022		0,455*	21 %
Having learnt sales skills	0,405		-0,006		0,09	
Integration to Softala	1		0,659**	43 %	0,202	
Interaction with teachers	0,659**	43 %	1		0,086	
Interaction with students	0,439		0,186		-0,027	
Interaction with customers	0,202		0,086		1	
Inner Entrepreneurship	0,042		0,271		-0,153	
Inner Entrepreneurship resp.	-0,112		-0,173		-0,118	
Inner Entrepreneurship chall.	0,228		0,331		0,011	
Sales work character	-0,013		0,058		0,286	
Sales work stressfulness	0,143		0,18		0,139	
Sales work requirements	0,097		-0,114		-0,033	
Inner Entrepreneurship						
Self-confidence strengthened	0,501*	25 %				
Respected worker and leader of my own job	0,507*	26 %				

** Correlation is significant at the 0,01 level

* Correlation is significant at the 0,05 level

6.5.4 Students considering dropping out of school at some point of their studies (N=11)

Integration with Softala correlates with understanding license practices and wanting more security. Interaction with customers in turn correlates with entrepreneurship attitude, salary expectations and diversity of work. The possibility to work in sales and the appreciation of sales work both correlate positively with the interaction with other students. The negative correlation between sales work character and Softala integration and interaction with teachers indicate that for students who have considered dropping out, the nature of the sales work as a teamwork and as a process has not become clear. But the successful interaction with the customer is helping them to understand the variety of software developer's work

and even making the attitude towards entrepreneurship more positive for potential dropouts. The appreciation of the sales work is strengthened by the positive influence of other students. This can be interpreted so that for the students who have considered dropping out earlier the framework like Softala is very important. It seems to give the opportunity to learn with the customers and other students in real life context in safe way and that is exactly what is needed to make students to commit to their studies. These results, presented in Tables 15a and 15b contribute to finding the answer to the RQ6.

Table 15a. Correlations between Integrations to Softala and students
Students considering dropping out of school at some point of their studies
(N=11)

	Integration to Softala	Explains mutual variation	Interaction with students	Explains mutual variation
Software business				
Understanding Contractual practices	0,381		-0,042	
Understanding licence practices	0,626*	39 %	0,408	
Having received info about company agreements	0,473		0,103	
Understanding software company operations	0,337		-0,304	
Service design importance	0,159		0,106	
Software developers job description broader	-0,097		0,033	
Entrepreneurship				
Organizing work better	-0,043		-0,606	
Handling several thing better	-0,01		-0,355	
Self-confidence strengthened	0,385		-0,256	
Knowing what I want	0,028		-0,565	
Respected worker and leader of my own job	0,114		-0,038	
Willingness to take risks	0,455		-0,198	
Tolerate more disappointments	-0,044		0,372	
Attitude toward entrepreneurship more positive	0,522		0,291	
Social status is less important	0,163		-0,136	
Want more security	0,611*	37 %	-0,057	

Sales				
Understanding sales and customer relationship management	0,42		0,01	
Seeing sales work more positive	0,354		0,554	
Salary is more important	0,213		0,085	
Variety and diversity of job important	0,465		0,346	
Job in sales work more likely	0,473		0,726*	
Understanding sales work challenges	0,544		0,569	
Understanding sales team activities	0,299		0,532	
Appreciating sales work and seller more	0,469		0,674*	45 %
Having learnt sales skills	0,296		0,367	
Integration to Softala	1		0,512	
Interaction with teachers	0,452		0,165	
Interaction with students	0,512		1	
Interaction with customers	0,581		0,361	
Inner Entrepreneurship	-0,499		-0,215	
Inner Entrepreneurship resp.	0,234		0,116	
Inner Entrepreneurship chall.	-0,053		-0,086	
Sales work character	-0,636*	40 %	-0,202	
Sales work stressfulness	0,203		-0,113	
Sale work requirements	-0,271		0,285	

** Correlation is significant at the 0,01 level

* Correlation is significant at the 0,05 level

Table 15b. Correlations between Integration to Softala, teachers and customers
Students considering dropping out of school at some point of their studies
(N=11)

	Integration to Softala	Explains mutual variation	Interaction with teachers	Explains mutual variation	Interaction with customers	Explains mutual variation
Software business						
Understanding Contractual practices	0,381		0,448		0,198	
Understanding licence practices	0,626*	39 %	0,648*	42 %	0,332	
Having received info about company agreements	0,473		0,6		-0,056	
Understanding software company operations	0,337		0,128		0,152	
Service design importance	0,159		-0,002		-0,113	
Software developers job description broader	-0,097		-0,692*	48 %	0,248	
Entrepreneurship						
Organizing work better	-0,043		-0,106		0,106	
Handling several thing better	-0,01		-0,313		-0,228	
Self-confidence strengthened	0,385		0,461		0,266	
Knowing what I want	0,028		0,2		0,303	
Respected worker and leader of my own job	0,114		-0,036		0,211	
Willingness to take risks	0,455		0,171		0,231	
Tolerate more disappointments	-0,044		-0,147		0,371	
Attitude toward entrepreneurship more positive	0,522		0,584		0,610*	37 %
Social status is less important	0,163		0,276		0,057	
Want more security	0,611*	37 %	0,258		0,164	
Sales						
Understanding sales and customer relationship management	0,42		0,208		0,328	
Seeing sales work more positive	0,354		-0,136		0,259	

Salary is more important	0,213		0,24		0,760**	58 %
Variety and diversity of job important	0,465		0,002		0,761**	58 %
Job in sales work more likely	0,473		-0,111		0,13	
Understanding sales work challenges	0,544		-0,005		0,332	
Understanding sales team activities	0,299		0,108		-.0,033	
Appreciating sales work and seller more	0,469		-0,058		0,258	
Having learnt sales skills	0,296		-0,356		0,147	
Integration to Softala	1		0,452		0,581	
Interaction with teachers	0,452		1		0,166	
Interaction with students	0,512		0,165		0,361	
Interaction with customers	0,581		0,166		1	
Inner Entrepreneurship	-0,499		0,411		-0,235	
Inner Entrepreneurship resp.	0,234		0,417		0,165	
Inner Entrepreneurship chall.	-0,053		0,383		-0,34	
Sales work character	-0,636*	40 %	-0,848**	72 %	-0,262	
Sales work stressfulness	0,203		0,585		0,19	
Sale work requirements	-0,271		-0,422		0,335	

** Correlation is significant at the 0,01 level

* Correlation is significant at the 0,05 level

7. Conclusions and discussions

In this chapter, the research questions, one at a time, are discussed and the conclusions based on the research results are drawn. Finally, the contribution, limitations and suggestions for future research are presented.

7.1 Discussions of the research questions and findings

RQ1: How did the students view software development and entrepreneurship before studying in Softala?

There are several studies in literature that support the idea of seeing software development and improving processes as a more comprehensive package than seeing them only as technological challenges and ad hoc business needs of a customer (Richardson & Wagenheim, 2007; Dangle & Larsen & Shaw & Zelkowitc, 2005; McCaffery & Talylor & Coleman, 2007; Coleman & O'Connor, 2008; Niazi & AliBabar & Katugampla, 2008).

According to the data collected with the first questionnaire, described in more detail in chapter 4, technology has a great impact on software developer's work. The work of a software developer has an impact on the profile of the developer. The students considering a software developer's profession seem to have a certain way of relating to entrepreneurship. They are not very brave to consider entrepreneurship in software business to be their future career, at least not right away. Sales and innovations are seen mainly to be included in entrepreneurship and business orientation. The processes in general are seen only slightly connected to software developer's work and they are mainly something the students are not interested in or they don't consider them to be important.

Entrepreneurship is nowadays seen as a complex process where the outcome is only partially dependent on the characteristics of an entrepreneur (Mulle & Tomas, 2000; Kamm & al., 1990; Burt, 2000; Grandi & Grimaldi, 2003; Bermann & Lichtenstein & Brush, 2001). This study shows some relations between entrepreneurship and software

development. The students who were the readiest and most eager to start their own business were not the ones wanting to study software development the most.

RQ2: What are the implications of students' views for teaching?

According to literature, software engineering is very much about teamwork and communication (Cockburn, 2007; Ghezzi & Jazayeri & Mandrioli, 2002; Bjorner & Dines, 2006) and knowledge sharing (Dixon, 2000). Pfleeger (2001), in his definition of software engineering, also emphasizes understanding complex technical models related with computer and computing in order to solve problems. Understanding the customer is also very important according to literature (Cusumano, 2008; IDC 2012). Literature presents several ways to approach entrepreneurship education and, in this study, the approach is partially based on the model described by Gartner (1985): a) process approach b) opportunity approach and c) small business management approach. In the Softala framework, the target is to concentrate especially on the first two.

In order to get a profound understanding of the phenomena and have an influence on students' attitudes and learning outcomes, it is important to help the learner to be aware of the critical aspects involved in understanding the phenomena and to help the learner to find out how these aspects interact with each other. In this study, several critical aspects were found to support learning: ability to learn complex technical models, team work, understanding economical risks, understanding customer needs, understanding the need for process and encouraging imaginativeness.

By paying attention to all these critical aspects presented above, it is possible to create the educational framework and environment to make the future software developers readier to face the customer and to be even bolder when it comes to starting their own business as a software business entrepreneur. These critical aspects listed here (and more precisely described in chapter 4) are the building blocks together with Kolb's experiential learning theory, when creating the Softala framework.

RQ3: Does studying in Softala have an impact on students' attitudes towards selling, sales work and sales process improvement?

According to literature, many college graduates generally have a negative perception of sales as a profession (Wiles & Spiro, 2004; Michael & Marshall, 2002; Peterson & Devlin, 1994; Weilbaker & Merrit 1992). Academic students, too, tend to see selling and sales work rather negatively.

(Hawes & al., 2004; Cengiz & Yazini & Erdal, 2010). Several studies have shown that the impact of teacher is very strong (Currant & Rosen, 2006; Parker & Pettihijohn & Luke, 1996; Cengiz & Yazini & Erdal, 2010). Marketing and sales majors and those students who have taken some sales courses tend to have more positive perception of sales work (Sojka, 2000).

According to the data collected with the second questionnaire (appendix 2), it seems that studying in Softala deepens students' understanding of the contracts and negotiations (Table 8). The results also show that those students who have been working in sales before realize the importance of service design to software industry. Softala thus reinforces the positive attitude towards sales work and service design.

In addition, the results suggest that it is possible to see the influence of parents behind the scene, as well. Those students whose parents have been working in sales think that, after having studied in Softala, they are more able to tolerate disappointments, they see sales work more positively than before and they can see themselves in sales positions more likely than those students not having had their parents involved in sales work (Table 8). Those students also see that the skills needed in sales work are something that can be learned and they have already experienced that while studying in Softala.

The students' own educational background influences the effectiveness of the Softala framework, as well. If a student has a graduate degree, he/she is more capable of understanding contractual practices and he/she feels that he/she has been given information about agreements during his/her studies and he/she also feels that he/she understands licensing practices better (Table 10). The students with higher educational background also consider salary to be more important for them after studying in Softala than before.

According to the findings, working together with other students also increases the ability to confront disappointments and the interaction with the teacher is very important, even more important than the customer relationship (Table 12). However, the interaction with the customer had an effect on the students' self-confidence giving further importance to the framework.

The result also suggest that when students experience strong integration to Softala, its teachers and fellow students, the impact of the framework is strong and, on the other hand, if the integration is loose, the attitude toward sales work is more negative.

This research supports the findings in literature and gives more information about the influence of parents' and students' own background.

The major impact, however, was seen in the integration to Softala, which reinforces the sales skills and sales work appreciation as part of the software developer's studies.

RQ4: Does studying in Softala have an impact on students' attitudes and willingness to become an entrepreneur in the near future?

The research indicates that graduates with entrepreneurship as major are more likely to start new businesses (Kolveredi & Moen, 1997; Peterman & Kennedy, 2003). On the other hand, Rasmussen and Sörheim (2006) argued in their study that the participants in entrepreneurship education are most likely to be recruited among people initially motivated to become entrepreneurs. In a study made in a secondary school and a college, it was found out that the entrepreneur programme had a slightly negative impact to students. This might be because these students didn't have a real context within which to start their business. In Softala, there are real start-ups which act as customers for the students. So, in Softala, the students are facing more realistic situations.

With Softala, it seems to be possible to strengthen the students' self-confidence at the same time when they are learning the importance of sales work and growing to appreciate the work and even considering sales work to be part of their job description in one way or other, even as an entrepreneur (Table 13). Softala seems to further encourage the entrepreneurial attitude of those students already relating positively to entrepreneurship and Softala also strengthens the students' inner entrepreneurial attitude (Table 13). The integration of the student with Softala also has an effect on students' understanding of customer relationship management and challenges in sales work which are important parts of the entrepreneurial attitude (Table 8).

RQ5: Does studying in Softala have an impact especially on those students having negative attitude to entrepreneurship in the first place?

When categorizing entrepreneurship courses according to Gartner there are a) process approach b) opportunity approach and c) small business management approach. The opportunity approach, which is mainly used in Softala, has some advantages over the other categories as it focuses on the opportunity instead of the personal quality.

In Softala, there were some changes in the attitudes that related closely to entrepreneurship. Studying in Softala seems to deepen students' understanding of contracts and negotiations (Table 14) and Softala helps the

students not relating positively towards entrepreneurship to understand the challenges in sales work. This is the effect that the Softala framework is especially looking for.

RQ6: What kind of impact does the Softala framework have on the learning process of the students not committed to their studies i.e. the potential dropout students?

According to literature, PBL and TBL are both important methods to support learning and prevent dropping out of a course or even of a school (Markham, 2003; Detmer & Li & Dong & Hankins, 2010). Dropout rates were smaller in TBL-courses than in lecture-based courses, but after a TBL-course, when attending a normal lecture-based course, the dropout rates were bigger. (Lasserre & Szostak, 2011).

According to the research data, the impact of the Softala framework on the students who have considered dropping out earlier seems important. The students who had considered dropping out said that they felt that the education was not giving them that much and they felt like they were studying for the teacher, not for themselves. Hence, Softala seems to give the students an opportunity to learn with the customers and other students in a real life context and in safe way, which is exactly what is needed to make students to commit to their studies (Table 15). It is important that there are, in Softala, many PBL-based courses that contribute to creating the actual Softala framework. In practise this means that the engaging effect of PBL- or TBL- courses is multiplied in the Softala framework.

7.2 Contribution

Softala combines software development, sales work, service business design and entrepreneurial attitude into one framework to enhance the learning outcomes of the students. The students of ICT in a university of applied sciences are eager to learn programming and all sort of technical frameworks. Software business in changing rapidly and the revenues of software business are increasingly moving from product selling to services (Cusumo 2008). Open source software and free software foundations drive the business to that direction and this is something that will affect the profitability of ICT companies. Coping with this trend requires a different attitude of their employees. It is also true that companies need to spend fortunes on sales and advertising as well as on product development

(IDC, 2012). The personnel in software business, in the future, needs to be composed of multi-talented people; it needs to be able to cope with this increasingly challenging environment.

In Kirkpatrick's (1998) publication, the following criteria are mentioned for evaluating training programmes: a) decide whether to continue offering a particular training programme b) improve future programmes and c) validate your existence and job as a training professional. According to the results of this research, it is clear that this framework is an improvement to more known TBL or PBL based courses. The Softala framework is an environment where learning happens continuously in several areas and at different levels.

Table 16. Kirkpatrick's four levels of evaluation (Kirkpatrick 1998) and the Softala framework

Level 1: Reaction In the prestudy, the reactions were measured with a questionnaire from the students not having studied in Softala yet. The Softala framework was built according to the results of the prestudy and Kolb's (1984) learning theory.	*Level 2: Learning* Learning happens in Softala during 1,5 years. Unfortunately, it was not possible to use a control group because of the ethical aspects of organizing the education. It would have been also impossible to finance such a long experiment at the same time for the control group. So the decision was simple: no control groups would be used in this experiment.
Level 3: Behaviour At this level in Kirkpatrick's evaluation model, it is argued that there should be enough time for a change to take place. This has been considered in the structure of the framework - the experiment lasted for 1,5 years.	*Level 4: Results* The contribution of the Softala framework is exactly in its hidden curricula beside the technological curricula. The results are promising in this area: the changes in students' attitudes are especially noticeable as for sales and service skills. The students' self-confidence and internal entrepreneurship are strengthened by the integration to the Softala framework. The results regarding the entrepreneurial attitude show that there is still work to be done and the Softala framework should be further developed to this direction.

7.3 Limitation

The approach in this research is relatively close to the action research (Miles & Huberman, 1994) approach, so the limitations of action research can be applied. Action research is associated with a great risk of a researcher bias. Miles and Huberman mention two kinds of researcher biases: a) the effects of the researcher on the case and b) the effects of the case on the researcher. In this case, the researcher bias is reduced by the fact that applying the framework was done by several teachers of different study groups. The researcher got a lot of help and commenting from teachers in the study organisation and creating the framework was teamwork of many people. However, the researcher's involvement was significant in the planning, implementing and coaching teachers in applying the framework. Another important issue of the researcher bias is the fact that the same researcher that interprets the results of applying the framework has constructed the framework.

The post-then-pre -technique, which was chosen for this study, has some limitations, too, because of the fact that pre- and post-questionnaires were done in the opposite order. On the other hand, the post-then-pre -technique is a very popular way to assess especially a learner's self-reported changes in knowledge, awareness, skills, confidence, attitudes and behaviours. It takes less time and, moreover, it eliminates pre-test sensitivity and response shift bias that result from making the pre-test before the post-test (Howard 1980). The reliability of the questionnaire can be seen as a limitation too, even though the questionnaire was organised during the lecture hours, it was still significantly long. So it is possible that at least some of the students didn't answer to the questionnaire truthfully. The accumulation of type I error might also have some influence to the validity of the research. The analysis includes many statistical tests; therefore it is possible that some of the tests might have passed the significance level by accident. For example using the p value of 0,01 would improve the situation, but this, in turn, might increase the risk of generating negative false (type II errors). The power of the statistical analysis could also be increased by limiting the total number of tests to only those tests that are essential to the main question of the study. Nevertheless, additional studies with more teaching groups, would significantly improve the reliability of the study. The transferability of the results could be tested, for example, by applying the Softala framework in other software engineering study groups in other universities of applied sciences, but also to other areas of the IT sector. The results are, however, promising, but more studies are needed to further validate these results.

7.4 Future research

In the future, more information will be gathered from students studying in Softala. The intention is to organize qualitative interviews and analyse those interviews more thoroughly in order to better understand the reactions of the students when they are learning in the different phases of Softala. This way it will be possible to learn more about how the Softala framework works and how it can be further improved.

The Softala framework has proven to be a very powerful tool to help students to understand important elements of entrepreneurship, such as sales and service attitude. This is extremely important for the other professions within the field of ICT, as well, not just for software engineering. The objective is also to introduce the Softala framework to other areas of studying information technology in university of applied sciences. In fact, the work is already in progress to extend the Softala framework to students studying to be system specialists.

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Appendix I

Questionnaire I

Background information

1. Gender, male/female?
2. Age?
3. Have you taken the matriculation examination?
4. Which specialisation area are you considering to take next semester?
   a) Software development
   b) System specialist
   c) IT management
   d) Small business IT specialist
   e) ICT innovator

Thematic questions (open-ended questions)

5. What properties, in your opinion, should a good software developer have?
6. What properties do you think you have? What are your strengths and do you have something to improve, in your opinion?
7. What kind of knowledge, in your opinion, should a good software developer have?
8. Could you consider becoming an entrepreneur? (Yes/No)
9. Explain your previous answer and if you consider the entrepreneurship to be an option for you, could you give some examples of your ideas of the timing etc.?
10. Sales as a part of software developer's work
11. Innovations as a part of software developer's work
12. Processes as a part of software developer's work
13. Technology as a part of software developer's work
14. Entrepreneurship and software development
15. My experiences when studying software development

Appendix II

Questionnaire II

Background information

1. Date of birth: _____
2. Gender: Female/Male
3. Education: Graduate degree / Vocational / Other: What
4. Mother's educational background: Postgraduate Diploma / Master's degree / Bachelor's degree / Vocational / Other, what? / I do not know.
5. Father's educational background: Postgraduate Diploma / Master's degree / Bachelor's degree / Vocational / Other, what? / I do not know.

Studying in Softala

6. How many study credits do you have at the moment? _____
7. How many study credits are you going to have at the end of this semester? _____
8. Which course are you currently taking? Softala project1/Softala project2/Softala project3?
9. Do you work while studying? Yes, how many hours/week? Yes/No
10. Do you work in the software industry while studying? Yes/No
11. Have you completed your internship? Yes/No
12. If you have completed the internship, did you work in the software industry? Yes/No
13. Have you ever considered dropping out of school? Yes/No
14. If you have considered dropping out of school, how much did the following reasons affect you?
    - The field of study is not what I want.
    - The contents of studies do not meet my expectations.
    - Studying seems to be too difficult.

- Studying seems to be too easy.
- I do not think I need a degree to fulfil my plans for the future.
- I want to spend my time more on hobbies or other leisure activities.
- I'm working and I don't have enough time for studying.
- Health reasons.
- Economic reasons.
- Other reasons.

None/Very little/A little bit/Neutral/Somewhat/Quite a lot/Very much

15. Are there any other reasons why you have considered ending your studies?
16. Integration to HAAGA-HELIA and Softala
    - I'm proud to be a part of the Softala environment.
    - I am glad that I am a part of the Softala environment.
    - For me, it is important to be a part of the Softala environment.
    - I feel that I am a part of HAAGA-HELIA community.
    - For me, it is important that I graduate from HAAGA-HELIA.
    - I'm sure that my decision to choose HAAGA-HELIA UAS was right.

    Strongly disagree/Disagree/Almost disagree/Neutral/Almost agree/Agree/Strongly agree

17. Interaction with Softala's teachers:
    - My teachers have a positive impact on my values and attitudes.
    - Contacts with my teachers have positive effect on me.
    - Teachers are genuinely interested in teaching and supporting my learning.
    - My teachers have a positive impact on my career wishes and my goals.
    - I am satisfied with the opportunities to meet and talk with my teachers outside class hours.
    - Most teachers are interested in students.
    - Only few teachers are interested in us – the students.

Strongly disagree/Disagree/Almost disagree/Neutral/Almost agree/ Agree/Strongly agree

18. If you want, you can tell more about your experiences regarding Softala's teachers.
19. Interaction with the fellow students:
    - I am a friend with other students in Softala.
    - Other students in Softala have a positive impact on my knowledge, attitudes, and values.
    - Contacts with other students have contributed positively to my growth to be a software development professional.
    - I feel I am a part of the student community in Softala.
    - I have found it difficult to get to know other students in Softala.
    - Only few students are interested in helping and listening to me if I have a problem with my studies.
    - Most of the Softala students have different attitudes and values from mine.

    Strongly disagree/Disagree/Almost disagree/Neutral/Almost agree/ Agree/Strongly agree

20. If you want, you can tell more about your experiences with other students in Softala.
21. Interaction with Softala's customers
    - Working with clients has been interesting.
    - Working with clients has a positive impact on me.
    - Working with clients has increased my motivation.
    - Working with clients has affected my career related wishes.
    - Working with clients has increased my understanding of the software industry and its potential.

    Strongly disagree/Disagree/Almost disagree/Neutral/Almost agree/ Agree/Strongly agree

22. If you want, you can tell more about your experiences with Softala's customers.
23. What are the techniques you have used during your internship or at work? If you have not completed your internship and you

have not worked in software industry, you can skip this question. Note that you can choose more than one option.

- Java
- iOS
- Android
- Win Phone
- Ruby
- php
- Scala
- NET
- Other techniques, what?

Software development and software services

24. Did you have computers and IT as a hobby before you started to study IT? Yes/No
25. If you answered yes to the previous question, please describe your hobby in more detail (single / club / friends / self-employed, etc.).
26. Do you still consider that you have IT as a hobby? Yes/No
27. If yes, in what way does it show in your everyday life?
28. In your opinion, what is important for software companies?
    - Designing software services is becoming more and more important.
    - Understanding clients and their needs and using the terminology clients' use (and understand) are important in software development.
    - Forecasting clients' future needs is important.
    - Serving current customers.
    - The personnel of a software company have to be able to create innovative new products and ideas in order to ensure acquiring new customers.
    - Technological solutions are the most important thing in a software company.
    - To be able to find answers by yourself is an absolute must.

    Strongly disagree/Disagree/Almost disagree/Neutral/Almost agree/Agree/Strongly agree

29. How do you see/understand the contracting practices in software industry?

- It is important that all employees are familiar with the contracting practices.
- It is important for the individual to understand contracting practices in software industry.
- I'm interested in contracts and licenses.
- License practices in the software industry are complex.
- Lawyers deal with the contracts.
- Software should mainly be distributed as licensed and installed software.
- In the future, software is not going to be distributed as licensed installed software.

Strongly disagree/Disagree/Almost disagree/Neutral/Almost agree/Agree/Strongly agree

30. Because of Softala studies
    - I understand better the current contractual practices.
    - I understand better the current license practices.
    - I have received information about company agreements in the framework of my studies.
    - I understand now better the software company's operations.
    - I see the service design to be much more important than before.
    - I think that a software developer's job description is much broader than I expected.

    Strongly disagree/Disagree/Almost disagree/Neutral/Almost agree/Agree/Strongly agree

Entrepreneurship

31. Are your parents entrepreneurs? If yes, mother and / or father?
32. Do you have friends who work as entrepreneurs? Yes/No
33. Are you entrepreneur at the moment? Yes/No
34. If you answered yes to the previous question, why did you start your own business and what kind of business did you start?
35. Do you see yourself as an entrepreneur in the near future? Yes/No
36. Please, explain your answer to the previous question.
37. Describe yourself as a member of a work or study community.

- I am persuasive and I am able to inspire others.
- Organizing work is easy for me and I like it.
- I am able to handle several things at the same time.
- I can make decisions and stay behind them if necessary.
- I believe in myself and I have a good self-confidence.
- I know what I want and I will try to achieve my target.
- I am in good physical condition.

Strongly disagree/Disagree/Almost disagree/Neutral/Almost agree/Agree/Strongly agree

38. What do you wish for the future?
    - I want to be my own boss.
    - I want to be respected at work.
    - I want to be on the cutting edge of technological development.
    - I want to implement my own ideas.
    - I want to guide and help others.
    - Work and career are not so important to me.

    Strongly disagree/Disagree/Almost disagree/Neutral/Almost agree/Agree/Strongly agree

39. Social issues about business and entrepreneurs' responsibilities
    - I am concerned about the development of the Finnish economy.
    - I contemplate quite a lot the inequality in the world.
    - People should take the Earth's natural resources more into account.
    - When buying electronic equipment and software, I pay attention to the carbon footprint.
    - I make my buying decisions based on price.
    - I make my buying decisions based on the ethics of the product.

    Strongly disagree/Disagree/Almost disagree/Neutral/Almost agree/Agree/Strongly agree

40. How do you feel about the potential challenges if becoming an entrepreneur?
    - I am willing to take the risks, for example, loans.
    - I want to succeed.
    - Failing will make me try even more.
    - Failure makes me sad.
    - I have a lot of ideas but I feel the uncertainty of the future.
    - I have a lot of ideas and I want to implement them.
    - If I were to lose my job, I might consider entrepreneurship.

    Strongly disagree/Disagree/Almost disagree/Neutral/Almost agree/ Agree/Strongly agree

41. Because of Softala studies
    - I can do better when organizing work than before.
    - I am able to handle several things at the same time better than before.
    - My self-confidence is strengthened.
    - I now know better what I want.
    - My desire to be a respected worker and the leader of my own job has strengthened.
    - I am more willing to take the risks now than before.
    - I can tolerate more disappointments than before.
    - My attitude towards entrepreneurship is more positive than before.
    - The social status is now less important to me than before.
    - I want more security now than before.

    Strongly disagree/Disagree/Almost disagree/Neutral/Almost agree/ Agree/Strongly agree

Sales work and selling

42. Does either of your parents work in sales? Yes, mother and / or father?
43. Do you have friends working in sales? Yes/No
44. If you answered yes, what kind of sales work have your parents and/or friends done?
45. Have you worked in sales? Yes/No
46. If you answered yes, what kind of sales work have you done?

47. Can you consider yourself working in the sales positions in software industry? Yes/No
48. Explain your answer to the previous question, please.
49. Can you see yourself as a member of a technical sales team? Yes/No
50. Explain your answer to the previous question, please.
51. How do you see the nature and appreciation of sales work in software industry?

    - The company's best salesmen are getting the biggest salary in the company.
    - When working in sales, you are able to schedule your time more freely.
    - Sales work, it takes a long time to succeed in it.
    - Sales work is teamwork.
    - Selling is a process that can be improved by developing the sales process.
    - Sales work is a profession like any other profession.
    - Selling is distressing when the sales person offers needless solutions to the unwilling customer.
    - In sales work, there are hard objectives and that's why the success of sales work is often evaluated only according to financial results.
    - Salesmanship is mentally and physically exhausting and the days are long.

    Strongly disagree/Disagree/Almost disagree/Neutral/Almost agree/Agree/Strongly agree

52. How do you see/experience sales job requirements?
    - Success in sales is about attitude.
    - Success in sales is about interaction skills.
    - Sales work requires talented professional attitude.
    - In sales work, closing the deal may take several months.
    - Selling refers to solving the customer's problems by offering products.
    - You can learn the needed skills in sales work.

    Strongly disagree/Disagree/Almost disagree/Neutral/Almost agree/Agree/Strongly agree

53. Because of Softala studies

- I understand now better sales and the importance of customer relationship management for the company.
- I see sales work now more positively than before.
- The salary is more important to me now than before.
- The variety and diversity of work is more important than before.
- I consider sales work for me now more likely then before.
- I understand now better the challenge in sales work.
- I understand now better the activities of sales teams and the role of experts in them.
- I appreciate the sales work and sellers now more than before.
- You can learn the sales skills; I also learned a lot as part of my studies.

Strongly disagree/Disagree/Almost disagree/Neutral/Almost agree/Agree/Strongly agree

Appendix III

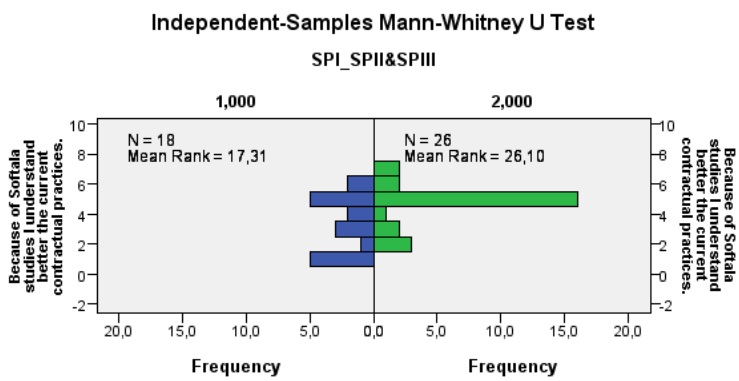
Mann –Whitney U tests reports

In the following chapters, the test summaries of hypothesis and distribution graphs are presented for all the tests with statistical significance. In SPSS runs, the null hypothesis was that there were no differences between the groups, so in every case presented below, the decision to make is to reject the null hypothesis, which means that there were differences between groups. The distribution graphs show in more detail how these groups differ from each other.

Chapter 6.4

Hypothesis Test Summary

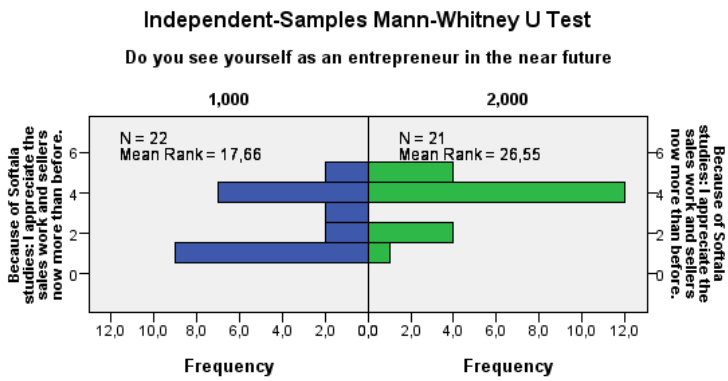
	Null Hypothesis	Test	Sig	Decision
1	The distribution of Because of Softala studies: I understand better the current contractual practices; is the same across categories of SPI_SPIIANDIII.	Independent-Samples Mann-Whitney U Test	,018	Reject the null hypothesis.

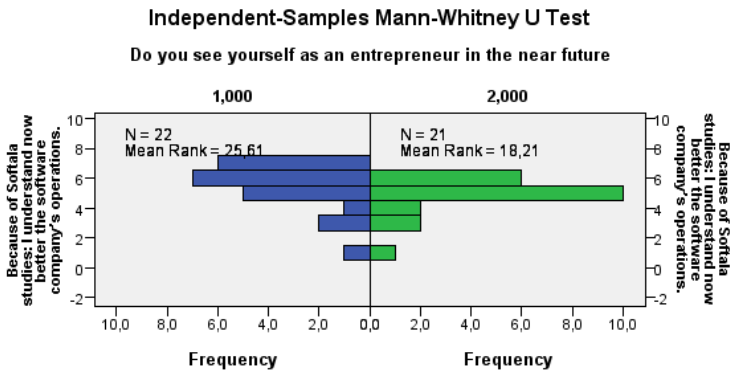


Chapter 6.4.1

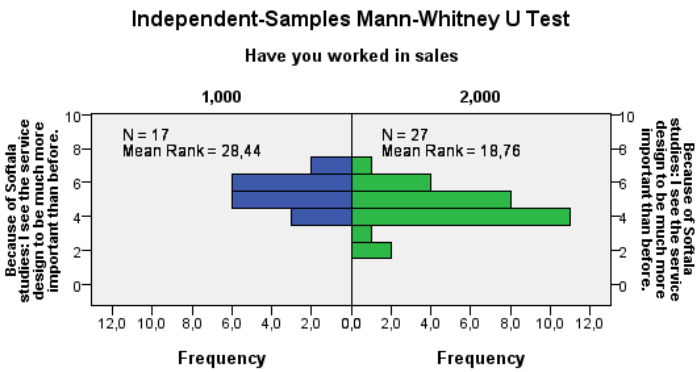
Hypothesis Test Summary

	Null Hypothesis	Test	Sig	Decision
4	The distribution of Because of Softala studies: I understand now better the software company's operations; is the same across categories of Do you see yourself as an entrepreneur in the near future?	Independent-Samples Mann-Whitney U Test	,045	Reject the null hypothesis.
24	The distribution of Because of Softala studies: I appreciate the sales work and sellers now more than before; is the same across categories of Do you see yourself as an entrepreneur in the near future?	Independent-Samples Mann-Whitney U Test	,014	Reject the null hypothesis.





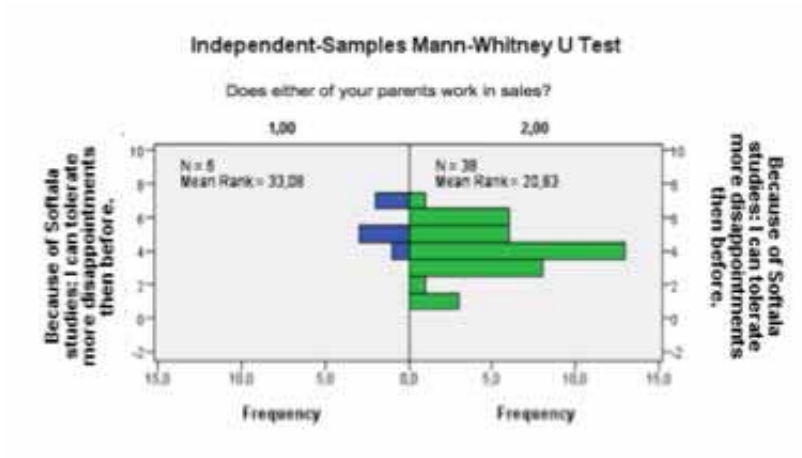
Hypothesis Test Summary				
	Null Hypothesis	Test	Sig	Decision
5	The distribution of Because of Softala studies: I see the service design to be much more important than before; is the same across categories of Have you worked in sales?	Independent-Samples Mann-Whitney U Test	,011	Reject the null hypothesis.

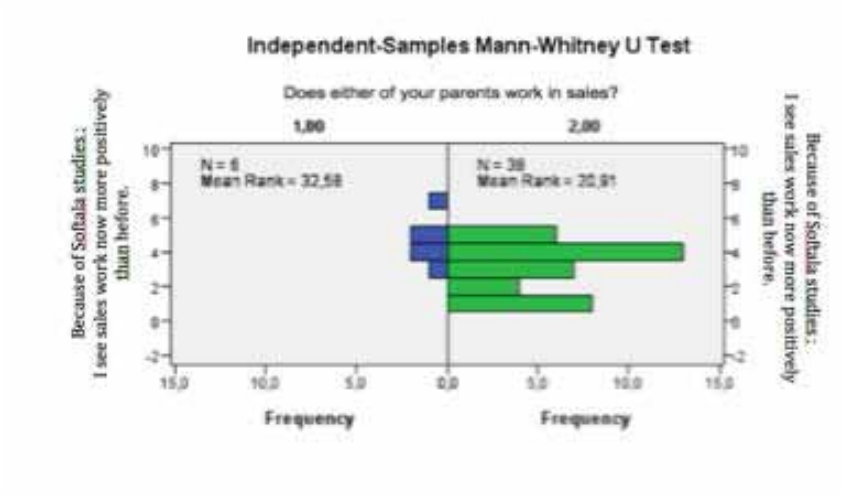


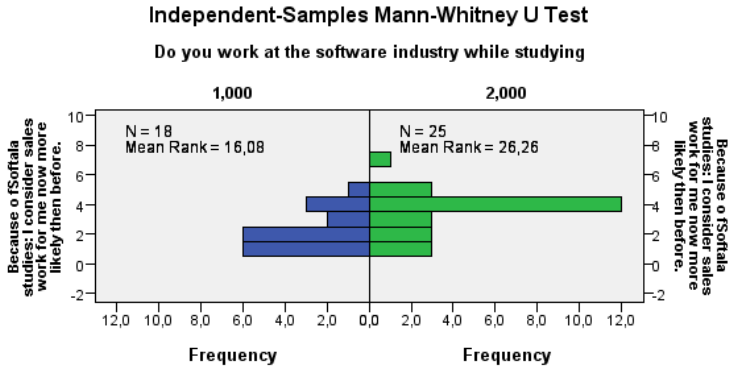
Chapter 6.4.2

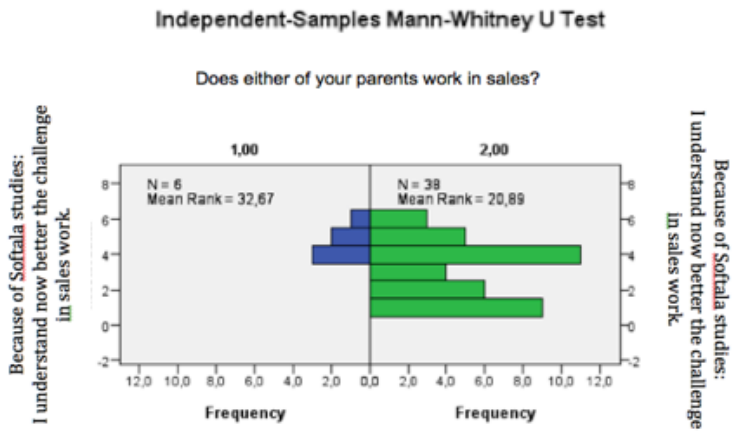
Hypothesis Test Summary				
	Null Hypothesis	Test	Sig.	Decision
13	The distribution of Because of Softala studies: I can tolerate more disappointments than before; is the same across categories of Does either of your parents work in sales?	Independent-Samples Mann-Whitney U Test	0,027	Reject the null hypothesis.
18	The distribution of Because of Softala studies: I see sales work now more positively than before; is the same across categories of Does either of your parents work in sales?	Independent-Samples Mann-Whitney U Test	0,036	Reject the null hypothesis.
	The distribution of	Independent-		Reject the

21	Because of Softala studies: I consider sales work for me now more likely then before. is the same across categories of Does either of your parents work in sales?	Samples Mann-Whitney U Test	0,005	null hypothesis.
22	The distribution of Because of Softala studies: I understand now better the challenge in sales work. is the same across categories of Does either of your parents work in sales?	Independent-Samples Mann-Whitney U Test	0,036	Reject the null hypothesis.
				.





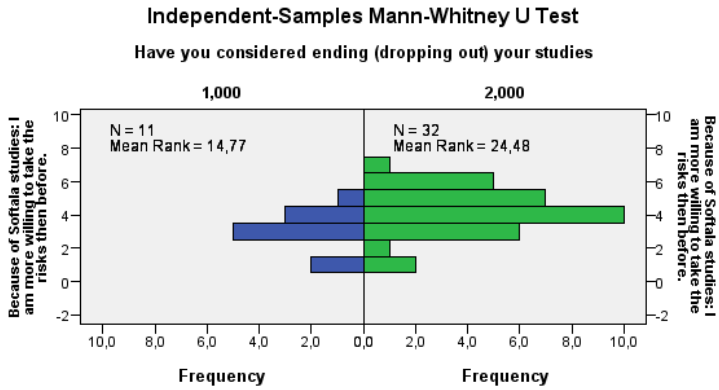


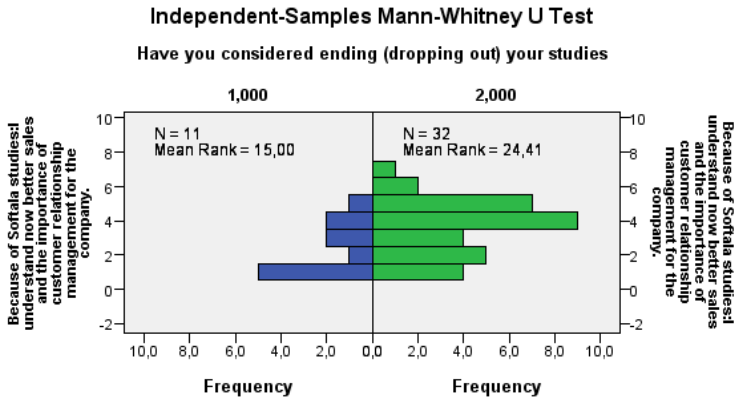


Chapter 6.4.3

Hypothesis Test Summary

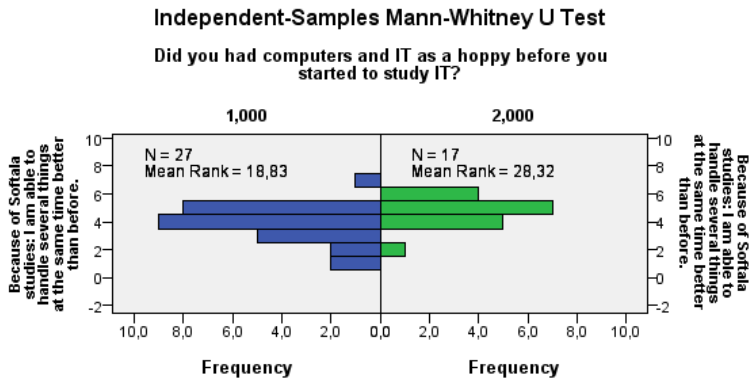
Null Hypothesis	Test	Sig.	Decision
The distribution of Because of Softala studies: I am more willing to take the risks now than before; is the same across categories of Have you considered ending (dropping out) your studies?	Independent-Samples Mann-Whitney U Test	0,025	Reject the null hypothesis.
The distribution of Because of Softala studies: I understand now better sales and the importance of customer relationship management for the company; is the same across categories of Have you considered ending (dropping out) your studies?	Independent-Samples Mann-Whitney U Test	0,032	Reject the null hypothesis.

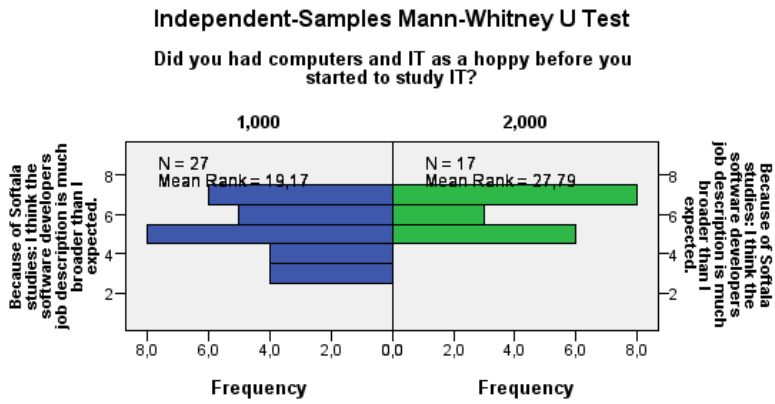


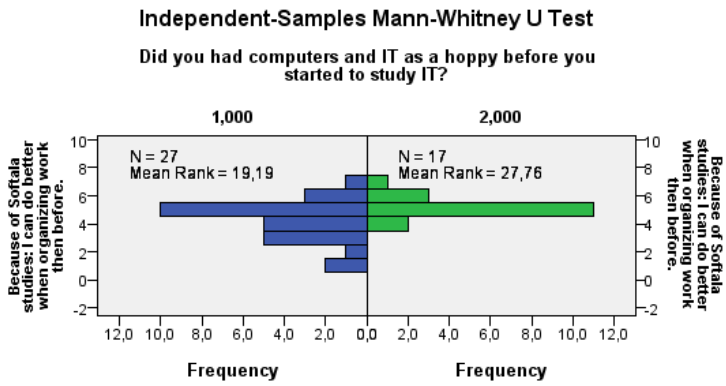


Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
6	The distribution of Because of Softala studies: I think the software developer's job description is much broader than I expected; is the same across categories of Did you have computers and IT as a hobby before you started to study IT?	Independent-Samples Mann-Whitney U Test	,024	Reject the null hypothesis.
7	The distribution of Because of Softala studies: I can do better when organizing work than before; is the same across categories of Did you have computers and IT as a hobby before you started to study IT?	Independent-Samples Mann-Whitney U Test	,022	Reject the null hypothesis.
8	The distribution of Because of Softala studies: I am able to handle several things at the same time better than before; is the same across categories of Did you have computers and IT as a hobby before you started to study IT?	Independent-Samples Mann-Whitney U Test	,013	Reject the null hypothesis.

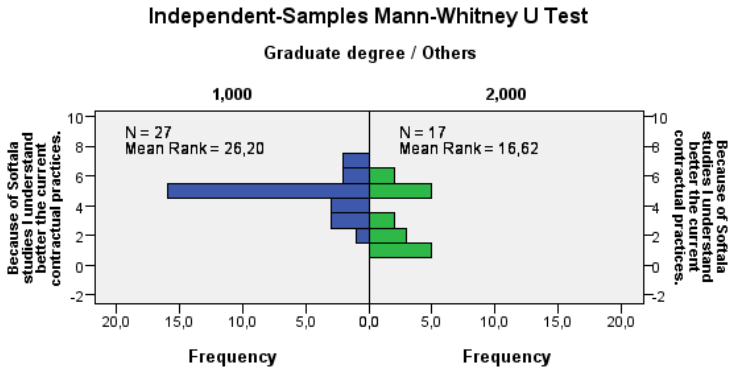

Independent-Samples Mann-Whitney U Test
Did you had computers and IT as a hoppy before you started to study IT?
1,000
2,000
N = 27
Mean Rank = 18,83
N = 17
Mean Rank = 28,32
Because of Softala studies: I am able to handle several things at the same time better than before.
Because of Softala studies: I am able to handle several things at the same time better than before.
Frequency
Frequency

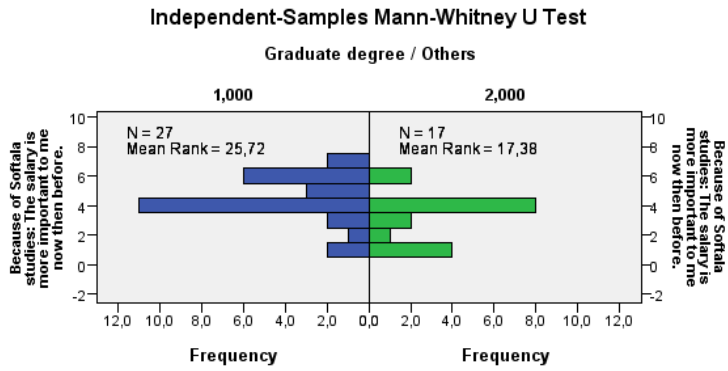

Independent-Samples Mann-Whitney U Test
Did you had computers and IT as a hoppy before you started to study IT?
1,000
2,000
N = 27
Mean Rank = 19,17
N = 17
Mean Rank = 27,79
Because of Softala studies: I think the software developers job description is much broader than I expected.
Because of Softala studies: I think the software developers job description is much broader than I expected.
Frequency
Frequency

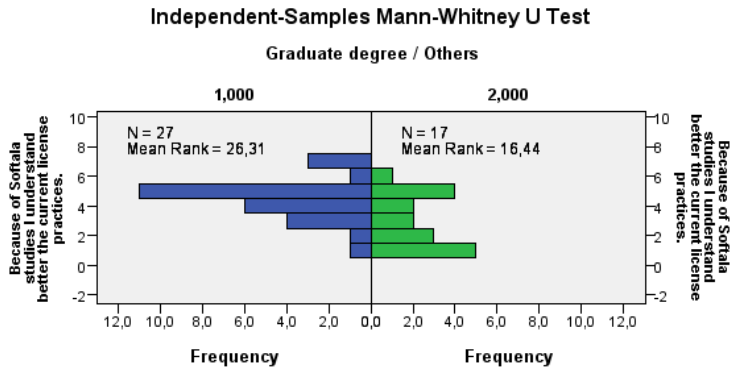

Independent-Samples Mann-Whitney U Test
Did you had computers and IT as a hoppy before you started to study IT?
1,000
2,000
N = 27
Mean Rank = 19,19
N = 17
Mean Rank = 27,76
Because of Softala studies: I can do better when organizing work then before.
Because of Softala studies: I can do better when organizing work then before.
Frequency
Frequency

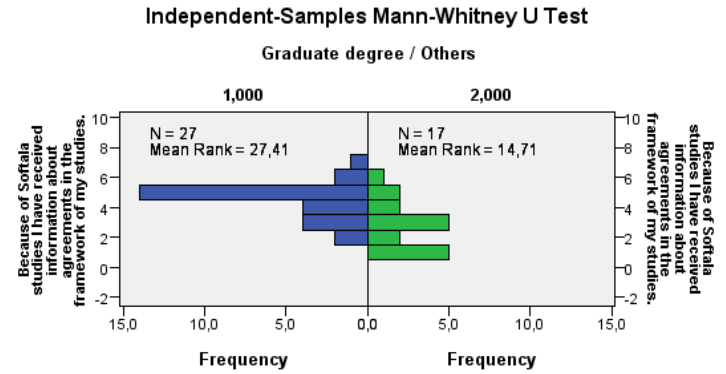
Chapter 6.4.4

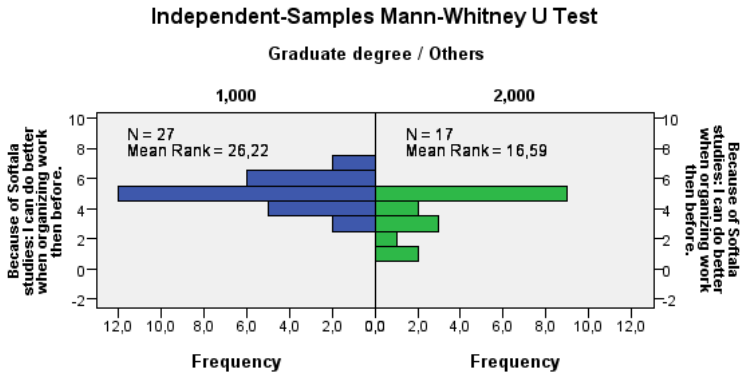
Hypothesis Test Summary				
	Null Hypothesis	**Test**	**Sig.**	**Decision**
13	The distribution of Because of Softala studies: I understand better the current contractual practices; is the same across categories of Graduate degree /Others.	Independent-Samples Mann-Whitney U Test	0,010	Reject the null hypothesis.
18	The distribution of Because of Softala studies: I understand better the licence practices; is the same across categories of Graduate degree /Others.	Independent-Samples Mann-Whitney U Test	0,011	Reject the null hypothesis.
21	The distribution of Because of Softala studies: The salary is more important to me now then before; is the same across categories of Graduate degree /Others.	Independent-Samples Mann-Whitney U Test	0,028	Reject the null hypothesis.
22	The distribution of Because of Softala studies: I have received information about agreements in the framework of my studies; is the same across categories of Graduate degree /Others.	Independent-Samples Mann-Whitney U Test	0,001	Reject the null hypothesis.
25	The distribution of Because of Softala studies: I can do better in organizing work then before; is the same across categories of Graduate degree /Others.	Independent-Samples Mann-Whitney U Test	0,010	Reject the null hypothesis.


Independent-Samples Mann-Whitney U Test
Graduate degree / Others
1,000
2,000
N = 27
Mean Rank = 26,20
N = 17
Mean Rank = 16,62
Because of Softala studies I understand better the current contractual practices.
Frequency
Frequency


Independent-Samples Mann-Whitney U Test
Graduate degree / Others
1,000
2,000
N = 27
Mean Rank = 25,72
N = 17
Mean Rank = 17,38
Because of Softala studies: The salary is more important to me now then before.
Frequency
Frequency

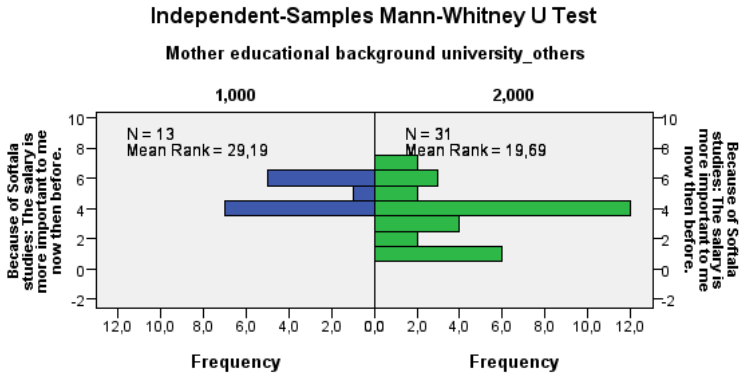

Independent-Samples Mann-Whitney U Test
Graduate degree / Others
1,000
2,000
N = 27
Mean Rank = 26,31
N = 17
Mean Rank = 16,44
Because of Softala studies I understand better the current license practices.
Frequency
Frequency

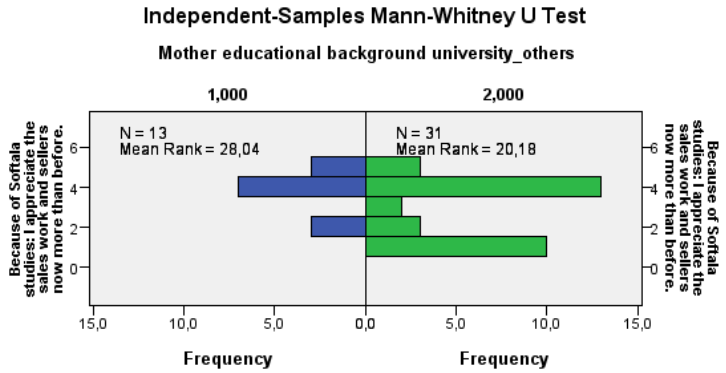

Independent-Samples Mann-Whitney U Test
Graduate degree / Others
1,000
2,000
N = 27
Mean Rank = 27,41
N = 17
Mean Rank = 14,71
Because of Softala studies I have received information about agreements in the framework of my studies.
Frequency
Frequency

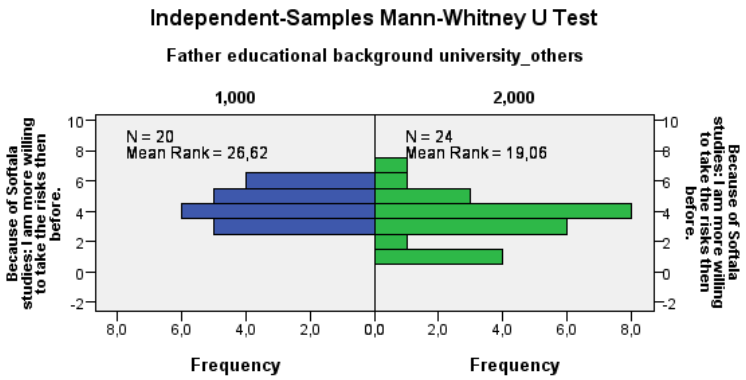


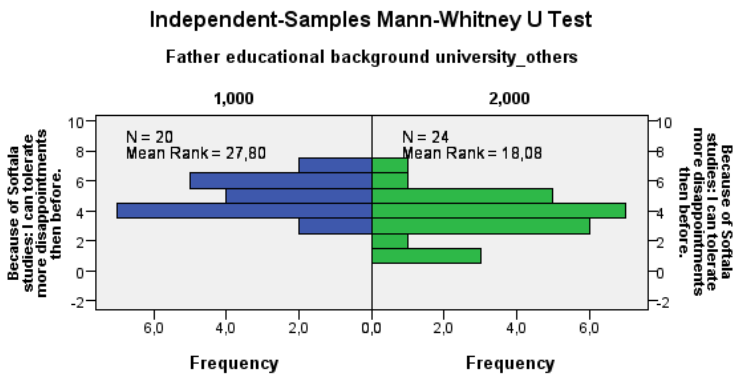
Hypothesis Test Summary				
	Null Hypothesis	Test	Sig.	Decision
19	The distribution of Because of Softala studies: The salary is more important to me now than before; is the same across categories of university_others_mother.	Independent-Samples Mann-Whitney U Test	,019	Reject the null hypothesis.
24	The distribution of Because of Softala studies: I appreciate the sales work and sellers now more than before; is the same across categories of university_others_mother.	Independent-Samples Mann-Whitney U Test	,050	Reject the null hypothesis.

Hypothesis Test Summary				
	Null Hypothesis	Test	Sig	Decision
12	The distribution of Because of Softala studies: I am more willing to take the risks now than before; is the same across categories of university_others_father	Independent-Samples Mann-Whitney U Test	,045	Reject the null hypothesis.
13	The distribution of Because of Softala studies: I can tolerate more disappointments than before; is the same across categories of university_others_father	Independent-Samples Mann-Whitney U Test	,010	Reject the null hypothesis.


Independent-Samples Mann-Whitney U Test
Mother educational background university_others
1,000
2,000
N = 13
Mean Rank = 29,19
N = 31
Mean Rank = 19,69
Because of Softala studies: The salary is more important to me now then before.
Because of Softala studies: The salary is more important to me now then before.
Frequency
Frequency


Independent-Samples Mann-Whitney U Test
Mother educational background university_others
1,000
2,000
N = 13
Mean Rank = 28,04
N = 31
Mean Rank = 20,18
Because of Softala studies: I appreciate the sales work and sellers now more than before.
Because of Softala studies: I appreciate the sales work and sellers now more than before.
Frequency
Frequency


Independent-Samples Mann-Whitney U Test
Father educational background university_others
1,000
2,000
N = 20
Mean Rank = 26,62
N = 24
Mean Rank = 19,06
Because of Softala studies: I am more willing to take the risks then before.
Because of Softala studies: I am more willing to take the risks then before.
Frequency
Frequency


Independent-Samples Mann-Whitney U Test
Father educational background university_others
1,000
2,000
N = 20
Mean Rank = 27,80
N = 24
Mean Rank = 18,08
Because of Softala studies: I can tolerate more disappointments then before.
Because of Softala studies: I can tolerate more disappointments then before.
Frequency
Frequency

SOFTALA –
a framework for coaching the students of software development to acquire sales and service skills required in small software companies

HAAGA-HELIA
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