Comparison of Two Team Learning and Team Entrepreneurship Models at a Finnish University of Applied Sciences

Setting the Scene for Future Development

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Abstract—This team learning and team entrepreneurship model of education has been deployed at the Bachelor's level in the degree programmes of IT and Business Administration (BA). In BA studies the students who take part in team learning have specialized in marketing since 2009 at the Saimaa University of Applied Sciences (SUAS). The model called ICT entrepreneurship study path (ICT-ESP) has been developed for IT education. The ICT-ESP has been built on the theory of experiental learning and theories of knowledge creation and knowledge management. The students study and complete their degree as team entrepreneurs. The model has been further developed in the Business Administration Degree Programme with students who specialize in marketing. The Degree Programme in IT at the Bachelor's level was terminated in 2011 by Finnish Ministry of Education and Culture. Currently, there are severe discussions on bringing it back – not as an IT but as an ICT Degree Programme.

This article makes a cross-section of what has already been explored with the team learning and team entrepreneurship model and what the next steps will be. It makes a comparison of two originally separately developed models and discusses their best practices. The article also argues whether the upcoming ICT education should be organized in a conventional way – as curriculum of courses, or as expansion of the current team learning and team entrepreneurship model. The data consists of field notes, meeting memos, and dozens of unofficial discussions with colleagues and company representatives. Literature studies made during the ongoing research, development, and innovation (RDI) projects offered an extra view of how the business context is changing and what should be done to make benefit out of the change.

The results suggest that the upcoming ICT Degree Programme at SUAS should be integrated into the existing deployment of team learning and team entrepreneurship learning environment. This would foster collaboration between different disciplines, e.g. marketing and ICT. Furthermore, the emerging ideation, service design and experimentation ecosystem which we are developing in ongoing RDI projects, would be strengthened by adding more students focused on ICT competencies into it.

The article was later extended to include interview data from 12 theme-based specialist interviews where the thoughts of original article were tested

among administration of our campus, RDI funder, experienced and former team entrepreneurs, and local entrepreneurs.

The results validated the author's previous suggestions of how future ICT education should be organized and also provided some new targets for development. The essential findings were: The future ICT education should be deployed in a way that it a) develops students' entrepreneurial mindset b) offers versatile cooperation possibilities with existing marketing team entrepreneurs and other enterprises, and c) the current ecosystem should be internationalized.

Keywords—team learning and team entrepreneurship model, ICT Bachelor's Degree Programme, Business Administration Degree Programme, comparison, action research, Experimental Development Ecosystem (EDE)

1 Introduction

We have been utilizing team learning and team entrepreneurship at the Bachelor's level education in IT and Business Administration Degree Programmes since 2009 at the SUAS. The team learning and team entrepreneurship are based on experiental learning, action learning and the methods of knowledge creation. The pedagogics needed in the universities of future and entrepreneurship education have been studied and utilized [1] in the deployment of the solutions. Innovation management has also been studied [2, 3, 4, 5] to organize the learning environment for the deployed model.

The IT Degree Programme was terminated by ministry of Culture and Education in autumn 2011. Therefore since spring 2015 team learning and team entrepreneurship is deployed only with Business Administration students specializing in marketing. Now, few years later ICT Degree Programme will be re-established. A funding decision for a pilot project where organization of ICT education will be piloted has been already done (12/2016) and the pilot will start in few months.

This article reflects on how the earlier team learning and team entrepreneurship models were deployed, compares their differences, and presents the current deployment of the model. It also argues that undergraduate studies in ICT should be deployed as part of the current team entrepreneurship model combining ICT and marketing skills. These skills would gain support and also benefit the ideation, service design, and experimentation ecosystem we are building with local towns, companies and researchers in ongoing RDI projects. The digitalization is rapidly transforming all the economies worldwide and also the demands for the Bachelor's level education are in continuous change. Therefore, the team entrepreneurship model's deployment with its flexible way of steering individual studies towards students' own interest and current needs for education has lot of strengths and it should be utilized.

The motivation of this article has been to sit back and reflect how the transition has taken place from the viewpoint of an experienced team coach and researcher. Writing the article also forced the author to analyze and reflect the data collected from the field recently. The team entrepreneurship model has recently been an increasing matter of interest at our own campus and also in other universities. When higher education is a target of heavy restructuring, the flexible models of deploying education in

undergraduate level efficiently and impressively are a matter of interest. This has been another reason for reporting to a wider audience where we are going with the model.

Parallel to the extension of this study another study concerning the whole experimental development ecosystem (EDE) has been conducted. The team learning and team entrepreneurship model (TLTE) described here is a crucial part of the EDE. However, this article focuses only into the TLTE and discusses how it should be a) utilizes in future ICT education b) further expanded.

The article is organized as follows. The next chapter will show what kind of research methods were used in the study. Chapter three will list some demands presented for the future of undergraduate studies in Finland. Fourth chapter will shortly describe the two team entrepreneurship models, their differences, and summarize the current deployment of them. In chapter five a current team entrepreneurship model is being presented. It also presents a framework for the ideation, service design, and experimentation ecosystem and the role of the undergraduate studies as part of it. The fifth chapter also presents the new interview data collected during the autumn 2016 to test the original findings and conclusions made based on those. Chapter six discusses of what has been learned and summarizes the topic article.

2 Research Methods Used in Developing the Team Entrepreneurship Model

Methodologically, the article is a case-study. It compares best practices with two different deployments of the team entrepreneurship model, deployment of ICT-ESP, and deployment with students specializing in marketing. The author has been studying the ICT-ESP and made a PhD of it. However, a comparison between the two parallel deployments has not been made yet. Based on the comparison, the current deployment – what best practices are already in use – is described, and next steps for development – what have been recognized but is not in practice yet – are discussed. So, this case study is partly exploratory and partly descriptive [6, 7].

The research framework for all the development activities concerning the team learning and team entrepreneurship model has been action research [8, 9]. During the academic year 2015 – 2016 there have been three mini-cycles where designed development activities have been done to the team coaching process. The outcome of these development activities have been followed by participative observation. The team coaches are active agents for change when they act with team entrepreneurs. The basic assumption of the author is that every research is value-laden and biased. By choosing to use qualitative methods for inquiry, the author has at the same time committed themselves to continuous reflection of his or their own values and how they affect the research. At this study, the objective has been the development of the current model, and therefore there is an inbuilt bias in the observations and interventions made.

The data analyzed for this study will be formed as designed actions for the next academic year 2016 - 2017. The results of the study have been discussed with three

team coaches. Luckily, the team coaches share a common room at the campus. This has helped to guarantee inner validation of the observations made at the field.

The data for the article consists of qualitative interview material (over 40 interviews), notes on direct and participative observations (over 50 training and other team learning sessions), information stored in repositories of student administration and dozens of unofficial discussions with colleagues and administrative stuff. In addition, the author has been working as coaching entrepreneur for some years and lot of participant observations (23 two-day team learning sessions) on useful team learning methods have been made also in that context. So, most of the data for the article was already collected, but the data had to be revisited and analyzed from a different viewpoint for this article. Luckily, the development targets have been a matter of interest also during the earlier studies, so some of the observations already made were useful also for this study.

Three new theme-based specialist interviews were carried out to verify observations made based on the existing data. These interviews helped the author and the interviewees to recall the justifications behind the decisions found in the data and highlighted some of the development targets listed later in the article. These new interviews served also as investigator triangulation of the study [10].The data was analyzed with principles of grounded theory [11, 12]. The objective of the study was to be able to answer to the following research questions:

Q1: What differences there are in these two separately developed team learning and team entrepreneurship models?

Q2: How could the upcoming ICT studies be integrated to the existing ecosystem?

Q3: What kind of development targets should be set for the team entrepreneurship model?

The grounded theory analysis includes three main phases, open coding, axial coding, and selective coding [11] and the method requires the researcher theoretical sensitivity [13], in other words one cannot force the data, but instead the researcher has to let the data "speak". In the open coding phase interesting phenomena in the data are marked or highlighted. In the axial coding phase the interesting phenomena marked in the open coding phase are grouped and their relations (causal and other) are analyzed. In the selective coding phase a lot of data is abandoned, core of the results is taken and reports are written. As mentioned, the grounded theory analysis lets the data speak, and therefore no pre-existing theory is needed. In an ideal case the grounded theory analysis is purely inductive. In practice there always exist little or more pre-existing knowledge and bias related to the research subject. To be exact, a target to develop something is already a strong bias. Who defines development? The development for one stakeholder group may be stagnation for other group. When discussing values and biases, the best we can do as researchers is to be as open as possible about the motives we recognize in ourselves.

When considering the timeline of the study, open coding and axial coding phases mostly went on in parallel. The selective coding phase in this study started also quite early and parallel with the axial coding phase, because the topic was partly (development targets) familiar for the author.

By analyzing the data two seed categories emerged [14] during the open coding phase: 1) best practices in developing the team entrepreneurship model 2) targets for the future development of the team entrepreneurship model. Based on these seed categories the differences between the two team entrepreneurship models were also found. Combined with the analysis of the new field notes (including memos, emails, book essays, and observation data) between September 2015 and May 2016 made during trainings and meetings with other team coaches, a pattern of "where we are now" was updated.

3 Demands for Undergraduate Studies – Where Should we be Heading?

Industry requirements for engineering students call for a set of skills and competencies which can be built only by reorganizing the conventional learning environments. The skills needed are e.g. team working skills, communal learning skills, problem solving skills, leadership and self-leadership skills, as well as innovativeness, shared expertise, and ability to reflect one's own values and attitude [15, 16]. Furthermore, the ongoing rapid and structural change in the ICT sector [17, 18] causes that a new set of skills is needed for ICT education, such as ICT services (maintenance, life cycle services), Green IT, language and cultures, leadership skills, and entrepreneurship, especially start-up entrepreneurship [18].

Lifelong learning, quality and effectivity of education have been essential and will be essential also in future. New ICT –related skills are needed in e.g. aftersales, cloud services, and information security to name a few. Overall, the demand of ICT skills is increasing in every company belonging the Federation of Technology Industries. The ICT skills are needed especially in RDI, marketing, and sales [16].

To be able to discuss the possible benefits of collaboration with the team learning and team entrepreneurship model used with marketing student and ICT students, the skills needed in undergraduate business administration studies were also shortly reviewed and it seems obvious that professions in Business Administration in Finland are also in rapid change. In future, professionals will need competencies which are described as "T" model. T model means that a person needs a deep understanding of one area and ability and will to learn more in several other areas. A reference [19] from Finnish National Board for Education reports that different types of double competencies, e.g. excellent customer service & diverse ICT skills, will also be needed [19]. The reference [19] continues by suggesting to put focus on such teaching methods and learning environments which support versatile methods of learning. These arrangements are seen as coaching for constantly changing world. The business administration learning environments should also foster entrepreneurship by offering students possibilities to pilot their ideas e.g. via cooperatives [19].

In higher education most of the learning is still deployed with teacher-led circumstances. Structures, scheduling and assessment of courses are all based on the need of personnel. Deployments where students are coached and longer participation to projects in collaboration with local companies are still rare [20]. Based on this short re-

view to the future need for the undergraduate bachelor studies in ICT and Business Administration in Finland, the team learning and team entrepreneurship model described in this article meets the requirements presented for the bachelor education both in ICT and Business Administration.

The trend of the message seems to remain similar even when the scope is enlarged to the international level. Most of the OECD countries have been and still are shifting into higher technology-intensive manufacturing industries and into knowledge intensive market services. This shift is also observed within lower technology industries, as shown in the high rates of productivity growth and the increasing R&D intensity within these industries [21]. The OECD's horizontal "Innovation Strategy", in considering how people can be empowered to innovate, concluded with a set of "policy principles" about education and training systems, and innovative workplaces. The future education policy will equip people with skills for innovation: "Ensure that education and training systems are adaptable, and can accommodate the changing nature of innovation and the demands of the future. Curricula and pedagogies should develop the capacity to learn new skills and take full advantage of information and communications technologies." [22].

4 Two Team Entrepreneurship Models and their Comparison

To better meet the rapidly changing requirements of undergraduate bachelor's level education, part of IT and Business administration Degree Programmes were reorganized already in 2009 – 2010 at SUAS. Though the two deployments were originally established and developed by different team coaches, they share a common theoretical background, objective, and leading thoughts. Therefore the deployments became quite similar. The theoretical background of the deployments is based on [23] the experiental learning theory (Fig 1) and studies on knowledge management and knowledge creation [24, 25, 26].

In practical level, students (we call them team entrepreneurs) who decided to study marketing or IT as team entrepreneurs, established a cooperative during their first academic year within a course called Team learning. After establishing the cooperative they run its operations together as part of their undergraduate studies. Parallel with establishing a cooperative they will carry out their first customer project, and become familiar to trainings. From the beginning of the second academic year, team entrepreneurs' studies consist of trainings, reading books (theory), doing customer projects, and innovation assignments. These elements of learning are now briefly presented.

In the trainings the team entrepreneurs will start practicing both generative dialogue and reflective dialogue [27, 28] depending on topics in hand. The generative dialogue is useful in team building activities. It is also needed when creating new products or services for the team enterprise, generative dialogue will be supported with ideation and innovation methods. Reflective dialogue is used to share information about ongoing projects. Special book dialogues are also carried out to share ideas learned from the books the team entrepreneurs have read. Book dialogues are

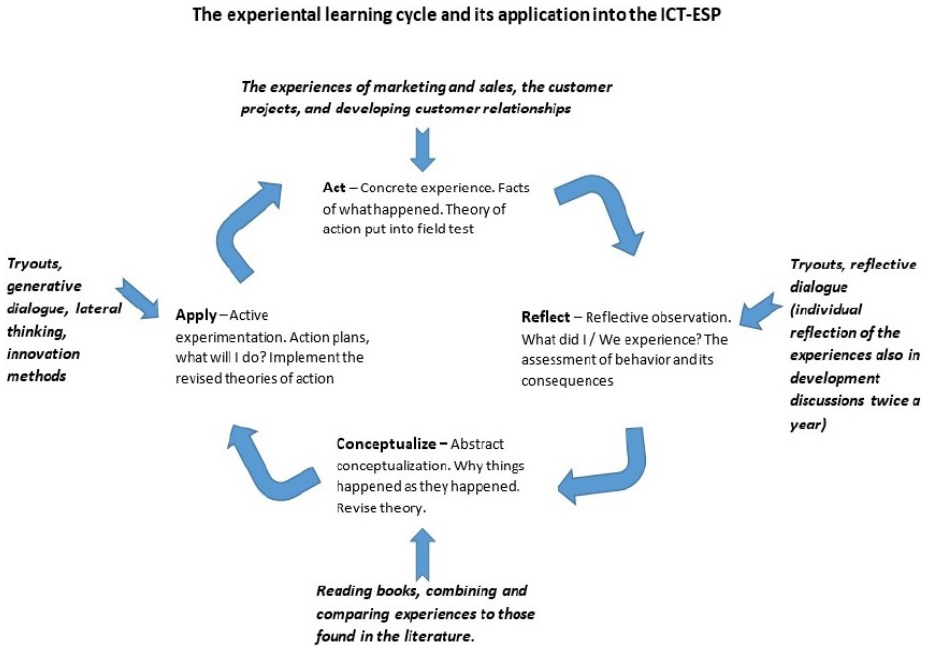

Fig. 1. The experiental learning cycle, adapted from [23].

also an easy route for the team coach to actively participate and share some ideas with the team. The trainings start officially from the beginning of the second academic year but currently those who decide to study marketing usually have trainings already during the spring semester of the first year. The team entrepreneurs are eager to start their business as soon as they have established the cooperative.

The team coach will help team members in team building activities [29, 30] such as understanding of group dynamics [31, 32, 33] finding appropriate team roles for team members [34], setting objectives, conflict resolution [35, 36] and reflection of the learned [37, 38].

Every team entrepreneur will study theory and collect book points by reading and returning an essays to team coach. The team coach will evaluate the essays and give feedback. Team entrepreneurs need to gather total of 102 points during their studies. Depending on content of the book, books may be one, two, or three book points. A normal business book is usually worth of two books points. Every team entrepreneur has to gather at least 75 book points. The rest of the points, 27 points, can be so-called seminar points, and they can be gathered either by enrolling to conventional courses or by participating to appropriate seminars. In the ICT-ESP the amount of books points was 72. Because the degree of bachelor in engineering was a four-year degree, the team entrepreneurs had more conventional courses, such as mathematics and physics, than the team entrepreneurs studying marketing.

Currently there are four different predefined book themes for studying theory. These themes are:

1. Management, leadership and entrepreneurship
2. Understanding customers and marketing environment
3. Innovation, productization, and branding
4. Creating profitable customer relationships

The book points will be placed to one of the four themes depending on the viewpoint of the essay written. The team entrepreneurs are able to specialize in different topics because every theme may include 15 – 60 book points. Furthermore, the theory built by reading books will be supported by projects. Quite often the team entrepreneurs also find a subject for their Bachelor's thesis based on the books and projects.

The innovation assignment is a method, where a customer gives a very challenging task to a team. Team has to bring solutions ideas, concepts or solutions depending on the nature of the innovation assignment. The innovation assignment lasts either 12 hours or 24 hours. Depending on the assignment, different methods boosting creativity and innovativeness are utilized. The customer organization giving the assignment pays for the results to the team enterprise in case the results are useful. The "wow +" level is means usually 1500€ (+vat) for the team. If the outcome is useless for the customer, the team pays 150€ (+vat) for the customer.

The projects are usually quite small at the beginning of the coaching process when the team entrepreneurs study their first semester. The team entrepreneurs practice basic skills of teamwork, managing project, dealing with customer, and building trust with each other. A typical project for IT team enterprise was renewing web pages for a small or middle-sized company (SME). Correspondingly, a typical first-year project for marketing team enterprise was a simple marketing plan or establishing a Facebook page for a SME. The scale of project increases for the second and third year, and biggest project that a team enterprise has done so far is a national student event with over 600 participants. The elements of team entrepreneurs' learning are summarized in table 1.

The biggest differences found between these two deployments were in type of projects, innovation assignments, and studying theory. The team entrepreneurs studying in ICT-ESP put lot of focus to internal development, whereas most of the projects carried out in marketing were connected to customer. On the other hand, in the marketing lot projects were started without any marketing or sales based on the network of personnel at the campus, whereas in the ICT-ESP all customer projects were either based on existing contacts of team members or created by team through sales. From the marketing and sales viewpoint, the ICT-ESP was the hard way for beginning of entrepreneur career and the marketing deployment was more like practicing entrepreneurship at school. However, both the deployments were lacking elements of real entrepreneurship such as fixed costs for the offices the team entrepreneurs are using.

Table 1. Comparison of learning methods utilized in THE ICT-ESP and marketing deployments of team learning and team entrepreneurship.

	ICT-ESP	Marketing
Scope of Degree Programme	4 years, 240 ECTS points	3.5 years, 210 ECTS points
Discipline	Technology, Bachelor of IT Degree Programme	Business and Culture, Bachelor of Business and Administration Degree Programme. Specialization in Marketing.
Time as team entrepreneur	3 years, some conventional courses were conducted during 2nd academic year.	2.5 years, all conventional courses are carried out during the 1st academic year (see Fig 1).
Studying theory by reading books	Reading books, participating in seminars, utilizing blogs, videos etc. 72 book points.	Reading books based on predefined themes, participating in seminars, utilizing blogs, videos etc. Enrolling in conventional courses is possible (3-4 courses). 75 books points + 27 seminar points
Projects	Internal projects (i.e. game development) and real customer projects were possible. Team members did marketing and sales to get new customer projects.	Mostly customer projects. In an ideal situation the team will learn, expand its networks and earn money. At least two out of three have to exist. Customers initiate many of the projects.
Trainings / retreats	Twice a week, four hours. Sometimes visitors offer special topics. One longer two-day retreat per year.	Twice a week, four hours. Team members organize training on their favorite topics. Sometimes visitors offer special topics.
Innovation assignments	Not organized, one of the teams made a service for this purpose and carried it out several times.	Organized by team coaching process, carried out twice per year (12 or 24 hours) as an interlude of teams' development and competencies.

5 The Current Deployment of the Team Entrepreneurship Model

This chapter presents the framework for the current deployment of the team entrepreneurship model. The structure of the Degree Programme and team coaches' role are described. Currently there are active team enterprises only in marketing so the ICT-ESP is not at the moment active. The comparison of the two deployments of the team entrepreneurship model revealed that most of the good practices from the ICT-ESP have been already taken into practice with team entrepreneurs studying marketing.

Currently, team coaches help the team in its group development process, conflict resolution, and support individuals' learning processes. The coaching process lasts for two and a half years, starting with issues such as team building and organizing projects, continuing with development of individual and group skills. Before the graduation every team member writes a Bachelor's thesis, and the customer organizations are usually found from the network team entrepreneurs have built during their studies.

The team coach participates in trainings which last for four hours and are carried out two times per week. In some special occasions the team coach may give independent assignments for the team entrepreneurs. In addition, the team coach partici-

pates in weekly meetings and carries out development discussions with team members 1 – 2 times per year. Though we have official development discussions, we see that ongoing daily-basis feedback is an important element for continuous development.

From the beginning of the second academic year until they graduate after 3.5 years, the team entrepreneurs' curriculum is completely different compared to conventional curricula in the Degree Programme in Business Administration. The overall structure of the current curriculum for team entrepreneurs in marketing is presented in Fig 2.

After comparing the two earlier deployments of the team entrepreneurship model and describing its current deployment, it is time to look forward. What should be done next? Where should we be heading? As a part of many changes in the field of undergraduate studies in Finland the amount ICT studies was diminished a few years ago. Now, there seems to be strong intention to increase the amount of it again. The ICT sector is by nature a rapidly developing discipline. The digitalization has hit every discipline and a huge transformation of businesses is going on. It will be no use to establish the future ICT studies deployment based on old-fashioned, conventional structures. It is not useful either to separate the ICT studies from Business Administration studies, instead it should be integrated into the existing team entrepreneurship model and let it foster the development of ideation, service design and experimentation ecosystem (Fig 3) we are already building together with local towns, companies, team entrepreneurs, and researchers. The current team entrepreneurship model guarantees enough flexibility and support to rapidly react and in some case act even proactively when industry needs are changing again. A suggestion of how the ICT studies in SUAS should be organized in future is presented as a high-level framework in Fig 3.

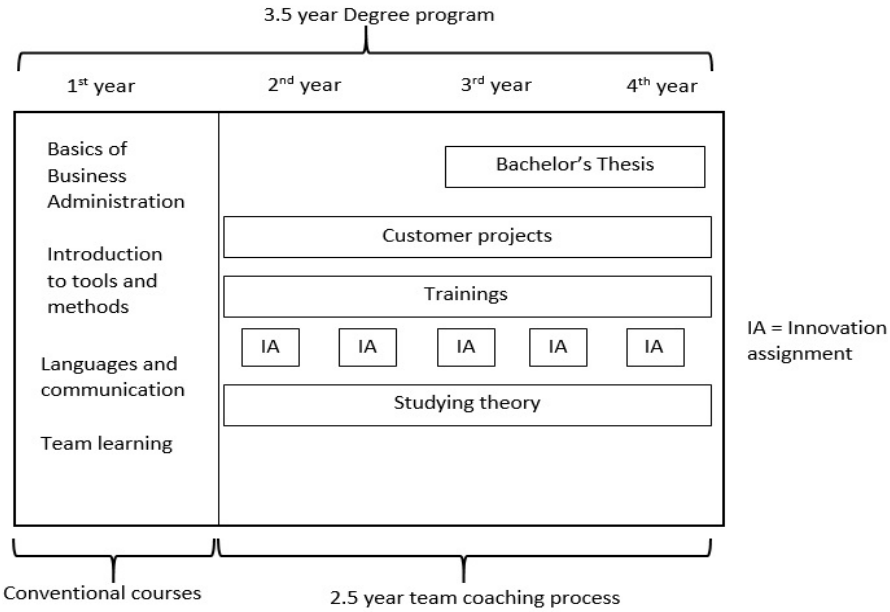

Fig. 2. Curriculum of students who decide to study marketing as team entrepreneurs

The current team entrepreneurship model has been continuously developed for several years already. The curriculum for the model has been adjusted to make close cooperation with local companies and other organizations possible. The research, development, and innovation (RDI) projects also support the current model by offering team entrepreneurs possibilities to work as research assistants and by that way benefit local companies.

In the supervision of experiences researchers the team entrepreneurs learn research methods and are able to help local organization with challenges their do not have skills or at least time to focus. These kind of collaboration modes sustain the ideation, service design, and experimentation ecosystem we have been building and also offer possibilities for further collaboration.

The ICT education deployment as part of the team entrepreneurship model would strengthen the model further. The development of ideation, service design and experimentation ecosystem we are building with local cities and companies would also be strengthened. The team entrepreneurs focusing on ICT tools and methods combined with the team entrepreneurs focusing on marketing with the ICT tools would be a strong combination. There would be ideation and implementation power present all the time. This combination would get strong pedagogical support from the team coaches and methodological support from the researchers. The ecosystem emphasizes agile development methods and citizen participation in ideation of new development projects. It would be a win-win situation for all stakeholder groups.

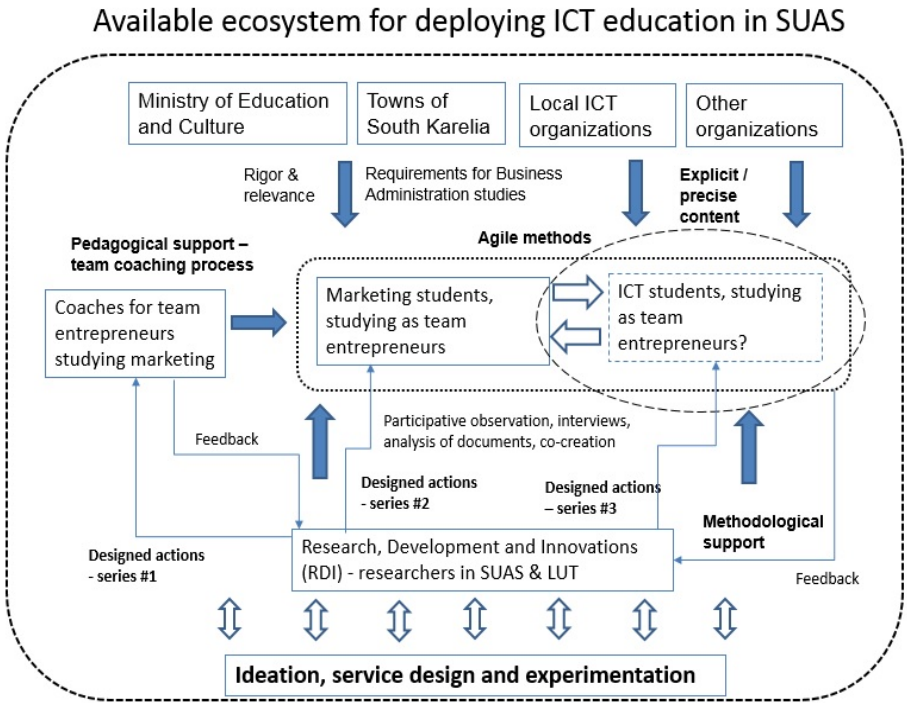

Fig. 3. The overall framework – a suggestion for organizing the ICT studies in SUAS.

5.1 Development targets for the current team entrepreneurship model

Most of the needed structures for ICT studies to be carried out with team entrepreneurship model already exist. Studying theory, customer projects, trainings and innovation assignments work well as they are. Naturally, there is always room for improvement. The development target found during the analysis of the collected data and during the development cycles of the current team entrepreneurship model are gathered and discussed in Table 2.

Between September and November 2016 when this article was extended some of the development targets listed in table 2 were already being changed in next mini-cycle of development of the team learning and team entrepreneurship model.

To give an example, theory studies that team entrepreneurs do by reading books was gamified [39, 40] from the beginning of September 2016. Since then, the whole team entrepreneur community has increased book reading and essay writing over 100 % compared to last spring semester. When the results of reading and writing essays were made public for whole team entrepreneur community it seems that almost everyone wants to achieve as much as others do. An overview of gamification solution is presented in figure 4.

Table 2. The development targets for the team entrepreneurship model.

Target of development	Possible solutions
Some of the team entrepreneurs start their theory studies slowly.	Utilization of gamification in studying theory, competition where the incentives are valuable for the team entrepreneur community. Participation to book dialogues is possible only when you have read a book before the trainings.
Some team entrepreneurs find reading books as a huge challenge	Appreciating other sources of information (e.g. blogs, useful Youtube videos) besides books as well Better utilization of massive open online courses Utilization of audio books Proving parallel ways to share what has been learned. Some rap songs and videos have already been done and approved.
Conventional courses do not motivate many team entrepreneurs	Better integration of courses with the team coaching process, new information is provided when needed.
Different levels of commitment to the team among the team entrepreneurs	Team development activities to get to know others' favorite working methods Discussion on what motivates, discussion about dreams Individual responsibilities based on the former discussion
Practices vary between team enterprises	Joint training for the whole team entrepreneurship community twice a year (in practice since 2/2016) More cooperation between teams
Slow progress in some projects	Agile methods (Scrum, Lean) in project management More training in rapid prototyping for team entrepreneurs, team coaches show example how to act Utilization of gamification, competitions New methods for information search such as "Spend one hour with Google and another hour to share the results."
Better organization of international student exchange	Development of international projects between students studying as team entrepreneurs in different European countries, such as Spain and Great Britain.

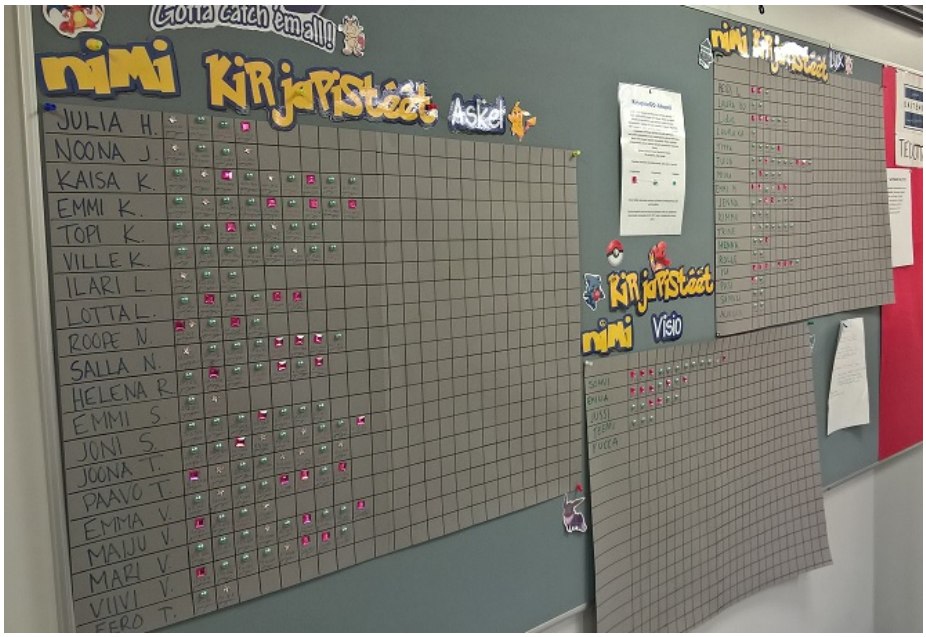

Fig. 4. The gamification of theory studies in team learning and team entrepreneurship model. This "KirjapisteGo" is very simple gamified solution. First, a team entrepreneur reads a book, writes an essays based on it and return the essay into Moodle platform we are using. Second, a team coach will read and evalueate the essay. Third, the team coach will put an appropriate sticker (1, 2 or 3 book points) to the wall, and write his signature and date.

To prepare for rapid changes in future, we should emphasize nonconformism, espouse disruption and the creation of the new ideas. This is more than thinking outside the box. This is acting toward that, and facilitating a culture that delivers on this [41]. Lot of businesses have already gone digital and in digital age we need new competencies, such as increasing clock rate of operations and getting rid of heavy structures to adapt to changes. This is also called as "Big shift", a fundamental reordering of the way we live, learn, socialize, play, and work that is now taking place, driven by a new technology infrastructure and public policy changes [42]. This transformation will create totally new business models for several areas. We are moving in to the collaborative (sharing) economy [43, 44]. These are some examples of the transformative changes we cannot tackle without major restructuring of the learning environments we create for undergraduate education.

In the digital age the complexity also increases. One discipline cannot solve the future challenges alone any more, instead we need to cooperate with different disciplines [45, 46]. In the current deployment the learning environment we already support flexible cooperation between different disciplines and several stakeholder groups. (Fig 2). What we have to create is a better ecosystem for participative collaboration between students, researchers, inventors, company representatives, local authorities,

and citizens. The huge transformation of business will change most of the companies. The ICT is one of the major catalysts in it [47]. Either companies transform by themselves and capture new markets or their business will be captured by those who have been able to transform their business.

6 Revisiting Field – New Data Collection

To test the earlier made suggestions and to extend understanding of the applicability of team learning and team entrepreneurship model a new interview round was conducted. A total of 13 persons were interviewed in 12 interviews. These theme-based specialist interviews lasted from 20 to 60 minutes and were partly done face to face and partly via telephone. The interview data was collected into word processing document and analyzed with grounded theory method [11].

The interviewees were asked to express their opinion what possible benefits and risks or drawbacks they saw in deploying ICT education as a part of the suggested ecosystem. They were also challenged to think what features the current ecosystem might lack or what could be the next steps in strengthening it.

The open coding phase of the analysis showed that the new data formed three new seed categories for further examination. These seed categories were:

1. Creating entrepreneurial mindset for students
2. Close cooperation with enterprises and with marketing team entrepreneurs
3. Internationalization of the ecosystem

Some quotations of how interviewees expressed their thoughts concerning the entrepreneurial mindset (seed category #1) are presented in Table 3.

Table 3. Quatations from the interviews (seed category #1)

#	Quotation
1	*"The ICT students will be part of someone's business – if not their own – and therefore sooner they learn how business operates the better it is.*
2	*"There has to be practical objectives in everything that is learned and done. "*
3	*"The students need coaching, and the coaches have to be broad-minded persons."*
4	*"Best learning experiences are connected to encouragement and moderate risk taking."*
5	*"It is useful to know what entrepreneurship is like. There will be several new ways to be an entrepreneur in future." "Entrepreneurial mindset should be a basis for all education."*
6	*"Students should be able to work in teams with people who have different background and skills."*
7	*"This is exactly what specialist organizations need. We want to recruit person who are able to self-leadership and are not waiting for instructions how to act in every turn."*

Some quotations of how interviewees expressed their thoughts concerning the close cooperation with enterprises and marketing team entrepreneurs (seed category #2) are presented in Table 4.

Table 4. Quatations from the interviews (seed category #2)

#	Quotation
1	*"This is exactly how education nowadays has to be organized. Cooperation with enterprises from the very beginning." "It seems that in this model the requirements are actualized well."*
2	*"It is wise to mix ICT students with marketing students. It is the best possible combination."*
3	*"Buying services from ICT students has to be possible to foster cooperation."*
4	*"ICT skills are needed everywhere and therefore mixed teams might work well. This could be supplemented with local enterprises as mentors for student teams."*
5	*"Team learning and team entrepreneurship should be expanded to other fields of study as well."*
6	*"This represents modern view of higher education. This is how working life is organized and it is exactly how learning should be organized too."*
7	*"Teams should attract and integrate skills from other fields of study as well."*

Some quotations of how interviewees expressed their thoughts concerning the internationalization of the ecosystem (seed category #3) are presented in Table 5.

Table 5. Quatations from the interviews (seed category #3)

#	Quotation
1	*"It seems that this ecosystems is already working well locally. But you need to expand this to elsewhere in Europe also. Being locally best is not enough anymore."*
2	*"It would be wise to scale this up to international level via current cooperation partners in education and in RDI projects."*
3	*"Some projects could be focused into digitalization of business. Finding international partners for the projects should be explored."*
4	*"You seem to be pioneers in this area. This ecosystem should be spread to elsewhere as well."*

The interviewees also expressed some worries and risks concerning the current ecosystems. Firstly, some of the interviewees asked how possible lack of motivation of students is being dealt. Second worry was that team coaches are in crucial role in the ecosystems and in case they decide to leave it might not be easy to replace them.

7 Summary and Discussion

By analyzing the collected data it was possible to answer all three research questions. 1) The differences of the two team entrepreneurship models were observed 2) the development targets for the team entrepreneurship model were updated 3) a suggestion how to deploy ICT education was made.

The differences between the two deployments were not crucial, and it seems that there has been unconscious and conscious benchmarking between the two models. Practices have been noticed from the parallel deployment, and after discussion put into practice. The analysis of the past data made for this article combined with the new interviews revealed however the targets for development in the future. A best possible momentum for making new designed changes to the team learning and team

entrepreneurship model is always the beginning of a new semester when a new team starts. Most of the development targets found and listed above will be on the development agenda for the next academic year.

Based on the experiences gained with the development of the team learning and team entrepreneurship model, the future needs for undergraduate studies found from other research, and the feedback gained from the organization we already cooperate with, the only reasonable way to deploy any new undergraduate studies in a rapidly changing world is to utilize flexible models of organizing. In the best case the models are already tested and performing. The team entrepreneurship model deployed in SUAS is a strong example of this type of a model and therefore it should be utilized also in the future ICT education. To be able to meet the rapidly changing demands for high level education we have to dissemble existing constructs and focus on models which enable more freedom for student-led learning. The transformation will continue and we have to adapt to it.

When marketing competencies would closely interact with ICT competencies, we believe that new transforming business ideas will follow. When this combination would be augmented with skillful team coaching, up-to-date pedagogics and leadership, together with methodological support from experienced researchers, we will have a practical startup incubator creating thick value and up-to-date competencies for all collaborating stakeholders.

The major changes described in the previous chapter mean that the Degree Programmes cannot go on like "business as usual" anymore. When the professions to which we educate youngsters may not yet even exist when they start their studies, we have to rearrange and diminish the structures to be able to rapidly adapt to changes. The conventional way of delivering information with little or no context to students has not been very useful for a long time anymore. By combining theory, practice and reflection within an ecosystem where the complexity of issues is all the time present, the students are better prepared for the world they will operate after graduating. Those who study as team entrepreneurs in our current team learning and team entrepreneurship model will actually work quite a lot in that world already before their graduation. We need more learning environments where all the main elements of the experiental learning process (conceptualize, apply, act, and reflect) are provided for the students in a balanced way.

The conclusions made got strong support among 13 new interviewees when they were asked opinions about how future ICT education should be organized during autumn 2016. A conventional way of deploying ICT education was even not mentioned during the interviews. It seems that we are moving to a phase of more detailed planning of deployment of future ICT education and utilizing the ecosystem that has already been created.

The next research topics concerning the EDE (experimental development ecosystem) are related to platform supporting cooperation and learning between several stakeholder groups and ways to internationalize the EDE. The exploring phase for these subjects has already been started.

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