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ASSESSING CO-CREATION OF VALUE USING SERVICE SCIENCE TO PROMOTE STUDENTS SHIFT FROM PASSIVE TO ACTIVE LEARNERS

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Abstract: In this paper our aim is to study the co-creation of value in E-learning in the context of Swedish higher education. In order to conceptualize the value realization in learning processes, we propose a framework based on service dominant logic and service science as well as on the revised Bloom's taxonomy. The service science approach contends that universities and teachers can only propose value of education and offer resources to its realization, but the real value of learning is always created collaboratively and interactively with learners and learner networks. The interactive participation within learning networks entails that it is not sufficient to only acquire factual knowledge from others but it is also necessary to create and exchange new knowledge. In terms of the revised Bloom's taxonomy this implies a shift from lower to higher order of thinking, towards more abstract forms of cognitive skills. We suggest that a successful interactive value realization in the learning process can facilitate the anticipated progress from passive to active learners.A pilot test has been conducted at the end of the spring semester 2015 on two distance based courses for bachelor students offered by the Department of Computer Science at Linnaeus University. The result from this preliminary survey aims to point out the direction for further research efforts.

Keywords: service dominant logic; service science; e-learning; Bloom's taxonomy; pedagogical goals

1. Introduction

In the modern world of continuous development, change appears to be the only constant in the field of information and communication technologies. The gradual evolution of higher education entails new technologies as well as innovative learning designs and practices, but even more important a reformed mindset of the participants. Hence education systems around the world face extraordinary challenges when institutions at all levels evolve to meet the educational needs of a global and digitalized society. In this context, e-learning has become an established concept of the 21st century, and what is more, the discipline of Service Science has taken a step into the education sector.

Bloom's taxonomy is a key instrument for communicating cognitive values in the educational sphere, and like the contextual field it covers, it has been subject to reformation during the last few decades. In this exploratory study, the merged concepts from the above fields will constitute a solid foundation, when looking for a pathway to overcome e-learning challenges experienced in our educational profession.

1.1 E-learning

E-learning is commonly referred to the intentional use of networked information and communications technology in teaching and learning (Naidu, 2006). Different terms are also used to define this mode of teaching and learning, such as online learning, virtual learning, distributed learning, blended learning, network and web-based learning. Basically, they all refer to educational processes that utilize information and communication technology to mediate asynchronous as well as synchronous learning and teaching activities.

1.2 Service Science

Service Science is a relatively new interdisciplinary approach to study, improve, create and innovate in service. Service as value co-creation is a useful change that results from communication, planning or other purposes and that comprises knowledge-intensive interactions between distinct entities such as individuals or firms (Spohrer & Maglio, 2010). The IBM Corporation Research team is actively

working with the worldwide research about Service Science activities which introduces new academic initiatives such as Service Science Management and Engineering (SSME) and sponsoring several conferences in this area to stimulate research and cross-disciplinary collaboration (Service Science, 2014).

The world has experienced a rapid transformation in the educational area, where quality related development of assessment methods is a crucial issue to handle. Effective assessment drives learning efficiency as the growth of e-learning technologies drives e-assessment. This growth reinforces the need to improve learning and is an important driver to define a strategy that can ensure that selected assessment methods respond positively to objectives and outcomes of our courses and programs. This allows a clear evaluation of competencies, skills and knowledge (TALOE project, 2014).

1.3 Background

Linnaeus University is a Swedish higher education institution, founded when the University of Kalmar (*Högskolan i Kalmar*) and Växjö University merged in 2010. Linnaeus University is located in Kalmar and Växjö with approximately 31,000 students in 150 degree programs and offering 2,500 single-subject courses, both on-campus and via distance learning.

E-learning has been implemented in the Department of Computer Science in Kalmar since 2000 but evolved in a greater scale when the “Web programmer program” (120 credits) started in 2002. The program was originally planned to be offered for both campus and distance students. Initially, the pre-conditions for a functional e-learning were not optimal. However, the teachers have systematically developed the distance learning concept and the technical platform so that this study program is now one of the most popular distance education programs at Linnaeus University.

During this time, the main consideration in implementing online courses was that the study requirements of online learners must be different from the ones expected in traditional campus courses. However, over the years the team of teachers, who are teaching the program, concluded that the requirements for a good learning environment are basically the same for both categories. Pedagogical efforts should

rather be based on individual learning styles and conditions independent of the campus/distance perspective.

Based on experiences and influences from courses in university pedagogy, a major reformation of the traditional teaching practice was suggested. Adjacent to a more flexible learning environment, a focus shift *from teaching to learning* was strongly needed, to provide a better support for the students' learning process. In view of this, a specific "Flexible Learning" project was initiated by the Center for Educational Development in Higher Education (*UPE*), that aimed to adapt a C++- programming course to the new pedagogical model (see project description in section 2, page 3).

Using the described course as a role model, other courses in C++ programming as well as many other subject areas in Computer Science and Informatics have been subject to similar development. This could be seen as a good example of a long-term perspective as was initially proposed by the main project visions. On the short terms basis, the first course development project was finished within a year and evaluated in spring 2006. Since then, the rapid "digital revolution" and new findings in the educational field have led to an ongoing development and our online courses have diverged in different ways. But our main pedagogical experiences and current challenges stem from the first (still running and evolving) "flexible learning" courses. We hence find it suitable to use these courses as a platform for our exploratory study.

1.4 Research objectives

Based on the teachers' analysis of the need for pedagogical improvements in the described "FL" course (see section 2, page 5) in 2005, notable efforts were made to improve the quality of course content and structure, as well as the digital learning environment. An additional vision of the pedagogues was that the efforts made should also challenge the students to reach higher complexity levels of learning, as seen in Bloom's (revised) taxonomy. However, no comprehensive evaluation of learning outcomes has been made so far regarding this specific issue. To assess goal achievement according to Bloom's learning criteria, the concerned educators experienced the need for better instruments and a generally greater pedagogical knowledge.

Aside from traditional pedagogical challenges, also an increasing flow of digital innovations and tools for educational purposes set new demands on the teacher's "digital literacy" when designing and evaluating E-learning. Ongoing pedagogical competency development initiatives at Linnaeus University, among others "Gula tråden" and "ONL" (Course in Open Networked Learning), have increased the readiness in teacher teams to take on the new challenges. An important goal for this study is to find a base for future research that may also contribute to this development work. This concerns primarily *the functional tools for follow-up assessments of the course quality*, and secondary recommendations for *design of appropriate learning goals and learning activities, tailored for the new "digital generation"*.

In the light of experiences gained, the current practice of assessment is not found to be a sufficient tool to evaluate if the e-learning services offered by the university are effectively used by the students - i.e. if the concept of "value-in-use" is actually realized. Based on the lecturers' view, several challenges are identified such as (1) lack of interaction with peers, (2) students aren't "noticed" if they don't participate, (3) many students are not self-directed enough to effectively use the given self-study material or they seem not to be aware of an adequate practice of online learning and (4) students do not use the interactive services offered (e.g. advising through Adobe connect sessions, forum discussions etc.). As illustrated in the following figure 1.0, the summarized goals for this exploratory study is subsequently to find an appropriate foundation and pathway to analyze and hopefully overcome the described challenges.

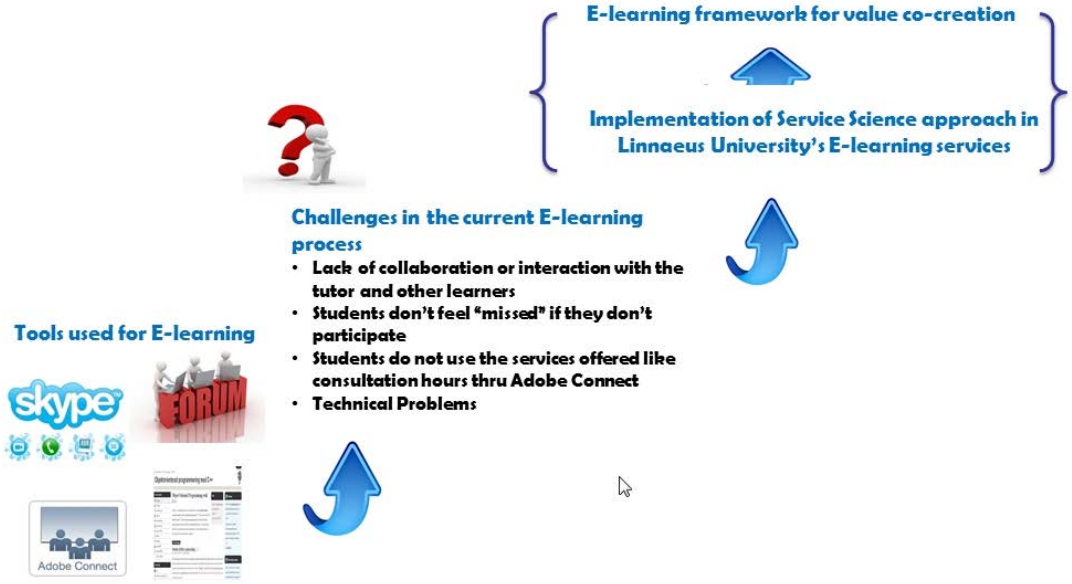

Figure 1. Objectives of this study seen as teachers/learners challenges to overcome in order to reach an effective implementation of the E-learning services

2. The flexible learning project at the Department of Computer Science

During the first years of distance lecturing, a strong collegiate interest concerning pedagogical developmental work grew, aiming to improve the quality of current online courses. These discussions pioneered a team of four (4) lecturers to join a competency development project on implementing Flexible Learning (*Flexibelt Lärande*), or shortened "FL". This was a pilot project initiated by the Center for Educational Development in Higher Education (*UPE*) in 2005 at *Högskolan i Kalmar*. The current subproject was part of a main FL project, consisting of separate development projects with FL as a beacon, one for each University department.

An important goal for the initial ***preparation phase*** was for each department to formulate the specific meaning of the Flexible Learning concept in the current context, i.e. for the student, for the teacher and partly for the institutional administrative staff. This description should thus form the guiding principle and vision for subsequent implementation work.

The ***course development*** phase of the project involved each department to decide a course or a program to be included in existing development activities, and where to consider the need of enhancement, alteration or improvement of course or program results. This work should be characterized by a long-term approach and not only activities of pedagogical nature were addressed. It could also include work methods, procedures or practices, for instance improved economy or improved work planning for both teachers and administrative staff.

2.1 Implementation

Structured Programming is a course for the foundation of C++ programming language, at the time offered to several engineering programs at *Högskolan i Kalmar*. This course was the choice for the teacher's team, to where the FL project in 2005 was applied. Since it is representative of several of our online courses, it is also the choice as basis for current study.

Aside from presenting all general information of the course, the resulting course website contained all study resources needed for the course except the textbook. In order to achieve the goals set in the FL project, it included lectures as downloadable presentation slides in different formats as well as extensive additional reading and practice materials at varying complexity levels – to meet varying student needs of pace, place and mode. Structured steps were used to show and clarify progression through the course. The six steps were concretized with well-defined phases, checkpoints and multiple levels of simplifying or deepening study material. The model is illustrated by Figure 2.0, where is defined the major content to master in respective course step.

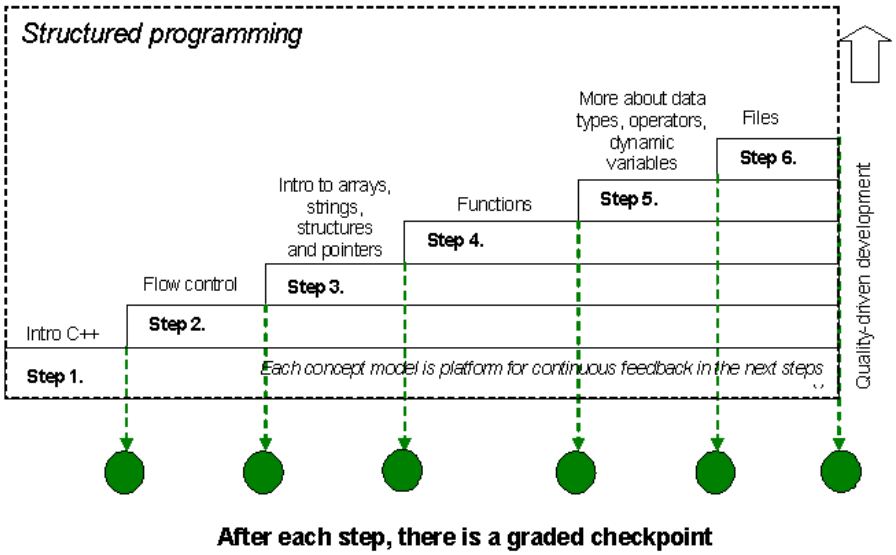

Figure 2. Conceptual stepwise model used in the Structured Programming Language course

Figure 2.0 is an embodied model of the FL course development project, which gives a conceptual example of the steps to the final goal of the Structured programming course. At the end of the course students are expected to master a number of fundamental areas of the C++ language. The figure also illustrates that each step has a checkpoint to examine, which may not be bypassed by the student, since each step is an important foundation for the next steps.

2.2 Evaluation

The final evaluation (spring 2006) of goal achievement was based on the parameters that were initially identified to control options of flexibility within the specified course. These included time, place, form (teaching/learning methods) and support resources (personnel, equipment, finance). In view of this, the following presented project goals were assessed with respect to different target groups – students, teachers, administration and organization. Refer to the table below that shows the project goal as defined for respective involved target group.

Entity	Goals
The student	• should within certain limits be able to complete the course at own pace. • should be able to choose when to take the course. • should be able to choose individual ways to acquire knowledge. • should be able to choose location for the studies. • should be able to choose study material of different complexity level.
The teacher	• should be accessible to a greater extent and through more "channels". • should provide more and alternative educational methods. • should have deeper knowledge about / support from production tools. • should have better teaching/pedagogical skills. • should have access to deeper expertise and support from colleagues.
Administrator	• Scheduling requires greater freedom. • Resource reservation requires greater freedom. • Reporting results requires greater freedom.
Institution	

Table 1. The project goals as defined for respective involved target group

Implementation of the flexible learning approach in described course, initially led to a perceived improvement of the course outcomes. Subsequent course evaluations indicated a higher degree of satisfaction with the new learning forms, a more active interaction with teachers and peers, as well as an increased participation in offered online sessions. Also, for the university were earnings seen in the form of higher throughput of students than in previous course rounds.

Until today, the course evaluations have been continually positive from the students perspective, though over the last 5 years, a steady decline in student interaction and presence on the course website have been noticed. Above all, utilization

of supervising sessions online has been greatly reduced. Another notable change is that students increasingly choose alternative (preferably web-based) resources and tools for the implementation of the course work, i.e. other than recommended and offered on the course web. Since the course results appear to remain unchanged this is not a drawback, but the new situation is experienced by the teachers as *"services offered" are misaligned* and *the resources consequently not beneficial for the students*.

Various data have been internally gathered for years, but there has not yet been made any efforts to specifically *assess the performance of the e-learning services* in general or especially from the service science aspect. Currently, the lecturers in the department has mainly relied on the general evaluation tool, mandated by the university management. Course evaluations are conducted in the Survey & Report tool, which is a multi-language system provided by the Pedagogical Centre of the University for Linnaeus staff, to enable the creation of course evaluations, research surveys and other surveys. The university-wide course evaluations, decided by the Rector, consists of four (4) mandatory and university-wide course evaluation questions for the students. Aside from optional questions added by the course responsible teacher, are also four (4) obligatory questions, imposed by the Faculty of technology. These predefined standard questions are seen in the attached Appendix 1. (Since the form is conducted for Swedish students, current questions are presented in Swedish.)

Due to the mismatch between students' and teachers' perceived satisfaction with the course implementation, it has been difficult to identify and understand the causal context, in order to make the right decisions for constructive improvements. Hence, for a future optimal utilization of resources for both students and university, the teachers make the assumption of a need for a learning environment and learning activities that are better adapted to how students of today relate to the digital world.

3. Theoretical framework

This study will focus on finding appropriate and reliable models for assessing the value co-creation process in e-learning services using the service science approach

and with respect to the commonly used Bloom's taxonomy for communicating educational learning values.

3.1 Service Science implementation in e-learning

Spohrer et al (2008) proposed that the Service System is a core abstraction to represent "*a configuration of people, technologies, and other resources that interact with other service systems to create mutual value*". In the current paper it is emphasized that not only product and goods manufacturing systems but all kinds of value exchanging social activities can be seen as service systems. This implies that educational systems are suitable as applications of Service Science theory. According to Vargo, Maglio & Akaka (2008), Service Science centers on the participants, processes, and resources that *interact to create value* in service systems, therefore it can be assumed that also pedagogical aspects may be treated as service such as learning process, student's assessment, course designs, quality assurance, etc.

Nowadays, a majority of the learners are more tech-savvy as they are online most of the time, and being online provides some form of value and enhance their relationship with the system. This change in attitude provides a research platform to look into the current E-learning system in which the concept "value-in-use" needs to be embedded into the system using the value co-creation method (Ismail, Yahyah, Mukhtar & Zahrawi, 2010).

Even if not much research articles have focused on the services aspect of e-learning, an arising interest has been seen after 2010 and among others, Lorna Uden (Staffordshire University, UK) has investigated how the concept may be applied to design innovative e-learning systems for higher education. In the article "Towards a New Model of Co-Creation of Value in E-Learning Service Systems" (2010) she presents her ideas on how a service-driven model of e-learning could enhance educational systems by providing knowledge co-creation opportunities tailored for the digital student generation of today. Hence her experiences and findings may be a good support for our research.

3.2 Co-creation of value in E-learning

The co-creation of value is "*the process by which products, services and experiences are developed jointly by companies and their stakeholder opening up a whole new world of value*" (Ramaswamy, 2009). In the new service view, according to Sandstrom, Edvardsson, Kristensson, and Magnusson (2008), value is realized *when a service is used*. Researchers agree that "*users of services are thus both the co-creators and the judges of service value*" (p. 112). This implies that the provider of the service – in current case the university and its actors on teacher's level - must be strongly aware about that the value for each individual is unique and dynamic for each occasion and offer of service.

Uden (2010) concludes: "*Since interactions can occur anywhere within the educational system, it is imperative that the system's infrastructure is centered on learners and supports their active involvement in all aspects of their learning experience.*" (p. 12).

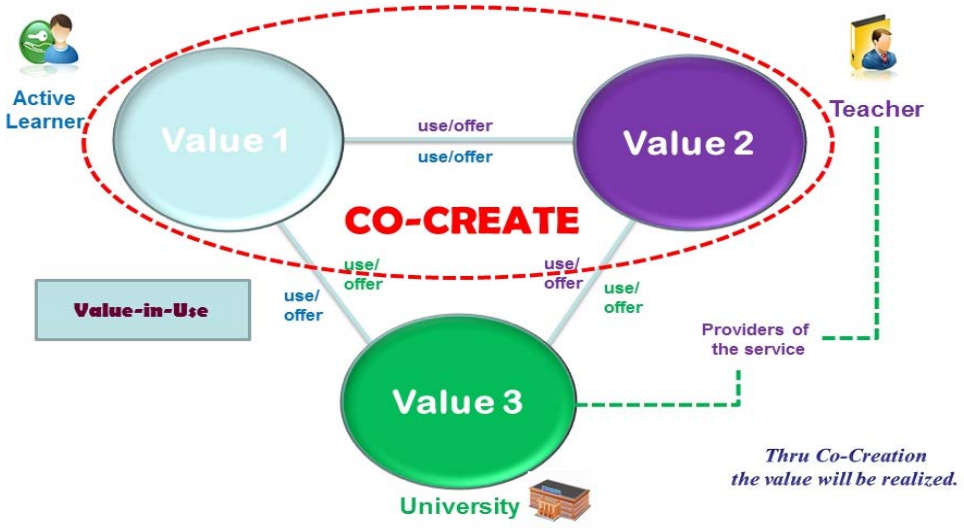

Figure 3. Service Science Theoretical Framework

Figure 3.0 shows that in the e-learning service science approach, the main roles are the learners, the teachers and the university, and each of the actors has services to offer. The university has services to offer to the teacher and the teacher to the

students. On the other hand, the "realization of value" of the services differs between the actors of learning process, i.e. the students' value perspective differs from the teachers' perspective. For instance, the teacher can offer a service of having tutorial session online using Adobe Connect. If and when the students use or avail the service we can say that the value is in use, therefore "**co-creation**" exists. Through co-creation, the value will be realized.

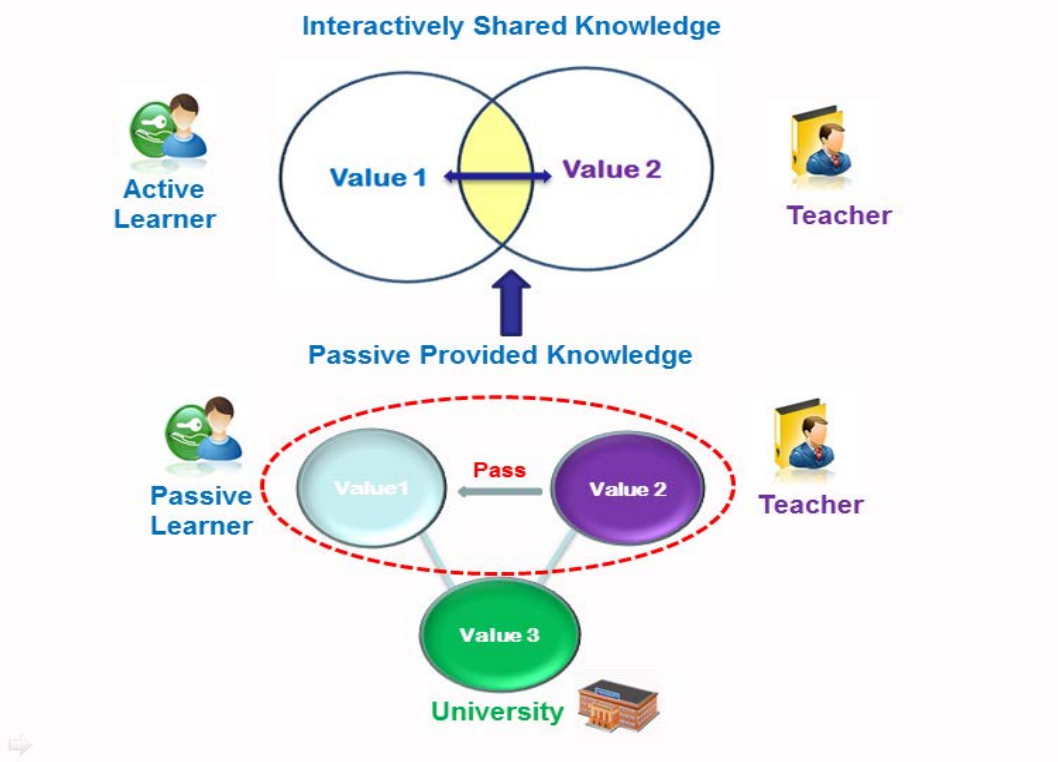

Figure 4. Value Realization in Learning Process

Figure 4.0 is an illustration of value realization in learning process that concentrates on the learner, through **value realization,** the ***passive learner*** will transform into an ***active learner***. The application of service science in e-learning process in Linnaeus University will help the learner to use the services offered and realize its value. Teacher and student can also share values from the services offered that enables them to **co-create**.

3.3 Bloom's taxonomy

The nature of human learning, is an active procedure of processing knowledge to reach a complex set of cognitive skills and abilities. Being able to critically analyze and evaluate information, not the least from today's rich content of web-based resources, and use it to create new ideas and innovations is a valued skill. It requires a higher order of thinking and most often a high level of interaction with the learning environment, sources of information, instructors and peers. This skill is hence a desirable learning outcome in all higher education. When considering this, we realize that an increased degree of co-creating in a learning context would imply also some not negligible pedagogical winnings. In educational sciences, Bloom's taxonomy is of significant importance as an instrument for communicating and assessing learning issues, and therefore it has a relevant place within the theory for the current context.

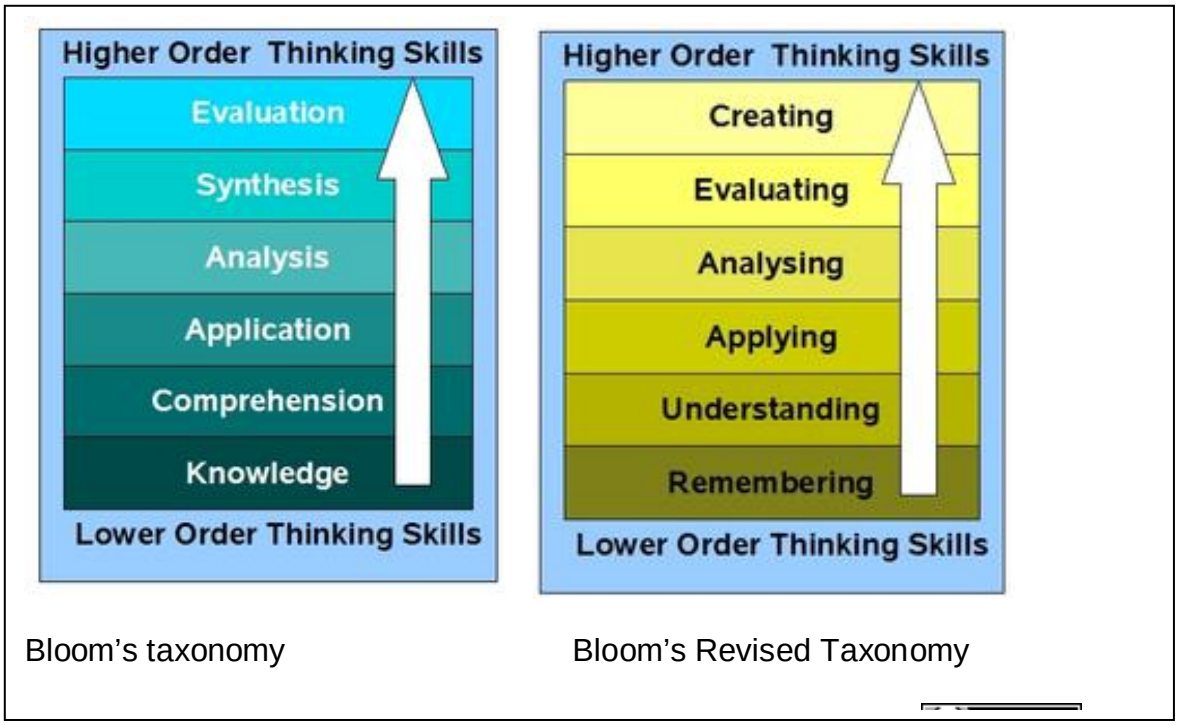

Figure 5. Original and Revised Bloom's taxonomy of the cognitive domain model

Figure 5 shows the Bloom's taxonomy of learning skills and abilities as in the original (1951) and the revised version of Anderson & Krathwohl (2001). This taxonomy of learning objectives is an attempt to classify forms and levels of learning (Atherton 2013).

In current generation of rapidly evolving digitization, also Bloom's taxonomy is subject to transformation to meet the new demands on communicative tools for digital literacies. An interesting initiative can be found in "Bloom's Digital Taxonomy", pedagogically presented under Creative Commons Attribution Share-Alike 2.5 License on the following Wiki-page: http://edorigami.wikispaces.com/Bloom%27s+Digital+Taxonomy. Churches' motivation for revising the existing model is *"to account for the new behaviors, actions and learning opportunities emerging as technology advances and becomes more ubiquitous. Bloom's Revised Taxonomy [2] accounts for many of the traditional classroom practices but does not account for the new technologies and the processes and actions associated with them …"* (Churches, 2009).

Over recent years the pervasive development of ICT has changed the way young people are learning as they apply technology to solve real world problems. Our students have become 21st century learners. But, have we become 21st century teachers? In 2007, to reflect these changes, Andrew Churches further developed and refined Bloom's Taxonomy to create Bloom's Digital Taxonomy. This taxonomy, which seems more aligned with 21st century learning, may be seen in the following summarizing diagram (Figure 6.0) from above mentioned Wiki-page.

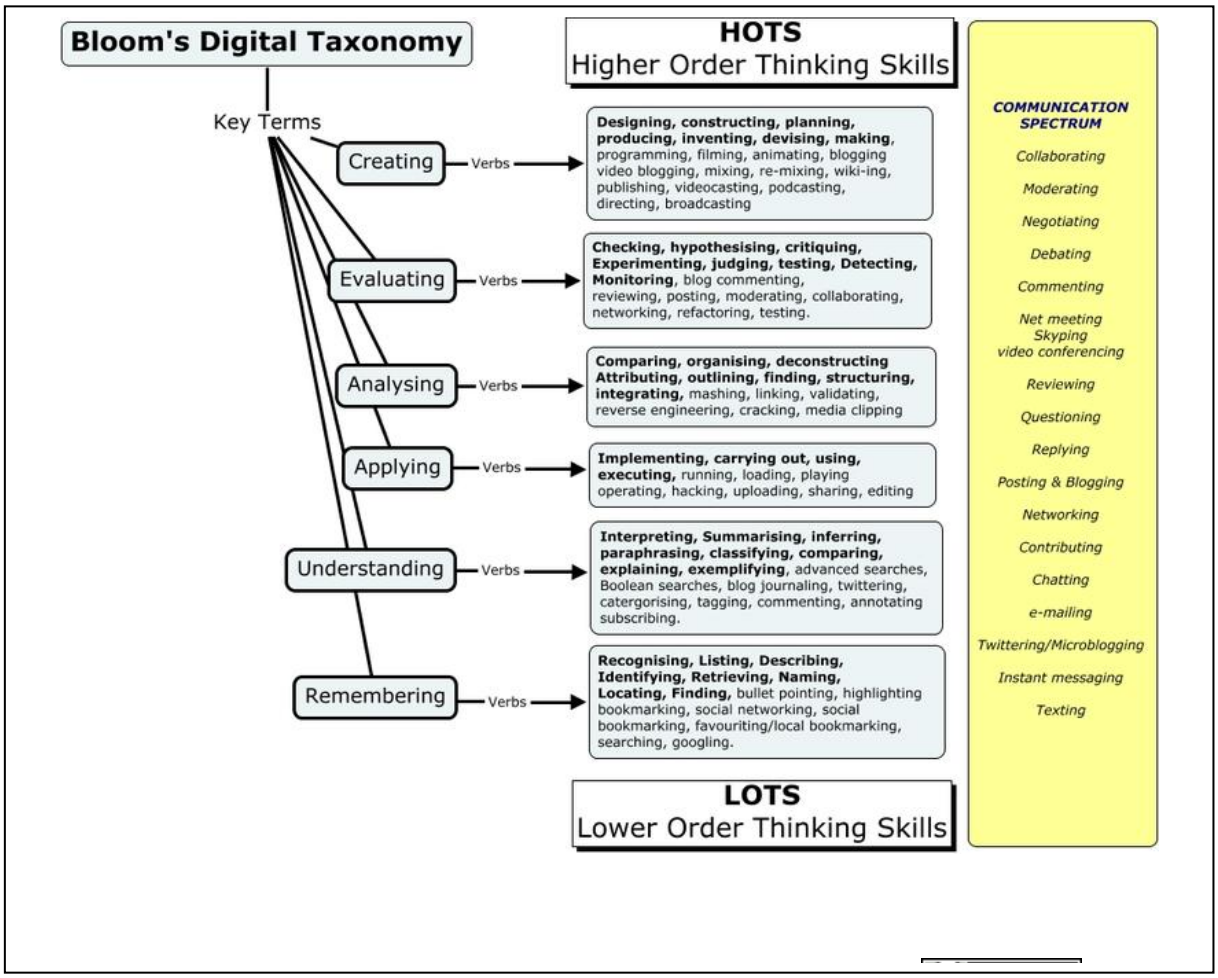

Figure 6. Bloom's Digital Taxonomy Concept Map. Adding a digital dimension into the taxonomy, provides us with a relevant vocabulary, developed to fit into the modern requirements of online learners and varying environment of the digital world.

The new communication spectrum in Bloom's Digital Taxonomy, as presented on the creators (Andrew Churches: http://edorigami.wikispaces.com/home) well-recognized and prizewinning Wiki-page, provide some added value to the learners and teachers to co-create in a more constructive way and even share value realization in the learning process. Actually, the digitized version of Bloom's taxonomy is itself "born" and has been continuously developed on such kinds of co-creative open platforms, which could illustrate the very core of the concept "value realization through co-creation".

4. Empirical pilot study

The authors first hypothesized that the current course evaluation routine, i.e. the Linnaeus University standard questionnaire, may not be a sufficient instrument for measuring the effectiveness and quality of the educational service offered in our online courses. Therefore, in the pilot study we selected two undergraduate courses from the Computer Science department, one in *1DV434 Object Oriented Programming with C++* and one in *Introduction to Java-programming*, these courses were offered the spring semester 2015.

Quantitative data was then gathered from regular course evaluation surveys with the following modification: The implementation of the Importance Performance Analysis (IPA) stipulated that in addition to the eight mandatory questions regulated in current course evaluation routine, a complementary ninth question was to be added. This additional question contained 27 statements correlated to previous survey questions and allowing the student to assess the importance of each preceding question. The scale used was a four-point Likert scale that included grades from "Very important" to "Not at all important". The current questionnaire can be seen in the attached Appendix 1 and the IPA method is described in section 4.1.

4.1 Importance Performance Analysis – Taguchi's signal-to-noise ratio approach

Importance Performance Analysis (IPA) was first introduced by Martilla and James (1977) as a method for investigating customer satisfaction regarding services, and after this the model has been modified several times (Lee, Yen & Tsai, 2008). The IP-analysis defines a service by using a number of quality attributes that can be analyzed separately. The customer satisfaction data is typically collected by using questionnaires that employ Likert-type scales for both performance and importance. The general model compares the perceived performance and importance of each quality attribute, but the actual visualization of the data can take different forms depending on which modification used.

The model that was proposed by Lee et.al (2008) combines the traditional IPA model with Taguchi's quality evaluation (1991) that includes an analysis of both the mean value and the variance concerning the performance of quality attributes. Consequently, customer satisfaction implies that the attribute performance must

have both high mean value and small variance. The outcome of this analysis can also be expressed as the signal-to-noise ratio (S/N ratio), where greater value indicates higher attribute performance. In the same way, the S/N ratio can also be determined for the perceived importance of each quality attribute and a greater value in this case implies that the attribute has greater importance for the customer.

In the context of higher education, the IPA model can be used by identifying the significant quality attributes (QA) for a course and conducting measurements in order to determine:

- Performance, how satisfied the course participants were concerning each QA
- Importance, how important each QA is for the participants

Finally, the modified IPA model (Lee, Yen & Tsai, 2008) defines a discrepancy (gap) between the perceived performance and importance and this can be illustrated by using four categories in an importance-performance map, as shown in Figure 7.0.

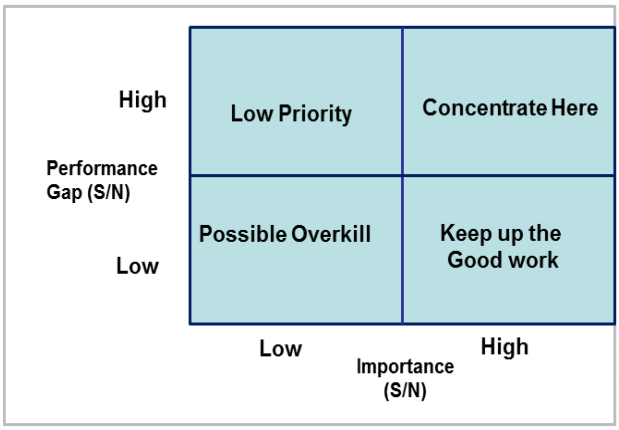

Figure 7. Modified IPA model illustrated as a map (Lee, Yen & Tsai, 2008)

The four quadrants of the Modified IPA model:

1. Concentrate here: *High importance, low performance*
2. Low priority: *Low importance, low performance*
3. Keep up the good work: *High importance, high performance*
4. Possible overkill: *Low importance, high performance*

The result from one of the selected courses (1DV434) is shown in Figure 8.0, and the first category *Concentrate here* is highlighted. What is more, the quality attributes that belong to this quadrant are indicated in the diagram.

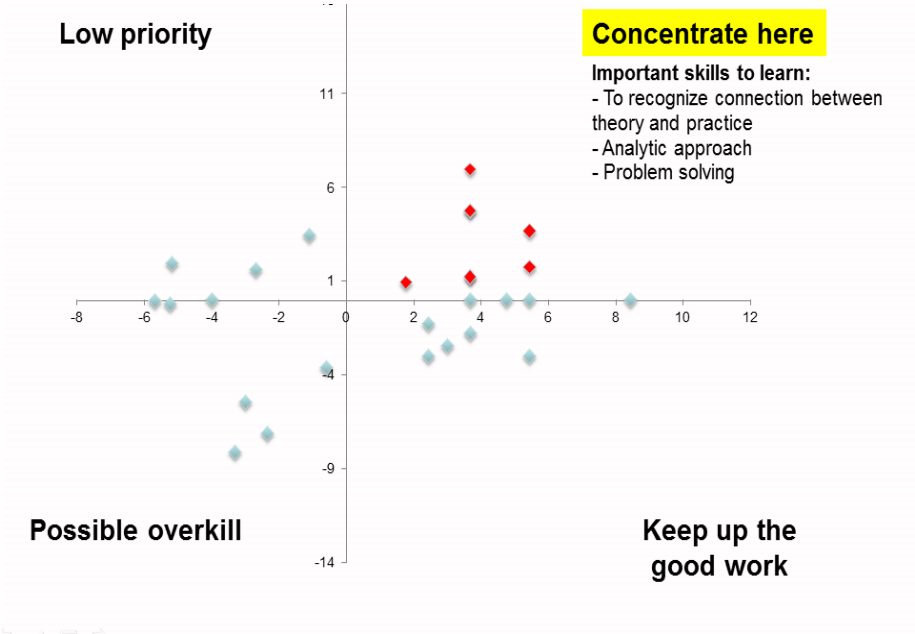

Figure 8.0 IPA Analysis for 1DV434 students emphasizing the CONCENTRATE HERE quadrant

4.2 Future study design - Mixed methods approach

After the IP-analysis, it was quite clear that students' perceived importance of quality attributes differs from teachers' perspective. The attributes that the authoring teachers consider to have great importance are for instance: students' active participation in the learning situation, possibility to interact with other students as well as possibility to enhance creativity and critical thinking skills. However, these particular attributes were classified by students as *Low priority* and *Possible overkill* attributes.

As the quantitative results quite confounded the authors, the decision was made that we should continue the data gathering in the pilot courses by using a mixed methods approach. This research design may provide a deeper understanding of

the e-learning experience. What is more, this approach may also help to elucidate the different perspectives that are anticipated in the value co-creation process.

Consequently, our aim is that in the future study use the explanatory sequential mixed methods design as the general approach for the course quality evaluation (Creswell, 2014). This design implies a twofold data collection procedure that starts with an IPA questionnaire (quantitative data) after which the results are analyzed and then followed up with a qualitative interview. The initial evaluation survey included the whole course whereas the interviewees can be purposefully selected among the course participants. The main aim of the design is to expand the interpretation and to gain deeper understanding into the quantitative results, especially as the students' answers are found to be puzzling and difficult to explain when we use the teacher's mindset as a yardstick.

5. Reflections and Conclusions

As stressed by the referenced researchers and other stakeholders who monitor the area, an explosive development of innovative computer-based educational systems and e-learning services has been noted since the early 2000s. These are often mobile and in the form of Open Educational Resources (OER). Hence, the rapid change of the educational landscape sets high demands on the upper education system to keep up pace with new developments and not to lose competitiveness in this arena in favor of external, worldwide actors. At the same time, not all educators seem ready for the new era of online-based learning models, which have evolved in parallel with our traditional teaching practices. For a lot of us professionals it's a fact that we don't know how to grasp or react to the phenomena, but most important we don't know how to act on it. Accordingly, we need to find appropriate instruments to understand and adapt our educational service system so that they can be applied for the new premises for learning and quality assessment.

Results from current quality assessment instrument (the basic questionnaire in the Survey & Report-tool regulated by the university management), which is used to assess our e-learning courses, most often gives "sufficient satisfaction grade". But it is difficult to interpret the gap between teachers' and students' view on satisfaction with the course implementation. That is, according to the teachers' informal experience, the result doesn't comply with desired quality outcome. Grossly sim-

plified, teachers perceive that students in general are satisfied with “passing the course” and/or ”get good feedback and grading from the teacher”. More specific, they stay passive during several learner activities (services) that would enhance their studies and learning outcomes with respect to the higher ordered criteria seen in Bloom’s taxonomy. This indicates that, in Service Science terms, the realization of value of the offered services differs from students’ to teachers’ perspective.

The IPA-analysis conducted in two courses during spring 2015 confirms the authors’ hunches with a not negligible discrepancy between teachers’ and students’ view, i.e. in “IPA-terms”, low learner activity is seen where (from a teacher’s perspective) we anticipate a high perceived importance and performance. Based on the result from our empirical pilot study, we may conclude that the standardized assessment model for course evaluations is currently too generalized to specifically address the e-learning aspect of the learning objectives. To provide the e-learning educators with adequate information for appropriate decisions on course development, a refined set of quality attributes is needed that may constitute our future yardstick.

Based on insights from the literature review as well as the experience from several years of distance education (e.g. described focus course for “FL” implementation), our study confirms that a more targeted study would be entitled on how to assess outcome/service value for stakeholders in our Service System. Although they do not give a proper confirmation on our beliefs, the results from the pilot study give a reasonable distinct indication that the methodology used may be a functional tool for the future research. With these findings in view, we also conclude that the Service Science approach fit well into the nature of the service and value offerings of higher education. Hence it may be an adequate choice as the theoretical foundation for quality enhancement in design and assessment of the e-learning activities that are in focus for our research.

Considering pedagogical aspects, the main goal of the educational actor should always be to promote the students' learning efforts to reach highest levels of cognitive understanding – as described in the conceptual model of Bloom's taxonomy. In order to obtain the drivers and obstacles for the scenario of “value realization”, our future research goals will be to tailor the existing evaluation model to address our specific needs. The potential future benefits for educators and students in

higher education is that our vision – to promote a student's shift from passive to active learner – will be realized in future implementations of our online courses.

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