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Making it Better: Value Perceptions of Usability Workshops in Education Outreach

Joni Matias Rajala
University of Oulu, joni.rajala@oulu.fi

Netta Iivari
University of Oulu, netta.iivari@oulu.fi

Marianne Kinnula
University of Oulu, marianne.kinnula@oulu.fi

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Completed Research Paper

Joni Rajala
University of Oulu
Pentti Kaiteran katu 1, 90570 Oulu
joni.rajala@oulu.fi

Netta Iivari
University of Oulu
Pentti Kaiteran katu 1, 90570 Oulu
netta.iivari@oulu.fi

Marianne Kinnula
University of Oulu
Pentti Kaiteran katu 1, 90570 Oulu
marianne.kinnula@oulu.fi

Abstract

IS Education outreach programs are important today, as the need for Information Technology (IT) professionals has risen in the last decades. Information Systems (IS) outreach efforts are often short lived and rely heavily on interested individuals to make them happen. This study looks at one case in Finland, where two universities collaborate with a company to create usability improvement workshops to upper secondary school students. By interviewing the stakeholders, this study aims to map the value for each stakeholder group, and their reasons for participating in the studied outreach project. Service dominant logic and value co-creation are used as the theoretical framework to categorize stakeholders' value expectations, perceptions, and propositions. The paper reports the value experienced by each stakeholder group, compares those to what others expect them to gain, and seeks to find ways to create outreach programs that benefit all participants.

Keywords: Education, outreach, collaboration, service dominant logic, higher education, upper secondary education, usability

Introduction

Degree programs in higher education are aiming at attracting large numbers of talented students, including degree programs in Information Technology (IT) (Rajala, Iivari, et al., 2021). They have a pressure to attract larger numbers of applications due to increasing student intake to tackle the shortage of workforce in IT (Eurostat, 2019; OECD, 2021). IT education is, however, experiencing difficulties in student recruitment: the field is perceived by young people as nerdy, boring, male dominated as well as technology, computer, and mathematics-oriented (Rajala et al., 2022; Vainionpää et al., 2019). This study addresses Information Systems (IS) education, which represents a business, organization, management, social, and human oriented side of IT (Vainionpää, Iivari, et al., 2020). Despite this orientation, IS degree programs are still experiencing similar kind of image problems as the more technical IT programs (Joshi & Schmidt, 2006; Rajala et al., 2022; Vainionpää et al., 2019). Student marketing and recruitment are thus on the agenda of IS education (Rajala et al., 2022; Vainionpää et al., 2019; Wilson & Avison, 2007).

In this study, we focus on educational outreach programs organized for the purpose of student recruitment and marketing, particularly the ones targeting students in upper secondary education. Even if many IS degree programs target bachelor students who are making decisions on their major (see e.g. Akbulut-Bailey, 2012; Downey, 2011), in some countries the major selection is expected to be made already when applying

to higher education, i.e. right after secondary education. Some studies on IT or IS education outreach programs have already addressed this age group (e.g. Becker & Thompson, 2009; Hoanca & Craig, 2019; Lakanen & Isomöttönen, 2013; Landry et al., 2019; Lawler et al., 2009; Vainionpää, Kinnula, et al., 2020). Our study builds on top of them, contributing by scrutinizing the participants' experience that so far has been poorly explored.

Various kinds of outreach programs can be identified in the literature on IS and IT education (Ahola et al., 2020; Downey et al., 2016; Hoanca & Craig, 2019; Knestis et al., 2022; Lakanen & Isomöttönen, 2013; Landry et al., 2019; Moller & Powell, 2019; Vainionpää, Kinnula, et al., 2020). Our focus is on collaboration between industry and higher education. Industry is a significant stakeholder for outreach programs, as the poor image of the field easily leads to lack of educated workforce (Rajala, Kinnula, et al., 2021). Some IS studies on educational outreach programs entailing company collaboration have appeared (Downey et al., 2016; Hoanca & Craig, 2019; Knestis et al., 2022), but the literature is limited so far. For the sustainability of such outreach programs, it would be important to understand the value each stakeholder group gains through the collaboration. Until now, there is very limited understanding especially from the viewpoint of student and company representatives (Rajala, Kinnula, et al., 2021). This study aims to fill in the gap.

The research questions addressed in this qualitative study are: 1) *What kinds of value different stakeholders expect to gain from educational outreach programs with collaboration between industry and higher education? 2) What kind of value different stakeholders perceive to have gained in said kind of outreach programs? 3) What kind of challenges are encountered?* We explore the topic through a case study (Walsham, 1995) of an outreach program where the emphasis is on the human oriented part of IS education - to tackle the image challenges of the field as well as to generally introduce variety within the field. The program entailed higher education and upper secondary education students collaborating in improving usability and user experience (UX) of a software that students in basic and upper secondary education in Finland commonly use. The outreach program was connected with Human Computer Interaction (HCI) oriented courses of the two participating universities. In addition to students and teachers from these educational institutions, the company developing the software was involved in the program. The courses introduced usability (e.g. Nielsen, 1993) and user experience (Sharp et al., 2019) literature as well as entailed practical work to improve usability and UX of a given system to the higher education students. The setup enabled integrating actual users of the system, i.e., the upper secondary education students, in its development. Hence, the setup invited the higher education students and upper secondary education students to engage in small scale participatory design of the system, in line with the spirit of Scandinavian participatory design tradition (e.g. Greenbaum & Kyng, 1991) and IS tradition on user participation more generally (e.g. Iivari & Iivari, 2011). We interviewed the stakeholders involved: upper secondary school students and teachers, higher education students and teachers, and company representatives. Value co-creation (Vargo & Lusch, 2008) was used as a sensitizing lens in our data analysis to study the value gained by different stakeholders. This lens has been shown as useful in making sense of educational collaboration and outreach programs in previous studies (e.g. Rajala, Iivari, et al., 2021).

The paper is structured as follows. The next section introduces the theoretical lens on value co-creation as well as reviews related research. Section three presents the research design involved in this study, including the procedures for data collection and analysis. Section four presents the empirical results while section five discusses the implications. Section six concludes the paper.

Theoretical Basis

Value co-creation

The current study is about multiple parties working together to create value for themselves and others, i.e., they participate in value co-creation. The study uses service dominant logic (SDL) as defined by Vargo and Lusch (2004), and their definition of value co-creation to make sense what kind of value different stakeholders in an education outreach program seem to gain in the process, to be able to understand how the programs could be further developed. Vargo and Lusch created SDL in 2004 after they noticed a change in marketing trends. Where previously marketing was focused on selling products as is, the newer marketing paradigm seemed to value products as tools that the end user could use in many different ways. This was in direct contrast to the trending marketing research at the time, that studied markets with stable value that was determined at the time of transaction. Instead, SDL supported another view, a value-in-use

view, according to which value can only be determined by the end user, when they use the product or service. The other stakeholders – or actors as SDL puts them – can only propose value to others. SDL views any commercial interaction as a service, where the manufacturer creates a service that the customer – or according to SDL, a beneficiary – can use as they see fit.

Central concepts we borrow from SDL are value co-creation, value proposition, and value perception. Value is hard to determine or define; even SDL is vague about it. Value is something that has worth and is helpful to the person who benefits from it. In SDL, the only possible way that value can exist, is if it has been co-created by the actors involved. The beneficiary of value always determines whether they perceive value or not (Vargo & Lusch, 2008), but if that actor needed the transaction to gain that value for themselves, then the other actors must have had part in the creation of that value. A person who buys bubble gum can use that bubble gum to destress, blow bubbles or make street art, but clearly that person needed someone to manufacture the bubble gum for them (as well as transport, store, and sell it). So, the manufacturer was part of the value creation, even if they did not have any direct connection to the end user and might have had different use cases in mind when developing the product (Vargo & Lusch, 2004). According to Vargo and Lusch, value is "co-created through the combined efforts of firms, employees, customers, stockholders, government agencies, and other entities related to any given exchange" (Vargo & Lusch, 2008).

To differentiate between the value different actors bring to the transaction, SDL proposes two kinds of views on value: value propositions and value perceptions. The beneficiary can perceive, i.e., determine the value that they gain using whatever metrics, views, and tools they find beneficial. The other stakeholders can only propose what value the beneficiary might gain based on their expected use cases and plans. But as they do not know what the beneficiary really values, their views on the usefulness might not reflect the values of the end user (Vargo & Lusch, 2016). Before the transaction, the beneficiary has an expectation of possible value. How this expectation manifests and how it affects the value, and the process has been described by Kinnula et al. (2018). Similarly, Vargo and Lusch also note that value co-creation happens in both directions, and all actors in the transaction are proposing value and expecting value from each other (Vargo & Lusch, 2016).

Value Co-creation in Education

While SDL has been designed as a multipurpose tool to describe any sort of economic activity (Vargo & Lusch, 2016), its basic idea is that all transactions are service transactions, i.e., the service is the dominant logic for marketing. Translating SDL to education context should be easy, as education is a service provided by teachers and institutions and benefitted by students. There have been some discussion on whether SDL is actually applicable to education context as is (Díaz-Méndez et al., 2019), but as a lens for mapping value in collaborative systems with multiple stakeholders in educational outreach endeavors, it should suffice.

When using SDL and value co-creation as lenses for education collaboration, there is an assumption that stakeholders do not participate without any reason. All stakeholders expect to gain something from the collaboration, be it money, data, skills, friends or just something to pass time with (value expectations). Other parties in the collaboration can propose value for others (value propositions), and if these things meet, then it is much more likely to achieve successful collaboration, i.e., the stakeholders perceive gaining value from the collaboration (value perception).

There is already some literature on educational collaboration and outreach programs in the context of IT or IS education from which value propositions and perceptions can be identified. The most common values for higher education educators in education outreach literature seem to be their need to get more enrolling students (Catherine et al., 2016; Harriger et al., 2012; Vainionpää, Kinnula, et al., 2020), and their need to get better and more motivated students (Lukioiden ja korkeakoulujen välisen yhteistyön kehittämistä valmisteleva työryhmä, 2019). Often the societal aspect is also brought up in the studies, including the needs of the industry, which could be considered as a value for the stakeholders (Sheth et al., 1991).

For the upper secondary schools, the main value seems to be on career guidance for the students (Devedjiev et al., 2019; Lakanen & Isomöttönen, 2013; Mufeti & Sverdlik, 2017; Reay et al., 2002). However, its importance seems to fluctuate based on the field (Rajala et al., 2022), and how popular it is in a given time (Whelan & Firth, 2012). Other possible outcomes that upper secondary education cares about in outreach programs are teacher training (Bredow et al., 2006; Gibson & King, 1997; Moller & Powell, 2019) and teaching assistance (Moller & Powell, 2019; Mufeti & Sverdlik, 2017; Shimanuki & Nakajima, 2011), both of which are heavily dependent on the style of the outreach program. Often reduction of teacher's workload

is proposed by other stakeholders (Rajala, Kinnula, et al., 2021) in addition to the teaching assistance, but there seems to be no indication whether the upper secondary education teachers see it as valuable for themselves. This proposition was often accompanied by higher education providing a full course or a workshop with teachers as part of the outreach program (Bredow et al., 2006; Moller & Powell, 2019).

In the IS and IT education context, upper secondary teachers do not often have the necessary skills or capabilities to offer the needed teaching for the students (Rajala, Iivari, et al., 2021). Either the teachers lack the necessary education to teach those subjects, or the curriculum is too crowded for the subject. However, at the same time the need for IS and IT education in secondary education has increased globally (Bell, 2018; Mufeti & Sverdlik, 2017).

Research Design

The focus of the current study is on collaboration between universities, industry, and upper secondary education to map what expectations the stakeholders had to a workshop that was organized as part of a university outreach program, and how those expectations actually played out. In the Finnish system, outreach programs are mostly targeted towards upper secondary school students, as they are the ones that need to apply to university and choose the major at the same time. To be precise, the studied outreach program was targeted to Finnish 'lukio', the nonvocational school in Finland with students between ages 15 and 18. The Finnish system is close to the Swedish gymnasium system. In Finland the industry's demand for increased workforce often drips through the higher education to upper secondary because career choice is done after that level. This means that the collaboration between higher education and upper secondary education is important in the Finnish context, even at a legislative level (Lukioiden ja korkeakoulujen välisen yhteistyön kehittämistä valmisteleva työryhmä, 2019).

This study represents an interpretive case study (Walsham, 1995), in which the case is an educational outreach program in which higher education and upper secondary education institutions collaborate with an IT company. In interpretive case studies, the goal is to interpret and make sense of a phenomenon and to gain deep and rich insights from the participants' perspective, not to explain in the predictive sense (see e.g. Walsham, 1995). The role of a researcher may vary; in our case one author acted as an involved researcher, who had a personal stake in the outcomes of the project and gained an insider insight into the project (see also Walsham, 1995), whereas the other authors had a more distant role in the case study.

The case study included multiple methods of data collection: interviews, observation, and document generation and collection, with interviews forming the primary data source for this study.

The Workshops

The study focuses on a cooperation between two universities in Finland, a company that creates software for education institutions and upper secondary schools. The cooperation started in the summer of 2021, when one of the universities contacted the company, and asked if they wanted to start some kind of usability related cooperation with their usability lab. As the nature of the cooperation became clearer, another university joined in to bring in expertise on how to do usability work with underage students. Later the upper secondary schools got involved as a place to recruit the participants for the workshops.

In the end, the cooperation was run as follows: both universities took the collaboration under one of their UX courses. In the courses, the university students were given a task to design and run a usability/UX improvement workshop for upper secondary students using the company's instructions as a basis. One workshop was organized in a location of a rural upper secondary school and one workshop was run remotely for students from multiple schools. The workshops themselves were events where the participants were asked for usability/UX feedback on the current system, and then tasked to provide suggestions or to create designs that they thought were better. Then the university students analyzed the data and reported the results to the company. In addition, there were also workshops done or planned with parents and teachers, but this study does not focus on those.

Data Collection: Interviews

To study the stakeholders that took part in the planning and executing the workshops, and how they benefited from them, representatives from each stakeholder group were interviewed (32 interviews in total;

length of the interviews between 19-84 min; altogether 14 hours and 7 minutes of audio). As the workshops were created in collaboration between two universities, an upper secondary school, and a company, stakeholders were needed from each of them. From each stakeholder organization, we asked who should be interviewed among the people who participated in the workshops. Then all the potential interview candidates were contacted through email to ask for an interview. The only group that was handled differently was the upper secondary school students, as their participation and time commitment was organized by their teacher. Not all students from the class participated in a workshop, and not all students who took part in a workshop wanted to be interviewed. We only managed to interview students from the on-location workshop, as no one from the remote workshop volunteered to be interviewed.

In total, there were four organizations who took part in the interviews, and within those organizations a total of 5 different groups of stakeholders were interviewed. These groups and how many people they contained are shown in Table 1. The focus in the interviews was on the organizational cooperation that was necessary to get the workshops going. Thus, while all stakeholder groups were interviewed, most of the interviews focused on the "grown-ups", i.e., the organizations and their representatives.

Stakeholder	Count
University teachers	6
University students	6
Upper secondary teachers	1
Upper secondary students	5
Company representatives	2

Table 1. Number of Interviewees in Each Stakeholder Group

The interviews were conducted in two parts, and in an open and non-structured way (Myers & Newman, 2007). The form of the interview questions depended a bit on the group that the questions were aimed at, but the interviews generally had the same format. The initial interviews were done before the workshops, focusing primarily on the following themes: 1) participants' expectations and 2) their reasons for participating. The second round of interviews was done after the workshops and focused on 1) what the participants gained from the workshops, 2) how it matched their expectations, 3) what went wrong and 4) if they were interested in participating in similar collaboration again. There was no strict structure to the interviews. They followed a freeform structure that discussed the themes, with a small handful of questions that needed to be asked in one form or another, though many other questions were asked in the interviews as well. These questions were mainly value and expectation related, and were split into past, present and the future: What are your previous experiences on these stakeholders and usability? What do you expect to gain from this, and what do you think the other stakeholders will gain from this? What has happened in the workshops thus far and why did you decide to participate?

The university students were asked in the initial interview why they took the course and what they expected to gain from it, what they expected to do in the workshop, what they had planned for it, and how the other stakeholders affected their choice to participate in the course. In the follow-up interview the students were asked how the workshops went, were there any problems, and how the experience matched their previous expectations.

The upper secondary students were additionally asked on their prior interest in IT / IS, what kind of outreach programs or career guidance events they had participated in previously, what kind of outreach programs they would like, how they would like them to be marketed, and where and when they would like them to be organized. They were the only group that did not have a follow-up interview, but instead all the questions were asked before the workshop. The one upper secondary teacher was interviewed using the same pattern and was not interviewed after the workshop either.

There were only two company representatives interviewed for this study, and only one of them had time to be interviewed twice. The other one participated only in the initial interview. The initial interview for them included questions on why they participated in the collaboration in the first place, how the collaboration had gone so far, and what were their expectations on the workshops and their outcomes. The after-workshops interview was organized just after they had gotten their hands on the data from the workshops,

so they had had a little time to read the reports, but not enough time to do anything with the data. In that interview, the questions were about whether they were happy with the results of the workshops or the collaboration in general and willing to engage in this kind of collaboration again, and what problems they ran into during the collaboration.

Six university staff members were interviewed for this study: four from one university and two from the other. One of these teachers did not participate in the initial interview, but all others were interviewed twice. As the organizing parties of the collaboration, the questions that they were asked were mostly about why this collaboration exists, what they wanted from it, and how the actual collaboration between the stakeholders has been. The later interview contained basically the same questions as the company interviews had, except targeting the university perspective. The university staff was from three categories: three collaboration organizers, two course teachers and a usability lab manager. Their roles did not affect the topics the interview covered but influenced the kinds of answers they provided.

Data Analysis

This study followed the methodology of qualitative content analysis (see e.g., Graneheim et al. 2017, Elo & Kyngäs 2008), particularly an abductive variant of it that includes moving between inductive and deductive approaches (Graneheim et al., 2017). In our case, the analysis included the phases of preparation, open coding, creating categories and abstraction (Elo & Kyngäs, 2008). All the interviews were recorded, and notes were taken during the interviews. In inductive content analysis, it is important to be initially immersed with the data (Elo & Kyngäs, 2008), which in our case was done by an initial mapping of the data based on the notes taken, after which recordings of the interviews were rewatched and more meticulous notes were taken as well as direct quotes identified. The theory driven approach was utilized by coding the data per stakeholder group. The value co-creation lens (Vargo & Lusch, 2008) was also used to code the data as value perceptions, propositions and expectations, i.e., during data analysis, the context in which the value came up was noted, e.g., whether the discussion was related to the workshops, previous experiences, or perception of other stakeholders.

The analysis focused on expected value as the motivation for participating in the workshops, and perceived value as how happy the stakeholder was about the usability improvement workshops in general. A value was categorized as expected value, if the interviewee was talking about a benefit for themselves or the institution they worked in, but that value had not yet been realized. This was mostly the case for the initial interviews, where the discussion focused on the upcoming workshops, but some interviewees, especially the organizers, had finished some parts of the collaboration, so those were not counted as expected value, but as perceived value.

Anything that the interviewee had already experienced or said to have experienced was counted as perceived value. Almost all the discussions during the after-workshops interview were about the perceived value, except for the expressed hopes for continued collaboration. The perceived value could include negative value as well, as was the case for the organizers who mentioned that the planning phase was too cumbersome and labor intensive, for example.

Value propositions were explicitly asked from all stakeholders in both interviews. In the initial interview the question was formed along the lines of why they think other stakeholders participate in this collaboration. In the postworkshop interviews, the questions were about what they thought that the other stakeholders gained from this collaboration. In addition to those, whenever an interviewee said that they did something to accommodate the interests or needs of another stakeholder, that was marked as a value proposition from them to the other stakeholder. However, the analysis does not put much emphasis on the value propositions as is and focuses more on the value expectations and perceptions as they were reported by the stakeholders that took part in the workshops.

Based on the initial, data driven coding of the value expectations, propositions and perceptions as expressed by the individual stakeholders, a more abstract categorization of the value expectations, propositions and perceptions per stakeholder group was formed. In cases where there were multiple stakeholders within one group, value that was mentioned only by one interviewee was not counted as value, except if it was unexpected and opposite to what every other interviewee seemed to indicate or in cases where the stakeholder group did not contain many people who wanted to be interviewed, i.e., the upper secondary teachers and company representatives.

Results

The interviewed participants are differentiated in this section by their organization, role, and a randomly assigned incremental number, e.g., university teacher 2; or company 1.

Upper Secondary School Teacher

There was only one secondary education teacher that was interviewed for this study, so their perspective is not that pronounced, but as a teacher that decided to help organize the workshop, it is interesting to find out what was the motivating factor for them.

Reasons for Not Participating

In addition to the one interviewed teacher, there was a handful of others who were contacted and asked if they would be interested in organizing or at least hosting a workshop in their school or in their classes. Interestingly, the upper secondary school teachers did not see enough value in the university outreach part of the workshop, as the reason they all stated for not joining in (if they answered at all) was that their school was not interested or did not use the software in question.

This kind of usability/UX improvement work for software that is used by the participants seems to make the participants focus more on the product itself, rather than on the outreach program. On the other hand, there are plenty of outreach programs or university marketing material to choose from (even if not for IS or IT), so the upper secondary school stakeholders might have a freedom to pick and choose. It might be that due to this, the outreach part might not have been a reason enough to participate in the suggested workshop.

On the other hand, some of the teachers that were not interested in the workshop had expressed an interest in participating in IS outreach programs in general, by participating in a EU funded IS outreach development program.

Value in Participating

The interviewed teacher did not have any immediate value in mind for herself. "Whatever it is that students gain from it, is beneficial for me" (upper secondary teacher), i.e., whatever the students can get from the workshop, that goal helps the teacher with her job as an educator.

The workshop seemed easy to organize from the teacher's perspective, which is in direct opposite to what almost everyone else said about them. She noted that it was simple for the students, as the workshop was organized during the Finnish language class, where the students did not have to travel anywhere or even choose to spend their free time on.

Most importantly, the teacher saw education potential in the workshop that fit the curriculum of the Finnish language class. According to her, usability improvement is a great tool for teaching as it makes students "see that they can affect things, so that they are not the ones that stay at the sidelines when issues that are important to them are decided on" (upper secondary teacher) so getting students to familiarize themselves with it was a bonus.

Upper Secondary School Students

Even though upper secondary school students' interests were not the main focus of the cooperation, and not of this study, their perceptions of the program are important for future outreach programs. In relation to other stakeholder groups, they were only interviewed once, before the workshop happened. This means that the interviews of the upper secondary school students indicate only expected value for the workshop. However, this already answers the question on their motivation to participate, and only the success of the workshop from their point of view is left unanswered.

Change of Pace

As much as the students wanted some kind of career guidance, they were much more focused on the present, and their current needs. The reason that almost all the interviewed upper secondary students said for their

participation was that the workshop was something new and different to their normal school days. They saw it as a "thing that is not learning things by rote" (upper secondary student 1) so that they could have an easier day at school.

The second-year upper secondary students were mostly interested in what the students' study in the university, and how it would affect their own lives. "I'm interested in studying, not working" (upper secondary student 1), was a common theme, "even if nothing works, you can get a job from somewhere" (upper secondary student 1).

Career Guidance

Some upper secondary school students also talked a lot about seeing as many possible majors or choices for higher education as possible. Only one interviewed student was interested in IS or IT specifically, but all students saw value in knowledge on what those fields include.

Other stakeholder groups proposed career guidance as a value for upper secondary students. These stakeholders also understood that this was not a normal kind of career guidance or student marketing, but there was a possibility that "maybe this is subliminal advertising to [upper secondary] students" (university teacher 1).

Making an Impact

Upper secondary school students' value expectations seemed to match those of the company. The students were not interested in the university's participation in the program, instead focusing on the software that was tested and improved in the workshops, and they wanted to influence its development. "It is smart to involve those that use the application" (upper secondary student 2). This was understandable, as the students were familiar with the improved software, and they used it often. The students also seemed to have preformed opinions on the usability of the software, including statements like: "[Its usability] is kind of… you know") (upper secondary student 4). When asked if the software in question was a good fit for a usability improvement workshop, the response was positive from the students. "I'm interested in participating in the development of [the software]" (upper secondary student 3).

University Teachers and Students

There were 5 university teachers that were interviewed for this study: three from one university and two from the other. One teacher from each university was responsible for managing the courses that included the workshops, one managed the cooperation and the third one from Vaasa was responsible for their usability/UX laboratory. In addition to the teachers, six university students were interviewed, who organized the workshop during their course. All these students were from the university who organized the workshop on location in an upper secondary school. These groups have a lot of overlap in their value expectations and perceptions, so they are reported together.

Course Content

The two teachers who were responsible for the courses that organized the workshops were eager to get real cases into the hands of their students. According to a teacher "This will be a good case for our students" (university teacher 4), both as a real case and as it fits the current course.

The students were similarly interested in the company's involvement. Most students did not have previous experience in working with IT companies, so they were eager to get their hands on the case. The workshop was seen as "good experience for the future" (university students 5), as the students wanted to know how companies address usability and software development. Similarly, all interviewed students were interested in learning about HCI and usability, one even remarking that "Human computer interaction, usability and accessibility, all were reasons why I joined this study program" (university student 4).

The students were somewhat disappointed in the course at the end, because they expected a better communication with the company. "We haven't had an opportunity to discuss with the company directly" (university student 2) was a major problem to at least one student, and "We do not get that much material from [the company]" (university students 4). These hindered the students work somewhat before the

workshop, but afterwards they were happy with the outcome regardless. The students went as far as to say that "From collaboration perspective, we have shared all the possible information" (university student 4) and "maybe there was more than enough information" (university student 2).

One older student had already worked in the industry as an UX designer, and they were more interested in the upper secondary education connection. "My own children use [the software]" (university student 1). To them, the course was "Nothing new, I have done similar usability courses in the past" (university student 1), but they were taking part "for my enjoyment" (university student 1) to participate in a group project and to help develop a system that they had used themselves.

Research Topics

Universities hoped that the data gathered from these workshops could enable some of their students to create bachelors or master theses based on it. They also saw that some other kinds of studies could be accomplished (such as this one). Initially it seemed like no student was interested in the workshop as a basis for any further study, but in the end, a year after the workshop, one student had taken the data from the workshop to be used in their master's thesis.

University Marketing

Even though the workshop was a collaboration effort between universities and upper secondary schools, which also included a small university IT department marketing material at the start, only one university actor expressed marketing as an expected value. Even she was unsure, as she assumed that they would get at most some form of subliminal advertising. Maybe the effort of gathering all these stakeholders together was too much, as the education marketing value was just "students from one school get a sample of university studies" (university teacher 4). There is a need to evaluate which projects are worth doing as "in the end, this took so much time" (university teacher 4).

It is even more interesting, as all the other stakeholders proposed student marketing as a value that universities could gain from the collaboration, and all upper secondary school students saw the university involvement as such. However, the upper secondary school students were more focused on the company's needs, so to them the university seemed probably as an unnecessary complication. The university stakeholders thought that the marketing efforts were aimed somewhere else: the IT industry. The UX laboratory in Vaasa was also interested in marketing its existence.

Industry Collaboration

The university stakeholders were interested in getting industry connections. Some teachers did not have any previous industry connections in their courses, while some reported that "I can count on one hand the number of cases where there have been companies" (university teacher 4).

The main thing that the university teachers seemed to expect to gain from the collaboration was to get a repeatable collaboration model. At very least "It would be easy to continue with [the company], as we know the rules and procedures with them" (university teacher 1), but there were also hopes that is could be copied to "other companies, if we make simple model for the process" (university teacher 1). Some proposed the same value for the company: "aim for a long-term collaboration" (university teacher 3).

Company

The company was interested in performing usability improvement work on their software, and the workshops had started by a university of Vaasa asking them directly about conducting some sort of usability tests, to which the company representatives had said yes almost immediately, as they had just formed a new usability/UX unit.

Marketing and Visibility

According to the company representatives, the UX specialists were interested and willing to offer their software for the workshops (or some other tests), but it was harder to convince the higher ups in the company that the workshops were beneficial. In the end, from the point of view of industry there were three

main foci in their interest for this type of program: The marketing or PR perspective, university connections and the software development perspective.

The first two were not touched much in the interviews directly, but they were mentioned by both interviewed company UX specialists as well as proposed as value by other stakeholders. The collaboration between universities and upper secondary education is "good from promotional standpoint. I would have been interested when I was younger" (university student 1). According to the company's UX specialists, focusing on marketing and PR helped them solve multiple issues coming from other parts of the company, such as resourcing and non-disclosure related issues, without which the workshops might not have happened. According to the university representatives' interviews, the need for non-disclosure agreements almost killed the collaboration altogether, as there were incompatible requirements between what the university was willing to sign and what the company needed. These internal discussions were visible to other stakeholders as well; one university teacher said that "I sensed from [the company] that they were not committed in the beginning" (university teacher 2). In the end though, the company managed to identify enough value of significance for them to join the workshops. In the later interviews, this value expectation seemed to have materialized, as the company representatives mentioned it as a benefit then: they were happy that the workshops had gained some traction in the local newspapers. It was also pointed out that the collaboration could be used as a recruiting tool, as "this is better than sitting in some hallway, when [university] organizes an event" (company representative 1).

Higher Education Connection

The workshops began as an idea for a cooperation between UX lab of university of Vaasa and the company. The company had a newish usability/UX unit, so they were eager to get help from the university. "User centered design is quite new to us" (company representative 2).

The university had the knowhow, interest, and tools for usability/UX work. The company's UX unit wanted to see how that could work, especially as they had never done this kind of usability work before and had never ordered usability work from outside. "In university I noticed that well conducted collaboration with companies is really rewarding" (company representative 1), even if, in the same breath, they added that it is also very labor intensive. "So long as we get smart data" (company representative 1).

The company representatives wanted to know what university could produce. All company representatives had university connections beforehand through previous work experience. The new kind of usability work was interesting for them, but so was just the idea that the university had a new usability lab. The company had expressed interest in getting to play around with the toys that the lab provided, but it seems that they did not get the opportunity during this collaboration, as the workshops were handled by the university students and organized remotely or at the upper secondary schools.

The company also noted that cooperation with universities could create free data for them that they could use. They thought that data collection is labor intensive, so collecting it with help from others is beneficial, though planning data collection with university requires a lot of lead time and "we need to find suitable projects for them" (company representative 1). At the same time, if a university could get some students to publish a research paper or a master's thesis on the subject, the company could get some information from it, while they normally would not have the time to gather and analyze it.

Software Development

In addition to the data that the company could use from the studies that the university created, the company's usability/UX unit was interested in the data that the workshops would bring. To them, the data was new, as their previous efforts were focused on other user groups and more quantifiable data. But according to them "quantifiable data is quite rough" (company representative 1), and they wanted more focused and qualitative data on the usage of the software.

"It is hard to get data from students" (company representative 1) was one of the reasons that was cited for how the workshops were planned. It did not seem to matter to the company what kind of students they wanted the data to be collected from. According to them, an earlier plan was to collect data from younger students than what the workshops ended up with.

In the later interview, the company had just received the report from the university students that organized the workshops. They seemed happy with the results, but at the same time they had not had time to go through all the results yet, and it remained unclear if the data would prove useful in the long run. However, the end note for the company was that they were impressed with the data and were willing to do the same kind of cooperation in the future.

Every other stakeholder group proposed data gathering as a value for the company. That way the company can "get more material than they could get by themselves" (university student 1). Some stakeholders expressed doubts whether the company would collect the usability data without these kinds of workshops. "What we could, we shared" (university student 4), said one student who participated in the workshop. "These results probably do not create a finished user interface" (university student 4) was expressed, indicating that the students might have done more. Whether that would have been useful for the company is unclear, especially as the company was happy with the results as is.

Other stakeholders expressed that they thought that these kinds of workshops were rare for the company, and that is why the company was interested in the workshops. "They probably organize these rarely. I have not heard of or run into these before. I'm not sure if I should have run into them" (upper secondary student 2). It also was seen as a reason for others to participate in a rare opportunity.

Discussion

This qualitative study was set to explore the value expected and gained in educational outreach programs entailing upper secondary education students and company collaboration. We concentrated on the perspectives and experiences of these diverse participants and focused particularly on the human oriented aspect of IS education. A case study was conducted on an educational outreach case involving both higher education and upper secondary education students and teachers as well as an IT company. Table 2 summarizes the empirical findings and how many interviewees mentioned the expected or perceived value.

	Value expectations	#	Value perceptions	#
University teachers	Course content	3	Course content	2
	Company connections	4	Company connections	4
	Research topics	2		
	Use for usability lab	2		
University students	Course content	5		
	Company connections	2	Work experience (new line in CV)	2
	Practical experience	4	Practical experience	3
Upper secondary school	Make an impact	3	-	-
	Change of pace	4		
	Ease of participation	4		
	Career guidance	5		
Company	Marketing and visibility	2	Marketing and visibility	1
	Software development	2	Software development	1
	Higher education connections	2	Higher education connections	1
Table 2. Most Common Value Expectations and Perceptions and their Occurences				

Our analysis revealed a variety of values that were expected and gained by the participant groups. The different stakeholders expected and gained different kinds of value, reflecting their specific interests and needs. University teachers expected and gained concrete value for their research and teaching, university students for their future studies and career. Upper secondary school students expected value in the sense of being able to make an impact, gain career guidance and experience variety to traditional schoolwork.

Company representatives expected and gained value in the sense of PR and development of their solution. It was positive to observe that many of the participant groups emphasized networking with other involved institutions, which lays a good ground for sustained collaboration. However, the expectations did not entirely match with the perceived value. Some value that was expected was not realized. This can be observed in relation to all participant groups that were interviewed in the end.

Our findings have interesting implications for IS research and practice on student marketing and recruitment. We will discuss the implications for IS research and practice from the viewpoint of 1) value to be expected and gained in educational outreach programs; 2) challenges involved in organizing such outreach programs; and 3) unexpected and paradoxical impacts of educational outreach programs.

Value Expected and Gained

The nature of the workshops meant that the expected value differed a bit from previous research on the subject. Some of the finding were not new or unexpected, like the fact that upper secondary education students want career guidance so that they know where to apply (Catherine et al., 2016; Harriger et al., 2012; Vainionpää, Kinnula, et al., 2020). Similarly, teachers and students seem to want practical experiences in upper secondary school classes (Fritz et al., 2016; Hadaway et al., 2010; Vainionpää, Kinnula, et al., 2020), which was noticed also here.

Most of the literature on IS or IT related outreach programs looks at outreach programs in general terms, often with social good and university management in mind. That is why the literature often identifies value in outreach programs related to issues that require a long timeframe to realize. Increased number of enrolling students (Catherine et al., 2016; Harriger et al., 2012; Vainionpää, Kinnula, et al., 2020), and better enrolling students (Lukioiden ja korkeakoulujen välisen yhteistyön kehittämistä valmisteleva työryhmä, 2019) are often mentioned as value that higher education gets from these outreach programs. This study indicates that as far as the day-to-day operations of university staff and everyone else who run the outreach programs is concerned, the value expected and gained differs from those. It could be argued that the value of increased enrolment is visible in relation to the upper secondary education students, who were interested in career guidance. But when it came down to why they participated in the workshop, the university's inclusion was seen as unnecessary or at least unimportant. Career guidance is something that they seem to be interested in generally, but at least according to our findings, its existence does not make students attend an outreach event, at least not on its own.

There is not much research on why the IT industry would collaborate in education outreach programs targeted to secondary school students. This study does not give many answers to it either, because the company was not interested in secondary school students as nothing more than users for their usability improvement work. Interestingly though, the company managed to find a career marketing angle in the collaboration: by targeting it to university students that designed the workshops. Research implies that industry gets its value by getting better or more workers from higher education (Catherine et al., 2016; Hoanca & Craig, 2019), but this study indicates that they can have other needs in education collaboration as well.

Considering value gains reported by the university students, those were, understandably, linked with the students' professional development. From their perspective, an education outreach exercise was not a relevant point to participate; instead, they saw a possibility to work with a real-life case in a company, collaborating with real users. This adds an interesting angle to the collaboration: exploiting this motivation could support similar kind of outreach programs, giving the university students experience of company collaboration and, at the same time, giving the secondary education students a glimpse of what the studies in the field can contain.

This is an interesting case where the values of outreach programs between universities and lower education institutions mix with the needs of industry. Organizing good and long lasting IS outreach programs is hard, as it requires that everyone gets what they want, everyone is on board, and there is enough time and resources to organize them. Given the different timeframes of each different organization, for example, implementing the program we have reported here required the commitment of some of our stakeholders and partners for almost a year.

Our analysis of the value expected and value perceived is highly beneficial for IS research and practice. IS research has been enriched by showing what the stakeholders value in practice, what is perceived as relevant

and valuable for them. Until now, IS research on this topic has remained on quite an abstract level, while we argue that for sustained educational outreach programs, understanding of them on a more practical level is needed to be able to fit these programs for the different stakeholders' practice and interests. This is beneficial for the planners of future IS educational outreach programs, which are always dependent on the stakeholders, who should perceive gaining value from their participation.

Challenges Involved in Organizing Educational Outreach Programs

Our analysis shows plenty of challenges involved in organizing educational outreach programs, at least in cases in which several institutions are involved. The case analyzed here involved stakeholders from four different organizations and seven different stakeholder groups. We show that such kinds of education outreach programs have a lot of moving parts. We listed value perceptions and expectations from each stakeholder group, but it should be remembered that the workshops included more than six months of planning and discussion, where the stakeholders hammered out a plan that worked for everyone.

Almost all stakeholders that took part in those six months of discussion said that the required amount of work was unwieldy if it was required from all similar outreach programs. Only the company representatives seemed to indicate that the amount of work was expected, though even they admitted that it was a bit much. Given the fact that the stakeholders even had a few moments where the outreach program was close to being abandoned, the amount of work poses even greater risk if this was to be redone again from scratch.

However, most stakeholders also agreed that the effort was worth it, and expressed interest in a rerun. Especially now that the parameters have been established, next time should be easier. Currently, we are documenting our experiences into a model to be used in future with similar cases. There was even hope among the stakeholders that this kind of collaboration would be expanded to other companies, universities, and upper secondary schools - all this indicating there is a fertile ground for this type of sustained educational outreach programs.

Despite the interest, there are many practicalities to be considered. We identified two major challenges relating to finding a suitable project in a company and finding interested upper secondary schools. The company expressed that finding a suitable test case was hard in the given timeframe the universities work in and would only be possible for features that are in the long-term planning stages. Similarly, the workshops ran into problems when recruiting upper secondary schools for the workshops. These endeavors seem to run on personal interest of upper secondary teachers alone (Rajala, Iivari, et al., 2021). Only one school from all the schools that were contacted was willing to spare time and space for the outreach program. This would probably be even harder in outreach programs that did not include usability improvements for software that the students actively used as part of their studies.

Unexpected, Paradoxical or Ironic Impacts

The IS literature has informed us long ago that IT may have unexpected, paradoxical, or ironic impacts in organizations (Robey & Azevedo, 1994; Robey & Boudreau, 1999). We observed some unexpected, surprising, maybe even paradoxical, or ironic aspects in this educational outreach program. One such a finding concerns the fact that the upper secondary school students appreciated the possibility to make a difference regarding the IT they use; they were eager to improve the usability of the software in question; however, for the company the impact on IT development remained unclear. The literature on usability work in industry warns us that oftentimes in companies usability is not among the top priorities and usability may be only used as a tool for sales and marketing, without any real effort put on usability work in practice (Rajanen & Iivari, 2007): companies often are technology focused, and conduct usability work only when necessary and if it does not hinder any other processes in the company, and companies may see a good user interface only as a marketing slogan or as a way to pass some required assessments. In our case, the company representatives that were interviewed were part of the newly created UX team of the company and they were at least personally interested in the data that came out of the workshops. We hope the company shows equal interest to usability improvements than to the marketing potential of this type of collaboration. Of course, impacts on the product in question appear in the longer run - we are eagerly waiting for the impacts to appear.

We see it as a very positive development that the young generation in upper secondary school was motivated to impact usability of the software in question. Impacting usability of IT seems to be a shared

interest among upper secondary and higher education students, according to our analysis. Hence, we think it could be seen as a useful marketing tool for IS education. However, we are somewhat uncertain how this tool works for the upper secondary school students. It remains unclear whether they were interested in usability just because the target software was familiar and necessary for them and viewed as needing some usability improvements from the students' perspective. In any case, usability seems to interest upper secondary school students – at least as far as enhancing software that they use – and thus could be a great marketing tool for studies related to IS. Our results are inconclusive whether the students would be eager to impact usability of any IT solution they use or usability of this particular solution only.

For the future IS education outreach programs, we recommend carefully considering the IT companies and the IT solutions we ask the young people to be working with. For attracting students to the programs, it would be ideal to work on IT that was familiar and interesting for its young users. However, most widely used and famous IT solutions and their development companies are not accessible for this type of local collaboration, at least so that it would have an impact on their development. It might also be possible to find less famous and exciting IT solutions with a company open for collaboration and actual development of the solution based on the input. There are pros and cons for both paths, while future studies should determine which path interests the young generations more: having an actual impact on IT solutions or working on high profile IT that plays a significant role in their everyday life.

In the results of the upper secondary school students, we identify two interesting trends. In general, the students seemed to prefer something easy and different; educational or future career ambitions were not necessarily driving them to join the educational outreach program, but ease and being able to escape their routine schoolwork. They all said that organizing the workshop as part of a class was a good idea, both as a change of pace and for lowering the threshold for attending. This may be something we wish to tap into.

Another trend relates to these young people's interest to have an impact, in this case through usability work on a software familiar to them. To serve this interest, it is important to ensure their work is also having an impact. In the literature on user participation and participatory design, an essential element is ensuring that users are having a voice and a say -- tokenistic or decorative participation of users is to be condemned (Greenbaum & Kyng, 1991; Iivari & Iivari, 2011). This is something we wish to teach both to our students in higher education institutions and to the potential students currently in upper secondary education institutions. To ensure we meet this ideal, careful negotiation with the involved companies is needed so that we do not promise too much or give a false impression to any of the parties as well as strive always towards as influential participation as possible. Ultimately, we wish to educate the young generation to start acting as active shapers and makers of our digital futures, for the achievement of which it is critical that all their engagements with IT development are meaningful and impactful (see also Kinnula & Iivari, 2021).

Limitations and Paths for Future Work

There are several limitations to be noted. Regarding the data collected, important to note is that mapping the value expectation for this case was somewhat hard, as a lot of the participants in this case had personal contacts with participants from other stakeholder groups. One of the company's employees was a family friend of one of the people organizing the UX courses in the university of Vaasa. According to the company interviews, this family connection helped a lot when hammering out details on who is responsible for what. Similarly, there was an issue on recruiting interested university students to run the workshops, but that was fixed with the teacher contacting students that she knew beforehand and offering them a possibility to get a course and credits. This can be summed up as normal teaching work, but at the same time, without those fiveish students, the workshops might not have happened in Oulu. These connections made it easier to start and continue with the program, when at times the sheer number of stakeholders seemed too much, and the effort was deemed times to be too much compared to the benefits by the organizing participants.

As study on one case between universities, upper secondary education, and industry, this could not hope to capture all the possible value that exist in the space of education outreach. There might be other value perceptions and expectations that these stakeholders could have in other forms of outreach programs. Whenever something new is done, it may also be that the potential benefits become visible only later. This particular case also has some peculiarities that make it harder to replicate elsewhere, like the brand-new usability facility in one of the universities, and the family connections shared with some of the stakeholders. In addition, when compared to any day-to-day outreach programs, like university visits or open university courses, this presents a more unique and tailored case. This uniqueness was even seen as a value by the

upper secondary school students, who wanted to attend the workshop because they thought it was a rare opportunity to influence the software that they depend on. Tailoring of the outreach program also meant that the effort required was too much for a normal outreach program, as was even reported by all the organizers. On the other hand, tailoring meant that the collaboration did create enough value for all participants, and that value was more tailored to their needs.

Even though this study tried to differentiate between value expectations and perceptions by doing two rounds of interviews, the timing was so tight that the stakeholders did not have a clearly formed view of the final value that they had gained from the collaboration at that point. University students were interviewed before their final seminar, company representatives were interviewed just after the seminar, but before they had time to make further plans, and upper secondary school students were not interviewed after the workshops at all. Thus, how those values will map out in the future remains to be seen. This should be studied further, but it is also important to note that some of the actual value that the stakeholders gain can take years and the SDL model might not be the best suited model to capture that.

This outreach program is specific to the educational system of Finland, where the outreach programs that are targeted to the upper secondary schools are the norm. In countries, where IS marketing is targeted towards higher education students who have not selected a major yet, the marketing needs to be different. In those cases, the needs of the upper secondary students are not as important, and they might not be even as interested in the university's presence as they were during this study.

Conclusions

We explored the value expected and gained in an educational outreach program entailing upper secondary education students and company collaboration. We concentrated on experiences of different participants and focused particularly on the human oriented aspect of IS education. We revealed a variety of value that was expected and gained by the participant groups. The different participant groups expected and gained different kinds of value, but also similarities were observed. The expectations did not entirely match with the perceived value; some value that was expected was not realized. We identify interesting implications for IS research and practice on student marketing and recruitment: on what kind of value to expect and to aim to offer to different stakeholder groups, on challenges involved in organizing such outreach programs and on potential unexpected, surprising, and paradoxical impacts of such educational outreach programs.

References

Ahola, S., Aittola, H., Salminen, T., & Spoof, J. (2020). *Lukioiden korkeakoulu- ja työelämäyhteistyö*. Valtioneuvoston kanslia.

Akbulut-Bailey, A. (2012). Improving IS Enrollment Choices: The Role of Social Support. *Journal of Information Systems Education*, *23*(3), 259–269.

Becker, J., & Thompson, M. (2009). IT/IS educational pathways: The road to increased IS/IT enrollments. *15th Americas Conference on Information Systems 2009, AMCIS 2009*, *2*, 1175–1183.

Bell, S. (2018). Koodaus on lisätty opetussuunnitelmaan, mistä opettajat? *Tivia*, 4–5.

Bredow, J., Wright, C., & Manley, B. (2006). Work in progress: A model for cooperation between university and K-12 components in science and technology education. *Proceedings - Frontiers in Education Conference, FIE*. https://doi.org/10.1109/FIE.2006.322503

Catherine, L., Annemieke, C., & MaryAnne, E. (2016). The importance of outreach programs to unblock the pipeline and broaden diversity in ICT education. *International Journal of Information and Communication Technology Education*, *12*(1), 38–49. https://doi.org/10.4018/IJICTE.2016010104

Devedjiev, V. A., Chahanov, I. S., Sotirov, S. O., Stefanova, S. A., Vasileva, T. K., & Kostenarov, A. D. (2019). University affiliated schools - The key to a modern economy. *2019 28th International Scientific Conference Electronics, ET 2019 - Proceedings*. https://doi.org/10.1109/ET.2019.8878569

Díaz-Méndez, M., Paredes, M. R., & Saren, M. (2019). Improving society by improving education through service-dominant logic: Reframing the role of students in higher education. *Sustainability (Switzerland)*, *11*(19). https://doi.org/10.3390/su11195292

Downey, J. (2011). An empirical examination of the composition of vocational interest in Business Colleges: MIS vs other majors. *Journal of Information Systems Education*, *22*(2), 147–158. http://search.ebscohost.com/login.aspx?direct=true&db=ehh&AN=66339177&site=ehost-

live&scope=site

Downey, J., Young, P., England, E., Young, P., & England, E. (2016). *An Eight-year Study of the Influence of IT Career Camps on Altering Perceptions of IT Majors and Careers*. *38*. https://doi.org/10.17705/1CAIS.03801

Elo, S., & Kyngäs, H. (2008). The qualitative content analysis process. *Journal of Advanced Nursing*, *62*(1), 107–115. https://doi.org/10.1111/j.1365-2648.2007.04569.x

Eurostat. (2019). ICT specialists in employment. In *Eurostat Statistics Explained* (Issue October). http://ec.europa.eu/eurostat/statistics-explained/index.php/ICT_specialists_in_employment

Fritz, J., Matthews, M., Wulf, T., Scott, J., & Fritz, J. (2016). University of Cincinnati and Saint Ursula Academy partnership: Introducing female high school students to the field of Information Technology, year 2. *SIGITE 2016 - Proceedings of the 17th Annual Conference on Information Technology Education*, 109. https://doi.org/10.1145/2978192.2978199

Gibson, I. W., & King, S. (1997). Partnerships, Technology and Teaching: Celebrating the Link between Universities and Rural Communities. *Proceedings of the 13th National Conference of the Society for Provision of Education in Rural Australia*, 16.

Graneheim, U. H., Lindgren, B. M., & Lundman, B. (2017). Methodological challenges in qualitative content analysis: A discussion paper. *Nurse Education Today*, *56*(June), 29–34. https://doi.org/10.1016/j.nedt.2017.06.002

Greenbaum, J., & Kyng, M. (Eds.). (1991). *Design at Work: Cooperative Design of Computer Systems*. Lawrence Erlbaum Associates.

Hadaway, L., Urbaitis, M., Lamendella, R., Oerther, D., Burrows, A., Borowczak, M., & Kukreti, A. (2010). Engineering education collaboration: Innovative pedagogical methods for high school and university environmentalists. *ASEE Annual Conference and Exposition, Conference Proceedings*. https://www.scopus.com/inward/record.uri?eid=2-s2.0-85029024736&partnerID=40&md5=ab44a3e3782a868753e3020c9d54d7e1

Harriger, A., Magana, A. J., & Lovan, R. (2012). Identifying the impact of the SPIRIT program in student knowledge, attitudes, and perceptions toward computing careers. *Proceedings - Frontiers in Education Conference, FIE*. https://doi.org/10.1109/FIE.2012.6462502

Hoanca, B., & Craig, B. (2019). Building a K-16-industry partnership to train IT professionals. *Journal of Information Systems Education*, *30*(4), 232–241.

Iivari, J., & Iivari, N. (2011). Varieties of User-Centredness: An Analysis of Four Systems Development Methods. *Information Systems Journal*, *21*(2).

Joshi, K. D., & Schmidt, N. L. (2006). Is the information systems profession gendered? *ACM SIGMIS Database: The DATABASE for Advances in Information Systems*, *37*(4), 26–41. https://doi.org/10.1145/1185335.1185343

Kinnula, M., & Iivari, N. (2021). Manifesto for Children's Genuine Participation in Digital Technology Design and Making. *International Journal of Child-Computer Interaction*, *28*.

Kinnula, M., Iivari, N., Isomursu, M., & Laari-Salmela, S. (2018). 'Worksome but Rewarding' –Stakeholder Perceptions on Value in Collaborative Design Work. *Computer Supported Cooperative Work: CSCW: An International Journal*, *27*(3–6), 463–494. https://doi.org/10.1007/s10606-018-9328-y

Knestis, K., Cheng, J., Fontaine, C. M., Feng, R., Knestis, K., Fontaine, C. M., & Feng, R. (2022). Information Systems Education Engaging Government-Industry-University Partnerships to Further Gender Equity in STEM Workforce Education Through Technology and Information System Learning Tools Engaging Government-Industry-University Partnerships to Furthe. *Journal of Information Systems Education*, *33*(May 2021).

Lakanen, A.-J., & Isomöttönen, V. (2013). High school students' perspective to university CS1. *Annual Conference on Innovation and Technology in Computer Science Education, ITiCSE*, 261–266. https://doi.org/10.1145/2462476.2465585

Landry, J. P., Barnett, H. L., Chapman, D. L., & McCullough, R. (2019). Four strategies for driving a University Pre-College computing outreach program. *Journal of Information Systems Education*, *30*(3), 191–201.

Lawler, J. P., Colton, D., Grant, K. A., & Colton, D. (2009). *Expanding Flexible Models of Service Learning in Information Systems Curricula*. *7*(95).

Lukioiden ja korkeakoulujen välisen yhteistyön kehittämistä valmisteleva työryhmä. (2019). *Katse korkealle - näkökulmia lukioiden ja korkeakoulujen yhteistyöhön*. Opetus- ja kulttuuriministeriö. https://julkaisut.valtioneuvosto.fi/bitstream/handle/10024/161375/OKM_6_2019_Lukiot ja korkeakoulut.pdf?sequence=4&isAllowed=y

Moller, F., & Powell, S. (2019). Teaching computing via a school placement. *ACM International Conference Proceeding Series*. https://doi.org/10.1145/3294016.3294029

Mufeti, T. K., & Sverdlik, W. (2017). Introducing computer programming in secondary schools: A case study of NAMTOSS. *2017 IST-Africa Week Conference, IST-Africa 2017*, 1–8. https://doi.org/10.23919/ISTAFRICA.2017.8102343

Myers, M. D., & Newman, M. (2007). The qualitative interview in IS research: Examining the craft. *Information and Organization*, *17*(1), 2–26. https://doi.org/10.1016/j.infoandorg.2006.11.001

Nielsen, J. (1993). *Usability Engineering*. Morgan Kaufmann Publishers Inc.

OECD. (2021). *Education Database: Enrolment by field*. OECD Education Statistics (Database). https://doi.org/10.1787/33c390e6-en

Rajala, J. M., Iivari, N., Kinnula, M., & Molin-Juustila, T. (2021). *Guiding Students Together: Value Expectations and Propositions in Education Outreach Programs*.

Rajala, J. M., Iivari, N., Kinnula, M., Rajanen, D., & Molin-Juustila, T. (2022). Perceiving ICT: Factors Influencing the Selection of Information Systems as a Major. *30Th International Conference on Information Systems Development*.

Rajala, J. M., Kinnula, M., Molin-Juustila, T., & Iivari, N. (2021). *Is IT Worth It? A Literature Review on Stakeholders and Their Value Propositions in IS Education Outreach Programs*.

Rajanen, M., & Iivari, N. (2007). Usability cost-benefit analysis: How usability became a curse word? *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, *4663 LNCS*(PART 2), 511–524. https://doi.org/10.1007/978-3-540-74800-7_47

Reay, D., Ball, S., & David, M. (2002). "It's taking me a long time but I'll get there in the end": Mature students on access courses and higher education choice. *British Educational Research Journal*, *28*(1), 5–19. https://doi.org/10.1080/01411920120109711

Robey, D., & Azevedo, A. (1994). Cultural Analysis of the Organizational Consequences of Information Technology. *Accounting, Management & Information Technology*, *4*(1), 23–37.

Robey, D., & Boudreau, M. (1999). Accounting for the Contradictory Organizational Consequences of Information Technology: Theoretical Directions and Methodological Implications. *Information Systems Research*, *10*(2), 167–185.

Sharp, H., Y, R., & J, P. (2019). *Interaction Design: Beyond Human-Computer Interaction* (5th ed.). John Wiley & Sons, Inc.

Sheth, J. N., Newman, B. I., & Gross, B. L. (1991). Why We Buy What We Buy : A Theory of Consumption Values. *Journal of Business Research*, *22*(2), 159–170.

Shimanuki, R., & Nakajima, S. (2011). Joint education program between technical high school and university for technical high school student through developing robots. *Journal of Robotics and Mechatronics*, *23*(5), 840–849. https://doi.org/10.20965/jrm.2011.p0840

Vainionpää, F. ;, Kinnula, M. ;, Iivari, N. ;, & Molin-Juustila, T. (2019). GIRLS' CHOICE - WHY WON'T THEY PICK IT? *ECIS 2019*. https://aisel.aisnet.org/ecis2019_rp/31

Vainionpää, F., Iivari, N., Kinnula, M., & Zeng, X. (2020). IT is not for me - Women ' s Discourses on IT and IT Careers. *Twenty-Eighth European Conference on Information Systems (ECIS2020)*.

Vainionpää, F., Kinnula, M., Iivari, N., & Hartikainen, H. (2020). *Aiming for Resemiotisation – Meanings Making and Co-Creation of Value Around an IT Course*. 1–17.

Vargo, S. L., & Lusch, R. F. (2004). Evolving to a New Dominant Logic for Marketing. *The Journal of Marketing*, *68*(1), 1–17. https://doi.org/10.1300/J047v07n04_02

Vargo, S. L., & Lusch, R. F. (2008). Service-dominant logic: Continuing the evolution. *Journal of the Academy of Marketing Science*, *36*(1), 1–10. https://doi.org/10.1007/s11747-007-0069-6

Vargo, S. L., & Lusch, R. F. (2016). Institutions and axioms: an extension and update of service-dominant logic. *Journal of the Academy of Marketing Science*, *44*(1), 5–23. https://doi.org/10.1007/s11747-015-0456-3

Walsham, G. (1995). Interpretive Case Studies in IS research: NAture and Method. *European Journal of Information Systems*, *4*(2), 74–81.

Whelan, E., & Firth, D. (2012). Changing the Introductory IS Course to Improve Future Enrollments: An Irish Perspective. *Journal of Information Systems Education*, *23*(4), 395–405.

Wilson, D. N., & Avison, D. (2007). *Double Jeopardy: The Crises in Information Systems, an Australian Perspective*. http://aisel.aisnet.org/acis2007/33