

“IT’S JUST COMPUTERS AND SCIENCE” - EXPLORING UPPER SECONDARY SCHOOL STUDENTS’ VALUE EXPECTATIONS, PERCEPTIONS AND PROPOSITIONS AROUND IS OUTREACH PROGRAMS

Joni Matias Rajala
University of Oulu
Oulu, Finland

joni.rajala@oulu.fi

Marianne Kinnula
University of Oulu
Oulu, Finland

marianne.kinnula@oulu.fi

Netta Iivari
University of Oulu
Oulu, Finland

netta.iivari@oulu.fi

Tonja Molin-Juustila
University of Oulu
Oulu, Finland

tonja.molin-juustila@oulu.fi

Abstract

Education outreach programs for Information Systems (IS) major are important today. As the need for Information and Communication Technology (ICT) professionals increases, higher education institutions create education outreach programs to attract students to study ICT majors, including IS. For the outreach programs to be successful, it is important to take the target audience and their needs and expectations into account. For this purpose, this paper investigates education outreach programs through the lens of service dominant logic and conducts an interview study with upper secondary education students to map their expected, perceived, and proposed values towards higher education outreach programs.

Keywords: IS, Education Outreach, Students, ICT Education, Student Recruitment.

1. Introduction

Information and communication technology (ICT) sector is in a continuous need of professionals globally [10, 19]. The continuous digitalization of all spheres of our life ensures that this need will continue to exist. Information Systems (IS) education represents a softer side of ICT education [26], focusing on managerial, organizational, business, social and human aspects. IS education is in some countries and universities located within business schools, which frames this education differently compared to IS education in countries and universities, in which it is located in ICT or natural sciences faculties [20]. When IS education is positioned close to ICT education, it tends to be suffering from similar kind of student recruitment problems to other ICT disciplines: it is perceived as a nerdy, boring, male dominated, technology, computer and mathematics-oriented field [21, 24]. In this study, we explore IS education as positioned within an ICT faculty and student recruitment and marketing within.

The IS discipline has recognized the importance and challenges involved in student recruitment and marketing long ago [31]; however, there are again differences between countries. There is a difference in which stage the major selection is expected to happen. In some countries, the students to be targeted are Bachelor’s students making decisions on their major [3, 8]. In other countries, the major selection happens already when applying

to higher education, in which case, the students targeted are upper secondary school students. In IS literature, various kinds of solutions for student marketing and recruitment have been proposed [22], while in this study, we focus on IS outreach programs and educational collaboration endeavors targeting upper secondary school students. The existing literature on the topic is quite limited, but some studies exist [4, 12, 15–17, 25]. This study builds on top of them, acknowledging that the student perspective so far remains quite ignored in the literature. Even if the students are the main target of these programs, there is a limited understanding in IS on how they perceive these programs.

The research question addressed in this study is: What kinds of value upper secondary education students have gained or expect to gain from involvement in IS outreach programs? This question is critical from the viewpoint of success of such programs. The question is answered through an interview study with 20 upper secondary school students in Finland, where IS is often located within ICT faculty and the major selection is oftentimes done before applying to higher education. In the recruitment of interviewees, we aimed at them having varied interest in ICT in order to gain a versatile picture on their value expectations and perceptions of IS outreach programs. Interest in IS could not be used as a criterion, as the students are expected to have no knowledge of IS at this stage of their studies as IS is not a subject in the upper secondary education curriculum in Finland nor introduced by study councilors [21, 25]. We rely on service dominant logic [29] as our theoretical lens. It has already been utilized for making sense of educational collaboration and outreach programs and hence is considered suitable [20]. This lens guides us to examine the expected, realized, and proposed value for the stakeholders, in this case upper secondary education students, from IS outreach programs.

2. Theoretical Basis

2.1. Related Research

Universities are aiming at educating more IS and ICT professionals to meet the market demand. Many outreach programs were created in the noughties to keep up the interest in the field following the dotcom bubble [30, 31]. The need for outreach programs has not decreased since then, as the need for more ICT professionals has increased in the last decade [10]. Universities use education outreach for multiple purposes, including increased enrolment [18] and getting better students [6] as well as for a variety of other reasons [22].

Studies have discussed different kinds of outreach programs. Some programs have tried to introduce ICT classes to upper secondary schools, either directly organized by a university [18], through open university [15], with help from a university [25], or through collaborative efforts involving industry professionals, university and school staff and administration [12]. Most outreach programs at least in Finland are purely marketing and introduction events [2]. However, some studies in other countries report on large scale outreach programs that entail government agencies, companies, and universities attracting specifically high school girls to IS and ICT fields [14], or annual high school ICT camps arranged by companies and universities to attract students to ICT [9]. They may use a variety to strategies for successful university high school collaboration including engagement of partner schools, whole-grade student participation, hands-on learning, and matching the collaboration with the high school teacher needs [16].

Studies that focus on student enrollment and societal problems often skip the view of the students entirely and focus on the effects of their subject or intervention, though some studies do note that their intervention started with focus groups [11]. Students' learning or views of the field may be measured, while the students' perception of these programs is not otherwise studied. There have been some studies with focus on the students' perspective, but these studies often focus on minorities [1] or girls [24], and tend not to focus so much on outreach. A literature review on educational collaboration and outreach programs in IS and ICT has identified several kinds of value that students are reported or proposed to gain, including university experience, community building, practical experience, increased motivation, broader course selection, university credits, career information and communication skills [22]. Some of the reviewed studies included only value propositions for the students, but also empirical evidence on value gained was provided in some studies. However, very few studies could be located within IS.

2.2. Service Dominant Logic and Value Co-creation

In 2004 Vargo and Lusch created service dominant logic (SDL) [27] as a way to describe how modern marketing works. They challenged the idea that value is created by the manufacturer only, and that value is determined at the point of sale. They argued that, instead, the manufactured product can be used in multiple ways by multiple users. They argued that value is co-created both by the manufacturer and the customer, akin to the way it is created in service industry. Their argument [29] was that each actor determines the value by themselves, but each contributes to the value creation process that concerns all actors. This lens has been used in many fields since, including IS.

The definition of value is unclear and understood differently in different contexts. It is often understood as something being beneficial or having worth. Value creation and perception is crucial to SDL. SDL defines value as co-created by all stakeholders in the process that leads to the exchange of goods or services, but crucially it can only be determined by the beneficiary through use [29]. This beneficiary is often viewed as a customer, but as value is co-created for everyone in the transaction, it could be any one of the actors involved in the value creation process [28]. In SDL, value is co-created with a loose interpretation of the word 'create'. The value that the beneficiary perceives in use can only be determined by the beneficiary, but because they cannot create that value only by themselves, value must be co-created by the actors who participate in the process. As all actors view value differently, and they must have some reason to participate in the transaction of goods or services, SDL proposes that value exists at different levels: experienced, proposed, and expected [28, 29].

This paper is mostly concerned with the definitions on experienced value and proposed value as argued by Vargo and Lusch [28, 29]. The argument is that only the beneficiary can experience the value from the transaction, and thus they determine the value that they gain. This experience of value is shaped by the actors' expectations about the value creation process and its outcome as well as by their needs and social circumstances [13]. But as value can only be experienced and defined by the beneficiary, actors cannot determine or deliver value to other actors. They can only propose what value those other actors could gain from the transaction [29]. This means that the value is there to incentivize other people to participate in the value co-creation process, but that is the limit of what value the actors can provide to other actors directly.

There has been some discussion on whether or not the service dominant logic can be applied as is in education field [7]. Applying the lens to education outreach is relatively straightforward, however, as an outreach program could be argued to be a service that gives students knowledge on what to choose as their major later in life. Students can choose whether to participate, and their value perception is crucial on the success of the outreach programs. In the context of education outreach there can be multiple actors involved with their own agendas, like universities wanting more applicants, while value can be perceived and proposed by all actors involved, as defined by Vargo and Lusch [28]. Students themselves are akin to customers in normal service transactions. Normally they do not participate directly in the creation education outreach programs, but they are the main beneficiaries of those in addition to the society at large. As the main beneficiaries, they determine the value and choose whether to participate or not. Often education outreach programs are not mandatory for students and students' value expectations are important for determining their participation.

3. Research Design

3.1. Data Gathering

Data for the current study was gathered between summer 2021 and summer 2022 with 15-18-year-old students from the schools near city of Oulu Oulu in Finland. Three interview rounds were arranged, each with different students in different contexts. In total there were 20 interviews. The first round of interviews was conducted in summer 2021, with a random selection of snowballed upper secondary education students (convenience sampling). These students had not necessarily shown any interest in IS, ICT, or even "computers", as

they themselves often called it. The second round was conducted during a workshop in spring 2022 organized in a neighboring town, where students took part in a user experience evaluation workshop that was organized during their Finnish language lesson. These interviews included five participants. The third and last round of interviews happened during summer 2022 with upper secondary school students who participated in a paid two-week summer job program in a makerspace located in University of Oulu.

The three rounds of interviews were conducted to gain insight from different points of view. Value propositions and expectations may vary greatly between students who have expressed interest in a subject and those who have not. The first round included students who had not expressed any interest in the subject, the second round had students who voluntarily participated in an ICT workshop as part of their normal classes while the third round contained students who were actively participating in ICT related activities on their own time, i.e., ICT related activities can be considered their hobby. The multiple rounds were organized to get as wide a view of students' interest in ICT as possible, as those can influence their value perception. In general, this study does not differentiate these groups, or compare the results between them, but they are kept separate to distinguish them. The views on value expectations, perception, and propositions could be different between these students, as they approach ICT from different angles. The literature has informed us that students' perception of the field correlates with their interest in the field and how likely they are to participate in the events and apply to that field in university [5]. Table 1 shows the number of interviewees per interview round and their gender distribution.

Table 1. Interviewees for the study based on where they were recruited.

Interview round	Men	Women	Total
Snowballed	5	5	10
School	2	3	5
Hobbyists	2	3	5
Total	9	11	20

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Interviews were freeform discussions that were centered around themes and followed an agenda that changed a bit depending on the context where the interview was done. The main questions posed for each student were around the themes of do they know what information processing – a Finnish study program combining information systems and software engineering - is, have they participated in education collaboration between upper secondary education and higher education previously, both in general and in ICT related subjects, and what they thought they had gained from these things and if they had positive or negative things to say about them. Each student was also asked to think what other stakeholders might gain from the event, and why the event was organized in the first place.

All interviewees were asked a set of background questions to see how familiar they were with IS and ICT, and how interested they were in the subject. These questions included things like do they know people who work in the industry, have they participated in outreach programs previously, have they participated in ICT or IS related outreach programs, how they view higher education and what they had considered for a career.

The question sets in all interview rounds were mostly the same, with small changes to accommodate the differences in the contexts. As the students who were gathered through snowballing did not have any event they participated in, the questions did not include any specific event related questions, instead focusing on previous experiences and expectations. The students were told a list of possible events that they could have participated in, and they were encouraged to come up with new ones as well. The list of possible events included open days, open university courses, a study, a workshop and a visit from a higher education teacher or student to their school. For the school group and

the hobby group, there were additional question on why they decided to participate in the user experience session or the workshop, and where they had heard about it.

For every outreach program that the student mentioned in the interviews, there were follow-up questions that asked the interviewee to elaborate on positive and negative things about them, why they had participated in it, where they had heard about it and what they gained from it. Also, most other questions were somehow tied to the current event. For example, in the two sessions with the students that were participating in an event, question on what value other stakeholders gain from outreach programs were stated.

All interviewees were also asked to come up with a way to market IS or ICT to students, to inquire their value expectations from a different angle. If the student could not think of a way to tie their answer to IS or ICT, they were encouraged to answer that question in general, or tied to some other subject.

3.2. Data Analysis

Most of the interviews were transcribed for faster analysis and easier management. The notes from interview sessions were used to analyze general patterns in the data, such as the gender distribution, the number of students interested in ICT, and if they had participated in outreach programs in the past. All the interviews were scoured for interesting quotes and views related to the ICT field or outreach programs, and all interviewees were categorized based on the things they mentioned. Afterwards, the categories were organized based on how often things were mentioned, and how important it seemed the student felt the issue was. The things that seemed unnoteworthy for the students or were mentioned only once were discarded. The categories were organized into values expectations, perceptions and propositions based on the context within which the students discussed it. Things they expected to gain from the event they were participating in, or any future event, were marked as expected value. Things mentioned in the context of a previous event that they had been part of, or things that had already happened in the current event were noted as perceived value. If they talked about value for other stakeholders, the mentions were marked as proposed value.

4. Findings

In this section, interviewees are reported by their assigned ids. These ids take the form of rXaY, where X is the interview round, and Y is an arbitrarily assigned number. Interview round numbers use the following logic: 1 is the snowballed round, 2 is the school workshop round, and 3 is the round with the hobbyists.

Studying upper secondary students' value expectations and perceptions regarding higher education outreach programs on ICT in Finland is difficult. Almost all the interviewed students had only participated in one or two different kinds of events organized by higher education organizations, and even then, most of them were not sure if those events were about higher education or careers in general. For most of the students in the school and hobby groups, their current event was the first non-lecture organized by a university that they participated in. Only one student from the snowballed sample had taken part in a summer school organized by a local software company in cooperation with university. The school group had similar results: nobody could name any higher education organized events that they had participated in, and one even said that the lack of those kinds of events was their main motivation for taking part in the workshop. Only the hobbyist students had knowingly and previously taken part in university organized events, and even among them, it was only three out of five interviewees who mentioned that. However, we must note that it is possible that the students have participated in an event organized by a higher education institution, where the students have not been aware of the organizing party. If the event was organized during their classes, and included things that happen during those classes, it might not have been obvious that the event had collaborators from some other institution than their own school. Terminological differences might have also played a role in figuring out what collaboration efforts they had participated in before. The students seemed to expect university collaboration to only include things where the university takes a central role. Compared to a study in which teachers were inquired on

educational collaboration [20], noteworthy is that the teachers could easily answer the question on education collaboration and what they expected from it, but the students could not. This might be because students do not participate in the collaboration part of education collaboration. For them, it is just different kind of studying. As education collaboration efforts are quite rare, the students do not participate in them often. For most students, there are probably only one or two events offered during their upper secondary education. This is in line with the interviewees not being able to pinpoint any university organized events that they had participated in. Compared to teachers and other staff that participate in education collaboration, the staff has more exposure to education collaboration as they have been in the game longer. When comparing the data gathered from teachers about education collaboration [20], even the teachers had experience from only a couple of cases. If even teachers do not have a lot of experience in education collaboration, what is the likelihood that a student who is in the school for at most 4 years has had any experience?

4.1. What is Information Processing?

This question is mostly relevant in Finnish context. The term information processing sciences (“tietojenkäsittelytiede” in Finnish) is not the clearest term for an ICT related field, even in Finland. The question was asked to see if the students understood the term, and to map what part of the vast spectrum of ICT subjects the interviewee was thinking about when the other questions were asked. Information processing in Finnish context contains a mixture of SE, ICT, and IS subjects, and is not part of engineering or business schools. It is very close to the Swedish subject “Informatik” in structure. The students did not have great grasp on differences between the subjects’ finer details, so they mostly seemed to answer about software industry in general. Some of the students were clearly confused with the term, and thought that that subject was about “You process information. Decide if it is good information or bad information. Be critical on knowledge and sources and the like.” (r1a9) Even some students who were interested in ICT were baffled by the term and thought it contained things like “You take information from some study and use that.” (r3a1) To these students the term was opened and explained. The other aspect that interviewees attributed to information processing was information security. “If there is some kind of social media, then passwords and usernames stay in the database.” (r3a2) was mentioned by one student, and couple of other students mused some things about passwords and databases. Otherwise, it was seen as mostly some kind of combination of programming and computers. “It could be everything you do with a computer. Maybe not absolutely everything, but it is mostly computer related.” (r3a3) was given as an answer by one student who continued to think about whether programming was part of it but was sure that at least technology was included somehow. The most interesting answer came from one student who was interviewed in English, and they immediately could translate the information processing to computer science, but then would not give any other definition for the field other than “It’s computers and science” (r1a1).

4.2. Students’ Expectations

The expectations of students did not differ much based on which round they were interviewed in. The students mostly talked about how they expected or wanted to get more information about careers and how higher education worked. They were mostly interested in more short-term things, like if the programs were fun or interesting or easy to access.

Career Guidance. All students, regardless of their age or previous participation noted that they would want more information about university and career options. When asked further whether they would want information about ICT or information processing in general, the answers were still positive, but vaguer. The students who were not already interested in ICT gave vague answers like: “Schools should provide more information [about education in general]” (r1a6). This association between interest and information was best put into words by one student who said that: “Those that think that [information processing] is cool, search it by themselves.” (r1a8)

There was a noticeable number of comments regarding visiting university or doing something concrete. “It would be nice, if I could visit the place.” (r1a5) was commented by a student, who wished to see how higher education studies work in practice. This notion

that these events needed to be concrete and/or students needed to go somewhere for them was a common theme in the interviews. Some of this might be because some of the interviews were conducted during the pandemic lockdown. Even then, no student expected any remote teaching or remotely organized events from higher education collaboration.

Interesting, Important, Fun. For the students the value expectation was mostly about learning about issues they viewed as interesting or important. “I would wish for more information about the application process.” (r1a5) was a common expectation, with similar thoughts expressed when talking about visiting university premises to know how the university life works in practice.

Interest and hobbies very much indicated in the students’ interest in participating in ICT related collaboration. However, even those who weren’t interested in ICT noted that “I will join, if it is interesting and fun enough.” (r1a9) when asked if they would participate in education collaboration organized by higher education. Some students clearly stated the same thing through negative: “I am not interested in information processing, so I would not participate.” (r1a7). The students also seemed to hold a view on education collaboration that there is no reason to target or even market ICT related outreach programs to students who are not already interested in the subject. “They were already interested, otherwise they would not have come.” (r3a3) said a student who had just introduced the workshop to his brothers. “I think that you get people that already know stuff” (r3a4) was noted when discussed about student marketing. One student pointed out that “If you can get money from it, it is a good career to study.” (r1a8) as a reason for why people should participate in ICT related events. Salary expectation came through from a couple of other students who were interested in the ICT field as well.

The students who were interested in ICT were also interested in the practical applications of the field. While this was more commonly answered as perceived value gained through previously participated in outreach programs, the students also stated that they were looking for such things. They would like to participate in “some kind of freeform project work” (r3a5), where they would do something practical and with a clear goal. They wanted “New skills, new experiences. You can meet new people and professionals” (r3a5) and get to know the field better.

Some students directly stated that if education collaboration happened during their classes, it would be more interesting for them. Especially students from the school round stated that they were interested in the school project because it was easy to attend for them. While no students from that interview round had participated in any education collaboration event before, they wanted to join. As the event was not mandatory, and there were many students who did not participate in the event, it would be interesting to inquire why those people did not participate. However, they were not interviewed in this study.

Where and When. Most students’ expectations of what higher education collaboration should provide were about things that were already present, and what they had at least heard of, if not participated in, before. The main things that they expected were university visits, career introductions, and workshops. None of these events provided new ideas, and for every suggested form of collaboration, there was at least one student who had participated in that kind of event. This would seem to suggest that at least from the students’ perspective, these kinds of events fill the stakeholders’ expectations.

When discussion drifted towards education outreach programs that did not happen during school hours, the answers seemed more positive. Some students outright said that because they are not interested in ICT or computers, they would not participate in the events. However, most students, even if they were not immediately interested in the subject, said that it depended on what that event contained. For some, this might have just been a polite way of saying they are not interested in ICT, but at the same time there could be room for marketing non-technical and possibly non-mathematical side of ICT and IS.

The students who were interested in ICT mostly raised concerns on the timing of these events. “If it is at a suitable time for me, I would participate.” (r1a6) Similar statements were common. This never was the only requirement stated by the students, but often combined with either interest in the subject or a wish to learn about higher education subjects. Similarly, the place of the event mattered to the students. Similarly to what teachers have stated [20], the closer the event is to the student the better. “If it is relatively close, like at the university of Oulu, I would come.” (r1a6). Similarly, the distance to the

university was clearly not an issue to the hobbyist students, who had already come to the university to participate in the workshop.

The view that the event can be within the city, but outside the school is different to the view expressed by teachers as reported by Rajala et al. [20]. This is probably because the teachers expected that the school is at least a bit involved in the event, and thus the requirement of their curriculum and restrictions posed by other classes affected their opinion. The students did not seem to have this restriction in mind, when asked about what kind of events they wanted to participate in. This is also true with the students who participated in the workshops during their classes. Those students saw that introducing education collaboration to their classes made it easier for them to participate in them, but when asked if they were interested in participating in similar kind of event outside of school, most did not see that as an immediate problem. Two students in that round noted that they probably would not have attended the event if it was outside of their Finnish class.

The school is an important factor for the students for information purposes. Most answered that their main source of information about higher education and education outreach programs was their school. Some even noted that other platforms were inadequate for that purpose. "You don't find it in social media" (r1a7) said one student, even if she noted that she tries to follow the relevant channels.

Some students had found information through search engines, or generally from the internet, but all those students were hobbyists who were already interested in the subject. But even they had not found out about the workshop that they participated in from the regular internet search. Most of the students had taken part in a similar workshop in the past and learned about this workshop from there or through a summer job listing.

4.3. Perceived Value by Students

The value that the students perceived they had gained from university collaboration can be divided into three categories: 1) Career guidance, where they gained knowledge of career opportunities and higher education possibilities; 2) Career related skills, where they gained skills that they think that they will need in the future; and 3) Creativity or enjoyment, where they perceived enjoyment or fulfillment of their creativity.

Career guidance was mentioned mostly by the students who had previously participated in the university outreach programs or events. The students who had taken part in events where students or university staff had come to introduce the subject to their school, or where the students had visited the university, saw career guidance as a value in education collaboration. One student (r1a4) noted that it was great that there were many people on many subjects in one event telling students about career possibilities. She described the event as "compact and informative".

Career skills were emphasized more by the hobbyists who were taking part in a maker space workshop. Those students were already interested in ICT, robotics, or engineering to some degree, so to them the skills gained from the workshop were important. "After all the classes I have taken, when there is a small break, it strengthens the knowledge." (r3a3) said one student who had taken part in similar workshops for multiple years. A similar idea was stated by another student who said that "I'll come again if the same position is available. Then I will know what they do at the [maker space]", though that person was unsure if he had any use for those skill in the future. Also, one student was interested in ICT and noted that: "It is a new job. If you know how to do it, you can use it on other things. You can do your own projects." (r1a8).

Creative and Enjoyable aspects were highlighted related to interest and hobby projects. A student who was interested in the subject and used the skills gained in his spare time noted that after the workshop "I know how programming works, and how 3D-printers and laser cutters work" (r3a2) and that he gained skills to use these tools by himself. Similarly interest and familiarity caused students to participate in the events. "I have been to code camps and coding courses since I was a child." (r3a2) All these things seem to stem from a need or want to build practical and concrete things and these students were "interested in what I can create with different kinds of tools." (r3a4).

Money was seen also as an important factor. Some students viewed money as a thing that they would gain later in life when they were employed, through the skills that they had acquired. Money was an important factor also for some students who took part in the maker

space workshop, as that was a paid summer job position. Interestingly though, no student brought up income from the workshop unless asked directly, so either they did not think it as an important factor for them, or they thought that it was so obvious that it does not need stating. However, one student did note that this was a different kind of summer job, and it drew them to participate in it.

4.4. Value Proposals to Others

The answers students gave to value proposition questions, i.e. what value do other stakeholders gain from education collaboration, were quite vague. Mostly the students were just indirectly quoting someone who had told them about it, like in case of students from the hobby group, who had been told at the beginning of their workshop that it is part of a student marketing push. “To get more technology people. They always hint that I should go to study technology.” (r3a3) Even when the students did not notice career marketing directly, they saw sharing of knowledge and how that leads to careers. “Give youth more experience on what you can do with that kind of machines.” (r3a2) and “Get people interested, so that they will study it in the future.” (r3a2) were stated by the same student after going through a small thought process.

The students also saw utility in their participation. The students from the school round took part in a user experience workshop for a specific program that they used every day in their school. Those students saw that their output during the workshop could help the company to develop a better program as a result. Most of the students also thought that the workshop was a unique opportunity both for them and for the company, as they did not believe that the company performed these kinds of workshops often. Within the scope of this study, it is impossible to know whether that assessment was true or not.

Interestingly, no students mentioned networking with higher education students as value; not even anybody from the school interview round where they were in direct contact with higher education students. The students were only focused on the company and the software side of the workshop and were not sure what the university was there for, except to perform the interviews.

In both cases, it seems that the students only could see and thus propose value to others through what they were already told.

5. Discussion

This study was motivated by the challenges involved in student recruitment and marketing in IS degree programs located in ICT faculties and targeting upper secondary school students. There is little understanding of what kind of value the students experience in IS outreach programs. For the success of such programs, it would be critical to understand what value to propose and try to generate for these students. To fill in the identified research gap and to contribute to IS education research, we asked as our research question: What kinds of value upper secondary education students have gained or expect to gain from involvement in IS outreach programs? We carried out an interview study with 20 students and in our data analysis we relied on service dominant logic [29] as our theoretical lens.

Our data tells a sad story about education outreach programs from the viewpoint of ICT and IS, at least in city of Oulu area in Finland. Practically no participant had received any information about IS, ICT, or any computing related field from their own school. Then again, this is not such a surprising finding as this correlates with findings of a study on freshly enrolled students to university ICT majors [21].

Our study indicates that despite this shortcoming, the students can inform us about the design of education outreach programs: they managed to come up with value expectations and value propositions as well as identified value they had gained through their own participation in the programs (see Table 2). For value expectations, the students hoped to gain information about the university and career options. They also hoped to gain practical experiences of studying at the university. The event being fun was pointed out as well. However, existing interest was seen to heavily shape their decision on whether to participate. Easy access to the events in the sense of integration with the schoolwork was pointed out. The students were able to identify university visits, career introductions and

workshops as something they could potentially gain value from. They pointed out the need for the school to inform about the events. Organizations engaged in ICT education in informal learning settings and informal projects with clear goals were also pointed out. However, existing interest was again seen as an influential factor.

Some students reported on the value gained. We identified three main categories for that: career guidance, learning career related skills, and enjoyment, the first being the most common value while the second being emphasized by the hobbyists. This aligns with the findings from the prior literature, where students perceived career guidance and gaining of important skills as gained value [22]. However, the literature remains silent about enjoyment as value student gain in this type of efforts. Providing enjoyable and fun experiences seems to be something IS research should explore further. Money came up both as a motivator to choose an ICT career and as a motivator to take part in the event. On the other hand, our study remains silent about many benefits for the students identified by the prior literature, such as gaining of university credit units, improving communication skills, or improving course selection [22]. These can at least partly be explained by the education outreach programs the respondents were familiar with or could imagine.

Table 2. Value expectations and perceptions upper secondary students have on outreach programs

Expected value	Perceived value
- Information about university and career options	- Career guidance
- Interest and fun of participating	- Career related skills
- Easy to attend as a part of their studies	- Creative and enjoyable experiences

The students were also able to pinpoint some value to be gained by other stakeholders through engaging in outreach programs, although they mostly seemed to repeat what the other stakeholders had said to them. They could propose value for a limited number of stakeholders and from a limited angle, probably shaped by their limited experience and knowledge on this matter. The prior literature has broadly considered the higher education and secondary education organizations, teachers, and administrators as well as companies and societies as actors benefitting from this collaboration [20, 22], while these aspects remain unexplored in this study.

There were not very clear differences between the students from different rounds after all. Understandably, the hobby group was most interested in participating in the activities due to their existing interest in the field. But students in general were happy to receive career guidance while doing something fun and learning new skills.

Overall, the students were having difficulties in identifying alternative forms for the education outreach endeavors; their imagination seemed limited to what they had experienced or heard, i.e. to university visits, career introductions, and workshops. Courses and events offered to upper secondary schools have been discussed in the literature, too [2, 15, 18, 25] and our study aligns well with the view that most outreach programs at least in Finland are purely marketing and introduction events [2]. In our study, more extensive collaborative efforts involving industry, university and school representatives remained unaddressed [9, 12, 14, 16], while the workshops offered for students during their leisure time in the university makerspace can be seen as an attempt towards that direction.

For future IS research and education, we recommend a participatory approach initially explored in this study: we suggest inviting students to design the education outreach endeavors. It is not a problem that students were unable to imagine alternatives, as this is the case with any participatory effort: participants are not expected to propose novel design solutions, but to describe their life world, interests, values, problems and needs, based on which designers are to come up with solutions. These students informed us about their interests and requirements for outreach programs. We should now be considering how to make them fun and enjoyable experiences for students, but also accessible and informative ones. As ICT field does not seem to interest many in the contemporary society, indicated by a number of studies reporting on the challenges in student recruitment in ICT [23, 24], our outreach endeavors could possibly be combined with those of other disciplines. This would enable students to gain a comprehensive information package on career options, within which we could sneak in valuable information about our interesting field. This information might in this way reach audiences it would not otherwise reach.

6. Conclusion

ICT field, including IS, is in dire need of more workers but young people are not necessarily interested in careers in the field. As our study shows, students are interested in participating in education outreach programs if they feel that they enjoy the activities, get career guidance, and the activities are easy to reach. However, no great enthusiasm to attend was seen in our data. That is why we want to stress the enjoyment aspect in this kind of activities, and we propose combining them with other disciplines, or possibly with arts or contemporary topic known to interest young people, to increase their motivation to attend as well as the potential of value gain for them. This study is limited by the relatively small number of participants and the fact that the participants were from one city and from one country, with relatively uncommon study program structure. Future studies with a larger number of participants, in different countries, and different study programs could be done to gain increased understanding of the topic of the study.

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