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▶ To cite this version:

Helga Sigurðardóttir. Empowering Women to Seek Careers in Game Development and Creative IT Studies. 18th Conference on e-Business, e-Services and e-Society (I3E), Sep 2019, Trondheim, Norway. pp.103-115, 10.1007/978-3-030-39634-3_10 . hal-03759108

HAL Id: hal-03759108

https://inria.hal.science/hal-03759108v1

Submitted on 24 Aug 2022

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Empowering women to seek careers in game development and creative IT studies

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Abstract. The purpose of this paper is to investigate what may increase the interest of young women in considering studies and careers within game development and creative IT studies in Nordic countries. The study is based on data gathered through a Nordplus project in 2017-2018, in Iceland and Norway, through surveys and group interviews with 16 - 19 year old female secondary school students and one of their teachers.
The findings reveal that young women appreciate chances to try out some creative IT tools and the participants also expressed generally positive attitude towards creative IT. They regret not having received more information about creative IT as well as insight into creative IT fields, study and job opportunities throughout their schooling, and they appreciate visible female role models within technology.

Keywords: Young women in creative IT, recruitment of women to creative IT, role models

1 Introduction

Gender aspects in digital games industry have become increasingly acknowledged and discussed in recent years [1-2][1]. This study is based on data gathered through a Nordplus preparation project in 2017-2018. The project was a cooperation project between Nord University (Norway), Reykjavik University (Iceland) and Aalborg University (Denmark) and several other supporting institutions and organizations. It resulted in another 3-year project where the focus on this topic is further developed. The involved university departments offer programs within a variety of areas such as Games and Entertainment Technology, 3D art, animation & visual effects and Film & TV production (Nord University) and Computer Science (Reykjavik University). To try to group all the relevant subject areas under one concept I use the common label "creative IT" – sometimes adding "media technology" as well.

In all the respective university departments, female students are a minority, in some cases not present at all [3]. The Nordplus project aspires to find solutions to

[1] A quick clarification of how I refer to "gender" in this paper: The data is limited to the traditional binary division genders; male and female. This is not to say that I am not aware of the complex nature of gender, sex and sexual identity, not necessarily bound to physically assigned sex. The non-exclusionary group of participants who identified as female may have included trans-non-binary students but the act of identifying as female was the only requirement.

such challenges, aiming for increased gender balance. This study is based on data from the preparation project, gathered through 2 different mini-workshops that were carried out with upper secondary school students in Norway and Iceland. The goal was to identify factors that might increase the interest of young females in considering studies and careers within game development and creative IT studies.

The paper is organized as follows: I first present an insight into previous research and theory. I then briefly describe the methods and introduce the data, followed by a presentation and a discussion of the findings. As this study is based on experimental workshops from a preparation project, the conclusions of this paper are first and foremost an indicator for further areas of focus and investigation.

2 Background

It is sometimes said that the core values of a culture are reflected through its most popular games [4]. If there is any truth in this, our culture has a long way to go, as women are still vastly underrepresented in video game content, in spite of some positive signs of change in later years [5]. The underrepresentation of women in game content seems to correlate with a sexist gamer culture and the underrepresentation of women in the programming, game development and creative IT workforce [6, 2]. Women in these disciplines frequently experience discrimination. The 2014 #gamergate controversy, among other things, brought this to light, as female game designers and game critics came under unfair scrutiny and suffered severe personal and professional harassment [7-8]. This situation, as well as widely accepted assumptions about digital games being a male-oriented and male-dominated domain, make it as important as ever to emphasize inclusion when designing digital games [9, 2]. Diverse teams, with regard to such factors as age and gender, have further been proven to contribute to the efficiency and success of software development projects [10].

Gender stereotyping has not proven successful in the commercial video game industry [1]. Nowadays women play about as much, or possibly even more digital games compared to men [11-12]. The current target customer is not the stereotypically assumed young, single, white male, but a wide range of individuals of all ages, genders, racial identities, marital statuses etc. Furthermore, designing designated “girl games” has not always turned out well, as using stereotypical gender roles as a foundation for engaging game play can be quite a bit of a challenge and can have a discouraging effect on the intended consumers [13, 1]. Evidence indicates that the gaming preferences of males and females overlap to a large extent [13]. At the same time women dislike heavily gender-stereotyped characters [14]. Constructing video game audiences through marketing may influence which groups get to be represented in the games, at the same time as shaping who identifies as a gamer [1].

A report from the Norwegian Media Authority in 2018, titled “Children and media” indicates that gender influences a variety of surprisingly different variables. For example, there are gender differences with regard to how many 9-18 year old children report playing digital games – 63% of girls vs 96% of boys. Although at 9 years old equally many girls and boys report playing, 93%, the number decreases with age.

Boys also report playing more often and for longer periods at a time. Although boys and girls share a fondness for some games, such as Minecraft, there is quite some difference in titles and genres between the genders. Gender also seems to have an impact on what kind of equipment is used for playing, how much the parents know about gaming and how many games with a (too) high age limit are played, to name some examples [15]. A comparable report from 2013 in Iceland shows similar trends. While only 72% of 9 – 15 year old Icelandic girls played digital games, 86% of 9 – 15 year old boys played digital games [16]. A new, unpublished report, suggests even higher numbers in total, indicating that 94% of children aged 6-12 play video games regularly, as well as 86% of children aged 13-17 [17]. Like in Norway, the boys also played more frequently and for longer periods than the girls. Only 24% of the Icelandic boys felt that their parents were well informed about the games they were playing, as opposed to 32% of the Icelandic girls [16].

Other research further demonstrates gender difference in behavior and relationships towards digital games. For instance, girls name a larger variety of games that they play in their free time, in spite of playing less in general than boys [18]. In some cases, girls seem to employ and stress not having skills in the domains of digital media or gaming, to assert their femininity [19]. Steinkuehler [20] draws to our attention a possible correlation between the fact that while boys seem to play more video games than girls they also seem more challenged in some aspects of school and education than girls. In Norway, girls in lower secondary schools score higher than boys in international comparisons of pupil's ICT skills [21]. At the same time, parents are commonly concerned with possible risks with regard to their children's online activities and tend to regulate girls' internet use more than boys' internet use [22].

Computer technology and related fields are traditionally seen as masculine sectors in Norway and Iceland, as in many parts of the Western world. In some other parts of the world, such as in Malaysia, the same sectors are considered feminine [23-24]. In order to address this technological gender gap, a number of initiatives have recently and currently focused on recruiting girls to game coding courses and programs, aiming to increase their interest, motivation & self-efficacy [25-27].

Code clubs are volunteer organizations, aiming to teach children basic coding skills through play and exploration. A 2015 study of gender proportions in code clubs in Norway revealed that in 7 code clubs across the country girls represented under 20% of the participants, with only one exception where the proportion reached 35%. It also indicated that the dropout rate was significantly higher amongst girls than boys [3]. Another study, from 2016, suggests that the code clubs focus more explicitly on recruiting girls [28].

The recruitment of women to IT studies at Nord University (former HiNT) has remained relatively low from the beginning of the studies, some 30 years ago – in spite of some peaks as a result of early campaigns to recruit more women. Recent numbers for the current Games and Entertainment Technology bachelor program at the same university confirms that the dropout rate amongst female students is considerably higher than for males [3].

Universities are currently not meeting the needs and demands of the growing IT sector, when it comes to educating enough professionals. Amongst those who do

graduate, the proportion of women is alarmingly low [29]. A research amongst college students in USA showed that women had significantly lower interest in CT fields than their male counterparts. There is evidence that young women give up on IT and computing before they graduate from secondary schools [29-30].

In 2016, women were only 13% of the workforce in the Norwegian Game industry. Furthermore, there are «reasons to believe that women are overrepresented in administrative positions and that the proportion of women game developers is thus even lower" [31]. In the flourishing Swedish game industry, female video game developers are considered to have insight into women gamers' preferences. This is seen as their primary advantage to their male counterparts, rather than their professional skills. While this belief is used to justify womens' participation in the game industry, it also ties them to a "specific gendered domain of expertise" [2].

While Norwegian authorities are reporting increasing need for individuals with IT- and engineering competencies [32], representatives of both the Norwegian and Icelandic IT-sector alike have in recent years highlighted a growing need for more women in the sector [33-34]. In both countries, several measures have been taken in order to increase the participation of women in the gaming industry, IT and other technological professions [35-36]. A similar trend can be seen in Sweden [2]. and in other parts of the Western world [37-38].

There is some disparity in research when it comes to the importance of role models. Several studies have supported the widely acknowledged assumption that women role models are important when it comes to career aspirations and attitudes of female candidates to science, technology, engineering and mathematics [39-40], and that female role models are a key factor in recruiting women to game studies [41] and other IT fields [42]. Research has even suggested that role models can help to improve womens' performance in male dominated studies [40]. According to one study, on the other hand, male and female role models are equally effective for female recruits [43]. Another study concluded that the gender of a computer science role model had no effect on women's interest in their field, while whether or not the role model was a stereotypical representative of computer science turned out to have both an immediate and lasting effect. To explain a bit further, a stereotypical computer science representative, for instance, claimed having these hobbies: "video games, watching anime, and programming" and "Electronic Gaming Monthly" as a favorite magazine – as opposed to the non-stereotypical representative who's hobbies were "playing sports, hanging out with friends, listening to music'' and the favorite magazine was "Rolling Stone" and so on. The study concludes:

> "Women who encountered a role model who embodied computer science stereotypes were less interested in majoring in computer science and felt less belonging in the field compared to women who interacted with a non-stereotypical role model or no role model [44].

Motivating and empowering young women to consider seeking studies and careers within creative IT is thus widely supported. Not only is the sector in growing need of workforce [40][32] but also benefits from diversity in terms of efficiency and success [10]. A diverse workforce may also provide role models to attract even more diversity

[39][40]. Diversity is further assumed to potentially lead to inclusive content, catering to a more diverse audience [9] which again likely leads to profit [1].

3 Methods

This study is based on a Nordplus project that bears the title Girls Just Wanna Have Fun-damental IT-skills. The project aims to empower female students in upper secondary schools and to motivate them to consider studies and careers in game development and other creative IT studies in the Nordic Countries. Nord University (Norway), Reykjavík University(Iceland) and Aalborg University (Denmark) as well as several upper secondary schools, organizations and institutions in the three countries cooperated to prepare a more substantial 3-year project. In the pre-project the participating universities had, among other things, two experimental workshops, to test out ideas on how to engage and motivate potential female applicants in the fields of creative IT and game development. Other project partners that were directly involved in the experimental workshops of this study were the Centre for gender equality in Norway (KUN) in the Norwegian workshop, and /sys/tur – a network for female students of computer science at Reykjavík University in the Icelandic workshop.

The data were gathered in the workshops, and consist of survey responds of a total of 25 upper secondary school pupils who identified as girls, in Norway and Iceland in the winter of 2017-2018, participation observation in workshops, field notes and informal and formal interviews. The goal of the workshops was to have the participants try out some creative and playful approaches to IT. As a research method workshops are a good approach to inspire new insight into a research domain, preferably in combination with other empirical approaches [45]. In addition, field notes from informal interviews or discussions with the groups of participants and an interview with one of their teachers also provided valuable data.

There were 17 participants in the workshop in Norway and 8 participants in the workshop in Iceland. They were aged 16 – 19, with a majority of 20 within the younger two years, 16 and 17 years old. They were pupils at a total of three upper secondary schools, one in Norway and two in Iceland. All had chosen some subjects that somehow relate to creative use of IT and/or media technology. The teacher who was interviewed is an Icelandic woman in her early fifties who teaches visual art and has considerable experience within digital art.

The workshops lasted for just under 2 hours and consisted of short presentations and practical assignments. In the first workshop, in Norway, the program started with a short introduction and an inspiring talk by a member from the Centre for gender equality, followed by a group activity using a coding game (Box Island), a quick price ceremony, another short and inspiring talk, a survey, group discussion and final words. The project partners from Nord University in Norway served both as facilitators and as participant observers in the Norwegian workshop.

Similarly, the program for the workshop in Iceland consisted of a short introduction and an inspiring talk by female students of the /sys/tur network, a group activity using a tool for coding music (Sonic Pi) where the /sys/tur network members assisted

the upper secondary school pupils. In Iceland, the partners from all three project partner universities took on the roles of participant observers.

After the workshops, the participants were presented with a survey, a brief group discussion and concluding words. The adults present in the Norwegian workshop, were a total of 2 women and 3 men, including 2 male upper secondary school teachers. In the Icelandic workshop, the present adults were 7 women, including one of their teachers, 4 computer science students from the /sys/tur network and 2 men.

The surveys were short and were presented towards the end of each workshop. All the 17 participants from each workshop in Norway responded. The surveys consisted of a total of 6 topical questions, of which 2 were open-ended, and 2-3 background questions. The background questions varied slightly between the two countries, as some improvements were made from the first to the second version of the survey. The topical questions all sought to reveal the participants' views and opinions regarding creative IT and how to get girls more interested and motivated. The participants could choose to be completely anonymous, or to provide their contact information in the surveys. In either case the data was treated confidentially.

The informal discussions with the groups of participants, as well as informal chats before and after the workshops were centered around similar themes as the survey. Notes were taken during the workshops and further processed those into short reports after the workshops. A telephone interview with a teacher aimed to look further into some of the topics. The teacher teaches at an upper secondary school that four of the Icelandic pupils attended. The phone interview was recorded and key points were summarized in a written form.

As the survey was short and the participants few, the survey data do not provide for a statistical analysis. However, the survey contents, including the answers to the open questions were roughly analyzed and coded, alongside the qualitative notes and interview. All the data was, in other words, viewed as interconnected. It was processed and interpreted simultaneously as a whole.

The data may have certain biases, as all the participants in the workshops have some experience with school subjects related to creative IT and all of the participants signed up for the workshop on their own initiative. It should also be noted that in addition to this bias the total number of participants in this study was simply too low to facilitate any sort of generalizability. The findings can thus not be viewed as anything more than an indication.

4 Findings

On a 5 point Likert scale, thirteen of the twenty-five participants reported finding it "rather" or "very likely" that they would consider working with media technology or creative IT in the future. A total of six respondents found it "neither likely nor unlikely". None of the girls replied that it was "very unlikely". Six of the participants, all of whom had attended the Norwegian workshop, answered that they found it "rather unlikely". A chat with the group of participants before the Norwegian workshop revealed that several of the participants had already firmly decided what to study in

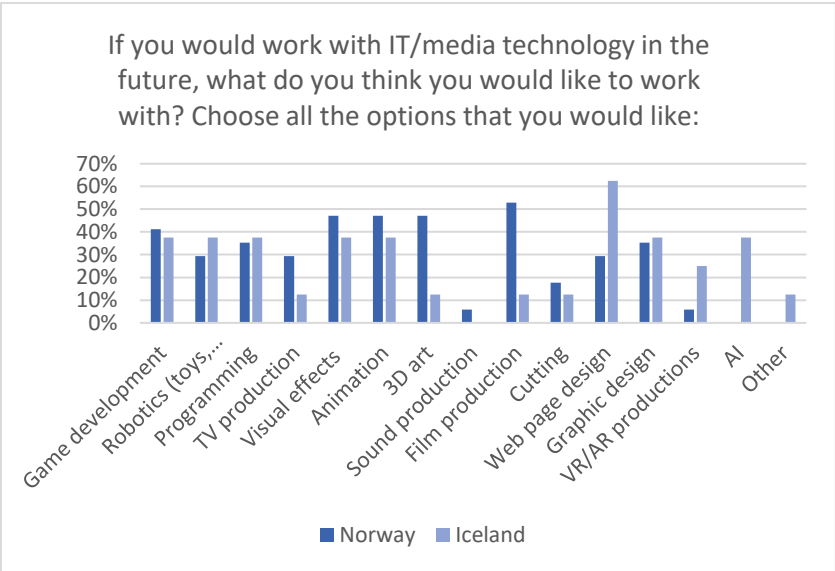
University. The fact that 8 of the Norwegian participants came from a preparatory program for university studies in their upper secondary school, may have been a factor here. The Icelandic teacher noted that she feels that the girls need more preparation and motivation than boys do, when it comes to considering careers within creative IT.

The participants were presented with a list of focus areas and asked to pick all the options that they would consider working with, if they were to choose to work with creative IT or media technology in the future. The list consisted of: Game development, robotics (toys, health, industry etc), programming, TV production, visual effects, animation, 3D art, sound production, film production, film editing, web page design, graphic design, VR/AR productions, artificial intelligenc and "other".

The most frequently picked subject for the Norwegian participants was Film production (nine out of seventeen chose this option). The most popular subject for the Icelandic participants was Web page design (five out of eight chose this option). Group discussions revealed that several of the Norwegian participants have attended a course on film production. None of the Icelandic participants reported having worked with film production, and only one Icelandic participant picked this option in the survey. At the same time, several participants from Iceland reported having had an introductory course in web design and their teacher confirmed this on behalf of one of the schools.

The overall most popular options for possible future occupation were visual effects and animation, picked by a total of eleven pupils each. 10 participants picked film production, web page design and game development. The third most popular options were programming, 3D art and graphic design. The least popular subject was sound production, picked only by one participant, from the Norwegian workshop.

Figure 1: The percentage of participants from each country that chose each option



When asked what would make them “even more interested” in creative IT/media technology, eleven participants wrote open answers. While the answers presented a variety of views, five of them had a common theme. They revealed that the girls found that information and opportunities regarding their creative IT/media technology options were lacking. One Norwegian participant phrased her comment this way: “I wish we got more information about media technology, then I’d definitely be more interested” while an Icelandic participant wrote “If one could get to try out more and get to see what it is like to work with this and what kind of jobs there are”. Interest in learning more about what the students of game development and other creative IT studies do in their day to day life at the university was also mentioned in this context in a group discussion with the Norwegian participants. They also expressed an interest in participating on some of the activities of the university students to gain a better insight.

During the workshop, the participant were all focused on their tasks and seemed highly emerged when trying out the creative and playful approaches to IT. The final topical question was “Did this workshop influence your opinion about working in creative IT/media technology in the future?”, to which answers were presented on a 5 point Likert scale, from “yes, very positively” which 15 Norwegian participants picked – to “yes, very negatively” which 1 Norwegian participant picked. While the Norwegian participants thus leaned towards the most assertive options, the Icelandic participants centered around the more neutral center of the scale. Six Icelandic participants claimed neutrality, but only 1 Norwegian participant. One Icelander chose “yes, rather positively” and another one picked “yes, rather negatively”. In an interview after the workshop, their teacher confirmed that the students had enjoyed the workshop and that it had opened new horizons for them. At the same time she commented that it had been a little too short to be likely to have any permanent effect on their future choices.

The tools that were used in the practical parts of each workshop were very different. In the Norwegian workshop, Box Island, a coding game that is aimed at a very young audience [46] was employed. The purpose was to present the strategic thinking that underlies programming, in a playful manner. The fact that the game was directed at a younger target group than the upper secondary school participants resulted in the participants finishing the free version of the game very fast. In spite of this, they were deeply engaged while playing through the game - and responded positively in the survey, with fourteen of the seventeen respondents claiming to have liked the game “very much” or “fairly much”. When asked to reflect on what the game had taught them, seven out of the fourteen that answered that question mentioned “logic” or “strategical thinking”. Creativity, cooperation skills and problem solving were also listed.

Sonic Pi, the tool that was employed in the workshop in Iceland is sufficiently suited to mature age groups. The participants played in groups of two and three. At first they seemed a bit shy, but with encouragement from the female computer science students, they soon became emerged in the activity. Seven out of eight respondents reported having liked the tool “very well” or “fairly well”. As for what the tool had taught them, two simply commented that they had learned that the program itself,

Sonic Pi, was “fun”. One respondent commented “that anything can be achieved through programming, such as composing music”.

A group chat with the Norwegian participants at the end of the workshop brought to light that they had been pleasantly surprised to learn that several women had contributed to the advancement of modern technology. In the introduction and an inspiring talk, a representative of KUN centre for gender equality had presented several women pioneers of technology, such as Ada Lovelace, Hedy Lamarr, Grace Hopper and more. This turned out to have made a strong impression on the participants who claimed to not have been aware of the contributions of women to such technological development, prior to the workshop. They furthermore highlighted the importance of female role models and when asked which ones of them had any women role models within creative IT and media technology areas in their family or surroundings, only one out of the seventeen Norwegian participants raised their hand. The Icelandic teacher also mentioned the importance of role models. She observed that having volunteers from the network for female students of computer science seemed to influence the workshop participants in a positive way, as they were relatively close to the participants in age. She also commented that they since the volunteers had come across as pleasantly “casual and laid back” and answered and guided the upper secondary school girls openly and with a friendly and encouraging attitude, this too was a motivating factor.

5 Discussion & Conclusion

The participants in this study expressed fairly positive general attitudes towards creative IT. When asked if they would consider working with media technology or creative IT in the future, a rough half of the respondents considered it likely and six more respondents took a neutral stand. When it came to considering subjects to work with in the future from a list of preselected creative IT and media technology subjects, the participants seemed to favor subjects that they had already had some experience with. The most popular options were visual effects, animation, film production, web page design and game development. Differences in preferences between the countries seemed to correlate with which subjects the participants were familiar with from their upper secondary schools. Although the participants of the Icelandic workshop got to experiment with the sound programming environment Sonic Pi and expressed a positive attitude towards it, none of them chose sound production as a possible future occupation.

The participants identified lack of information about creative IT as an obstacle in the way of making them more interested in the field. They regretted not having received more insight into the field throughout their schooling, more knowledge of the actual tasks and activities of students of game development and other creative IT-subjects as well as more practical information about relevant job opportunities in the field. In spite of the experimental workshops being very short, and while the Icelandic participants expressed a somewhat more doubtful attitude in this respect, the attitude was generally positive and a majority claimed that the workshop had influenced their

opinion about working in creative IT/media technology in the future in a positive way. Another key fact to highlight is they were both positively inclined towards the tools that they had gotten to try out in the practical workshop sessions – and reflective about their purposes.

Female role models within technology turned out to be important to the participants. They were intrigued to learn about some of the women pioneers of modern technology and emphasized the importance of female role models in their own environments. Their teacher also noted a positive effect of the presence and participation of female computer science students as role models in the workshop. Although the teacher's assertion may contradict the conclusion of Cheryan, Drury & Vichayapai [42], that the gender of a role model does not matter, it may also support their conclusion that counteracting stereotypes may work, as she described the young women from the /sys/tur network were fairly "casual", "laid back" and "friendly".

As the two experimental workshops were only short and were attended by pupils who were already more positively inclined towards creative IT subjects than average students, the Girls Just Wanna Have Fun-damental IT-skills project has some challenge ahead when it comes to finding effective ways to appeal to the average female upper secondary schools pupil. The findings of this study of the preparatory project do however provide some valuable indications that will be processed further in the main project.

While creative IT-workshops seem to have some positive effects on the participants' views, the identified obstacles of lacking information and role models draw attention to the importance of the education system. With increasing need for women's participation in creative IT, the education system may need to step up their game and cater to the seemingly lower technological interest of girls in ways that inform, motivate and inspire. The lessons learned from the preparatory project have resulted in the planning of frequent creative IT seminars for upper secondary teachers in the main project, where the aim is to equip and inspire teachers to address this need.

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