Digital Education For All: Better Students Through Open Doors?

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ABSTRACT

The Digital Education For All project (DEFA) is a joint collaboration of five universities to open first-year computer science courses online and for free to audiences outside of universities. Additionally, students who complete enough courses through the project can apply for a study right at any of the participating universities.

Completing university courses as a method of applying for a study right measures students' motivation over a long period of time, and gives the students a clear idea of the content they will encounter during their studies, whereas a traditional entrance exam measures competence only at a single point in time. While high school grades, another typical intake mechanism besides entrance exams, measure generic study skills, course-based intake mechanisms may help with student retention, as students express and gain interest in the field while completing the required courses.

This study is a preliminary examination of the student intake of the DEFA project in the University of Helsinki, one of the participating universities, and a comparison of how the students accepted through the project perform in studies compared to students accepted through other intake mechanisms. Students wishing to apply for a study right through this intake are expected to complete one regular study year's worth of first-year computer science and mathematics courses in approximately one calendar year.

CCS CONCEPTS

• **Social and professional topics** → **Computing education**.

KEYWORDS

admission policies, retention in computer science, intake mechanisms, student intake, student admissions

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1 INTRODUCTION

The usual Bachelor's degree in Finland is 180 ECTS[1] credits. The Finnish government has set a 3-year target time for graduation; this target influences both the students and the education provider. Students can receive financial support during their studies, and the support has two parts: a monthly grant and a government-guaranteed loan. The grant can be received for up to 30 months for the Bachelor's degree. The loan also includes a built-in incentive for in-time graduation: if the degree is completed within the target time, up to a third of the loan may be compensated.

There is also a built-in incentive to meet the graduation target time for the education provider. The Finnish government started a new funding model for universities in 2021[2]. There are three main parts in the model: 1) education, 2) research and 3) other education and science policy considerations with weighting factors 42 %, 34 % and 24 %, respectively. Within the education part, the financial focus and the aforementioned built-in incentive comes from the number of completed degrees: the number of degrees completed within the target time or within 12 months after the target time will be compensated with weighting factors of 1.5 and 1.3, respectively.

The normal intake mechanism to tertiary education in Finland is via a nationwide joint application system. In this system, applicants rank up to six education providers in a decreasing order based on their interest. When they score enough entrance points for any of the education providers in their list, they are given the opportunity to enrol in the one with the highest rank in the list. In this system, the entrance points are based on success either in the matriculation examination taken in the final year of high school studies (with certain discipline weighting factors) or in a separate entrance exam. The main shortcoming of this mechanism is that it ostracises individuals suffering from stress in an examination situation. Moreover, as computer science has traditionally not been taught in high schools in Finland, many people either do not apply in the first place because they do not know the discipline, or discontinue their studies having had a false impression of what computer science really is like.

Another intake mechanism in the University of Helsinki is via Open University. A student completing the basic studies module (25 credits) of computer science within 3 years and with a weighted grade point average (GPA) of at least 3.5/5 is entitled to enrol in the Bachelor's programme. Our programme, however, has offered extra intake mechanisms.

[1] *European Credit Transfer and Accumulation System*, in which each credit corresponds to approximately 27 hours of work, and 60 ECTS credits to full year of studies.
[2] The principles of the model can be found here: https://minedu.fi/en/steering-financing-and-agreements.

In 2012, we started a MOOC path where the students had to complete two courses (introduction and advanced course in programming, 5 + 5 credits) in 14 weeks [11, 20]. Any student managing to complete 90 % out of the weekly assignments throughout the courses was invited to an exam. The top 50 students of the exam were given a permission to enrol in the computer science programme. Over time, this path became highly popular, ending up in a situation where this path got more competitive than the joint application system. Moreover, as the path became more and more populated by people already in the job market who only had the interest of the benefits of a student status and no plans to complete their degree, we decided to replace that path with another one, hopefully better targeted to motivated students.

In 2017, we began a 3-year-long pilot project with four other universities, supported by the Ministry of Education. The aim of the Digital Education For All project (DEFA) is to open computer science studies to everyone, and to try a new intake mechanism favouring hard-working students. As the five participating universities are rather different in the application popularity and number of annual intakes, each participating university planned their own requirements for intake. We decided to offer the right to enrol to any student completing 50 (only in the first year of the project) or 60 credits of our MOOC courses within a calendar year. This corresponds to a full year of studies in the ECTS.

The Finnish government has taken several measures in order to lower the average age both of students starting and completing their university studies. One specific feature of computer science is that students are desperately wanted in the job market, and therefore widely employed in an early phase of their studies, resulting in a long tail in the graduation distribution.

By offering a new intake mechanism, we aim at finding good, motivated students who hopefully graduate younger and in less time. In this paper, we report preliminary results on whether the new DEFA intake mechanism meets these goals.

This paper is organised as follows. Section 2 reviews common university admission policies and computer science student retention. Section 3 describes the context of the study, as well as the data and research methods used. In Section 4, we present the results of this study, which are then discussed in Section 5. Finally, we summarise the work and outline future directions in Section 6.

2 RELATED WORK

Admission policies vary from university to university. Most commonly, students are required to have successfully completed primary and secondary level education to be eligible to attend tertiary education, i.e. university studies. However, since typically only a limited number of students can be accepted due to resource constraints, tertiary educational institutions often consider additional merits such as secondary education (e.g. high school) grades, or rank students based on scores from university entrance examinations.

Aspects that have been considered in university admissions include, for example, entrance examinations specific to the university or study program [6], national or universal entrance examinations where students apply to multiple universities or programs at the same time [1, 2], high school grades [15], standardized tests taken by high school students (e.g. the SAT and ACT exams) [15], extracurricular activities (e.g. activity in student clubs) [9], motivation letters/essays [5], and recommendation letters [10]. All of these measure different aspects of potential students and universities often take multiple aspects into account in their admissions. Some are entirely merit-based and objective such as standardized test scores or high school grades whereas others are more subjective such as motivation essays and recommendation letters.

In Europe, most universities are publicly funded [8]. Thus, in some countries, public authorities have a say on how many students are admitted to specific university degree programs [17]. Pruvot and Estermann [17] categorize European university admission policies into three models based on who decides on the policy: 1) universities, 2) external authorities, or 3) co-regulated by universities and external authorities together. Countries where universities can freely decide admission policies include, for example, the UK, Ireland, Finland, Poland and Italy. Countries where external authorities decide admission policies include, for example, France, Belgium, Switzerland and Austria. Many countries also have free admission policies, meaning that generally all students who wish to enrol in universities are allowed to do so [17] – these include, for example, the Netherlands, France, Belgium, Switzerland and Austria.

Comparing open admissions to selective, competitive admissions, one major limitation of open admissions is that a larger student body requires more resources from the university. On the other hand, tertiary institutions usually get more resources if they can attract more students, for example, more tuition fees or more government funding. Nguyen and Lewis found that the presence of competitive enrollment policies, i.e. requiring an application or certain grades, for computer science programs negatively predict students' sense of belonging, self-efficacy and perception of the department being applied to [14]. They suggest that competitive enrollment policies may thus have unintended consequences. Regarding open admissions, the US National Center for Education Statistics reports that tertiary institutions with open admission policies report lower graduation rates compared to more selective institutions [7].

STEM (Science, Technology, Engineering, and Mathematics) subjects, and especially computer science have often been claimed to have high dropout rates [12, 16, 19]. In computer science, it has been found that globally, around one third of students fail the introductory programming course [3, 21], which could partly explain the high dropout rates in CS programs: students who do not pass the introductory programming course are unlikely to continue in the computer science degree since it is usually a requirement for more advanced courses. The high dropout rates could also be partly explained by students' lack of understanding what the CS programme entails. Thus, it is important to study alternative intake methods that could help bring in motivated students who end up completing their degrees. In this article, we study how students accepted to a CS undergraduate programme through an alternative intake method based on motivation and inspired by open admission policies perform in their studies compared to students accepted through traditional admission pathways.

3 METHODOLOGY

3.1 Context

The study was conducted at the Department of Computer Science at the University of Helsinki, a public research-first university in Finland. Students apply for a combined Bachelor's and Master's degree programme, and choose their major at the time of application. The Bachelor's degree consists of 180 ECTS credits with a target schedule of three years, while the Master's degree is 120 ECTS credits with a target schedule of two years. Thus, students are expected to complete approximately 60 ECTS credits each year. The first year of the Bachelor's degree is mostly computer science and mathematics courses with a heavy focus on programming and introductory topics such as databases.

Most of the students enter the computer science programme through what we call the "main intake", which consists of two possible intake routes: an entrance exam or high school matriculation examination grades. The computer science programme also used to have a third intake route for the main intake, a MOOC intake described in [11, 20], and similar to [13]. The MOOC intake has since been discontinued, but is included in the data set for the sake of comparison. Besides these, the programme has also admitted a small population of students through open university courses.

The DEFA project is an extension of the open university intake. Students applying to the University of Helsinki through the DEFA project are expected to complete a year's worth of studies relevant to computer science. There are 30 credits of basic courses that are mandatory, including 5 credits of mathematics and 25 credits of computer science, while the rest of the required credits can be collected from a wide variety of computer science, mathematics and statistics courses. The project offers almost 60 courses for free from five universities, totaling in over 200 credits. The offered courses are mostly online, with a few exceptions when it comes to exams. All the course content offered through the DEFA project is comparable, and in some cases identical, to the courses university students take.

The DEFA intake does not have a grade average requirement – instead, the students have to complete the required number of credits in one calendar year, allowing them to complete courses from the beginning of July until the end of June. The courses completed for the application are accepted as is for the degree after receiving a study right, meaning that the students accepted through the DEFA intake effectively start their studies from the second year.

The idea behind the conception of the DEFA project is to reach more motivated applicants who also will have a clear grasp of the requirements and the content of university and computer science studies when at the very beginning of their studies. Our hope is that these students would be less likely to drop out of university. Compared to the main intake, the DEFA intake should also help those students who do not perform well in entrance exams due to exam anxiety, or have not performed well in high school. The DEFA intake makes it possible for these students to show their motivation and capabilities in computer science through actual studies, and use this to acquire a study right.

3.2 Data

The data used for this study consists of study records containing all the courses a student has taken in the University of Helsinki. Courses completed in the other universities participating in the DEFA project are not included in the data. From this data, we examine the credits and grades accumulated during the first two years of studies for students who have been accepted to the computer science programme in 2018 or 2019. For the DEFA students, the first year of studies is the year they participate in the DEFA courses, and the second year is their actual first year in the university.

For the purposes of this study, we have defined a *DEFA student* to be a student who has completed more than 50 credits from the DEFA course list in a year, and has been accepted to the computer science programme immediately after their DEFA study year. We also identified students who have most likely tried the DEFA project, but failed to complete the required credits within a year for the DEFA intake, and got accepted through some other intake mechanism. We have labeled these students who completed more than 30 credits as *DEFA tried*. This is to try to differentiate this group from *open university intake*, which allows students three years to complete 25 credits of set basic computer science courses with a GPA of 3.5/5 to get a study right.

Besides the aforementioned intake mechanisms, we also examine two other intake groups for comparison. The *main intake* consists of students who have received their study right either through an entrance exam or with their high school matriculation examination grades. This is the largest group in the data, and the students from this intake usually have very few, if any, courses completed at the time of the admission. In the years under study, the university also had a *MOOC intake*, which allows students to complete a semester long programming MOOC and apply for the university if they succeed well enough [11, 20]. These students have at least 10 credits from the programming MOOC.

With this division, we end up with five intake groups with 437 students in total. The intake populations from our data for two years are as follows:

- DEFA: 28
- DEFA tried: 30
- Open university: 76
- Main: 253
- MOOC: 50

Table 1 shows the university-reported yearly intake numbers through each intake mechanism – first, the number of accepted students and then, the number of applicants in parentheses. These numbers are also reported in Figures 1 and 2, for accepted and applied students respectively. During the application, students apply for either main or open intake, and they are further divided into the previously described intake groups later during the process. Thus, MOOC intake is reported as a part of main intake, while DEFA is a part of the open university intake. The number of applicants for the open university and the DEFA intakes are the same, as they are reported as one, non-differentiated statistic.

We can see that our division mechanism is not completely precise when comparing the numbers listed above to the numbers in Table 1. We have removed students who registered as absentees from our data, which explains some of the differences. Besides this, students can apply through multiple intakes at the same time, meaning that there are duplicates in the university-reported data. It should also be noted that only approximately 10 % of the students who start the

Intake	Year 2017	2018	2019	2020
Main	157 (1026)	168 (1256)	179 (1623)	183 (1689)
MOOC	50 (85)	50 (187)	50 (349)	50 (445)
Open university	20 (24)	28 (31)	63 (85)	72 (98)
DEFA	n/a	n/a	19 (85)	16 (98)

Table 1: Number of students accepted (and applied) through each intake for years 2017 to 2020. DEFA intake is not available for years 2017 and 2018.

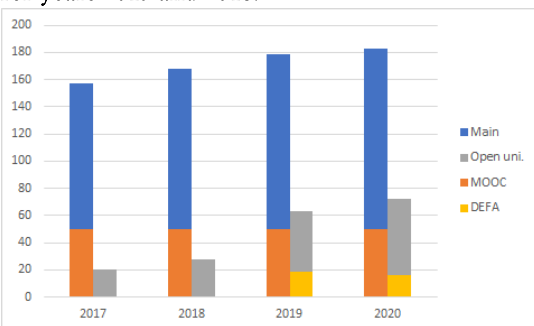

Figure 1: Number of students accepted through different intake mechanisms.

MOOC persist through the course and apply through the MOOC intake, making the interest towards the intake seem lower than it is. The differences are mostly in the main and MOOC intakes, namely, it seems that some of the MOOC intake students end up in the main intake in our data. This causes no significant changes to our results, as the differences are relatively small and in cohorts that are very similar to each other demographics-wise. Additionally, this does not affect the DEFA intake, which is the main intake under study.

3.3 Research Methods

Our research questions are as follows:

RQ1. How did the DEFA project affect student intake in general?

RQ2. How do students accepted through the DEFA project perform in their studies compared to students accepted through other intake mechanisms?

Our research is based on a quantitative analysis of the intake reports and study transcripts. For the first research question, we examine the intake reports published by the university. We inspect the number of applying and accepted students, and briefly examine the age demographics of the latter group, as one of the government incentives is to encourage students to start their tertiary education earlier. For the second research question, data described in Section 3.2 is used to analyse the differences between students from different intakes. We compare the completed credits and GPAs for the first two year of studies between students from different intakes, focusing especially on comparing the DEFA intake students to main intake students, as they are the majority.

4 RESULTS

4.1 Effect on Student Intake

Results for the RQ1. *How did the DEFA project affect student intake in general?* are summarised in Table 1, and Figures 1 and 2. While the interest for the computer science programme has been growing

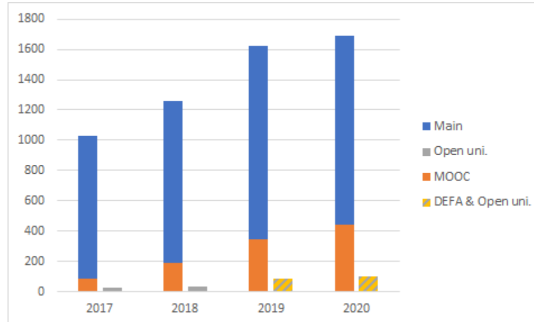

Figure 2: Number of students applied through different intake mechanisms. Application information for the DEFA and open university intakes only available in one, non-differentiated statistic.

Intake	GPA total	Credits total	Credits Y1	Credits Y2	GPA Y1	GPA Y2
DEFA	4.2 (0.5)	92 (27)	57 (11)	38 (24)	4.3 (0.5)	4.1 (0.5)
DEFA tried	4.1 (0.6)	98 (30)	50 (22)	67 (4)	4.0 (0.8)	4.0 (1.4)
Open uni.	4.1 (0.8)	88 (41)	49 (22)	48 (25)	4.1 (0.7)	4.0 (0.9)
Main	3.7 (1.5)	61 (45)	40 (23)	37 (27)	4.2 (0.7)	3.9 (0.8)
MOOC	3.9 (0.9)	88 (53)	49 (26)	44 (27)	4.1 (0.6)	3.8 (0.9)

Table 2: Mean GPAs and credits in total over two years and by year of studies (Y1 for the first year, Y2 for the second). Standard deviation in parentheses.

rapidly, the effect of the DEFA project on the applicants through the open university is clear. Even though the actual DEFA students form only a small portion of all the applicants, the number of students accepted through the open university intake has risen dramatically. It is possible that some of these students have tried the DEFA project and dropped out at some point of their studies, opting for the open university intake instead, or that the students have learned about the open university intake through the media attention that the DEFA project has gained.

Not all students who get accepted necessarily decide to enrol at the university, which is why all the numbers presented in Table 1 are slightly higher than the actual number of students starting each year. Students can also apply through multiple intakes during the same year, causing some duplicate entries in the reported numbers.

As for the age demographics, we only took a cursory look into this part of data, and will leave a more throughout inspection for future work. However, it seems that the main and MOOC intakes have the youngest applicants, with a large portion of the students starting almost directly after high school at ages 19-20. For the main intake this is understandable, as it is most natural to take the entrance exam or apply using one's matriculation examination grades directly after graduating high school. For other intakes, the age demographics vary greatly, but the average age of the students is noticeably older, around 30 years old. While the DEFA intake peaks at just after 20 years old and at 40 years old, the open university intake has a noticeable peak at 30.

4.2 Performance Between Intake Groups

Results for the RQ2. *How do students accepted through the DEFA project perform in their studies compared to students accepted through other intake mechanisms?* are summarised in Tables 2 to 4. Table 2 shows the total mean GPA and credits for each intake over two

Intake	Credits CS Y1	CS Y2	Math Y1	Math Y2
DEFA	39 (6)	26 (16)	16 (5)	8 (8)
DEFA tried	33 (17)	54 (14)	14 (8)	8 (11)
Open uni.	30 (15)	29 (12)	14 (10)	13 (14)
Main	26 (15)	21 (17)	12 (8)	11 (10)
MOOC	31 (16)	28 (21)	14 (11)	13 (8)

Table 3: Average credits by subject for first (Y1) and second (Y2) year of studies. Standard deviation in parentheses.

Intake	GPA CS Y1	CS Y2	Math Y1	Math Y2
DEFA	4.2 (1.2)	4.5 (1.1)	4.6 (1.0)	4.4 (0.8)
DEFA tried	4.3 (1.1)	3.0 (2.8)	4.3 (1.3)	2.0 (n/a)
Open uni.	4.2 (1.2)	3.7 (1.4)	4.2 (1.1)	4.0 (1.4)
Main	4.4 (1.1)	3.9 (1.2)	4.2 (1.2)	4.1 (1.2)
MOOC	4.4 (1.0)	3.8 (1.4)	3.7 (1.2)	3.8 (1.3)

Table 4: Mean GPAs by subject for first (Y1) and second (Y2) year of studies. Standard deviation in parentheses.

years, as well as the separated values for each year on their own. Table 3 has the average credits by subject, computer science or mathematics, for the first and second years separately. Similarly, Table 4 summarises the mean GPAs by subject for the first and second years separately. In all the Tables 2 to 4, standard deviation is given in parentheses.

We applied the Mann–Whitney U test to examine whether differences between groups are statistically significant. In order to avoid the multiple comparisons problem, the statistical tests were not run for all the possible combinations of intakes, but only for the most interesting comparisons.

When comparing the DEFA and the main intakes' credits, for year one Mann-Whitney test statistics $U = 2575.0$ and $p = 0.01$, meaning that the difference in credits between these intakes for the first year is statically significant. For the second year, $U = 3126.0$ and $p = 0.15$, meaning that the difference in credits for the second year is not statistically significant. The difference in GPAs for these intakes is not statistically significant for either of the years.

Looking at the completed credits from only computer science courses for the same intake mechanisms, for year one $U = 2674.5$ and $p = 0.02$, while for year two $U = 3204.0$ and $p = 0.20$. Thus, the difference in completed computer science credits between the intakes is statistically significant for the first year, but not for the second. As for the GPAs with the same parameters, for the first year $U = 2474.5$ and $p = 0.002$, while the second year is not statistically significant ($U = 3323.5$, $p = 0.30$).

When comparing the yearly credits from DEFA intake to the open university intake, for the first year $U = 807.5$ and $p = 0.03$, and for the second year $U = 824.0$ and $p = 0.04$. Both of these results are statistically significant. For the computer science credits, the difference for the first year is statistically significant ($U = 673.5$, $p = 0.002$), while the second year is not ($U = 852.5$, $p = 0.06$).

Finally, comparing the credits of students who got accepted through the DEFA project to those who tried the project, but ended up applying though some other intake mechanism (i.e. the DEFA tried group), the difference in completed credits is statistically significant both for the first ($U = 295.5$, $p = 0.03$) and the second year ($U = 279.5$, $p = 0.01$). The difference in total credits is not ($U = 373.0$, $p = 0.23$), but since the standard deviation is high for both of the intakes ($sd = 27$ for the DEFA and $sd = 30$ for the DEFA tried group), it is difficult to find statistical significance.

5 DISCUSSION

The DEFA project has had a clear effect on the number of applicants and accepted students, especially when it comes to the open university intake, as seen in Table 1, and Figures 1 and 2. Open university courses have traditionally not been free, but most of the courses required for this intake became free because of the DEFA project. Thus, the DEFA project increases the applicants of the open university intake in two ways: the open university is not as costly as it used to be, and it becomes an attractive intake mechanism for students who drop out of the DEFA project as the course requirements have some overlap. The DEFA project has also garnered some media attention, which has probably increased the visibility of the computer science programme in general, affecting all the intake mechanisms, but especially the ones relying on open courses, the DEFA and the open university intakes.

While the DEFA project has not achieved the goal of accepting younger students into the university earlier, it still serves as an intake mechanism that makes sure that the students accepted certainly know what computer science studies include. Those younger students that did decide to participate in the DEFA project directly after high school and got accepted to the university did not essentially take any gap years, as they can begin their computer science studies directly from the second year courses after completing the DEFA intake requirements.

The DEFA students complete more credits during their first year than any other intake group, 57 credits on average. This difference in credits is also statistically significant when compared to the main and open university intakes. This is understandable, as the students have the pressure of completing enough credits during their DEFA year to gain the study right. While the DEFA students complete fewer credits during their second year, in total, they have as many credits completed as students from any other intake after two years of studies. Thus, it seems that the DEFA students are as successful as students from other intakes when it comes to completing courses. Since students from other intakes complete fewer credits during their first year, they are doing some of the courses the DEFA students took in their first year during their second year – thus, the DEFA students might be faring slightly better, as they have more advanced courses left for their second year.

Another reason why the DEFA students complete fewer credits during their second year may also be that they either get or return into working life faster than other students. Since there is a shortage of computer science professionals in the job market in Finland, motivated and well-performing students tend to get hired as early as after their first year of studies, which in turn slows down their studies during the second and third years of Bachelor's degree, and postpones graduation. We also noticed a peak in older students accepted through the DEFA project at around 40 years old. It is possible that these students have taken a study leave from their regular job, applied to the university through the DEFA intake, and are then continuing to work whilst also studying for a degree.

Interestingly, the students who tried the DEFA project but did not complete the requirements, the DEFA tried group, completed the most credits in total, 98 credits in two years. While the average credits for the first year in the DEFA tried group is in line with the other intakes at 50 credits, the second year's average of 67 is higher than usual. It is possible that there are students in this group who have dropped out of the DEFA project relatively late, so they have partially completed some of the courses and have easier time with them during the second try. As the students in this group overall performed well, it seems that they did not drop out of the DEFA project due lack of motivation or skill. These students possibly decided that a full year of self-studies was not for them and decided to pursue some other intake mechanism, or they encountered some personal issues we cannot account for in this study.

The DEFA students have not only shown great skills in studying independently, but also interest and internal motivation to the subject, as is it unlikely that a student could complete a year's worth of credits only by self-studying while relying completely on external motivation of getting into the university, especially since there are less laborious intake mechanisms available, such as the open university intake. Our findings support this idea of motivation, as the DEFA students continue to perform well during their second year of the studies.

Since 2016, students who apply for tertiary education in Finland for the first time, that is, they have not had a study right to any university or college previously, have a priority in the student intake. A significant portion of the allowed intake is limited to first-time applicants only. This has caused some students to hesitate when deciding what to study after high school, making the transition from one level of education to another a longer process – losing one's first-time applicant position makes applying for another major much more difficult. The DEFA project allows students to sample a wide variety of computer science courses for free and with no repercussions regarding university applications. This makes it easier for the students to decide whether studying computer science is for them without losing their first-time applicant's position. If a student decides not to pursue a computer science degree, they can still use their completed credits in another degree.

The DEFA project also opens up courses for other participants outside of universities who have no interest in applying for full-time education. As university-level courses, the DEFA project courses are suitable for, for example, in-service training and those who wish to hone their skills in computer science topics without a lasting commitment or a need for a degree. Our study only examines those who applied and got accepted into the university, and thus, students completing only a handful of courses got excluded from our data.

5.1 Limitations

The results of this study are specific to this particular context. There are study structure and country-specific factors, such as student benefits and government funding models, and one cannot draw direct conclusion to other contexts based on our results.

The DEFA project has been running only for a few years, and thus, the collected data is still limited. This study only strives to examine some preliminary results. Longer-term effects, such as the intake's effect on the graduation time, are still unknown and part of the future research endeavors.

Our data did not include credits completed in other universities, even though these credits could have been used at the application process, as long as they were completed from the DEFA course list within the given time constraints. Also, dividing the students based on their completed courses and credits is not completely accurate, and some students' intakes may have been categorized incorrectly.

6 CONCLUSIONS

In this work, we examined how students admitted to the computer science programme in the University of Helsinki perform during the first two years of their studies when compared to their peers accepted through other intake mechanisms. We also inspected the effect of the DEFA project on the student intake in general.

To summarise, we answer our research questions as follows:

RQ1. How did the DEFA project affect student intake in general?

Answer: The DEFA project significantly increased the number of applicants and accepted students, affecting especially the open university intake. Moreover, the project seems to have a notable influence on the number of applicants in the main intake as well.

RQ2. How do students accepted through the DEFA project perform in their studies compared to students accepted through other intake mechanisms?

Answer: The students accepted through the DEFA project perform just as well in their studies as students accepted through other intake mechanisms, and complete more credits during their first year than other students.

While our study is context-reliant, it gives us more information on how intake mechanisms affect student populations and their performance in general. This can be useful for other universities planning to change or expand their intake mechanisms.

For future work, we will look into student performance further as the DEFA students progress in their studies, as well as examine whether the different intake mechanisms will also have an effect on whether the students complete their Bachelor's degree, and if they graduate within the target schedule. We are also interested in examining the student demographics further, as well as other factors that may influence study success between intake mechanisms, such as previous programming experience. Another research direction that we would like to pursue in the future is gathering information from the DEFA students of their experiences during the DEFA study year, and how well have they managed to integrate into university studies after receiving a study right.

We do not know the full effects of the COVID-19 situation on student performance, but based on various student well-being reports around the world, the effects will most likely show up in our future data. While some students are able to perform normally in their studies, at least in the beginning of the pandemic [4], the negative effects of isolation and the longevity of the uncertain situation might have a negative impact on students' well-being [18].

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