Flowthrough Analysis on Student Intake Paths

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Abstract

In 2018, we initiated the DEFA project, admitting students not only through traditional channels but also by offering entry to those who completed 60 ECTS credits annually by taking our MOOC courses. Earlier findings indicated that students admitted through the DEFA pathway perform at least equally well academically than those admitted through other means, often completing more credits in their first year. Moreover, the DEFA initiative substantially increased applicant numbers across all admission paths. In this study, we observe the graduation rate of students admitted through different channels. Our findings indicate that students admitted through DEFA graduate faster than students admitted via other channels. This is significant as Finland's ICT sector graduation rates are typically slow, with many abandoning studies upon employment. Swift flowthrough is pivotal for educational institutions due to the incentivized funding model in the Finnish system, emphasizing the importance of graduation rates. In this article, we also compare the graduation rates from other channels, for example, the open university, and discuss the changes in these rates during the 2020 COVID pandemic.

CCS Concepts

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

Keywords

admission policies, retention in computer science, intake mechanisms, student intake, curriculum flowthrough

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1 Introduction

This study extends previous research [18] on the effectiveness of various intake mechanisms within a Finnish Computer Science Bachelor's Programme, focusing primarily on the flowthrough of the students. The previous study analyzed their academic performance in terms of grade point average (GPA) and credit accumulation during the first two years of their studies. Now, with the graduation of the initial cohorts under the new intake path – assuming adherence to the Finnish three-year target time for graduation – we assess whether the new intake path not only fosters academic success in the first two years of their studies but also enhances overall curriculum performance and timely graduation. In this paper, we present an initial evaluation of the different intake paths and how the students coming from them graduate in general.

The standard intake mechanism for 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 interests. When they score enough entrance points for any of the education providers on their list, they are allowed to enrol in the one with the highest rank on the list. In this system, the entrance points are based on success either in the matriculation examination 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 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 is like.

Another intake mechanism for us is via Open University. A student completing the basic studies module (25 ECTS[1] credits) of computer science within three years and with a weighted GPA[2] of at least 3.5/5 can enrol in the Bachelor's program. Our program, however, has offered extra intake mechanisms.

In 2012, a MOOC path was introduced. In this path, the students had to complete two courses in programming (an introductory course and an advanced course, 5 + 5 ECTS credits) in 14 weeks

[1] *European Credit Transfer and Accumulation System*, in which each credit corresponds to approximately 27 hours of work and 60 ECTS credits to a full year of studies.
[2] Finnish universities deviate from the ECTS standard by *not* using a proportional scale. Studies are graded 0-5, corresponding to the terms 'Fail', 'Passable', 'Satisfactory', 'Good', 'Very good', and 'Excellent'.

[21]. Students completing 90 % of weekly assignments throughout the courses were invited to an exam. The top 50 students could enrol in the computer science program based on exam performance. Over time, this path became highly popular, resulting in a situation where it became more competitive than the standard application system. Moreover, as the path became more and more populated by people already in the job market who only had an interest in the benefits afforded by the 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 Finnish Ministry of Education [17]. The project's name is DEFA, an acronym for Digital Education for All. The project aimed to open computer science studies to everyone and try a new intake mechanism favouring hard-working students. As the five participating universities are somewhat different in the application popularity and number of annual intakes, each participating university planned its requirements for intake. We decided to offer the right to enrol to any student completing 60 ECTS credits of our MOOC courses within an academic year[3]. When adjusted to the target graduation timeline, this equals a full year of studies. Although the pilot project has already concluded, we have continued to use this pathway because previous research indicates that students admitted through this channel performed better than their peers during their first two years of studies.

To facilitate the reader's understanding of why it is crucial to examine the flowthrough, let us next provide an overview of Finnish higher education policy, focusing on its funding systems.

The usual Bachelor's degree in Finland is 180 ECTS credits. The Finnish government has set a three-year target time for graduation; this target influences both the students and the education provider. Students can receive financial support during their studies, which has two parts: a monthly grant and a government-guaranteed loan. The grant can be obtained for up to 30 months for the Bachelor's degree[4]. The loan also includes a built-in incentive for in-time graduation: if the degree is completed within the target time plus an additional year, up to one-third of the loan may be forgiven.

The education provider also has a built-in incentive to meet the graduation target time. The Finnish government started a new funding model for universities in 2021[5]. The model has three main parts: 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.

This study explores the following questions:

(1) Are there differences in the graduate rates between students admitted via standard intake, students admitted via Open University, and students admitted via DEFA?
(2) Are there differences in the dropout rates between students admitted via standard intake, students admitted via Open University, and students admitted via DEFA?
(3) Are there differences in the graduate rates or dropout rates between the students admitted via exam entrance and diploma entrance?

The rest of this paper is organized as follows. Next, Section 2 reviews relevant previous works. Section 3 describes the present study's context and 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

While the admission policies may differ in different universities and countries, some typical admission methods can be identified. First, entrance examinations [5] are typical of admittance. As noted in [8], the entrance exams can predict graduation and the number of achieved credits better than past performance in high school. However, the entrance exams can also be troublesome [3] as the applicants can feel very anxious about them and even feel that they are an all-or-nothing issue. This may be even more troublesome in countries like Finland, where first-time applicants have a clear advantage in the admittance procedure [9]. Due to these problems, the effect on non-admitted students can be devastating (see, for example [11, 12]).

Another typical way to admit students is by their high school grades. While they probably provide less stress for students than a single-shot entrance exam, there are conflicting results about the correlation between grades and success in university studies (see, for example [6, 22, 24]). Admitting students by their success in high school can be more problematic in subjects such as computer science, which is not a subject typically taught in all high schools. However, as stated in [25], success in previous math studies contributes to success in computer science studies. Still, previous computing experience can be even more significant in predicting students' success in computer science studies [1].

Open courses and MOOCs (massive open online courses) allow everyone to introduce themselves to computer science before applying for university. Although there are some known problems with high dropout rates [7] and issues like plagiarism [4], MOOCs can still be a solution to providing high-quality education for everyone. MOOC courses can also be used as an entrance exam on their own, and according to [21], the students admitted this way perform at least as well as students admitted via traditional entrance exams or high school grades. Another study [15] states that students selected this way perform better in computer science studies, but there is no difference in other studies. Still, yet another study [19] found out that students admitted via MOOC completion performed worse in mathematics than other students.

The dropout rates in computer science education are typically high [20] for various reasons. For example, [16] identifies seniority in studies and effort as positive factors for retention, while, unexpectedly, expected GPA is found to be a negative factor. Moreover, [14] continues that, for example, the number of subjects passed and the entrance exam results are essential factors in predicting

[3]As the project's first year started one month later than the academic year, 50 credits sufficed that year.
[4]Vacation months are not counted towards this.
[5]The principles of the model can be found here: https://minedu.fi/en/steering-financing-and-agreements. An updated model is due to start in 2025.

dropout, but factors such as gender are not. It is also typical that the dropout rates in the first introductory programming courses (which are often the first courses in the curriculum) are high (see, for example [2, 10, 23]). Usually listed reason for dropping out is the lack of motivation [13]. The possibility of trying out the studies with open courses before getting admitted may be a potential solution.

3 Methodology

The data was collected from the university study registry, and the years between 2017 and 2021 were selected for the study. Students who started in 2021 had technically reached the 3-year suggested limit when we were writing this article, but some course completions for the spring of 2024 were still not registered. As such, we omit, for example, the three-year graduation rates for the 2021 intakes from our tables below. For this study, the following groups of students were categorized:

- **Standard** students are the ones who are admitted via the standard intake mechanism. In Finland, these include the students admitted based on their high school grades (or, to be more specific, matriculation examination grades). Another group of students included in this category are the students who are admitted based on the entry examination. This examination is shared between all Finnish scientific universities that teach computer science[6].
- **DEFA** students are the students who are admitted based on the completion of the required amount of open-access DEFA studies. The students must complete 60 ECTS credits of MOOC courses within one academic year. There are 30 ECTS credits of mandatory courses (including subjects like programming, databases, and one mathematics course), and the remaining credits can be freely selected from our list of available MOOC courses, totalling a little over 100 ECTS credits.
- **Open** students are those who have completed at least 25 ECTS credits of computer science studies in the open university within the last three academic years with a GPA at least 3.5/5[7]. The course list is fixed, and the courses are free and open to anyone interested.
- **MOOC** students were admitted based on completing a two-part (5 + 5 ECTS credits) programming MOOC and a separate entry exam after that. The MOOC was freely open for anyone interested. The same MOOC is used as part of DEFA and Open university studies. MOOC entry was discontinued in 2020 due to the number of applicants becoming too high to serve the original purpose: providing a shortcut for gifted programming students. The MOOC entrance is described in detail in [21].

Additionally, the study does not include smaller student populations (e.g. those enrolled based on performance in science competitions or those listed under a catch-all enrolment track of 'other'). For clarity, we will subsequently use **bold** to indicate a term that refers to the group. In contrast, unbolded terms refer to a broader concept: e.g. the **DEFA** intake group completed their DEFA studies.

We also present data for two 'synthetic' groups of students, **Standard DEFA** and **DEFA shifted**, defined as follows:

- **Standard DEFA** is a subgroup of the **Standard** group consisting of those students who completed at least 60 ECTS credits of studies in their first year. Hence, students are those from the **Standard** group who progressed in their first year of studies at a pace that would have allowed them to enrol through the DEFA intake path had the studies been completed before university enrollment. This group enables us to compare the **DEFA** population with students of similar initial academic performance from the standard intake.
- **DEFA Shifted** shifts each **DEFA** cohort one year earlier, thus treating them as if they started their official studies one year before enrolling. This normalizes the students regarding when they completed the relevant coursework to the other intakes. At the same time, this normalization does not extend to the length of the studies, i.e., both DEFA cohorts get an additional 'free' year of study compared to the non-DEFA cohorts.

It should also be noted that due to the Finnish higher education funding system described in the Introduction, DEFA studies are not counted as part of the official curriculum study time from the perspectives of the Ministry of Education and the education provider. Consequently, **DEFA** students are effectively given an additional year to complete their studies, allowing them the same compensation as those entering through other intake mechanisms[8]. Thus, comparing the DEFA groups against other intake groups is also essential financially, especially for the Ministry and the education provider.

Since this paper focuses on flowthrough, we do not include details other than the number of students for each group that had graduated as of spring 2024. The average collected ECTS credit amounts (for non-graduating) of students are not listed in this study but may be of interest in the future.

4 Results

4.1 DEFA vs Standard

Based on the three-year graduation rates in Table 1, we observe that a significantly higher proportion of the **DEFA** population graduates within the three-year target time than from the **Standard** population. When contrasted to those students from the **Standard** population who completed their first year of studies at speed comparable to those required from the **DEFA** population, that is **Standard DEFA**, we observe that the groups perform relatively equivalently in 2019—the subset of **Standard** population even overperforming the **DEFA** population—but there is a significant drop in the graduation rates among both the **Standard** and **Standard DEFA** students starting from 2020. The reasons for this change cannot be deduced from our data, but we discuss one potential explanation in Section 5.

When the above analysis is extended to students who graduate at most a year behind schedule (i.e. by the end of their fourth year

[6]The Finnish Technical Universities have had another shared entry examination, but these two will be joined in spring 2025.

[7]More recently, we have also included mandatory mathematics course in here, but that not was the case with the cohorts under this study.

[8]To be precise, the same compensation relaxation also applies to the *students* coming through the DEFA path as described in the Introduction.

	Standard			Standard DEFA			DEFA			DEFA Shifted		
Year	Intake	Graduated		Intake	Graduated		Intake	Graduated		Intake	Graduated	
2017	134	18	(13.43 %)	53	18	(33.96 %)	–	–	(– %)	–	–	(– %)
2018	143	21	(14.69 %)	46	19	(41.30 %)	–	–	(– %)	18	6	(33.33 %)
2019	148	22	(14.86 %)	46	18	(39.13 %)	18	6	(33.33 %)	12	6	(50.00 %)
2020	157	11	(7.01 %)	49	9	(18.37 %)	12	6	(50.00 %)	–	–	(– %)

Table 1: DEFA three-year graduation rates compared to Standard intake population. Standard DEFA is a subset of Standard, including those who completed their first year of studies at a rate that would have made them DEFA-eligible if the studies were completed before their curriculum studies. DEFA Shifted is the DEFA column shifted up one year.

of study; Table 2), the broad trends appear to be similar. Due to the timing of this study, we do not yet have a full view of the four-year graduation rate of the 2020 cohort, but early data indicates the **DEFA** cohort is likely to achieve a rate at least as good as that of the 2019 cohort (58.33 % as of 5/2024), while the **Standard** and **Standard DEFA** intakes are showing a similar drop in performance than in the case of the 3-year performance (14.65 % and 25.56 %, respectively, as of 5/2024). This further reinforces the view that the trends between three-year and four-year graduation rates are highly similar across these intakes.

As we observe the proportion of each yearly intake that has graduated at all (Table 3), the same pattern continues: **DEFA** populations overperform compared to the **Standard** intake population in general. In contrast, the **Standard DEFA** subpopulation outperforms the **DEFA** population at first before their performance significantly drops starting from 2020. Meanwhile, the **DEFA** population does not exhibit a similar drop in performance over the years.

As for students who have effectively dropped out from their major (i.e. those un-graduated who have not completed any CS, mathematics or statistics related courses in the last year; Table 4), we note that **DEFA** population has fewer dropouts than the **Standard** intake population up to the 2020 cohort. However, the 2021 **DEFA** population has *more* dropouts than the 2021 **Standard** intake (44.44 % vs. 43.16 %). We also observe that while the **DEFA** dropout rates almost doubled from 2020 to 2021, the **Standard DEFA** dropout rates effectively halved during the same period.

4.2 DEFA vs Open

When compared to **Open** and **MOOC**—the two other open studies intake mechanisms included in this study—a larger share of the **DEFA** population graduates within the three-year target time (Table 5). We also observe that the **Open** intake track consistently outperforms the **MOOC** intake.

As for graduating at most one year behind the target schedule (Table 6), the **Open** and **MOOC** tracks perform broadly similarly to the 3-year graduation times when compared to each other (accounting for the small sample sizes). The DEFA intake outperforms the **MOOC** intake, whether basing the comparison on the **DEFA** or the **DEFA Shifted**. As for the comparison of the DEFA and **Open** intakes, the relative performances are more difficult to gauge given the significant variability in the graduation rates of the **Open** track: Comparing **DEFA** and **Open** would favour **DEFA**, but comparing **DEFA Shifted** to **Open** would favor **Open**.

Interestingly, when observing the per-cohort proportion of students who have graduated *at all* (i.e. irrespective of timing; Table 7), we note that **DEFA** population only slightly outperforms the population of the **Open** University intake track. Contrasting the **Open** track to the synthetic **DEFA Shifted** population, however, reveals that the 2018 **Open** intake outperformed the 2018 **DEFA Shifted** by a large margin. The **Open** intake consistently outperformed the **MOOC** intake.

The fraction of dropouts (using the definition of 'dropout' from the previous subsection) between the **DEFA** intake and the other open intake routes does not show any apparent patterns, with the relative dropout rates fluctuating significantly between cohorts. At the same time, the **DEFA** population shows the highest proportion of dropped-out students in the data, with some 44.44 % of the 2021 **DEFA** cohort having neither graduated nor completed any CS, mathematics or statistics studies in the last year (i.e. between 5/2023 and 5/2024). We also observe that the **Open** intake consistently outperforms the **MOOC** intake, albeit with a reducing gap in performance.

4.3 Subpopulation of the Standard intake

We also analyzed the two major subpopulations of the **Standard** intake: those who entered through a ranking of scores from an entrance exam and those who entered through a ranking of scores based on a previous diploma. The graduation and dropout rates between these two populations are shown in Table 9.

Regarding graduation rates, we first observe that the diploma entrance population exhibits less variation in graduation rates across the years. Second, while the diploma entrance population appears to outperform the exam entrance population in terms of three-year graduation rates for all but one of the years, the phenomenon is reversed for four-year graduation rates. Neither group appears to consistently outperform the other regarding total graduation rates (i.e. ignoring target graduation times). We also note that both populations exhibit a significant drop in graduation rates for the 2020 intake compared to the preceding intakes. As for dropout rates, the exam entrance population outperforms the diploma entrance population for all but the 2020 intake, where the dropout rates are broadly similar.

	Standard			Standard DEFA			DEFA			DEFA Shifted		
Year	Intake	Graduated		Intake	Graduated		Intake	Graduated		Intake	Graduated	
2017	134	36	(26.87 %)	53	31	(58.49 %)	–	–	(– %)	–	–	(– %)
2018	143	38	(26.57 %)	46	25	(54.35 %)	–	–	(– %)	18	8	(44.44 %)
2019	148	35	(23.65 %)	46	26	(56.52 %)	18	8	(44.44 %)	–	–	(– %)

Table 2: DEFA four-year graduation rates compared to Standard intake. Standard DEFA is a subset of Standard, including those who completed their first year of studies at a rate that would have made them DEFA-eligible if the studies were completed before their curriculum studies. DEFA Shifted is the DEFA column shifted up one year.

	Standard			Standard DEFA			DEFA			DEFA Shifted		
Year	Intake	Graduated		Intake	Graduated		Intake	Graduated		Intake	Graduated	
2017	134	46	(34.33 %)	53	32	(60.38 %)	–	–	(– %)	–	–	(– %)
2018	143	52	(36.36 %)	46	30	(65.22 %)	–	–	(– %)	18	8	(44.44 %)
2019	148	38	(25.68 %)	46	26	(56.52 %)	18	8	(44.44 %)	12	7	(58.33 %)
2020	157	23	(14.65 %)	49	18	(36.73 %)	12	7	(58.33 %)	–	–	(– %)

Table 3: DEFA graduation rates (irrespective of timing) compared to Standard intake. Standard DEFA is a subset of Standard, including those who completed their first year of studies at a rate that would have made them DEFA-eligible if the studies were completed before their curriculum studies. DEFA Shifted is the DEFA column shifted up one year.

	Standard			Standard DEFA			DEFA			DEFA Shifted		
Year	Intake	Dropped out		Intake	Dropped out		Intake	Dropped out		Intake	Dropped out	
2017	134	78	(58.21 %)	53	20	(37.74 %)	–	–	(– %)	–	–	(– %)
2018	143	77	(53.85 %)	46	8	(17.39 %)	–	–	(– %)	18	7	(38.89 %)
2019	148	90	(60.81 %)	46	12	(26.09 %)	18	7	(38.89 %)	12	3	(25.00 %)
2020	157	66	(42.04 %)	49	10	(20.41 %)	12	3	(25.00 %)	18	8	(44.44 %)
2021	190	82	(43.16 %)	49	5	(10.20 %)	18	8	(44.44 %)	–	–	(– %)

Table 4: DEFA population dropout compared to Standard intake. Standard DEFA is the subset of Standard, consisting of those who completed their first year of studies at a rate that would have made them DEFA-eligible if the studies were completed before their curriculum studies. DEFA Shifted is the DEFA column shifted up one year.

	Open			MOOC			DEFA			DEFA Shifted		
Year	Intake	Graduated		Intake	Graduated		Intake	Graduated		Intake	Graduated	
2017	13	4	(30.77 %)	40	8	(20.00 %)	–	–	(– %)	–	–	(– %)
2018	20	5	(25.00 %)	46	7	(15.22 %)	–	–	(– %)	18	6	(33.33 %)
2019	35	9	(25.71 %)	43	9	(20.93 %)	18	6	(33.33 %)	12	6	(50.00 %)
2020	52	17	(32.69 %)	37	7	(18.92 %)	12	6	(50.00 %)	–	–	(– %)

Table 5: DEFA three-year graduation rates compared to other open studies intakes. DEFA Shifted is the DEFA column shifted up one year.

5 Discussion

We provide a broad overview of the results from the previous section in Tables 10 and 11. Refer to tables in Section 4 for additional precision and absolute numbers.

Overall, we observed that the **DEFA** populations tend to outperform the **Standard** populations in graduation rates irrespective of whether we consider the three-year, four-year or total graduation rates. However, the synthetic **Standard DEFA** population—consisting of those students from the **Standard** intake that completed their first year of studies at a rate comparable to that required from **DEFA** students during their pre-enrollment studies—performed significantly better than the **Standard** populations as a whole and in places outperformed the relevant **DEFA** populations

	Open			MOOC			DEFA			DEFA Shifted		
Year	Intake	Graduated		Intake	Graduated		Intake	Graduated		Intake	Graduated	
2017	13	5	(38.46 %)	40	15	(37.50 %)	–	–	(– %)	–	–	(– %)
2018	20	12	(60.00 %)	46	14	(30.43 %)	–	–	(– %)	18	8	(44.44 %)
2019	35	11	(31.43 %)	43	12	(27.91 %)	18	8	(44.44 %)	–	–	(– %)

Table 6: DEFA four-year graduation rates compared to other open studies intakes. DEFA Shifted is the DEFA column shifted up one year.

	Open			MOOC			DEFA			DEFA Shifted		
Year	Intake	Graduated		Intake	Graduated		Intake	Graduated		Intake	Graduated	
2017	13	8	(61.54 %)	40	20	(50.00 %)	–	–	(– %)	–	–	(– %)
2018	20	14	(70.00 %)	46	20	(43.48 %)	–	–	(– %)	18	8	(44.44 %)
2019	35	14	(40.00 %)	43	16	(37.21 %)	18	8	(44.44 %)	12	7	(58.33 %)
2020	52	23	(44.23 %)	37	12	(32.43 %)	12	7	(58.33 %)	–	–	(– %)

Table 7: DEFA graduation rates (irrespective of timing) compared to other open studies intakes. DEFA Shifted is the DEFA column shifted up one year.

	Open			MOOC			DEFA			DEFA Shifted		
Year	Intake	Dropped out		Intake	Dropped out		Intake	Dropped out		Intake	Dropped out	
2017	13	4	(30.77 %)	40	16	(40.00 %)	–	–	(– %)	–	–	(– %)
2018	20	5	(25.00 %)	46	20	(43.48 %)	–	–	(– %)	18	7	(38.89 %)
2019	35	10	(28.57 %)	43	15	(34.88 %)	18	7	(38.89 %)	12	3	(25.00 %)
2020	52	18	(34.62 %)	37	14	(37.84 %)	12	3	(25.00 %)	18	8	(44.44 %)
2021	88	32	(36.36 %)	–	–	(– %)	18	8	(44.44 %)	–	–	(– %)

Table 8: DEFA dropout rates compared to Open and MOOC studies intakes, as of 5/2024. DEFA Shifted is the DEFA column shifted up one year.

	Exam Entrance					Diploma Entrance				
Year	n	3y grad.	4y grad.	Grad.	Drop.	n	3y grad.	4y grad.	Grad.	Drop.
2017	23	8.70 %	26.09 %	30.43 %	56.52 %	70	15.71 %	28.57 %	32.86 %	64.29 %
2018	26	26.92 %	38.46 %	46.15 %	34.62 %	80	15.00 %	22.50 %	32.50 %	60.00 %
2019	23	13.04 %	39.13 %	43.48 %	52.17 %	119	15.97 %	21.85 %	23.53 %	60.50 %
2020	37	5.41 %	–	10.81 %	43.24 %	120	7.50 %	–	15.83 %	41.67 %

Table 9: Comparison of the Exam Entrance and Diploma Entrace subpopulations of the Standard intake as of 5/2024. '3y grad.', '4y grad.' and 'Grad.' indicate the fraction of the cohort who graduated in three years, four years, or at all, respectively. The column 'Drop.' shows the fraction of dropouts, using the same definition as above.

as well. The **DEFA** population also appears to, in general, outperform the two other open intakes (**Open** and **MOOC**) included in this study. The **Open** intake generally appears to fare better or at least as well than the **MOOC** intake. Both **Open** and **MOOC** outperform **Standard**, but not **Standard DEFA**.

We observed a significant decrease in the graduation rates of the **Standard** intake (and the synthetic **Standard DEFA** intake) for the 2020 cohort. Meanwhile, no similar drop was observed for the **Open**, **MOOC** or **DEFA** tracks. A natural post-hoc hypothesis for this drop is to attribute the phenomenon to the effects of the COVID-19 pandemic and associated lockdowns. While the 2019 cohort would have been able to start their studies in person, the 2020 cohort would have both prepared for and started their university studies in a highly stressful and non-standard environment. At the same time, our data cannot validate this hypothesis beyond pointing out the temporal link.

Regarding dropout rates, **DEFA** outperforms the **Standard** intake except for the 2021 intake. At the same time, the synthetic

	Standard			StdDEFA			Open			MOOC			DEFA			DEFA shift.		
Year	3y	4y	Tot.	3y	4y	Tot.	3y	4y	Tot.	3y	4y	Tot.	3y	4y	Tot.	3y	4y	Tot.
2017	.13	.27	.34	.34	.58	.60	.31	.38	.61	.20	.38	.50	–	–	–	–	–	–
2018	.15	.27	.36	.41	.54	.65	.25	.60	.70	.15	.30	.43	–	–	–	.33	.44	.44
2019	.15	.24	.26	.39	.57	.57	.26	.31	.40	.21	.28	.37	.33	.44	.44	.50	–	.58
2020	.7	–	.15	.18	–	.37	.33	–	.44	.19	–	.32	.50	–	.58	–	–	–

Table 10: Summary of graduation rates across the various intakes. 'StdDEFA' is short for StandardDEFA. Refer to previous tables for absolute numbers and more precision.

Year	Standard	StandardDEFA	Open	MOOC	DEFA	DEFA shifted
2017	58.21 %	37.74 %	30.77 %	40.00 %	–	–
2018	53.85 %	17.39 %	25.00 %	43.48 %	–	38.89 %
2019	60.81 %	26.09 %	28.57 %	34.88 %	38.89 %	25.00 %
2020	42.04 %	20.41 %	34.62 %	37.84 %	25.00 %	44.44 %
2021	43.16 %	10.21 %	36.36 %	–	44.44 %	–

Table 11: Summary of dropout rates across various intakes. Refer to previous tables for absolute numbers.

Standard DEFA populations appear to outperform **DEFA** in turn consistently. Of the two other open intakes, **Open** consistently outperforms **MOOC**, but the relationship of **DEFA** to **Open** and **MOOC** is less clear. It has exhibited lower dropout rates in some years but has the highest dropout rate for any yearly cohort in the data outside of **Standard** at 44.44 % for the 2021 **DEFA** cohort.

However, the analysis of the dropout rates is complicated because we lack information about the *reasons* for students dropping out of their studies. In other words, it is not clear from this data alone how to interpret this phenomenon: high dropout rates could stem not only from, e.g. misaligned student expectations and low academic performance but also from highly performing students finding employment in the middle of their studies. While all these reasons are negatives from the study program funding perspective, they are distinctly different from the students' perspectives.

Finally, we included an analysis of the two major subpopulations of the **Standard** intake, those who entered through a ranking of scores from an entrance exam and those who entered through a ranking of scores based on a previous diploma. We noted that the diploma entrance subpopulation appeared to exhibit less varied performance, but despite some trends, neither entrance method conclusively outperforms the other.

6 Conclusions

This study compares the efficiency of various student intake paths in the Computer Science Bachelor's programme at the University of Helsinki. As a previous study showed, on average, the students coming from the **DEFA** path perform better than the other students in their first years; we were interested in seeing whether that performance carries on and shows a better time graduation rate passing their counterpart populations coming from other, especially the standard admission paths.

Our study indicates that the DEFA approach aligns effectively with Finland's educational objectives, particularly the Ministry of Education's funding model that incentivizes faster graduation rates. However, our analysis reveals that when comparing the **DEFA** intake population to a subgroup from the standard pathway – those who complete an equivalent amount of coursework in their first year as required for DEFA eligibility – in general there is no significant difference in performance between these groups. This finding suggests that the key to achieving swift graduations is identifying and enrolling motivated students with effective learning skills and practices. The primary benefit of the DEFA pathway is that it attracts a significantly higher proportion of students who are motivated and also possess strong study skills, particularly when compared to those entering through the standard pathway.

In future work, we will incorporate additional metrics for academic success and analyze more cohorts to enhance the robustness and generalizability of our findings.

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