Completion from Vocational Educations:

A Register Based Analysis

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September 2021

Introduction

After completing compulsory schooling, individuals face the choice between whether or not to pursue additional education, and in the case of continuing in education whether this should be academic or vocational. There are immense differences between the two educational paths with respect to student composition and completion. Around 20 percent of those applying for admission to upper secondary education right after finishing compulsory schooling apply for admission to vocational education and training (VET) and around 72 percent apply for admission to academic upper secondary education (high school)[1]. This means that a relatively low share of individuals in a cohort choose the vocational track. In addition to the young students, a large share of the vocational students are older in age and many come with some prior education and/or labor market experience[2]. Finally, the completion rate for VET students is 52 percent whereas the completion rate for academic upper secondary education is 85 percent[3].

The high level of dropouts from VET constitutes the background for the present project, "Reducing the dropout rate from vocational schools", funded by the ROCKWOOL Foundation. In this project, we analyze the patterns of dropping out from a VET programs. We document the continued enrollment status of VET students, after initial enrollment, and investigate the education and employment paths

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[1] Numbers from The Ministry of Children and Education, 2019, https://www.uvm.dk/aktuelt/nyheder/uvm/2019/mar/190326-flere-grundskoleelever-soeger-mod-en-erhvervsuddannelse

[2] Statistics Denmark, 2019, "Erhvervsuddannelser i Danmark 2019", https://www.dst.dk/da/Statistik/Publikationer/VisPub?cid=32526

[3] The numbers for dropout rates are calculated five years after starting the education and taken for the cohort of students starting in 2012, Statistics Denmark, 2018, "39 pct. falder fra på erhvervsuddannelserne", Nyt fra Danmarks Statistik, 19. marts 2018 - Nr. 111. Note that 39 percent of the students have dropped out, 9 percent are still enrolled, and 52 percent have completed after 5 years.

of the VET students that drop out. We further describe which student and parental background characteristics that determine the probability of graduation. There are most likely other factors than observable student and parental characteristics that determine VET completion. This could be the students' unobserved abilities, the quality of the teaching at the vocational schools and the overall structure of the VET programs. We expect each of these reasons to play a role both separately and in interaction with each other, but analyzing these is outside the scope of this project. The results in this project can be read as complementary to the "Vocational School Initiative" by the ROCKWOOL Foundation, which aims to develop and evaluate an intervention with the goal of increasing completion at the vocational educations.

A vocational education consists of a basic program and a main program. The basic program consists of the first basic course (GF1) and the second basic course (GF2) that each take half a year. Younger students that have finished compulsory schooling recently must take the two basic courses whereas older students start directly on the second basic course.[4] In many vocational educations, the dropout rates are particularly high during the first year, more specifically at the second part of the basic program (GF2) where students have chosen a specific vocational education (for example carpenter). For this reason, this project focuses on completion of the GF2 program.

We present descriptive information about students enrolled in specific GF2 educations selected from the largest VET educations in terms of number of students in the GF2 program. In the Danish VET system there are 11 main subject areas that fall into four broader subject areas: care, health and pedagogy (OSP); administration, commerce and business service (KHF); food, agriculture and hospitality (FJO); technology, construction and transportation (TBT), see Table 5 in Section 5 for calculations of the number of GF2 students in each subject area. In this project, we only consider educations within the three subject areas: "construction", "technology: power and electronics", and "office, commercial and business services". Within these three broad VET groups, we select the largest specific educations. We end up with the following educations (see Tables 6 to 8 in Section 5):

Construction (TBT): Building painter, bricklayer, joiner, carpentry, plumbing technique
Technology: power and electronics (TBT): Data and communications technology, electrician
Office, commercial and business services (KHF): Retail, trading

In the following, we will refer to educations within TBT as technical educations and educations within KHF as business educations.

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[4] For a description of the Danish VET system from The Ministry of Children and Education, see
https://eng.uvm.dk/upper-secondary-education/vocational-education-and-training-in-denmark.

We consider the following aspects regarding dropout and completion of the GF2 programs:

1. Types and timing of transitions out of the GF2 program
2. The educational pathways of students that start a GF2 program and subsequently either continue through the VET system or drop out
3. Student background and its implication for student completion or dropout.

In the analyses we distinguish between students having completed the first part of the basic program (GF1) prior to starting GF2 (younger students) and students starting directly on GF2 (older students)[5]. We categorize students as belonging to the group "with prior GF1s" when the students' most recent prior education was in the GF1 program. This means that if a student completes GF1 but enrolls in GF2 a second time, we do not include this student in the "with GF1" group but rather in the group "without GF1", since this student does not come directly from GF1. We do the categorization this way, such that the students we categorize as "with GF1" are the students who are going straight through the educational system; from compulsory school to GF1 and then to GF2. Section 5 provides a detailed description of the data and the samples used in the analyses.

The main findings are the following:

- The dropout from GF2 is substantial. Overall, the dropout is higher for the older students starting without GF1 than for the younger students coming through GF1.
- A relatively large share of those completing GF2 do not continue in the main program. This is most apparent for the students within the business educations.
- For the students dropping out of the GF2 program the re-enrollment rate in a new GF2 program, within 60 weeks after initial enrollment, is around 1/3 for all students but higher for students with GF1 relative to students without GF1.
- Students who dropout of GF2 without a subsequent enrollment in education are most likely to be out of work. They either receive benefits or are without any type of income. Students enrolled without a GF1 are most frequently benefit recipients and students with a GF1 are most frequently without any type of income.
- Students who graduate from the GF2 program but do not continue to the main program are most likely or to be employed 60 weeks after initial enrollment.
- Family background such as labor force participation of the parents as well as high grades from compulsory schooling (especially high grades in math) increase the probability of completing

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[5] We exclude students who are enrolled in the business education and have already completed any type of upper secondary education (high school) because these students have a shorter GF2 track of either 5 or 10 weeks.

GF2. Students of parents with a vocational education also have marginally higher probability of graduating.

- Having completed an education or completed parts of a high school degree prior to starting a vocational education increase the probability of completing GF2 relative to those students who at most have completed compulsory schooling. In addition, not being employed and instead being unemployed, receiving benefits or not receiving any income before starting the education, decrease the probability of completing GF2.

- There is a large difference in the completion rates between the different educations considered in this analysis. Our results show that the reason for this finding is neither because of differences in student composition in the different educations nor because of differences across schools. Consequently, a large part of the differences in completion rates between educations is unexplained.

1. Types and timing of transitions out of GF2

Figures 1 to 6 illustrate the weekly status up to 60 weeks (just over a year) after having started the second part of the basic program (GF2). The duration of the second part of the basic program is 20 weeks exclusive of holidays. This means that we expect most of the students still enrolled to complete or dropout from the second part of the basic program around 20 weeks after starting the program. Students that complete GF2 and continue into the main program (HF) will alternate between school courses and apprenticeship where the latter takes place in a specific company or organization. This also means that being able to find a firm for the apprenticeship is an important factor for students in the transition between GF2 and HF.

In Figures 1 to 6, the students are divided into the following categories: Enrolled in the main program (HF), dropped out from the main program (HF), completed GF2 (but not enrolled or dropped out from the main program), enrolled in GF2 or dropped out from GF2.

For students starting in one of the GF2 programs within construction (Figures 1 and 2), we see that around 77 percent of the students with GF1 and around 66 percent of the students without GF1 end up completing the second part of the basic program after 60 weeks. For both types of students (with and without GF1), the dropout seems to be relatively constant during the first 20 weeks and there is no indication of more students dropping out at specific points in time during the GF2 program, for example in the beginning or at the end of the course. In addition, we see that 71 percent of the students with GF1 and 56 percent of the students without GF1 continue to the main program. This means that a sizable proportion of those completing the second part of the basic program (completing GF2) do not enroll in the main program afterwards; after 60 weeks it is 6 percent of students with GF1

and 10 percent of the students without GF1. The reasons for this is unknown but it could be that students no longer want to continue in the chosen education or it could be that the students are not able to find a company for their apprenticeship. In the latter case, the vocational school provides apprenticeship-like courses at the school ("skolepraktik" in Danish). However, students consider this option as being less attractive and this could be the reason why some students decide to drop out of the education even though they have completed GF2[6]. Altogether, while the dropout is larger for the students without GF1 compared to students with GF1 the transition patterns in terms of timing of dropout is similar for the two groups of students. For students enrolled in technology: power and electronics (Figures 3 and 4) the dropout is the same for students with and without a GF1 at around 35 percent, which is a higher dropout than construction. Furthermore, only around 53-54 percent of the students both with and without GF1 enroll in the main program within 60 weeks after starting the GF2 program. Otherwise, the patterns are similar to the ones found for students enrolled in construction.

For students enrolled in the business educations (Figures 5 and 6) the dropout patterns from GF2, for students with and without a GF1 prior to GF2 are similar to what we find for the technical educations. A difference to the technical educations is that a remarkably low share of these students enroll *and stay* in the main program within 60 weeks, around 23 percent of students without a GF1 and around 32 percent of students with a GF1. As explained above an explanation for this could be difficulties in finding a firm for the apprenticeship.

A final remark on the business students who graduate from GF2 are for the students who continue in the main program in Figures 5 and 6. Relative to the technical educations, the business students have a high dropout rate in the main programs, suggesting that the few business students who do continue in the main program are at risk of dropping out.

Altogether, our results show that, in the specific VET educations considered here, there is a large share dropping out during the second part of the basic program (GF2) and to some extent also during the transition to and after starting the main program (HF).

2. The educational pathways of GF2 students

In order to perform a detailed analysis of the pathways and transitions of the students that start a GF2 we consider student progression through the educational system for both those that complete the GF2 program and those that do not. Some of the students that drop out from the GF2 program will enroll in a new education, either a new GF2 education or a different type of education. Some of the

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[6] Danmarks Evalueringsinstitut, 2011, "Skolepraktik i erhvervsuddannelserne".

students that drop out from the GF2 program will get a job in the labor market, some will receive social benefits and finally some will not appear in any of these states. We will also analyze this type of transitions for the students that complete the GF2 program but that do not enroll in the main program (HF).

We present Sankey diagrams that display the flow of students between different states in proportion to one another. The width of the arrows in the diagram show the magnitudes of the different states, such that the larger the arrow, the larger the flow. We present all numbers in percentages of the total number of students enrolling in the GF2 program within a given education. To ease the interpretation we present the shares in the different pathways as the number of students out of one hundred students.

Figures 7 to 12 show the flow of students from the start of their GF2 and 60 weeks on. We have chosen 60 weeks to allow students to begin a new education spell the following year. The diagrams show the three main education groups split by whether or not the students have graduated from GF1 prior to starting the GF2.

The Sankey diagrams show the same graduation patterns as we saw in Section 1. Students that have graduated from a GF1 program prior to starting the GF2 program are overall more likely to graduate from GF2 and enroll in the main program. Students in the business educations are less likely to enroll in the main program.

For students in construction with GF1, the Sankey diagram in Figure 7 shows that 21 students out of one hundred students drop out of the GF2 program. Out of the dropouts, 7.7 re-enroll in a new GF2 education, 2.8 enroll in a different education while the remaining 10.5 do not re-enroll in any type of education after starting the GF2 program. We calculate the re-enrollment rate in a new GF2 education among the dropouts as the number of students re-enrolling over the number of students dropping out. The re-enrollment rate in GF2 among the student dropouts in construction with a GF1 is 7.7/21*100=36.6 percent, meaning just over 1/3 of these students re-enroll in a new GF2 after dropping out from a GF2 program. This shows that a relatively large share of the dropout students re-enroll in a new GF2 program.

For students in construction without GF1, the corresponding numbers are that 31.5 students out of one hundred students drop out of the GF2 program, cf. Figure 8. Out of the dropouts 7.5 re-enroll in a new GF2 education, 4.6 enroll in a different education while the remaining 19.4 do not re-enroll in any type of education within 60 weeks after enrollment in GF2 and subsequent dropout. The re-enrollment rate in GF2 among the students in construction without a GF1 is 7.5/31.5*100=23.8

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percent. This shows that the re-enrollment is substantially lower for students starting directly on GF2 compared to students coming from GF1 where the re-enrollment rate is 37 percent.

We also see that there are large fractions of student dropouts who do not re-enroll in another education. This is most noticeable for students without a GF1. Figure 8 shows that out of every 100 students starting in construction without a GF1, there are 19.4 students dropping out from the GF2 without starting a new education (new GF2 or any other education) within 60 weeks. Out of these 19.4 students, 7.9 are on some type of benefits, 7.6 are employed and 3.9 are in the "other" category, meaning that they have no income or income transfers 60 weeks after starting GF2. It means that slightly more students are on benefits after dropping out than there are students who are employed (7.6 percent). Among students in construction with a GF1, the most frequent outcome after dropping out is to re-enroll in a new GF2, cf. Figure 7.

The bottom part of the Sankey Diagrams shows what happens to the students who graduate from the GF2 program. Figure 7 shows that for every 100 students with a GF1 that start a GF2 in construction, 77.1 students complete the GF2 and out of these 70.7 students continue in the main program (HF). These are the same numbers as can be found in the bar charts in Figure 1. However, Figure 7 further shows what happens to the students who do not continue in the main program. Out of the 77.1 students with GF1, who completed a GF2 in construction, there are 1.5 entering a different GF2 program, 4.1 are not enrolling in any education, and 0.8 are enrolling in another education than GF2 or the main program. This means that the majority of students who do not continue in the main program do not enroll in a different education. Instead, among the 4.2 students who complete GF2 but do not enroll in another education, the majority, 2.4, are employed 60 weeks after starting GF2. In Figure 8, for the students in construction without a GF1, it is even more pronounced that the majority of the students who complete GF2 but do not continue in the main program, end up in employment 60 weeks after initial graduation. For these older students in construction, 3.5 students out of the 66.5 students who completed GF2 are employed 60 weeks after enrollment.

Overall, around 1/3 of the students who drop out re-enroll in a new GF2 education with a higher fraction among students with GF1 and a lower fraction among students without GF1. We find similar results, as for construction, for the other technical educations (Figures 9 and 10) and for the business educations (Figures 11 and 12).

Students who drop out from both technical and business educations, like construction educations, differ in their most frequent outcome 60 weeks after starting GF2, depending on their enrollment paths. For students without GF1 and drop out, the most frequent status is to be on benefits, closely followed by being employed and being re-enrolling in a new GF2. Figure 10 shows that among the

technical students without GF1 who drop out, 8.3 students are on benefits after dropping out while also 8.3 students are employed after dropping out and 6.8 students have graduated or are still enrolled in a new GF2 education after dropping out. Figure 12 shows that among the business students without GF1 who drop out, there are 9.5 on benefits, 6.9 employed, and 7.2 have graduated or are still enrolled in a new GF2.

Figures 9 and 11 show that students enrolling from a GF1 in technical and business educations also are most likely to start a new GF2 after dropping out. This is the same as for student with a GF1 in construction. The second most frequent status after dropping out, among the students with a GF1, is to either be employed or to be in the "other" category, meaning that they have no income from benefit or work.

The main difference between students with and without a GF1 is their age. Students with a prior GF1 are in general younger. Therefore, they might not qualify for receiving certain types of benefits, and many might still be living with their parents and therefore they might not have the same financial obligations (e.g. housing rent, food etc.). This could lead the younger students to more often be in the "other" category as opposed to the older students without GF1. At the same time, students with a GF1 have not been out of the education system and may therefore find it more natural to continue in school, even if they drop out. On the other hand, students with no prior GF1 are older and may not be used to attending school, such that their re-enrollment is lower if they drop out.

For students who graduate from GF2, we see in that the other technical students who graduate behave very similarly to the construction students who graduate the GF2. We see this by comparing the Figures 9 and 10 to the Figures 7 and 8. The greatest difference in the patterns across educations is when we compare business students who graduate to all the technical students. As in the bar charts, Figures 1 to 6, there are fewer business students than technical students who continue in the main program (HF), after completing the GF2. Figure 12 shows what the older business students without a prior GF1 do, after they graduate. As we saw in Figure 6, Figure 12 shows that close to half of the older GF2 business graduates do not continue in the main program and even fewer stay in the main program. Instead, out of the 68.2 graduates, 9.2 re-enroll in a new GF2 program, 20.2 have no new education start, and 2.2 enroll in a different type of education than GF2. Like the students without GF1 from the technical educations, the most frequent status business students that do not continue in the main program, is to be employed 60 weeks after starting the GF2.

Altogether, our results show that the most frequent status, after dropping out from a GF2 program, depend on whether the students come from a GF1 program or enroll in GF2 directly. For students entering from a GF1, the most frequent status after dropping out is to re-enroll in a new GF2 program.

This means a large share, around 1/3, of the student dropouts from GF1 re-enroll in a new GF2 program and thus stay within the VET educations. Among the older students entering the GF2 directly, the most frequent status after dropping out is to be on benefits, but this is closely followed by being employed or re-enrolling in a new GF2. In contrast to the students entering directly from GF1, the older students may have been enrolled in a GF2 program before the enrollment we observe them in our analysis and thus may have tried several different VET educations before we include them in our sample. This could be one of the reasons why we do not see as many of older students staying within the VET education after dropping out of the GF2. The second reason might be that these students are older and thus are more likely to qualify for some type of benefit. Because of the additional option of being able to receive benefits, this could lead more students without GF1 to enter benefits rather than a new GF2 after dropping out. To support this last hypothesis we see that the most frequent status for students with GF1, who drop out and do not start a new education, is not to be on benefits like the older students, but rather to be in the "other" category where they do not receive any income or income transfer.

The students who graduate from GF2 are less likely to end up on benefits or in the "other" category than the students who drop out from GF2. Among the GF2 graduates, the majority continue in the main program, although this is significantly lower for the business students. The students that graduate and do not continue in the main program are most likely to be employed 60 weeks after starting the GF2.

3. Student background

As d escribed above students coming through GF1 have a higher probability of completing the GF2 program compared to the students starting directly on the GF2 program (66 percent versus 60 percent). To get a better understanding of this difference we present the differences in background characteristics for the two groups (Table 1, 2, and 3).

Overall, the group of students starting directly on the GF2 program are typically older students some with prior education and/or labor market experience. Table 1, 2, and 3 show the distribution of background characteristics for the students prior to enrolling in the GF2 program, column 1 presents the overall share and column 2 and 3 respectively presents the shares for students entering with and without a GF1 program. Table 1 shows that the students coming from GF1 are typically younger and more likely to be male. We see that a relatively large proportion of the students without GF1 are not in education or in a job during the year prior to enrollment in GF2. The alternative to being in education or work is either to be registered as unemployed, receive benefits (there are several types), or to be in the remaining group that does not receive benefits of any type. Somewhat surprisingly, a very large

share of 21 percent of the students without GF1 do not receive any type of benefit meaning that they do not themselves have any source of income. The large share of people without any income is also found in Bjørsted et al (2018) who finds that 5.2 percent of the population in the age category 16-64 years old are living without an income[7]. They further find that a large share of the people living without an income are in the age category 20-29 years old, which is exactly the main group of students enrolling without a GF1. By definition, the group of students from GF1 are all in GF1 before they start the GF2 program and none of students without GF1 are in GF1 before they start the GF2 program. Finally, Table 1 shows that students with a GF1 are more likely to be natives than students without a GF1 are.

In Table 2, we see that students coming from GF1 have GF1 has their highest prior education and, by definition, GF1 is the most recent education they were enrolled in prior to starting the GF1 program. The prior education for the older students show that 9.5+18.4=27,9 percent of the students have a non-completed basic vocational course as their most recent educational enrollment prior to starting the GF2. At the same time, 12.1 percent of students without GF2 have obtained another vocational degree before entering our sample and 18.9+3.0=21.9 percent has a GF2 education or a basic education from before the reform in 2015. There are 3.5 percent of the students not entering from GF1, who have obtained a GF1 degree at some point. These students can for example end up in the "without GF1" group by first completing a GF1 and then enrolling in – and dropping out of - a GF2 before entering the GF2 included in our analysis sample. Furthermore, among the students without a GF1, 7.2 percent have completed parts of a high school education, 14.2 percent have completed high school, and 2.3 percent have tertiary education. We also see that the students with GF1 are more likely to have a recorded grade in Danish and in math from their lower secondary school. This is because the recording of grades from lower secondary school started in year 2002 and older students who graduated lower secondary school before this will therefore have a missing lower secondary school grade. Students can also have a missing grade if they did not obtain a lower secondary school degree in a traditional way. For both groups of students we see that their average grade in Danish and math are relatively low. The average grade in the population is 7, and the passing grade is 02. The highest grade is 12.[8]

Table 3 shows the distribution of the parental employment and education information for the students. We see that the largest share of students have parents where the mother, father or both

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[7] Bjørsted, E., Damm E. A. and Jensen T. L, "160.000 personer er ikke i job eller uddannelse og får ikke understøttelse", Arbejderbevægelsens Erhvervsråd, 2018

[8] In 2007 the grade scale changed. We have converted grades from the older system to the newer grading system of grades from -3 to 12.

are employed. We also see that the share of parents being out of the labor force is around 19 percent for students overall, but is higher for students going directly to GF2. This could be because these students in general are older and therefore they have older parents that have retired from the labor market. Looking at the parents' highest attained education, we see that around 40 percent of the students have parents where at least one parent has a vocational education. In general, the students in GF2 have parents with lower highest educational attainment than the Danish population (see DST tal for HFUDD for 2016-2019), and only around 2 percent have one or two parents with a MA/PhD education, which is much lower than the Danish population where around 11 percent have a MA/PhD education.

4. Which students complete GF2?

We have shown that students with and without GF1 differ with respect to their probability of completing the GF2 program. Further, we have shown that they also differ in their background characteristics. In the following, we quantify how the background characteristics translate into the probability of completing the GF2 program. To do this we run a linear regression model where the outcome measure is a binary indicator for having completed the GF2 program within 7 months, a so-called Linear Probability Model. The regression table shows six different models, where we sequentially add groups of background characteristics. All models also include school indicators, this allows us to control for time constant differences between the schools. We do not report these estimates in the tables. We base the final interpretation of the regression results on model 6 for both groups.

Table 4, column 1 includes a dummy variable for whether or not the student is coming from GF1 or directly entering GF2 controlling for school, education, and semester start. The regression shows that after controlling for school, education, and semester start, the students without GF1 have 5 percent point lower probability of graduating the GF2 program relative to the students coming from GF1. In Table 4, column 2 we split the students entering GF2 without a GF1 into their prior status before entering GF2. This regression shows that GF2 students coming from employment actually have a higher probability of graduating than students with a GF1, but that student coming from benefits and especially the "other" category have a much lower probability of graduating the GF2. After controlling for more background characteristics across the six columns, having come from benefits or the "other" category remains a strong predictor for a lower graduation probability. This finding is in line with other

analyses on Danish data showing that those without education and with poor labor market attachment have been enrolled in but not completed a vocational education[9].

Looking at the results in column 6, we see that another important determinant for completion of the GF2 program is previous education history. For example, approximately 14 percent of the students without GF1 have completed high school education (academic upper secondary education) prior to starting the GF2 program and this turns out to increase the probability of completion by 13 percent point compared to those without any prior education except for compulsory schooling. An explanation behind this could be that these students while having the ability to complete an academic education qualifying for tertiary education instead decided to pursue a vocational education. In line with that explanation, the results also show that, a preceding dropout from a GF2 program decrease the probability of completing the GF2 program by 6-8 percentage point.

Of other determinants, we see that that relative to the 15-16 years old, the 17-24 year old have significant lower graduation probability and that all older ages of students do equally well as the 15-16 year old[10]. We further see that grades from lower secondary school seem to matter a lot for the students' probability of completing GF2. The probability of completing GF2 is increasing in both Danish and math grades, and in the most extreme case students with grades between 10-12 in math are 20 percentage points more likely, than students' with the lowest grades, to complete GF2. It is also worth noting that the Math grade seems more important for the students' probability of completing GF2. This is highly expected as having high grades suggests having high cognitive ability, which is key in determining how students fare in any kind of education.[11] Further, it is also worth noting that males have 5 percentage points lower probability of completing GF2 and 1st and 2nd generation immigrants have 9 to 13 percentage points lower probability of completing GF2 compared to natives.

Turning to the students' parental background characteristics, we see that compared to having an employed mom and/or dad, students with one or both parents unemployed or out of the labor force have a slightly lower probability of completing GF2 relative to students with employed parents. Students with parents with the different educational backgrounds seem to have largely the same probability of completing GF2. Only three groups are little above average; parents with a VET

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[9] Chapter III in "Dansk Økonomi, efterår 2018", DØRS. In particular, the results show that for the cohort of 29 years old unskilled and with Danish background, 73 percent had at some point been enrolled in a VET education (page 215 in the report).

[10] This is except the students older than 50 year old, but these students only represent 0.3% of all students.
[11] Notice that students with the grade 10-12 in Danish are not doing significantly better than the students with the lowest Danish grades, but this is a highly imprecise estimate since only 1.4 percent of the students have a Danish grade in the range 10-12.

education and mothers with either a high school degree or a short-cycle higher education are 2-4 percentage points more likely to complete GF2 than students with mothers who have lower secondary school as their highest education.

5. Data

The data is administrative register data from Statistics Denmark (DST). The sample includes all students in the following GF2 programs: Building painter, bricklayer, joiner, carpentry, plumbing technique, data and communications technology, electrician, retail and trading

In addition, we select the students according to the following criteria overall selection criteria:

a) Starting dates in January or August from August 2015 to August 2017.

b) Enrolled as "skolevejen" or "praktikvejen". They will follow ordinary G2 courses at the vocational school. This means that we exclude students who take apprenticeship-based GF2 programs from the analysis.

c) We further remove students who are 14 years or younger when starting GF2 and remove schools with fewer than 30 students starting on a given start date.

After the selection criteria in a) to c) we select individual VET educations. Table 5 presents the number of student in each of the overall VET educations, from which we select the three major educations; Construction, Office, commercial and business services, and The technology area, power and electronics etc. Table 6 to 8 present number of students in the individual educations in each of our selected overall educations. From each of our overall educations, we select the individual educations with the most students. For construction in Table 6, we choose building painter, bricklayer, joiner, carpentry, and plumbing technique. For Office, commercial and business services in Table 7 we choose retail and trading.[12] For Technology area, power and electronics in Table 8, we select the educations: Data and communications technology and Electrician.

Data in the bar charts

Education data is from the register KOTRE and we select students using the following requirements:

- Students fulfilling selection criteria a) to c) and our chosen educations.
- We keep information on whether the most recent education was a GF1.

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[12] We do not select office education despite the fact that this education has many students. We exclude office education because the students in this education is enrolled in high school at the same time and thus do not follow the same type of GF2 program that students in the other educations follow. Further, in the analysis we drop students in these educations with a prior high school or higher degree, as these students follow shorter GF2 spells and are therefore not comparable to other students.

- We follow students up to 60 weeks after starting GF2 and only allow for enrollment/graduation in initial GF2 enrollment as well as further enrollment into the main vocational program.

Data in the Sankey diagrams

Education data is from the register KOTRE and we select students using the following requirements:

- Students fulfilling selection criteria a) to c) and our chosen educations.
- We keep information on whether the most recent education was a GF1.
- We include all other education spells up to 60 weeks after starting GF2 and allow students to enroll in new educations as either GF2 or any other educations.

Employment/Benefit data is from the register DREAM and we select students using the following requirements:

- If a student is recorded as having not started the main program (HF) or another education (e.g. has no new start after start in GF2) the student is matched with DREAM 60 weeks after starting GF2.
- We code employment status as having a non-missing workplace code 60 weeks after starting GF2.
- We code benefit status as having received benefits in at least during the interval one week prior to two weeks after 60 weeks after starting GF2 and not having an employment during this period.
- If the student has a missing observation in both employment status and benefit status and is registered in DREAM (2015-2018) 60 weeks after GF2 start, the student is given the label "Other" which covers students which are neither in employment nor receiving benefits.

Data in the Regression Analyses

Vocational Education data is from the register KOTRE and we select students using the following requirements:

- Students in a GF2 spell defined as above.
- We define completion of GF2 as having completed within 7 months from the starting date.

Background characteristics of the GF2 students is data combined from four different administrative registers:

- The demographics register, BEF, supplies information on age, sex, immigration status, and parental identifiers. We select these from January 1 during the year of enrollment.

- For individuals who graduated 9th grade after 2002, we observe the grades in this year in the register UDFK. The 9th grade is the last obligatory year of school in Denmark. We choose the Danish and math grade received at the end of year exam, which are exams given to all 9th grade students and conducted at the same for all students. We categorize the grade with [0-2), [2,4), [4,7), [7,10), [10,12)

- Highest completed education is obtained from the register from the Danish Student Register, KOTRE. We observe, by dates, each educational enrollment spell and any credentials obtained from the educations. We use this data to construct parental education and highest completed education of the students. We also use KOTRE to construct the most recent education prior to GF2 enrollment. This provides us with an indicator for whether the students are coming from a GF1 program or are dropouts from either GF2 or the old GF program.

- The Integrated Database for Labor Market Research (IDA), in which we observe parents labor market status and labor market status of students during the year prior to enrollment. During the year prior to enrollment, education has first priority, such that if a student is enrolled in school, we classify this as a student during the year prior to enrollment. For all the future GF2 students who did not go to school during the year prior to enrollment, we categorize them as unemployed if they received unemployment benefits for at least 6 months during the year. For the rest of the group, we categorize them according to their most important status in November during the year prior to enrollment.

6. Figures and tables

Figure 1: Weekly status, construction, with GF1
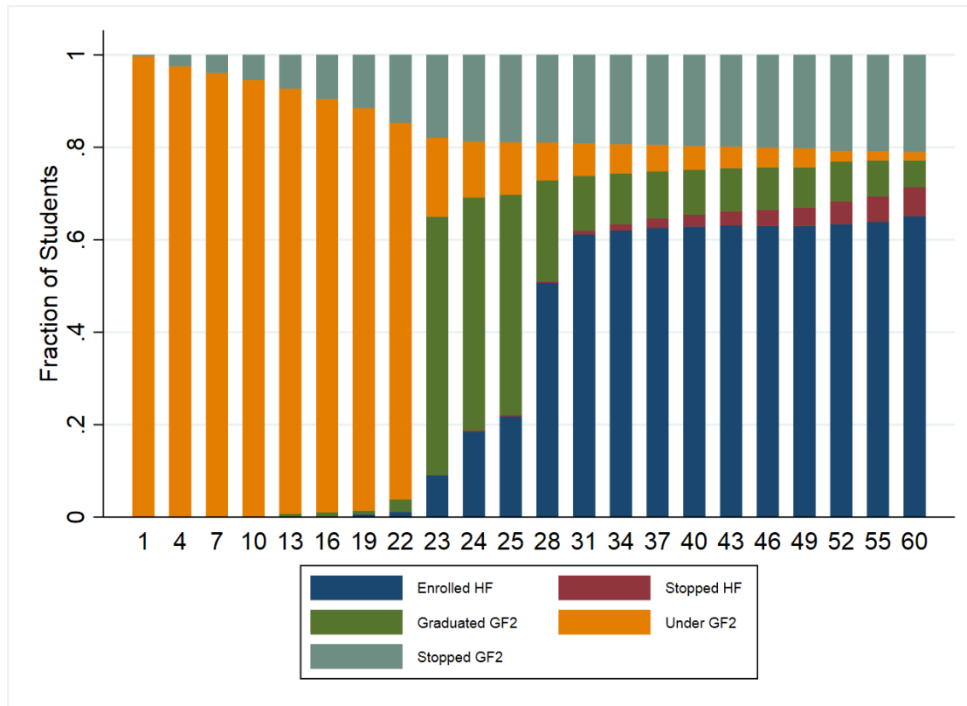
Note: Numbers based on KOTRE register and own calculations.

Figure 2: Weekly status, construction, without GF1
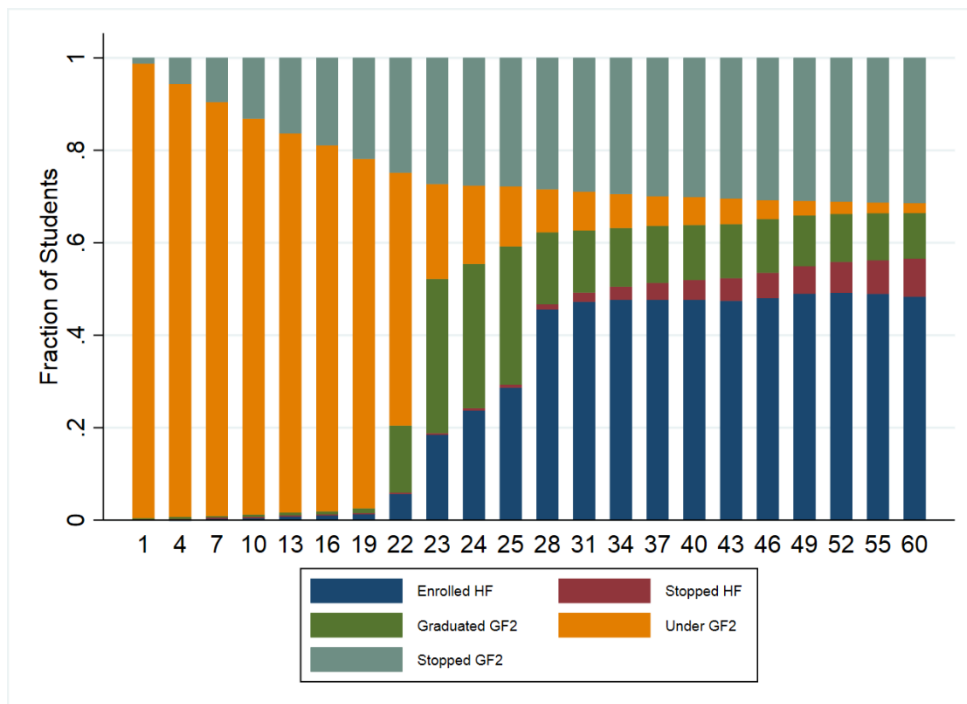
Note: Numbers based on KOTRE register and own calculations.

Figure 3: Weekly status, technology: electricity and power, with GF1
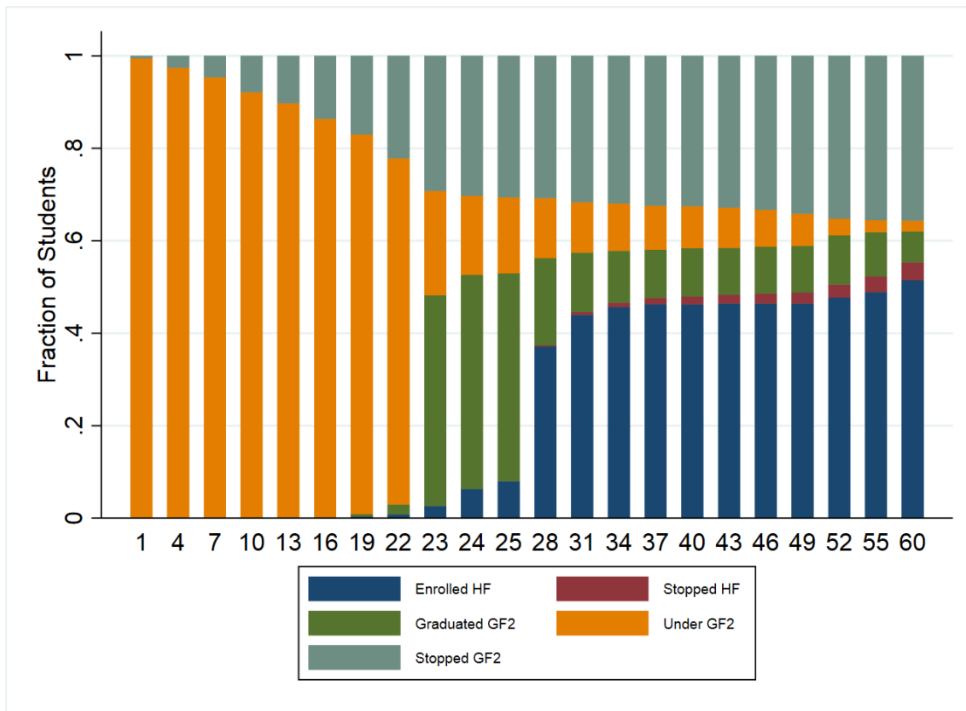
Note: Numbers based on KOTRE register and own calculations.

Figure 4: Weekly status, technology: electricity and power, without GF1
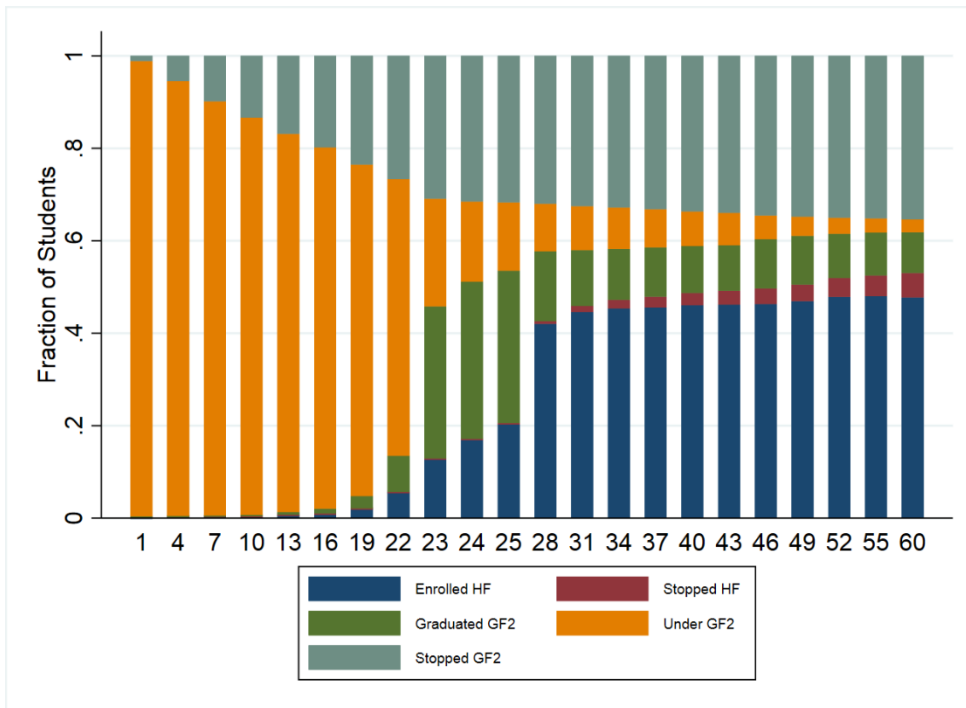
Note: Numbers based on KOTRE register and own calculations.

Figure 5: Weekly status, office, commercial and business services, with GF1
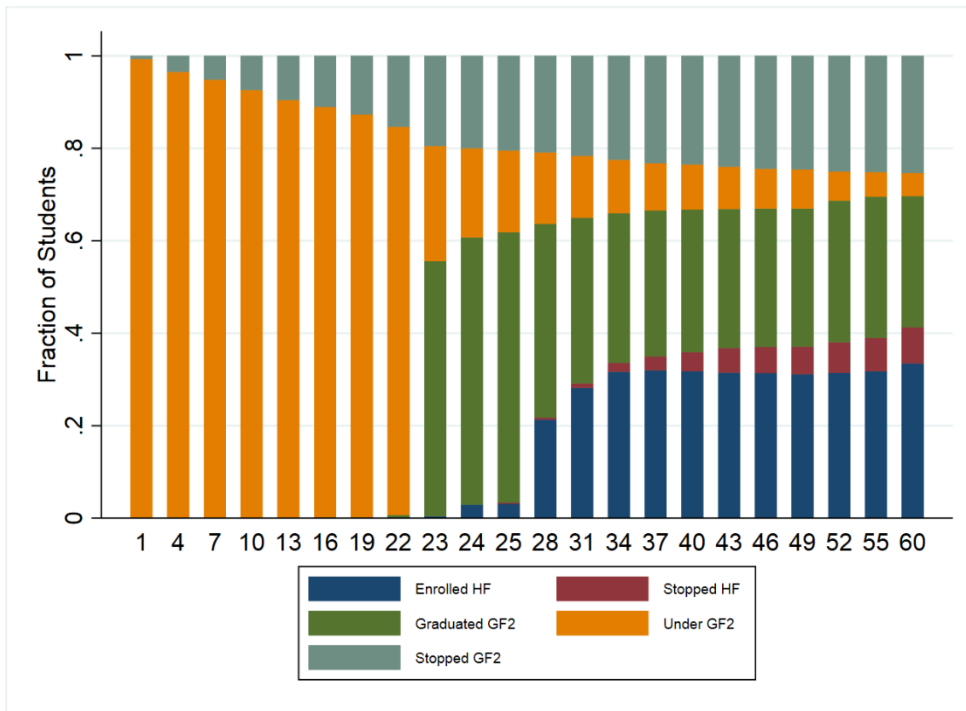
Note: Numbers based on KOTRE register and own calculations.

Figure 6: Weekly status, office, commercial and business services, without GF1
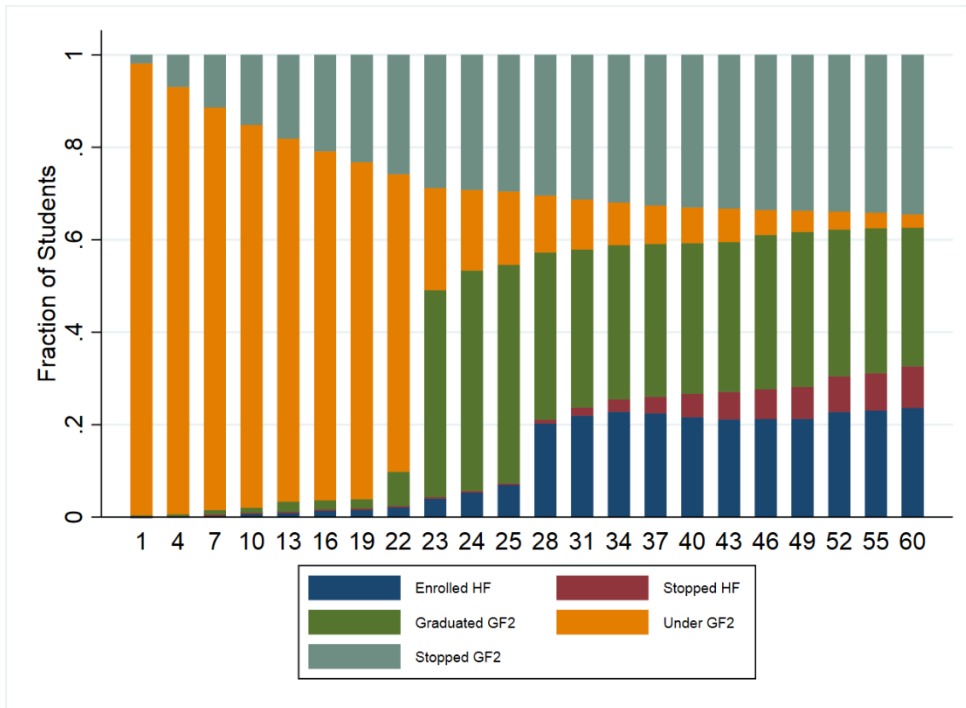
Note: Numbers based on KOTRE register and own calculations.

Figure 7: Sankey diagram, construction, with GF1
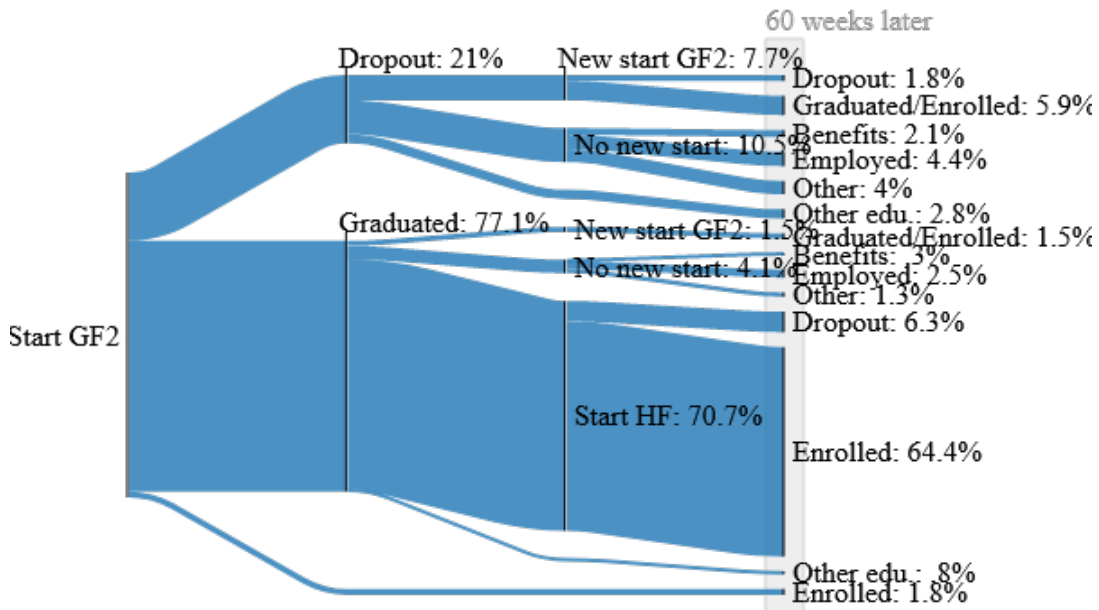
Note: Numbers based on KOTRE and DREAM registers and own calculations.

Figure 8: Sankey diagram, construction, without GF1
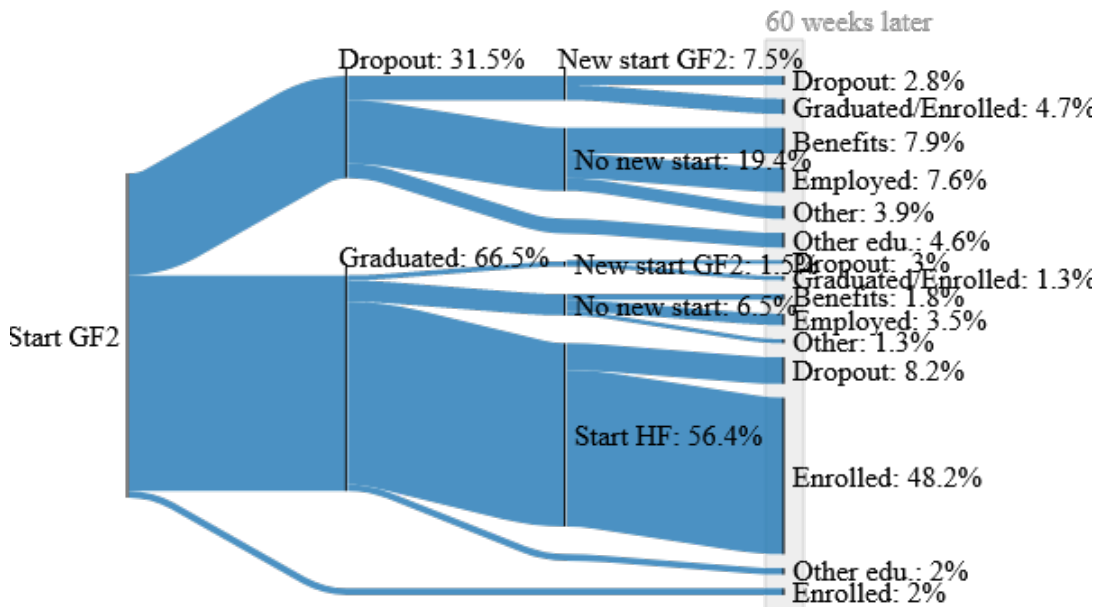
Note: Numbers based on KOTRE and DREAM registers and own calculations.

Figure 9: Sankey diagram, technology and electricity, with GF1
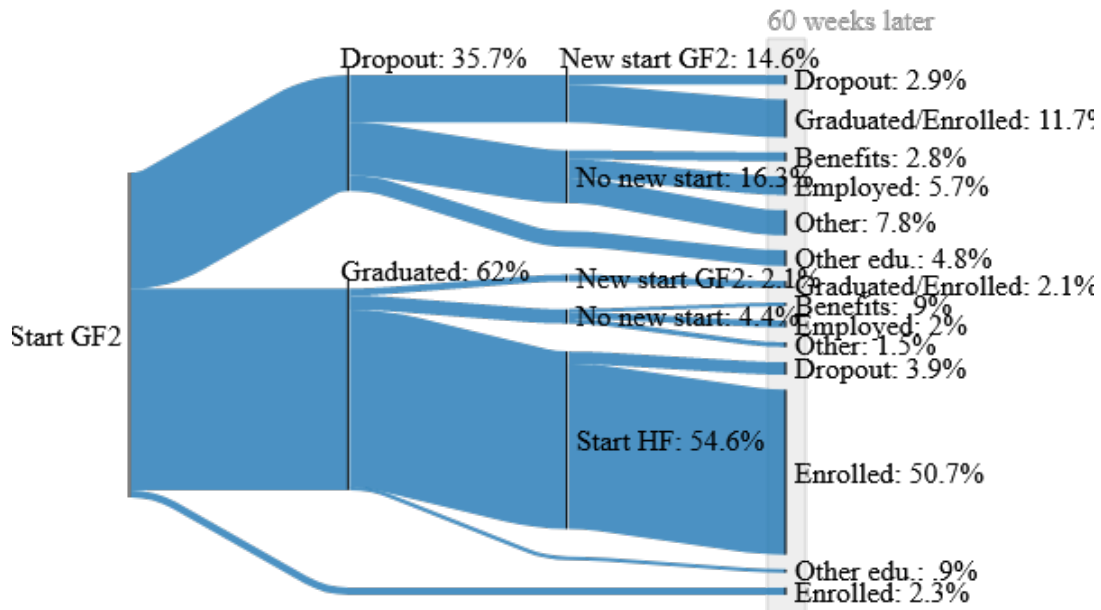
Note: Numbers based on KOTRE and DREAM registers and own calculations.

Figure 10: Sankey diagram, technology and electricity, without GF1
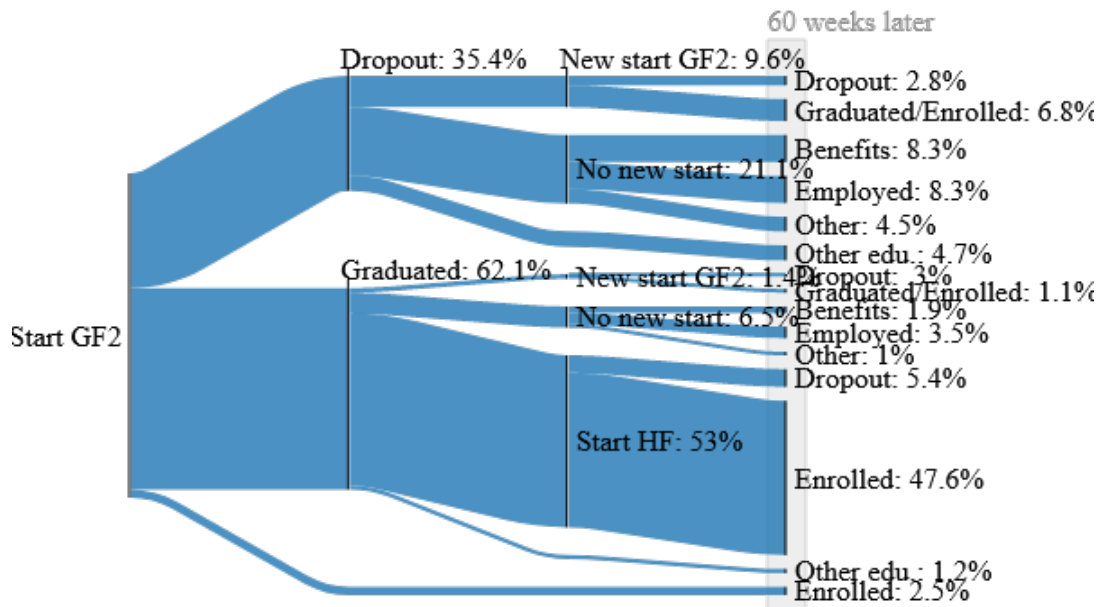
Note: Numbers based on KOTRE and DREAM registers and own calculations.

Figure 11: Sankey diagram, office, commercial and business services, with GF1
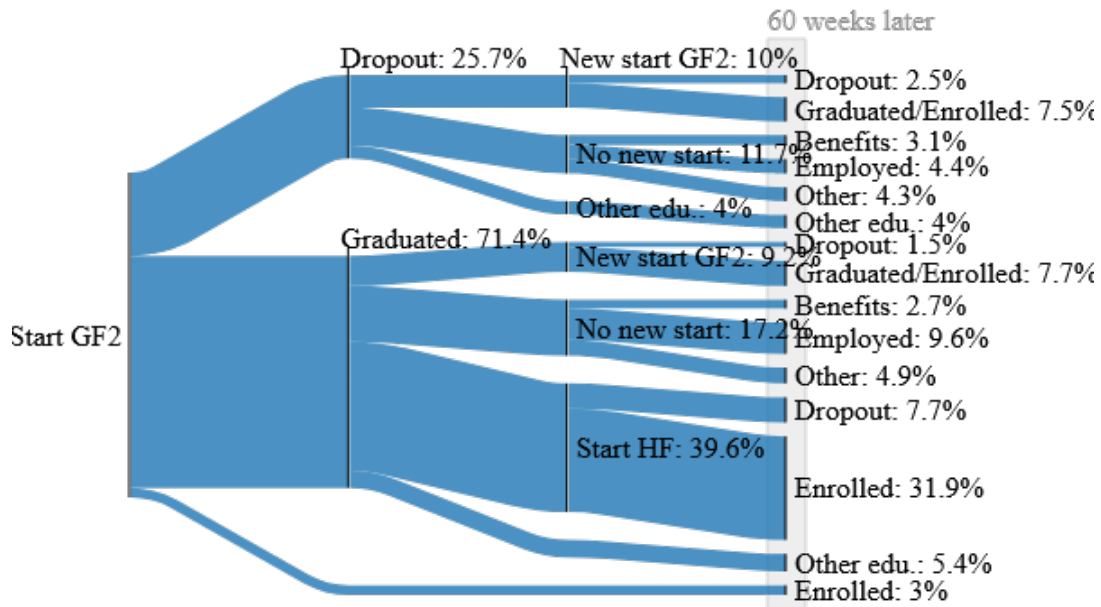
Note: Numbers based on KOTRE and DREAM registers and own calculations.

Figure 12: Sankey diagram, office, commercial and business services, without GF1
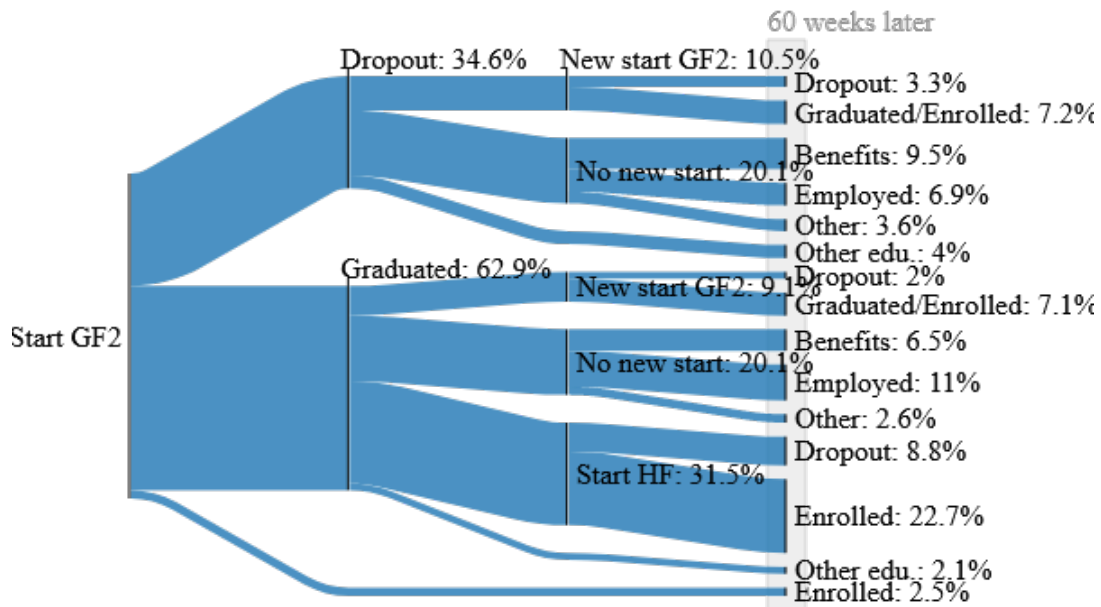
Note: Numbers based on KOTRE and DREAM registers and own calculations.

Table 1: Students background characteristics

	All	GF1	No GF1
Male	76.08%	81.74%	74.27%
Native	88.32%	90.84%	87.52%
2nd generation immigrant	6.35%	2.86%	7.46%
1st generation immigrant	5.33%	6.30%	5.02%
Prior employment			
Employed	17.25%	0.00%	22.77%
Unemployed	1.83%	0.00%	2.41%
Education	34.04%	0.00%	44.93%
Benefits	6.73%	0.00%	8.89%
Other	15.90%	0.00%	20.99%
GF 1	24.24%	100.00%	0.00%
Age group			
15-16	9.12%	21.77%	5.08%
17-18	34.54%	75.71%	21.37%
19-20	17.18%	2.52%	21.87%
21-22	12.46%	0.00%	16.45%
23-24	8.38%	0.00%	11.06%
25-30	11.06%	0.00%	14.59%
31-35	3.36%	0.00%	4.43%
36-40	1.90%	0.00%	2.51%
41-45	1.15%	0.00%	1.52%
46-50	0.54%	0.00%	0.72%
>50	0.31%	0.00%	0.41%
Observations	25,659	6,220	19,439

Note: Own calculations with selected data from the register BEF.

Table 2: Students education information

	All	GF1	No GF1
Math grade (lower secondary school)			
<02	15.82%	9.97%	17.69%
02-4	21.81%	28.07%	19.80%
4-7	23.89%	33.81%	20.71%
7-10	16.49%	20.16%	15.32%
10-12	4.77%	3.97%	5.03%
Missing	17.23%	4.02%	21.46%
Danish grade (lower secondary school)			
<02	14.06%	7.72%	16.09%
02-4	28.42%	37.85%	25.40%
4-7	28.77%	39.00%	25.50%
7-10	10.48%	10.69%	10.41%
10-12	1.38%	0.63%	1.62%
Missing	16.89%	4.12%	20.97%
Most recent prior VET			
Dropout from GF2	7.19%	0.00%	9.49%
Dropout from old GF	13.91%	0.00%	18.35%
Graduated GF1	24.24%	100.00%	0.00%
Highest education			
Lower secondary school	27.22%	0.00%	35.93%
Some high school	5.42%	0.00%	7.16%
Old GF	14.30%	0.00%	18.87%
GF 1	26.86%	100.00%	3.45%
GF 2	2.30%	0.00%	3.03%
High school	10.78%	0.00%	14.22%
Vocational School	9.16%	0.00%	12.09%
Further education	1.73%	0.00%	2.28%
Missing highest education	2.25%	0.00%	2.97%
GF2 spell			
Graduated GF2 in under 7 months	61.44%	66.38%	59.85%
Observations	25,659	6,220	19,439

Note: Own calculations with selected data from the registers UDFK and KOTRE.

Tabel 3: Parental background characteristics

	All	GF1	No GF1
Employment			
Dad employed	70.93%	81.66%	67.50%
Dad unemployed	6.34%	5.71%	6.55%
Dad out of the labour force	19.05%	12.32%	21.20%
Dad employment missing	3.68%	0.32%	4.75%
Mom employed	65.01%	75.93%	61.51%
Mom unemployed	8.83%	7.73%	9.18%
Mom out of the labour force	19.79%	14.60%	21.45%
Mom employment missing	6.37%	1.74%	7.86%
Highest Education			
Dad lower secondary school	25.98%	26.43%	25.83%
Dad VET	42.87%	51.13%	40.23%
Dad high school	2.81%	2.57%	2.88%
Dad short-cycle higher education	4.28%	4.63%	4.17%
Dad Prof. BA degree	6.24%	5.58%	6.45%
Dad BA degree	0.37%	0.26%	0.41%
Dad MA/PhD degree	2.60%	1.67%	2.89%
Dad education missing	14.85%	7.73%	17.13%
Mom lower secondary school	26.24%	22.81%	27.33%
Mom VET	42.05%	50.10%	39.47%
Mom high school	4.01%	4.28%	3.93%
Mom short-cycle higher education	3.16%	3.99%	2.90%
Mom Prof. BA degree	14.42%	14.20%	14.49%
Mom BA degree	0.35%	0.26%	0.38%
Mom MA/PhD degree	1.97%	1.41%	2.15%
Mom education missing	7.80%	2.96%	9.35%
Observations	25,659	6,220	19,439

Note: Own calculations with selected data from the registers BEF, IDA, and KOTRE.

Table 4: Probability of graduating from GF2 in 7 months

	(1) Graduated GF 2		(2) Graduated GF 2		(3) Graduated GF 2		(4) Graduated GF 2		(5) Graduated GF 2		(6) Graduated GF 2	
	estimate	se	estimate	se	estimate	se	estimate	se	estimate	se	estimate	se
From GF 1 (ref. group)												
Not from GF 1	-0.05***	(0.01)										
Prior employment												
Employed			0.07***	(0.01)	0.03**	(0.01)	0.03**	(0.01)	0.02*	(0.01)	0.08***	(0.01)
Unemployed at least half a year			-0.01	(0.02)	-0.05*	(0.03)	-0.04	(0.03)	-0.04	(0.03)	-0.00	(0.03)
Enrolled in education			-0.05***	(0.01)	-0.06***	(0.01)	-0.07***	(0.01)	-0.07***	(0.01)	-0.01	(0.01)
Benefits recipient			-0.09***	(0.01)	-0.15***	(0.02)	-0.14***	(0.02)	-0.13***	(0.02)	-0.04**	(0.02)
Other			-0.20***	(0.01)	-0.22***	(0.01)	-0.20***	(0.01)	-0.20***	(0.01)	-0.10***	(0.02)
Demographics												
Female (ref. group)												
Male					-0.06***	(0.01)	-0.06***	(0.01)	-0.06***	(0.01)	-0.05***	(0.01)
Native (reference group)												
1st generation immigrant					-0.11***	(0.01)	-0.09***	(0.01)	-0.09***	(0.02)	-0.09***	(0.02)
2nd generation immigrant					-0.21***	(0.01)	-0.17***	(0.01)	-0.13***	(0.01)	-0.13***	(0.01)
Age												
Age 15-16 (reference group)												
Age 17-18					-0.10***	(0.01)	-0.07***	(0.01)	-0.07***	(0.01)	-0.08***	(0.01)
Age 19-20					-0.05***	(0.01)	-0.03*	(0.01)	-0.02	(0.01)	-0.06***	(0.01)
Age 21-22					-0.03**	(0.01)	-0.02	(0.01)	-0.01	(0.01)	-0.07***	(0.02)
Age 23-24					-0.03	(0.02)	0.02	(0.02)	0.02	(0.02)	-0.05***	(0.02)
Age 25-30					-0.05***	(0.02)	0.05***	(0.02)	0.06***	(0.02)	-0.03	(0.02)
Age 31-35					0.01	(0.02)	0.09***	(0.02)	0.09***	(0.02)	-0.00	(0.02)
Age 36-40					-0.01	(0.03)	0.07**	(0.03)	0.08***	(0.03)	-0.03	(0.03)
Age 41-45					-0.03	(0.03)	0.05	(0.03)	0.06*	(0.03)	-0.05	(0.03)
Age 46-50					-0.06	(0.04)	0.02	(0.05)	0.03	(0.05)	-0.08*	(0.05)
Age >50					-0.18***	(0.06)	-0.10*	(0.06)	-0.12*	(0.06)	-0.23***	(0.06)
Math grade (lower secondary)												
Math grade <02 (ref. group)												
Math grade 2-4							0.02**	(0.01)	0.02*	(0.01)	0.01	(0.01)
Math grade 4-7							0.09***	(0.01)	0.08***	(0.01)	0.07***	(0.01)
Math grade 7-10							0.15***	(0.01)	0.14***	(0.01)	0.12***	(0.01)

	(1)		(2)		(3)	
Math grade 10-12	0.25***	(0.02)	0.24***	(0.02)	0.20***	(0.02)
Danish grade (lower secondary)						
Danish grade <02 (ref. group)						
Danish grade 2-4	0.01	(0.01)	0.00	(0.01)	-0.00	(0.01)
Danish grade 4-7	0.06***	(0.01)	0.05***	(0.01)	0.04***	(0.01)
Danish grade 7-10	0.06***	(0.01)	0.06***	(0.01)	0.04***	(0.01)
Danish grade 10-12	0.04*	(0.03)	0.04	(0.03)	0.01	(0.03)
Parental Employment						
Dad employed (ref. group)						
Dad unemployed			-0.06***	(0.01)	-0.05***	(0.01)
Dad out of the labour force			-0.02**	(0.01)	-0.02**	(0.01)
Mom employed (ref. group)						
Mom unemployed			-0.04***	(0.01)	-0.04***	(0.01)
Mom out of the labour force			-0.03***	(0.01)	-0.02**	(0.01)
Parental Highest Education						
Dad lower secondary school (ref. group)						
Dad VET			0.03***	(0.01)	0.03***	(0.01)
Dad high school			-0.02	(0.02)	-0.02	(0.02)
Dad short-cycle higher education			0.03*	(0.02)	0.02	(0.02)
Dad Prof. BA degree			0.03**	(0.01)	0.02	(0.01)
Dad BA degree			-0.04	(0.05)	-0.04	(0.05)
Dad MA/PhD degree			0.02	(0.02)	0.01	(0.02)
Mom lower secondary school (ref. group)						
Mom VET			0.02***	(0.01)	0.02***	(0.01)
Mom high school			0.04***	(0.02)	0.04**	(0.02)
Mom short-cycle higher education			0.04**	(0.02)	0.04**	(0.02)
Mom Prof. BA degree			0.01	(0.01)	0.00	(0.01)
Mom BA degree			-0.04	(0.05)	-0.04	(0.05)
Mom MA/PhD degree			0.01	(0.02)	0.00	(0.02)
Most recent prior VET						
Other/From GF 1 (ref. Group)						
Dropout from GF 2					-0.08***	(0.01)
Dropout from old GF					-0.06***	(0.01)
Highest education						
Lower secondary school (ref. group)						

	(1)		(2)		(3)		(4)		(5)		(6)	
GF (GF 1/GF 2/old GF)											0.01	(0.01)
Some high school											0.07***	(0.01)
Vocational School											0.15***	(0.01)
High school											0.13***	(0.01)
Further education											0.22***	(0.02)
Starting Month												
Aug, 2015 (reference group)												
Jan, 2016	-0.00	(0.01)	0.00	(0.01)	0.01	(0.01)	0.01	(0.01)	0.00	(0.01)	0.01	(0.01)
Aug, 2016	0.02	(0.01)	0.02*	(0.01)	0.02**	(0.01)	0.02**	(0.01)	0.02**	(0.01)	0.02**	(0.01)
Jan, 2017	0.03***	(0.01)	0.03***	(0.01)	0.04***	(0.01)	0.04***	(0.01)	0.03***	(0.01)	0.04***	(0.01)
Aug, 2017	0.01	(0.01)	0.02*	(0.01)	0.03**	(0.01)	0.02*	(0.01)	0.02*	(0.01)	0.02	(0.01)
VET Education												
Retail Education (reference group)												
Trading Education	-0.11***	(0.01)	-0.12***	(0.01)	-0.11***	(0.01)	-0.12***	(0.01)	-0.12***	(0.01)	-0.12***	(0.01)
Building Painter	-0.03	(0.03)	-0.02	(0.03)	-0.02	(0.03)	-0.01	(0.02)	-0.01	(0.02)	-0.01	(0.02)
Bricklayer	0.03	(0.03)	0.02	(0.03)	0.06**	(0.03)	0.06**	(0.03)	0.06**	(0.03)	0.05*	(0.03)
Joiner	0.08***	(0.03)	0.06**	(0.03)	0.06**	(0.03)	0.01	(0.03)	-0.00	(0.03)	-0.05*	(0.03)
Carpentry etc.	0.07***	(0.02)	0.06***	(0.02)	0.08***	(0.02)	0.06***	(0.02)	0.06**	(0.02)	0.04*	(0.02)
Plumbing technique	0.08***	(0.03)	0.06**	(0.03)	0.10***	(0.03)	0.09***	(0.03)	0.09***	(0.03)	0.07***	(0.03)
Data and communication	-0.08***	(0.03)	-0.08***	(0.02)	-0.06**	(0.03)	-0.09***	(0.02)	-0.10***	(0.02)	-0.12***	(0.02)
Electrician	-0.02	(0.02)	-0.05**	(0.02)	-0.02	(0.02)	-0.06***	(0.02)	-0.07***	(0.02)	-0.09***	(0.02)
Constant	0.59***	(0.03)	0.58***	(0.03)	0.76***	(0.03)	0.63***	(0.03)	0.62***	(0.04)	0.57***	(0.04)
Observations	25,659		25,659		25,659		25,659		25,659		25,659	
R-squared	0.03		0.06		0.08		0.10		0.10		0.12	

Table 5: All educations

	Frequency	Pct.
Agriculture and nature (FJO)	4,661	6.18
Care, health and education (OSP)	15,350	20.36
Construction (TBT)	11,197	14.85
Experience and events (FJO)	2,000	2.65
Food etc. (FJO)	6,503	8.63
Office, commercial and business services (KHF)	12,346	16.38
The technology area, cycling, automotive and marine mechanics etc. (TBT)	3,984	5.29
The technology area, graphical techniques and media production (TBT)	2,622	3.48
The technology area, mechanical engineering and production (TBT)	5,320	7.06
The technology area, power and electronics etc. (TBT)	9,251	12.27
Transport and logistics (TBT)	2,146	2.85
Total	75,380	100.00

Table 6: Construction

	Frequency	Pct.
Bricklayer	1,312	11.72
Building Painter	1,648	14.72
Carpentry etc.	4,877	43.56
Chimneys and boiler systems technician	13	0.12
Construction Installation Technician	-	-
Glazier	34	0.30
Home decoration and upholstery etc.	129	1.15
Joiner, etc.	1,191	10.64
Machin Joiner, etc.	121	1.08
Plumbing technique	1,180	10.54
Stonemason	-	-
Technical insulator	24	0.21
Tiler	46	0.41
Tiler and instructor etc.	616	5.50
Total	11,197	100.00

Note: - indicates cell is based on <5 observations.

Table 7: Office, commercial and business services (KHF)

	Frequency	Pct.
Financial Education	46	0.37
Office Educations, general and specialized	1,891	15.32
Property Service Technician	477	3.86
Retail Education	6,663	53.97
Security Guard	505	4.09
Service Assistant Education	464	3.76
Trading Education	2,300	18.63
Total	12,246	100.00

Note: We further remove 1329 observations which have High School or further education as their highest prior education level, as these students follow special shorter spells in GF2.

Table 8: Technology area, power and electronics etc. (TBT)

	Frequency	Pct.
Automation and process automation	471	5.09
Data and communications technology	3,604	38.96
Electrician	4,215	45.56
Electronics Operator	-	-
Electronics and weak current training	276	2.98
Frontline Broadcasting supporter	-	-
Frontline pc-supporter	-	-
Process Operator	443	4.79
Supply Operator	25	0.27
Theater, exhibition and event technology	207	2.24
Total	9,251	100.00

Note: - indicates cell is based on less than 5 observations.

Table 9: Distribution of GF1 and no GF1 by educations

	GF1		no GF1		Total
	count	pct	count	pct	count(100%)
Educations					
Bricklayer	302	23.0	1,010	77.0	1,312
Building Painter	169	10.3	1,479	89.7	1,648
Carpentry etc.	1,581	32.4	3,296	67.6	4,877
Joiner, etc.	78	6.5	1,113	93.5	1,191
Plumbing technique	209	17.7	971	82.3	1,180
Retail Education	1,625	28.3	4,127	71.7	5,752
Trading Education	373	19.8	1,507	80.2	1,880
Data and communications technology	765	21.2	2,839	78.8	3,604
Electrician	1,118	26.5	3,097	73.5	4,215
Main groups					
Construction (TBT)	2,339	22.9	7,869	77.1	10,208
Office, commercial and business services (KHF)	1,998	26.2	5,634	73.8	7,632
The technology area, power and electronics etc. (TBT)	1,883	24.1	5,936	75.9	7,819

Table 10: Share who graduate within 7 and 14 months by GF1/no GF1 and educations

	GF1		no GF1		Total	
	7 months pct	14 months pct	7 months pct	14 months pct	7 months pct	14 months pct
Educations						
Bricklayer	69.9	76.8	60.5	65.5	62.7	68.1
Building Painter	64.5	67.5	54.6	58.7	55.6	59.6
Carpentry etc.	75.4	78.4	63.8	67.7	67.5	71.2
Joiner, etc.	71.8	76.9	67.8	70.2	68.1	70.6
Plumbing technique	73.7	76.1	66.1	71.2	67.5	72.0
Retail Education	71.2	75.8	59.8	64.9	63.0	68.0
Trading Education	46.1	52.0	53.0	57.4	51.6	56.3
Data and communications technology	54.4	57.5	57.1	60.8	56.5	60.1
Electrician	59.2	65.2	59.0	63.2	59.1	63.7
Main groups						
Construction (TBT)	73.6	77.2	62.5	66.5	65.0	68.9
Office, commercial and business services (KHF)	66.5	71.4	58.0	62.9	60.2	65.1
The technology area, power and electronics etc. (TBT)	57.2	62.1	58.1	62.1	57.9	62.1