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The need for tailored support for long-term students

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Abstract

Long-term students in higher education are characterised by extended durations of study well beyond the expected or typical completion time. Extended durations of study pose a persistent problem to higher education institutions in Austria, as they rely on their students graduating in a timely manner for budgetary reasons. Despite the significance of the issue, long-term students are currently an understudied topic in higher education research. This paper investigates subgroups of long-term students and discuss potential barriers to successful graduation.

The data used for this study are records from a technical university which include enrolment information, exams, and grades. There are 50 cases of registered students (as of August 2023) who enrolled in the Software and Information Engineering (SIE) bachelor programme between 2011 and 2016, have completed over 160 ECTS points, and have neither graduated nor dropped out.

Results indicate there is a subgroup among the long-term students struggling with the bachelor thesis while others struggle with specific exams, either repeatedly failing or not attempting them. A subgroup of these students is continually active, completing only one or two courses each semester, but doing so persistently. The university records unfortunately do not contain any information on why this is the case, since the data only contain information on the long-term students' academic performance and administrative status. To shed some light on the issue, a representative sample of long-term students would need to be surveyed and asked about their living circumstances.

The findings show that not all students who study for a long time without graduating need help, while others struggle, especially with the bachelor thesis. This illustrates that a more fine-grained understanding of the reasons for extended study duration is required if universities want to develop support structures for long-term students that actually meet their needs.

1 Introduction

Extended durations of study among students pose a persistent challenge to public universities in Austria.

Long-term students in higher education are characterised by much longer periods of study well beyond the expected or typical completion time. Higher education institutions in Austria rely on their students graduating in a timely manner. Their budget is determined by so-called performance agreements with the Federal Ministry of Education, Science and Research (*Bundesministerium Bildung, Wissenschaft und Forschung*). These agreements set specific objectives the university must obtain in order to receive the full budget. A significant performance indicator is the number of graduations within a three-year period which is used to determine the budget for the subsequent period. This indicator is adversely affected by extended durations of studies. Students who complete most of the curriculum, but ultimately fail to graduate are especially costly, as they create expenses almost equivalent to a complete study degree, but the university is not compensated for them due to the failure to graduate. For the concerned students, the delay results in missing out on employability (Statistik Austria, 2023) and wage benefits (OECD 2022a; OECD 2022b) that a university degree ensures. After exceeding the standard duration of study of six semesters plus two so-called tolerance semesters, they are required to pay a study fee of 363,36 € each semester in order to stay enrolled. In the public discourse, the topic of long-term studies is a controversial one (Kuda 2000) that usually revolves around penalty measures, such as study fees, to incentivise all students to progress swiftly through the curriculum (Kuda 2000).

Available literature on this topic was predominantly published in the early 2000s, often in the form of grey literature (e.g., Fischer 2018; Bienert 2002; Kuda 2001), and mostly in German. As a result, there are no widely or internationally recognised scientific standards or definitions for long-term students. Standard or minimum period of study plus two semesters is often used (e.g. Kuda et al. 2000), but it is not scientifically grounded and not in relation to the effective length of study needed by the students, which may differ considerably between universities and study programmes. Previous studies from Germany have investigated mental health problems (Jamrozinski et al. 2009) and demographic characteristics (Neumann et al. 2019) associated with extended duration of study. But not only is researching such factors costly in terms of data collection, mitigating them is far beyond the means of a university. This makes it difficult for universities to develop tailored support structures that could prevent long-term students from withdrawing from their studies completely and leaving the university without obtaining a degree. This preliminary study thus uses on university records that are automatically collected by universities and accounts for changes to the curriculum by aligning equivalent mandatory courses across curricula. This allows more fine-grained analysis of barriers in the students' mandatory coursework.

The remainder of the paper is organised as follows: Section 2 describes the approach for leveraging and enriching the university records for descriptive data analysis. Section 3 presents the key findings of our study, followed by discussion of these results in section 4. Section 5 concludes with limitations and plans for future research.

2 Data and Methods

2.1 Raw Data

The raw data used in this study are student records from a technical university in Austria. Students enrolled in one of the six informatics bachelor programmes were the focus of the analysis, after the observation was made that numerous students who started a bachelor programme in 2011–2016 have neither graduated nor dropped out but are still officially enrolled as of August 2023.

The university records contain per-semester information on the students'

- anonymised student identifier
- status (enrolment, graduation, dropout, leave of absence)
- courses (title, course identifier, type, ECTS)
- grades (on a scale from 1–5 with 1 corresponding to *"excellent"*, and 5 to *"insufficient"*, i.e. failing the exam

As mentioned, the information is given for each semester the student is enrolled for which results in a nested data structure with several rows corresponding to one student. The data are anonymised with a six-digit identifier to ensure data protection. Students can be enrolled in more than one of the six informatics bachelor programmes:

- UE 033 521 – Informatics *(new as of winter semester 2023)*
- UE 033 526 – Business Informatics
- UE 033 532 – Media Informatics and Visual Computing *(discontinued)*
- UE 033 533 – Medical Informatics *(discontinued)*
- UE 033 534 – Software & Information Engineering *(discontinued)*
- UE 033 535 – Computer Engineering

It may be worth noting that three of the individual bachelor programmes are discontinued as of winter semester 2023 and are replaced by a general informatics bachelor with seven optional areas of focus (TU Wien 2023). For the purpose of this study, going back to the year 2011, the separation of bachelor programmes is still relevant, though.

2.2 Data Preparation

In the timespan from 2011 to 2016, the informatics bachelor programmes have seen various changes and updates to the curriculum. This is relevant for our analysis: To assess how close a student is to completing their studies, it is necessary to know to what extent they completed the mandatory coursework. Since the mandatory coursework changes according to the different curricula, a lot of missing data are introduced to the dataset. As a consequence, it is not possible to distinguish whether a student has a grade missing in their records because *a)* they have not attempted the course yet or *b)* they already completed an equivalent course under a different curriculum.

To mend this issue, equivalent courses from different curricula were mapped. Since this is a pain-staking task, the scope of the analysis was limited to students enrolled in the most popular and largest bachelor programme,

Software and Information Engineering. It encompasses almost half of the concerned long-term students. Equivalent courses across a total of ten curricula were mapped out.

This was done only for the mandatory courses, as the curricula allow wide-ranging freedom to the students with regards to elective courses. Also, it seems unlikely that students are deterred from graduating in a timely manner by elective courses – if they struggle with an elective, they are at liberty to choose a different one. This is not the case for mandatory courses, which is why these are more likely to act as stumbling block to graduation.

The resulting data structure differs from the raw data, as mandatory courses from different curricula are now pooled into one variable for each mandatory course module. Elective courses are excluded from the analysis due to their aforementioned versatility.

The new variables that were created during this process mark a module as completed when equivalent courses or combinations of courses from any curriculum were completed with positive grades. As a result, a clearer picture to emerge of which and how many courses and modules are still missing for the long-term students. The data were pivoted to represent each student using one row. To account for cases when students needed several attempts to pass a course, individual grades were averaged.

3 Results

Of the 5 036 students who enrolled between the winter semester 2011 and the summer semester 2017 (range limits included), 445 are still enrolled in at least one informatics bachelor programme. Limiting the scope of the analysis to students enrolled in the Software and Information Engineering (SIE) bachelor programme further reduces the sample to 217 long-term students. This sample was again filtered to include only students who are relatively close to graduating. To account for the fact that the number of completed ECTS points that count towards the bachelor degree may be overestimated, students with at least 160 ECTS were included. This brought the sample down to 50 long-term bachelor students of Software and Information Engineering with at least 160 completed ECTS points.

Eleven students completed their bachelor thesis, but have not completed all mandatory courses. Upon closer inspection, three enrolled in several bachelor programmes, graduated from one of them, and then enrolled in a master programme. The bachelor programme Software and Information Engineering was not completed, though, and remains unfinished to this day. Due to the fact that the students are now enrolled in a master programme at the same university, they also continue to be enrolled in the unfinished Software and Information Engineering programme, unless they proactively de-register from it. Since they have moved on to a master programme, it seems unlikely that these students are interested in graduating from the unfinished SIE programme, even though they have completed substantial portions of the curriculum.

This leaves eight students who struggle with courses in specific modules. Unsurprisingly, the modules related to mathematics (statistics, linear algebra) and technical subjects (distributed systems, operating systems) have students either fail or put off courses. To gauge whether the long-term students are still actively engaging with their studies, the last semester in which they exhibited any study-related activity was extracted, no matter if they passed or failed and no matter how many ECTS points they attained or tried to attain. As can be seen in Figure 1, six out of eight students were active in the previous semester (2023S). Two students were last active in the summer semester 2020 and winter semester 2022. It should be noted that while these two students have not

actively engaged with their studies ever since, they have continuously renewed their enrolment each semester and each time paid the study fee that is associated with extended durations of study.

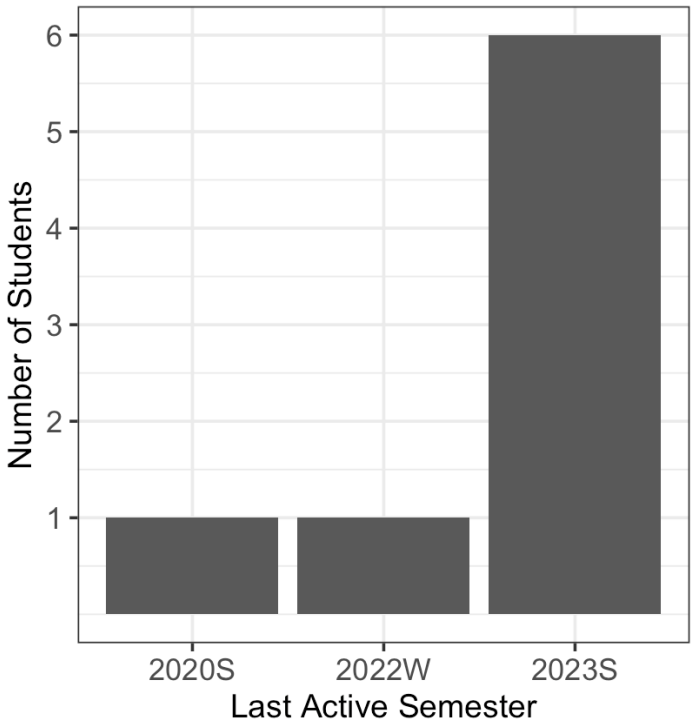

Fig.1: *"Last semester with any exam-related activity of long-term students (SIE, with more than 160 ECTS points) who completed the thesis, but not all mandatory courses."*

42 long-term Software and Information Engineering students (SIE) with more than 160 ECTS have completed the mandatory courses, but not the bachelor thesis. As can be seen in Figure 2, twelve of them were active in the previous semester (2023S). Nine were last active before the 2019 summer semester. Compared to the group of students who finished the bachelor thesis and not all mandatory courses, this group of students who have not completed the thesis is larger and for many years have passed since their last exam-related activity. This is remarkable, as these students are paying a study fee of 363,66€ to continue their enrolment every semester – despite their inactivity.

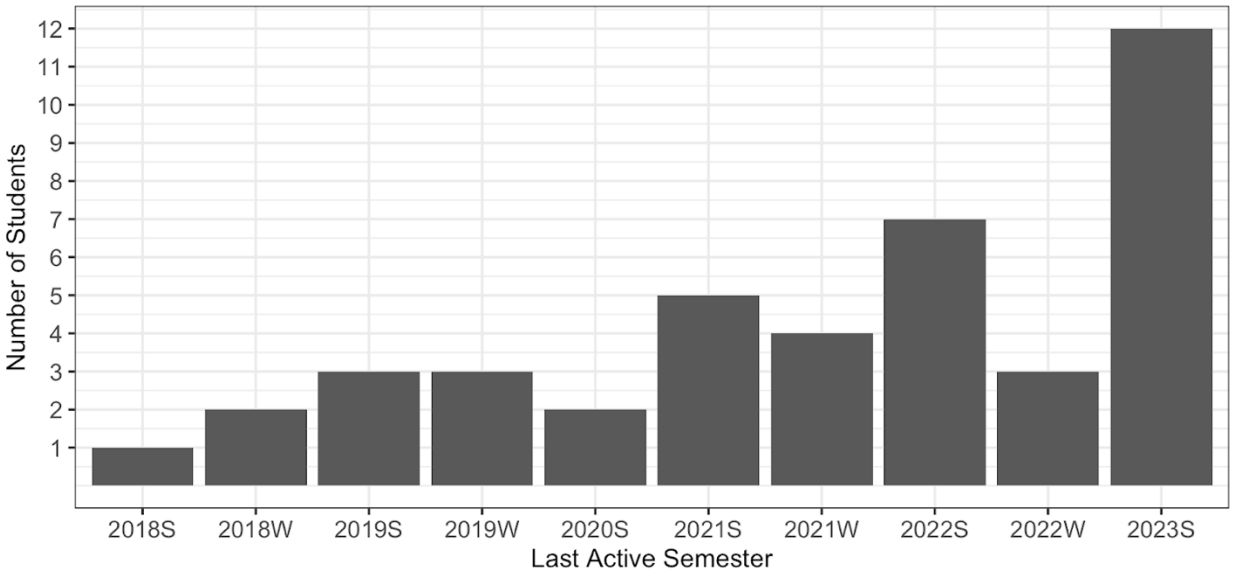

Fig.2: *"Last semester with any exam-related activity of SIE long-term students with >160 ECTS points who completed the mandatory courses, but not the bachelor thesis."*

4 Discussion

Based on grade records from a technical university in Austria, there are distinct problem areas that long-term students struggle with, as indicated by low grades, failed exams, and the absence of grades. Students who fail specific exams may be in need of tutoring for those subjects. Students who have completed the mandatory courses, but not the bachelor thesis may require support in finding a thesis topic or a supervisor. If they already started working on the thesis, they may need help in overcoming writer's block and structuring the writing process more efficiently. Students who are close to graduation but have abandoned the incomplete bachelor curriculum for master courses need to be nudged to return their attention to the courses from the bachelor programme. They may be struggling with procrastination and test anxiety issues and may profit from personalised outreach and counselling. Continuously active students do not require specific support as long as they do not fall out of that group.

The results seem to indicate that mandatory courses are not the prime reason for delays: First of all, the group of concerned students is small with N = 8, and second, six of them were active in the previous semester. It thus seems that open mandatory courses do not pose too much of a roadblock to students. The bachelor thesis appears to be more of a challenge. The concerned group is larger with N = 42, out of which twelve students were active in the previous semester. This leaves 30 SIE students who despite having successfully completed more than 160 ECTS points and all mandatory courses are not graduating with only the bachelor thesis left to complete.

Possible explanations are manifold and should be investigated in future research. Informatics is a highly technical subject with pronounced practical orientation. Students who study this subject primarily out of interest to implement code and solve practical challenges may be apprehensive about the theoretical component of an academic thesis. Further they may be inexperienced with the academic writing process, since it is rarely required

in their study programme. There is a mandatory course on the scientific workflow, but this may not be enough to lower the psychological barrier of researching and writing the thesis.

For some students it has been years since they last actively engaged with their university. However, it is clear that they have not given up hope of graduating which is reflected by the fact that they re-enrol consistently every semester, despite the study fee of more than 300 €. Universities need to figure out how they want to deal with such cases. If students who have clearly shown persistence and commitment to their studies over years appear stuck, should universities just abandon them when they fail to take the final step in graduating? Is offering support to them fair to other students who manage on their own? What could such support look like?

This paper obviously does not have all the answers but wants to encourage decision-makers to consider these questions. Effective interventions to reduce extended durations of study require a nuanced knowledge of the target group. Higher education has seen considerable diversification in the last decade, with students coming from more different cultural and socio-economic backgrounds (Altbach et al. 2009). As a consequence, the students' pre-conditions and access to resources (material and immaterial) are not equal (Manzoni and Streib 2023). The question at hand is what the role and the societal and social responsibilities of universities are (and are not) in today's context.

5 Limitations and Future Research

This research focused on long-term students in the Software and Information Engineering bachelor for practical reasons: Manually aligning curriculum changes is a laborious task and was not done yet for the other five bachelor study programmes at the informatics faculty. The SIE bachelor programme encompasses almost half of all informatics bachelor students, but this still means that half of the long-term students were not included in the present analysis. Learning

Another constraint was introduced by focusing on SIE students with > 160 ECTS points. If students drop out this close to the finish line it is especially tragic – for the university that invested a maximum of educational resources without getting compensated, but also for the students: They committed considerable time and effort to their studies and persisted for years way beyond the standard study duration. These considerations led to the somewhat arbitrary cut-off 160 ECTS points. Future research could look into the long-term students below this threshold to find the patterns and antecedents leading up to extended study durations. There may be predictors manifesting at an earlier stage as to why some long-term students manage to graduate eventually and others do not.

Finally, the approach of mining automatically collected university records leaves a blind spot with regards to the students' perspectives. The approach was chosen to identify angles and measures that are within the sphere of action of universities and can easily be monitored without the collection of personal data. The assumptions drawn from the results should still be validated by contacting long-term students and conducting qualitative interviews or quantitative surveys with them.

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FK: Conceptualisation, Methodology. BK: Conceptualisation, Methodology, Writing–Original Draft. PK: Conceptualisation, Supervision.

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