COURSE SELECTION CRITERIA AND DIGITAL ASSISTANCE IN A MODULARIZED WORLD

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Abstract

The Bologna reform has transformed higher education in Europe leading to more flexibility but also complexity in the structure of study programs. As study planning becomes more challenging for students, supporting this process becomes more relevant in research. This paper's main contribution is an in-depth exploration of the factors which influence students' course selection and how they might be addressed by a digital study planning assistant or related systems. To gain insights on how exactly students select their courses, previously collected interviews were reanalyzed, personas of typical student behaviour were extracted and further social aspects of planning were conducted via a group interview. For course selection, 14 aspects and three personas representing different types of selection behaviour were extracted from the interviews. For the group interview, several social factors on the group, community and external level that are related to students' study planning decisions were collected. Emerging ideas regarding the realization of these factors in a supporting system are presented and may be valuable to similar projects.

Keywords: digital study assistant, course selection, social influences, student support.

1 INTRODUCTION

More than 20 years ago, the Bologna declaration aimed to make higher education more transferable between the different European countries [1]. Besides the introduction of a credit-system – the European Credit Transfer System (ECTS) – the modularization of study programs was a result of this initiative. This transformation in the European higher education area has given the structure of study programs more flexibility, but also more complexity, which might be one reason why students perceive course planning – the selection and timing of courses and modules – as challenging and stressful [2]. The selection which module or course, respectively, to attend can be influenced by various factors [3]. To help students in their planning process, identifying these influencing factors is just the first step. As digital study assistants (DSA) are becoming more relevant in research [4], the question of how these influential factors might be addressed by a digital support system arises.

In light of this background, this research aims to (1) identify general course selection criteria based upon a content analysis of existing interviews with students, (2) explore specific social influential factors based on group interviews with students and (3) discuss how these aspects could be addressed by a DSA. Therefore, this paper is structured as follows: First, related work will be outlined. Then, the applied methods to approach the research questions are described. Next, the main results, divided into general course selection criteria, extracted personas as well as social aspects of the planning process are described. These results are discussed in the section thereafter to show how a DSA could address the criteria to support students in the process of study planning. Finally, the conclusion summarizes the results, makes the limitations of this research transparent and outlines future research.

2 RELATED WORK

Research on course selection criteria has proposed several categorizations. Babad and Tayeb distinguish between academic aspects, consisting of course and instructor characteristics, and personal aspects, consisting of individual factors such as personal aspirations or limitations [3]. A similar categorization is made by Latif and Miles, who identify three broad factors – course and instructor characteristics, and teaching and assessment styles [5]. Furthermore, Hewner [6] proposed a theory of students' educational decision-making that consists of three stages. The process begins with no explicit goals and exploration. With increasing experience, students begin to define their own goals and narrow their educational focus, sometimes influenced by surrounding social groups. Once their focus is chosen, students begin to make decisions based on their long-term goals. Regarding the influencing social groups, Hewner distinguishes between peers, parents, advisors, and professors [6]. Since this is a

proposed theory, there is no empirical evidence on how strong the influence is. Parental influence is further examined by Workman, who focuses on career choice and college major selection [7]. Further evidence of the importance of peers, family, and friends is provided by Towers and Towers [8], who analyze the decision-making process in graduate student course selection.

As mentioned earlier, there is a growing interest in digital student support as a field of research. One of the sub-topics in this field is the support of a student's planning process. Several projects aim to support students in different ways, an overview of which is given in [9]. Common to all of them is that social factors involved in planning one's studies are currently either not addressed at all or only to a limited extent. This paper aims to contribute to this research gap.

3 METHODOLOGY

This section will shortly describe the method used to answer the aforementioned research questions (1) and (2). To identify general course selection criteria (1), previously collected interviews ($n = 25$, among others [10]) have been re-examined in the context of a *Complementary Secondary Analysis* [11]. A decontextualization of data [12] has been prevented by iterative testing of preliminary results as far as possible. *Thematic Analysis* has been performed on this data in order to extract attitudinal and behavioural data [13]. *Thematic Networks* [14] and *Affinity Diagrams* [15] are further used in this context to structure the codes that resulted from the previous thematic analysis [13] – and to derive and define course selection criteria. Further user characteristics have been examined by clustering users according to the *Personas* method [16].

To validate partial results of (1) and to gain a deeper understanding of social influential factors (2), a group interview with students has been conducted and qualitatively analyzed as well. The group interview was conducted with eight students via Microsoft Teams. Boards of the collaboration tool *Miro*[1] were used for interaction during the interview. The structure of the interview was based on Weßel's four phases [17]: At the beginning, the research topic and context were introduced. Afterwards, the participants were asked to brainstorm on a prepared interactive whiteboard, collecting social influencing factors and aspects that have had a direct impact on their study planning decisions and module choice. Afterwards, the group discussed how these influencing factors can be addressed digitally within an application. Finally, the group interview was concluded explaining the planned further procedures and a closing.

To improve differentiation and enhance the precision in determining social influencing factors, they were divided into three areas – Group, Community and External – in the group interview and each of the three areas was discussed separately by the participants. The *Group* includes influencing factors that affect students who are in close contact, for example friends, students of one study group, or students who are taking modules together. *Community* covers factors that arise from students who study the same program but are not in direct contact with each other. *External* includes factors that directly or indirectly influence students in their study planning and module selection such as friends outside of the study program, parents, or administrative requirements, e. g., regarding the financing of the studies.

4 RESULTS

Based on the application of these previously introduced methods, this section presents the results of this research. First, general course selection criteria will be introduced; Second, three personas that were developed are explored and last, social factors in study planning are described.

4.1 Course Selection Criteria

In the analysis of the interviews, 14 course selection criteria could be identified, which are shown along with their frequencies by *Table 1*. Drawing on Babad and Tayeb's terminology, they can be divided further into academic and personal aspects, which is reflected in the order of the table rows. Most of these criteria reflect either academic aspects relating to the course or instructor[2] (ECTS, Summer / Winter Term (Rhythm), Module Context, Exam, Institute, Capacity, Lecturer) or personal aspects (Personal Interest, Failed Courses, Fellow Students), while some of the criteria may relate to both (Time, Place, Weekday, Prior Knowledge / Prerequisites, Degree of Difficulty, Recommendations).

[1] https://miro.com/

[2] here: including organizational aspects that are not instructor- but program-specific, i. e. ECTS, Capacity, Module Context, …

Table 1 Course selection criteria extracted from reanalysing existing interviews (n = 25).

Criteria	*Description*	*Count*
ECTS	Courses are chosen to achieve approx. 15 or 30 ECTS each semester	10
Summer / Winter Term (Rhythm)	Term in which course is offered, especially important for master students due to shorter duration of degree	7
Module Context	Select courses to meet open credits in module groups	4
Exam	Procedure and date of exam as well as time for preparation	10
Institute	Prefer courses of specific institute to focus content, due to sympathy or to improve chances for supervision of thesis	3
Capacity	Difficulty to find course place; avoiding courses with limited capacity	8
Lecturer	Teaching style, sympathy, and antipathy to specific lecturer and how lecture is realized	9
Personal Interest	Courses are selected to meet interests and prepare for future jobs	14
Failed Courses	Re-participate in failed course (or not, if interests change)	2
Fellow Students	Course selection together with fellow students to learn and prepare for the exam together	2
Time, Place, Weekday	Important factors to avoid overlap in timetable and to consider personal preferences or time restriction (workday, care work)	13
Prior Knowledge / Prerequisites	Consideration of prerequisites for course and the recommended term; preference of basic courses or prerequisites for desired courses	15
Degree of difficulty	Difficulty of course or module	5
Recommendations	Recommendation for different aspects (lecturer, demand for prior knowledge, order in which courses should be taken)	13

4.2 Personas

While examining the interviews, not only selection criteria were extracted, but also the user characteristics of students making study planning decisions in a similar manner were condensed into three student personas. The first persona, *Freshman Freddy*, is overwhelmed with the amount of information required for study planning and has only little knowledge about how to navigate their studies. They largely rely on external sources such as other students or introductory tutorials. Among the advanced students, two further personas were found: *Goal-oriented Grayson* is a strategic, long-term planning person who navigates through their studies efficiently rather than interest-oriented and therefore may focus on getting any course done rather than waiting for the most interesting one to be available. In contrast, *Interest-driven Ida* strives to study according to their personal interests and is led by those rather than fellow students or timely constraints. More detailed descriptions of the personas can be found in Figure 1, which presents a typical profile for each of the types.

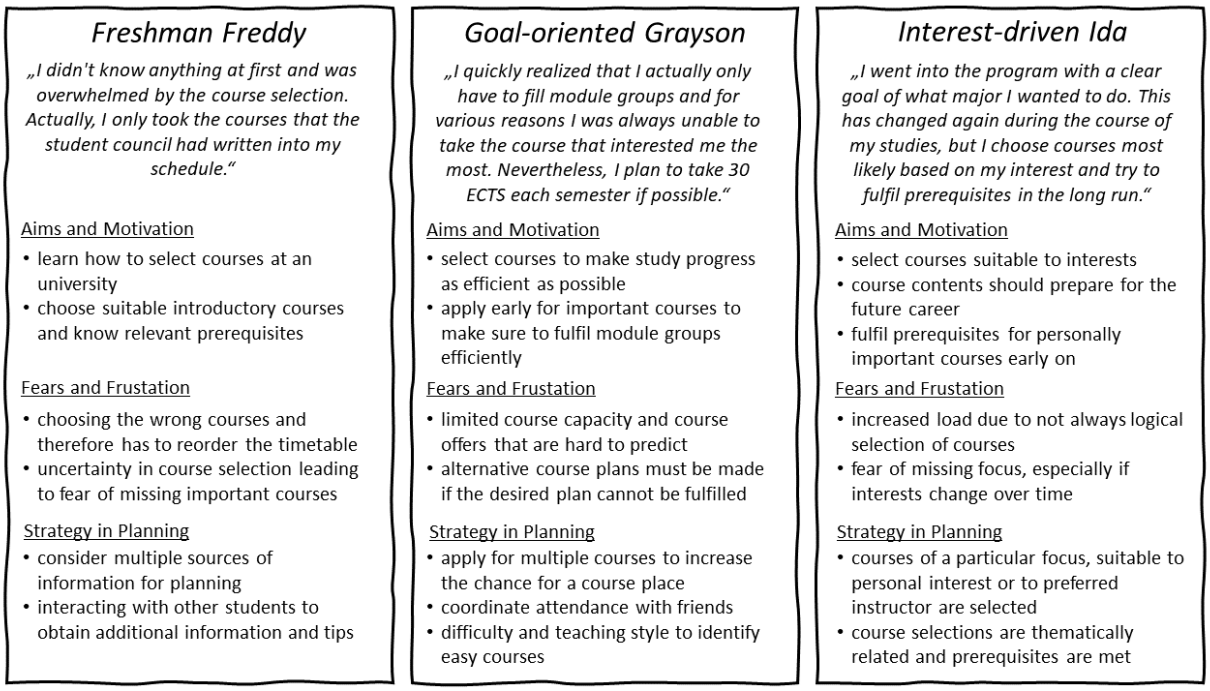

Figure 1 Description of the three personas gathered from the interviews.

4.3 Social Aspects in Study Planning

Besides the selection criteria and personas, further insight on social aspects that can influence study planning decisions could be gained via the group interviews and is presented according to the threefold structure introduced in section 3.

Group: A social aspect within the group mentioned several times by various participants is the exchange of experiences and recommendations among each other. Among other things, this involves the assessment of the effort required for a particular module, the quality of the teaching or the subjectively perceived likeability of the lecturer. In addition, within the group, modules are specifically sought which can be taken together with the other students of the group. This serves on the one hand to be able to spend more time with the other students of the group and on the other hand also to be able to study together for a certain module and the associated exam in a familiar environment – which in turn increases motivation.

Community: Within the community, a social factor is the absolute number of students attending a module. For participants, this usually reflects how much learning material is available for a module and how popular the module is in the study program in general.

External Factors: A major social influencing factor within the external factors represents the relevance of modules for the participants' planned career entry and related professional career. Furthermore, the time compatibility of private life or secondary occupations with studies was mentioned, which is why modules are deliberately (not) chosen due to the fixed weekdays and times, among other things. Also, the fulfilment of requirements related to the financing of one's studies is an essential factor and participants might choose to add modules that require little effort to an existing timetable in order to pass a certain amount of ECTS. Another aspect is the general relevance of the topic of a module, which gives students the opportunity to acquire and reflect upon well-founded specialist knowledge for current topics or personal interests.

5 DISCUSSION

After describing the results in the previous section, this section will discuss how the criteria can be addressed by a digital study assistant. In accordance with the outline of the results, such an implementation ideally addresses all three aspects.

First, such a system should address the entire study planning process including both short-term and long-term decisions [10] and thereby include the aforementioned course selection criteria as far as

possible. As an example, the criterion of recommendations can be integrated regarding the entire study planning process. Recommendations can support short-term decisions such as selecting a course by lecturer as well as long-term decisions, drawing attention to prior knowledge that is necessary for a certain module and thereby impacting the path of navigation.

Second, using the knowledge about certain user personas in such a system, for example within the process of onboarding, user guidance or even recommendation of items can be valuable for the success of such a system. While the approach of personas is always prone to generalization and cannot depict the complex reality of students' approaches to study planning, it can be of use to adjust initial system settings for new users, provide helpful information or introduce yet another weighting factor for the ranking of recommended modules.

Third, according to the study's participants, social factors can be implemented within a digital study assistant in several ways. In order to find current topics or topics that are relevant to students, the function of individual "tags" for modules (i. e. "Big Data", "Cybersecurity") can be realized, which makes it easy for students to find suitable modules. In addition, a function of sharing one's own semester plan or timetable with other students in one's own group can make joint semester planning much easier. Based on this, another realization possibility would be indicating that a student friend will attend the currently open module in the coming semester in order to find common modules within the group. A concrete functional suggestion within the community is a rating or recommendation system, which reflects the popularity or the quality of a module within the study program. In addition, automated recommendations could be communicated by the system to students, based on data from other students who have already taken the module – or similar modules – in the past. This would make it possible, for example, to suggest specific prior learning or advanced modules based on the viewed module. Another suggestion is to create detailed module or even chair overview pages, which could provide direct links to learning materials and legacy exams, so that students can form a more informed opinion before choosing a module. With regard to the external factors, the proposed "tags" system can be used to specifically find relevant modules for their career entry, current topics or personal interests. Furthermore, extensive filtering options for the module list were suggested, which enable students to filter out modules or courses that are not suitable in terms of time and thus more efficiently create a timetable that suits them. Finally, the idea was developed to analyze the student's timetable automatically and to evaluate it objectively (e. g. amount of ECTS) by the system.

While supporting all of these criteria and approaches would likely exceed the scope of one supporting system, the results of this research provide an extensive understanding of what might be influential factors and how they could be taken up by such a system. The concrete integration of such factors (i. e. in the form of a recommendation system, advanced filtering options or persona-specific initialization) has to be carefully constructed and the value of such solutions has to be evaluated according to the specific application setting, and – of course – the fulfilment of student needs.

6 CONCLUSIONS

This paper identifies 14 different course selection criteria as well as three types of student behaviour in managing the study planning process based on existing interviews with students of different study programs. The social influencing factors were further analyzed by conducting a group interview. Both aspects validate the categories found in related work. Parental influence as a potential social influencing factor could not be verified for course selection. Here, the group interview may not be suitable to discover more personal influencing factors, in future work, individual interviews may be a better choice for these aspects. Furthermore, this paper discussed how the identified course selection criteria and social influencing factors could be addressed in a DSA. The next steps are a concrete implementation of the mentioned features and an evaluation within a user test. A major limitation of this research is its contextuality as well as the subjectivity that comes with the choice of qualitative methods.

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