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Expectations and Challenges of First-Year Biotechnology Students – The Importance of Social Relations

Abstract

This paper explores the experiences of first-year biotechnology students during the first eight months of their studies. We study what the students expected to be challenging when entering the programme, and what they eventually experienced as challenging as they progressed further into the programme. Building on qualitative data (video-diaries, interviews and open-ended survey responses), we analyse the dimensions of challenges, the congruence and the students' sense of belonging. We find that students were mainly challenged by the organisational dimension (lack of clarity in goals and course organisation). The social relations to peers were pivotal for the students as learning support when managing the challenges and decoding expectations, but also for keeping up the motivation. We argue that in order to support the students' sense of belonging and their academic achievements, the study programmes should facilitate the formation of social networks and consider the course organisation and management.

INTRODUCTION

Students entering science higher education get the opportunity to engage with content they find interesting. However, they also face challenges that could affect their learning outcomes and their completion of the programme. Previous research has pointed at challenges related to particular aspects of the transition, but also that the transition into higher education is a complex process where students need to change study practices and handle changes in the wider context of life. Transition into higher education is 'fine-grained, messy and nuanced' (Gravett & Winstone, 2021, p. 1587).

Some of the identified challenges are general for students entering higher education, e.g., different learning and teaching formats and demands of self-governing compared to high school (Charalambous, 2020; Coertjens, Brahm, Trautwein, & Lindblom-Ylänne, 2016; Harvey, Drew, & Smith, 2006; Hussey & Smith, 2010). Further, teachers are often perceived as less accessible, leaving the students more on their own when interpreting the expectations, requirements and norms in the institutional setting (Scanlon, Rowling, & Weber, 2007).

Some students experience challenges in the encounter between their own background and the study and culture they enter, even in institutions where the number of non-traditional students is high (cf., Read, Archer, & Leathwood, 2003). Hurtado and Carter (1997) found that students' experiences of a hostile climate affected the sense of belonging among ethnic minority students (in their case, latino students).

Some challenges are specific to particular disciplines or fields of study. Malm, Madsen, and Lundmark (2020) found that particular disciplinary cultures (e.g., the strong emphasis on fieldwork in geology) could in effect exclude particular students, e.g., those who were physically impaired and therefore not able to perform the expected practice in the field.

There has been numerours studies of students' transition into science higher education, not least because of the endemic call for more graduates in science and technology combined with non-completion rates being higher in these fields than in most other higher-education fields of study (Neugebauer, Heublein, & Daniel, 2019; OECD, 2008; Thomsen, 2022). Some studies have found that students entering higher-education science programmes experience gaps between the knowledge and expectations they bring with them and what they meet at the programme, both concerning the content (e.g., toolbox courses) and the sequencing of the courses (Holmegaard, Madsen, & Ulriksen, 2014; Kinnunen et al., 2018; Ulriksen, Holmegaard, & Madsen, 2017).

A quantitative study of German students who had left their study before completion found that more students in science and engineering than in other disciplines mentioned challenges related to performance. Particularly, the academic requirements were perceived as too high (Heublein, Hutzsch, Schreiber, Sommer, & Besuch, 2009, p. 21ff). Likewise, how well prepared the students felt for meeting the academic requirements appeared to be more important for students' staying or leaving studies in mathematics and the natural sciences, than for students in other fields of study (Heublein et al., 2009, p. 67).

A Danish study based on administrative data found an increased relative risk of not completing a STEM study programme for students with a low GPA from high school compared to students with higher GPAs (Ulriksen, Madsen, & Holmegaard, 2015). The same study found an increased relative risk of non-completion for students with parents with little or no education. A number of studies point at challenges related to the science culture and available science identities when trying to explain the persistent imbalance related to gender as well as social and cultural background among science students (e.g., Carlone & Johnson, 2007; Gonsalves & Danielsson, 2020).

The transition into higher-education science programmes occurs over an extended period of time where students continuously try to learn to interpret and understand the expectations and requirements of the study programme they have entered (Gale & Parker, 2014; Holmegaard et al., 2014). During that process, students draw on the resources and repertoires they have developed, inter alia, during previous schooling, and with these resources and repertoires they try to develop a viable study practice for handling the expectations and requirements.

The way students experience the encounter with the study programme is affected by their expectations concerning what they will come to experience, but also how they expect to be able to cope with the requirements (Jensen, Henriksen, Holmegaard, Madsen, & Ulriksen, 2018). Therefore, we need to consider not only what students expect to meet at the study programme, but also what they expect

to be difficult. What they expect to be difficult and how well they expect to be able to handle that, will eventually affect their expectancy of being able to succeed at university (Bandura, 1977). However, just as there is a gap between expectations and experiences concerning the content of the programme as the research presented above has found, there may also be a gap between the challenges the students expect and what challenges they experience. If what students experience as difficult after they have actually begun studying differs from what they expected to be difficult, this could affect their beliefs concerning how well they will cope with the challenges.

This paper contributes to the understanding of students' experiences with studying at university and their developing ways of studying based on these experiences. We focus on the expectations of and experiences with what is difficult at study programmes, and how students try to deal with this. We do this by analysing the experiences of first-year biotechnology university students during the first eight months at their study programme. The paper explores the following three research questions:

RQ1: What do students expect to be difficult when entering a study programme in science?
RQ2: What do the students experience as challenging during the first eight months at the programme?
RQ3: Which elements in the study environment do the students draw on in order to manage the challenges they experience?

ANALYTICAL APPROACH

In our analysis of the empirical data in this paper, we apply three different ways of looking at students' experiences of their first-year studies. These three approaches offer different ways of unveiling what happens during the students' first year. Together, they provide an insight into the processes where students through their interaction, interpretation and negotiation with the environment try to make sense of what they experience.

The first approach is a categorisation into four categories of challenges experienced by first-year students (Trautwein & Bosse, 2016). The second is the concept of congruence that offer a way of understanding the educational context of the students (Hounsell & Hounsell, 2007). Thirdly, it is the work of Tinto (2017) focusing on sense of belonging as a way to understand student persistence. We will briefly present these three approaches.

Trautwein and Bosse (2016) categorised the challenges experienced by first-year students in different disciplines. They identified four dimensions of critical requirements: the personal, the organisational, the content-related and the social dimension.

The personal dimension related to *'general study skills such as scheduling learning activities'* and *'balancing study with other areas of life'* (2016, p. 377). The organisational dimension concerned the institutional system and acquiring an orientation of the institution, its rules and requirements, including the quality of teaching. The content-related dimension referred to aspects of the content, such as to *'meet the high curricular demands and pace'* (ibid.) or elements relating to academic language, assessment standards, etc. Students' identification with the programme was also a part of the content dimension. Finally, the social dimension concerned the relationships to fellow students, academic staff, and the social environment at campus or in class (Trautwein & Bosse, 2016). The authors described and analysed the four dimensions separately to distinguish the different kinds of challenges, but they emphasised that in the students' experiences the dimensions were interconnected.

The second approach concerns the importance of congruence between different elements of the teaching-learning environment for students to develop what the authors call 'ways of thinking and practicing' in a discipline (Hounsell & Hounsell, 2007). In addition to the alignment between the intended learning outcomes, the teaching and learning activities and the assessment at the programme or the

course (Biggs & Tang, 2011), congruence includes three additional elements: students' backgrounds, knowledge & aspiration, course organisation & management and learning support (e.g., access to tutoring) (Hounsell & Hounsell, 2007).

The concept of congruence does not address the social dimension identified by Trautwein and Bosse. However, as argued by Tinto (1993), the student experience of higher education relates to an academic as well as to a social system, and these systems relate to formal as well as informal domains. Tinto, our third approach, argues that students' motivation and persistence are closely related to developing a sense of belonging (Tinto, 2017). This sense of belonging is affected by the students' perception of the curriculum, by their self-efficacy beliefs and by becoming a part of a community at university. Students' social bonds to others (students, faculty etc.) result in a commitment that *'serves to bind the individual to the group or community even when challenges arise'* (Tinto, 2017, p. 258).

METHODOLOGY

The analysis builds on qualitative data produced during the first eight months at a biotechnology study programme at a research-intensive university in Denmark. The study year is divided into four blocks, each nine weeks long. In most blocks, students follow two courses. In the following, we present how the data was produced and analysed.

Open-ended survey responses

During a lecture in the second week at the study programme, we asked the students to complete a survey. At this time, students had had the chance to attend lectures and exercise classes for just over one week, but studying was still a new experience for them. Of the 61 students entering the programme, 55 completed all or parts of the survey.

The survey contained seven open-ended questions addressing, e.g, their reason for choosing the programme, what they were looking forward to, and if they expected anything in particular to be challenging. Additionally, the students gave their consent, and they were asked if they would sign up for making video diaries.

The survey responses on four of the seven questions were analysed using a semi-open coding. These questions concerned what the students imagined would be interesting, what would be challenging, what they were looking forward to and whether they had already met something different than expected. We first coded in three general categories: a) positive expectations; b) fears and concerns; c) neutral statements. Within each of these categories, we coded the responses in an open process to capture patterns of what the students mentioned in each of the three categories. The remaining three of the seven questions were analysed focusing on the students' ideas about the programme and their motivations and perspectives for deciding to enrol. We did this in an open coding.

Video diaries

The video diaries (cf. Danielsson & Berge, 2020) were short video recordings made by the students four times during the first six months. Using their phones or computers for recording, the students talked about their experiences with studying at the programme. For each of the four sets of recordings, the second author made a video recording to give an example of what a video could look like and to introduce some themes the students could address in their video. Hence, the videos were responses to explicit and implicit questions asked by the researchers. In the students' videos, this showed through explicit comments ('you asked about …') and some videos were clearly structured in sections, but the students also pursued their own themes. Thus, the data production was semi-structured.

Of 18 students who volunteered for making a video diary, 10 were selected following a principle of maximum case variation (Flyvbjerg, 2006) concerning, gender and their survey responses. Eventually, six students made video diaries: three male and three female. The first video diary was submitted

in October (during block 1), the second and third in November and January (during block 2) and the fourth in February (during block 3). Not all students submitted all four videos. Table 1 (below) presents an overview of the data.

Qualitative interviews

After they had submitted the fourth video diary, all six students were invited to participate in an individual, qualitative interview with the second author. Four students accepted the invitation. The focus of the interviews was looking back at their time at the programme, reflecting on how they had dealt with the challenges and changes during that period. The video-diary students were interviewed in April, by the beginning of block four.

Intensively during the first weeks and more occasionally during the rest of block 1, the second author carried out participant observations (Spradley, 1980), attending classes, group sessions and extracurricular activities. Based on these observations, she was concerned that the voice of some of the more quiet students would not be heard in the material. We therefore decided to approach three students for individual interviews to gain insight into the experiences of these less outspoken students at the programme. The three students were interviewed individually in October-November, focussing on the students' experiences during the first block at the programme.

Table 1. Overview of video-diaries and interviews. F1-3: Female participants; M1-3: Male participants. A1-3 were all female.

	F1	F2	F3	M1	M2	M3	Additional interviews (Oct-Nov, block 1-2)		
							A1	A2	A3
Video 1 (Oct, block 1)	X	X	X	X	X	X			
Video 2 (Nov, block 2)	X	X	X	X	X	X			
Video 3 (Jan, block 2)	X		X		X	X			
Video 4 (Feb, block 3)			X		X	X			
Interview (April, block 4)	X	X	X			X	X	X	X

The video diaries and the interviews were transcribed verbatim. All quotes in this paper were translated to English by the authors.

The analysis of interviews and video diaries was made using a modified thematic analysis (Braun & Clarke, 2006) using NVivo. In the first step of the coding, we defined general themes in the texts. We then looked for patterns, conflicts and dilemmas within each code and between codes in order to capture the doubts and ambiguities in the students' reflections. During this coding process, the

social relations appeared as a recurrent theme in the students' narratives. Hence, we included this as an additional focus of the analysis, exploring in which ways the social relations and networks were important for the ways the students managed the challenges.

RESULTS

In the following, we first examine the students' responses about what they *expected* would be challenging. Next, we discuss what the students *experienced* as challenging as they progressed through the first months of study. Finally, we focus on the role of the social relations in the students' coping with the challenges.

What did the students expect to be challenging?

When the students in their second week at university wrote what they expected would become challenging in particular, they mentioned elements across all four dimensions identified by Trautwein and Bosse (2016). Challenges concerning the content-related dimension (the academic level, specific courses and the pace) and the personal dimension (prioritising time and tasks, not least balancing study life and time to family and friends) were the most pronounced challenges.

Question 4 in the survey concerned whether the students expected anything in particular to be challenging at the programme. There were 53 of 55 students responding to this question. The responses addressed a broad range of expected challenges. These included balancing the study with a social life and other interests besides studying, keeping focus and motivation and a heavy workload.
The majority of the students mentioned challenges related to the academic level and requirements. Some responses reflected that the students by the time of the survey had already experienced the courses:

> The academic level is higher than I am used to. So, keeping a focus, when it is not all new and there is no one to keep an eye on you to see if you are paying attention in teaching and that you understand the content taught

This response addressed the academic level, but also a change from external to internal control. Another student also mentioned the high academic level, expecting it *'to be higher from now on'*, but added that '*it varies from course to course, it also depends on what you are good at'*. Thus, differences in the students' prior knowledge would play a role.

A considerable share of the students (20 out of 53) pointed at specific parts of the academic content of the programme. Some mentioned the mathematics course that had just begun, and one student expected *'hard core chemistry'* to be a challenge. One student felt insufficiently prepared in terms of study techniques:

> I think the academic requirements will be a challenge. You receive a lot of information in a relatively short amount of time, and I do not yet have a system for how to deal with the teaching formats, notes, assignments etc. So, I think it will be quite difficult and tough in the beginning.

Another survey question asked what kind of student they expected they would become. Several students mentioned the balance between academic and social engagement. A large group of 18 students stated that they would prioritise the academic activities, but that they would still leave room for social activities . Seven students indicated that the academic aspects were clearly more important than the social ones, while, conversely, six expressed that the social aspects were more important than the academic ones. When the students referred to social life, this concerned campus and fellow students, but also friends and family outside campus.

Thus, the most frequent perception was that being a student should leave room for academic as well as non-academic activities. This was also reflected in the students' concerns about balancing time and

tasks. The students' responses suggested that they perceived both the academic and the social aspects of studying as legitimate parts of being a student, but also that these were two separate entities that were competing for time rather than being related to each other.

What challenged the students?

In the video diaries and the interviews, the students talked about their experiences as they progressed through the first eight months of the programme. Thus, while the previous section reported what the students *expected* to be challenging, this section presents what the students experienced as challenging. The general picture was that the students indeed found the academic content to be challenging, just as they expected it to be. However, this was not what they experienced as the most challenging at the programme. Rather, they were challenged by lack of clarity in the teaching or the course organisation, and when it was not clear what they were expected to learn or do at the exams.

Just as they had expected, the academic level and the pace in the mathematics course was challenging for some students. After the completion of the mathematics course, one student said:

> A general thing about [the mathematics] course, is that it has been very, very intense. There has been so much to read, a lot of assignments to do all the time and, well, I have really felt that it is a fulltime study I have gotten myself into (video2)

Learning the math had been demanding, but the students also expressed that the math course was better than expected. One of the three additional students interviewed in the autumn said after the completion of the math course:

> I think I had expected it to be worse. But it really just is standard exercises. If you have calculated enough sets of exercises, then you just have it in your notes, I mean, then when you get the assignment, you say, I've definitely solved that one before. Then you look it up, yes, and you just change the numbers. […] I've always had a complex relation to math. I think it is great because you could just look up an exercise you did before. But this about solving the exercise for the first time was not so easy for me

The student's description suggests that a large part of the course was doing standard exercises, and the key point was to grasp the mechanics of the different types of exercises. This made the course appear straightforward because it provided the tools for solving the exercises. However, it is not clear from the quote whether this also meant actually understanding the mathematical content.

Many of the students had similar comments about the mathematics course. The math had been just as difficult as expected, but the course itself was a different and positive experience. Particularly, the students mentioned that the teachers had been very good at communicating the goals and what was expected of the students, offering tools for learning. The teachers '*were really good at getting everybody on board, even me who finds it difficult*', as one student said in video2. Even if the content was difficult and the students were struggling, the course organisation and the teaching made it easier for the students to see how they gradually could manage and overcome the challenges.

The importance of the course teaching and course organisation also showed in an introductory course, presenting the wide array of fields within the biotechnology programme. The course consisted of a range of different topics that were introduced through lectures by different researchers from the department or by guest lecturers. Along with this, the students worked in groups on a project about a problem related to research within biotechnology. However, the purpose and the larger context of the course were not clear to the students. One of the students who made video diaries said that one got a sense of *'every lecture is like a separate island' (interview)*.

The introductory course addressed many of the topics the students found interesting, but the organisation of the course made the students experience a lack of coherence that affected their motivation as well as their learning outcomes. One student said that it was *'difficult to remember what we have learned, I think, when we have had to go over so many different topics' (video2)*.

The importance of how the students experienced the teaching and organisation also appeared in relation to a later course. In a video diary submitted during that course, a student said the teaching was

> unstructured and the lectures are not very well aligned with the exercise classes and we don't really understand what we are supposed to know by the end of the course [...] And that's a bit scary as the exams are closing in [...] and even those who usually like [the discipline] – you lose your motivation for the course. And you just feel uneasy and feel stupid and you feel, like, surely everybody else can do this, it's just me who can't, and that can make you feel a bit sad (video3)

The lack of clarity in goals and structure and the lack of coherence between different elements (e.g., the lectures and the exercises) made it difficult for the students to see the direction of the course and what they were expected to learn. Thus, while the students had expected challenges related to the high academic level of the courses, the challenges rather related to unclear organisation, objectives and requirements. In some cases, the challenges concerned the teaching itself. While still attending a particular course, one student said about the teaching:

> I just find it difficult to follow one of my lecturer's lectures. So, I have been forced to work my way around it and see how I could still follow the course and learn what I'm intended to learn without attending the lectures, because they do not help me so much (video3)

The students' way of coping with this experience of poor teaching varied, but some of them decided to skip the lectures and stay at home reading on their own instead.

When the students told about the challenges they experienced, they also, explicitly and implicitly, told about developing study strategies to deal with these challenges. When doing that, the social network and the social dimension of the programme played an important role.

The importance of social relations in managing challenges

RQ3 concerned which elements in the study environment the students drew on to manage the challenges. It was primarily other students at the programme that served as help and resources for the first-year students. Study groups, a study café and extracurricular activities provided informal learning spaces where students could help each other and draw on each other's resources. Hence, the social relations that students established had a distinct academic importance as well. It appeared that it was mostly up to the students to form these relations, and this meant that students who for some reason had not succeeded in making social relations found themselves alone when dealing with the challenges. It also means that academic and social aspects of study life were entangled in each other.

In the third video diary, one of the students said that she had lost her 'best friend at the programme' and continued:

> I was so much like him, and we had fun together, and we worked really well together. We pretty much worked in the same way. And in the previous block, we supported each other quite a lot, but unfortunately he has dropped out now. [...] I am somewhat lost again, just having lost my anchor. And it feels weird, after six months trying to find a new study partner (video3)

This quote shows that the relation to this special fellow student concerned the academic aspects in various ways (as a study partner and as support when things were difficult), as well as the social ones, contributing to a sense of belonging at the programme.

In several parts of the data, we found this pattern of the social relations being important when the students experienced the study as challenging. The students would help and support each other, e.g., in study groups where students worked together on preparing for classes, on assignments or reading for exams. Several students emphasised that the culture at the programme was very open and supportive and not as competitive as they had feared.

Students could help each other understanding the content, but the social relations could also provide a feeling of not being the only one struggling. In a video diary, one student mentioned that she lost her motivation for a course she was currently taking because the teaching was poor. She continued:

> You just get a stomachache and feel a bit stupid and feel like, oh everybody else is probably doing well, and now it is just me, who doesn't do well, and you are sad about it. Then it is nice to talk to each other about it […] And we help each other and cheer each other up. […] it makes it easier to get through it. (video3)

Social relations could make the students realise that others were *'going through the same thing' (video3)*, as one student said. It helped them realise that feeling challenged was a general experience and not that they as individuals were just stupid. This increased their self-efficacy beliefs as well as the social well-being.

The social environment could also strengthen the motivation. One student explained in the first video that studying took up much time, but it had been fun working in the study group and with the projects because *'it has been cosy [hyggeligt] sitting together for many hours when it is with nice people'*. She enjoyed *'hanging out with them for those 10 hours it takes to make the project' (video2)*, and that helped her. Similarly, another student said in the final video that *'A piece of advice to future students would be to get a good social life at campus, because it is just nice to have this extra motivation' (video4)*.

Hence, the social life and the study environment balanced the challenges and difficulties that the students experienced that affected their motivation. The social environment could also be an incentive for attending classes and for coming to campus even when the teaching appeared purposeless. One student said that she was very happy about the study programme in general and had not considered dropping out, because *'… this strong social life there is, would make it extremely difficult for me' (video3)*.

The social relations with peers from the same year group were important, but access to students at second year or later also provided valuable support in managing the challenges. These more senior students had been through the same challenges as the first-year students (e.g. the same difficult content, courses or exams), and they served as living proofs that it was possible to make it through the first year. One video-diary student said that it was nice to know that *'they are still standing'*, meaning *'that you can get through it' (interview)*. The senior students could make the first-year students more relaxed, showing them not to take it all too seriously, as one student explained.

A more direct help from the senior students concerned the lack of clarity in expectations, structure and purpose in some of the courses that made it difficult for the first-year students to navigate. The senior students could help the first-year students with decoding some of the information about the courses, the exams, and what was expected of them. Based on their own experiences, they could help with advice and tactics. The senior students were also 'experts' in being students, and they could answer questions like *'How do I prepare for the exam in this course? What do they expect of me?'* and they helped make the pieces of the puzzle fall into place as one video-diary student said in the interview.

The first-year students could meet senior students in various contexts. One was the 'study café' that was organised by the study programme as a place where first-year students could seek help in an informal way. Another was by engaging in extracurricular activities that cut across the year groups at the programme. Neither the 'study café' nor the extracurricular activities were mandatory, and not all students used or knew about these offers.

Differences in access to social network and support

Thus, forming social relations was important. The social and academic aspects were interwoven in a way that meant that even though social and academic integration are not the same, they are related. There are two additional points in relation to this.

First, some students might spend too much time on the social life. Looking back on the first six months, one of the students said that his advice to new students would be not to involve themselves in all the social activities from the beginning. He had stopped attending some of the social events during weekends, because it had taken up too much time. Second, although our data in general showed the programme as having a supportive social environment there were also students who found it difficult becoming part of this environment.

Some groups were formed by the teachers in relation to project work in one of the courses. Some of these project groups worked smoothly, while other students experienced frustrating group processes where a few group members ended up doing most of the work. As for other groups, e.g., study groups, the programme encouraged the students to form such groups, but they were mainly organised by the students themselves. This meant that there was a risk that some students would not become part of a group and therefore be in a vulnerable position without access to the peer learning, help and support. These students would be more on their own in coping with the challenges. This could affect their self-efficacy beliefs.

The importance of that point showed in relation to one of the three additional students we interviewed in the autumn. This student was not a member of a study group and she felt that she was very much on her own. At some point, she realised that another student from her class was in a study group where they worked together on the exercises. She would have liked that as well, she said, but *'you don't wish to intrude, because, it is like, I don't know people' (interview)*. When a fellow student invited her to join her study group, she did not do so, because she did not wish to enter a group that was already established, either: *'You all know each other, you have all formed a bond, and then I come like "hey, I am an outsider"' (interview).*

There did not appear to be any facilitation of establishing social networks after the induction week and the formation of groups in some of the first courses. Her experiences remind us that even at studies that the majority of students experience as inclusive and supportive, other students may still feel and in effect be excluded.

Thus, the programme relied on the students to form groups and serve as learning support for each other. Still, some students found it difficult to establish social relations that could help them, and not all students were aware of the opportunities for access to the social and informal support that existed. For instance, as mentioned earlier, the study café was only known to some students.

DISCUSSION

When students entering their university study programme should point out what they expected to be challenging in particular, they mentioned elements across all four dimensions identified by Trautwein and Bosse (2016). Mostly, they mentioned challenges concerning the content-related dimension (the academic level, specific courses and the pace) and the personal dimension (prioritising time and tasks, not least balancing study life and time to family and friends).

As the students progressed through first semester, it turned out that what the students experienced as challenging was different from what they had expected. Several students said that even though the high academic level of the courses and the requirements, e.g. in mathematics, had been challenging, they had been able to manage it due to the organisation of the course. Instead, what they had experienced as challenging was related to what Trautwein and Bosse (2016) labelled the organisational dimension, particularly concerning the clarity of the objectives, the organisation of the courses and the quality of the teaching.

Consequently, the students had to develop strategies to handle these challenges. In doing this, they relied on peers rather than on the teachers or the learning support of the study programme. This points at two key findings of our study: first, the multiple roles and importance of the social dimension, and, second, the importance of the organisation of and teaching at the programme.

The importance of the social dimension

In the beginning of the semester, most of the students responded that they would try to find time to both the academic and the social life. They said this in a way that suggested they were two separate realms, but our analysis shows that they are profoundly related.

The students' social relations in study groups, with study partners and in social activities provided spaces where students experienced a social support that added to their sense of belonging. The social dimension also provided access to the help, support and experiences of peers from the same year as well as from senior students. This is in line with previous studies that found that peers both in same and across cohorts could be viewed as important resources for the students (Cameron & Rideout, 2022; Matthews, Andrews, & Adams, 2011). A strong social and academic community provided opportunities for the students to reach out for help with understanding the content as well as for getting a feeling of being 'in it together' and knowing that others struggled too. This is similar to what Wilcox, Winn, and Fyvie-Gauld (2005) mentions as direct support and 'buffering'.

Access to senior students played a particular role. Not only could they explain things in different ways than the teachers, but the fellow students acted as a kind of informal learning support (Hounsell & Hounsell, 2007). Neither in the video diaries nor the interviews, did the students mention additional learning support. Apparantly, the study programme relied on this peer support which mostly occurred in informal contexts organised by the students themselves. An exception from this was the study café that was funded and initiated by the programme.

However, relying on peer support could also have some disadvantages. The virtues of peer-assistance notwithstanding, the senior students could have used tactics focusing on passing the exams rather than learning and understanding the content. When passing on their advice about study strategies to the first-year students, they could in some situations make questionable models.

Furthermore, relying on peers for informal learning support makes access to social relations crucial. This makes students with limited social relations more vulnerable when it comes to access to support and help, as was the case for one of our interviewees. Thus, informal learning spaces and communities can lead to exclusion as well as inclusion (Berman, 2020; Smith & Vonhoff, 2019). What Tinto (1993) called the academic system and the social system are thus affecting each other, and close social relations are important for developing a sense of belonging as well as for coping with academic requirements. Social and academic aspects were intertwined, just as Trautwein & Bosse found that the four dimensions they identified formed a 'chain reaction' where events in different dimensions together lead to a risk of drop-out (Trautwein & Bosse, 2016, p. 383).

The importance of teaching and organisation at the programme

As the students progressed through first year, what they mentioned as most challenging in terms of learning was lack of clarity concerning the course organisation, the course goals or the exam require-

ments. They also mentioned teaching that left them confused and without directions concerning how to deal with the challenges.

In the introduction, we referred to studies arguing that science students were particularly challenged by the academic level (Heublein et al., 2009). The students in our study also mentioned the academic content as challenging, but instead of focusing on the students' background and aspiration, our study suggests that we should be looking at other parts of the course congruence (Hounsell & Hounsell, 2007). Not least should we consider the course organisation and management, the quality of teaching and the students' access to learning support when trying to identify what could be done about the students' challenges.

Higher-education institutions and study programmes can support the students in handling the challenges they meet and developing a sense of belonging (Thomas, 2002; Tinto, 2017). Considering the importance of the social relations, it seems obvious to link these efforts to informal contexts that already exists, as the biotechnology programme had done by funding the study café, providing time and space for students to interact. However, the programme could also try to enhance the clarity of requirements, purposes and structure, and it could enquire into the teaching quality. It is not possible to make all explicit and transparent, but it would be relevant to consider the congruence of the course organisation and of the teaching-learning activities (Hounsell & Hounsell, 2007).

CONCLUSION AND IMPLICATIONS

In this paper, we explored students' expectations and experiences when entering an undergraduate biotechnology programme. Concerning RQ1, we found that the students expected that the most challenging when studying biotechnology would be the academic level, the high workload and balancing time and tasks.

In RQ2, we looked at what students experienced as challenging during the first eight months at the programme. Although they did find the academic level difficult, it was lack of clarity in course structure and goals, a lack of coherence between course elements and, to some extent, the quality of teaching that were particularly challenging. These are elements related to the organisational dimension. Conversely, when the course organisation was clear it was experienced as less challenging even though the content was difficult. This suggests that if students have difficulties in relation to specific courses, the first place to look for explanations should not necessarily be whether the students are sufficiently prepared (the congruence of students' background knowledge). Rather, the course organisation, the teaching and the learning support could be equally important, just as the interaction between the various elements are pivotal for understanding the challenges.

When students tried to cope with these challenges (RQ3), the social relations to fellow students were particularly important. They were important for learning the course content and for developing study strategies. As such, social relations to peers from the same class and to more senior students served as learning support. Social relations were also important for the sense of belonging, for maintaining motivation and for keeping up the spirit when the going got tough. From both a learning and a retention point of view, facilitating the integration of students in social networks appeared an important task for the programme, not least because there also were students who had difficulties establishing social relations. Caring about students' social relations and sense of belonging therefore not only concerns the students' well-being. It is profoundly linked to their academic participation and outcomes.

Limitations

This is a case study of one science study programme in Denmark building on students' own reporting of their experiences. This prevents us from addressing students' learning outcomes or the teachers' perceptions of the course teaching, including of the students' participation. Focusing on students' experiences, however, provides a more nuanced understanding of how the learning environments af-

fect the students' perceptions and participation. This can serve as a starting point for further enquiries into the development of learning environments.

The specific experiences of the students may be different in other programmes and disciplines, e.g., due to different curriculum design, different types of content and differences in student characteristics. Hence, the specific reactions of the students may differ, even if the reliance on other students and the importance of clarity may be the same.

There are variations across national educational systems and the specific conditions of students vary between countries, but the findings in this study is in line with findings from other countries. We therefore posit that the importance of social relations and of clarity in course organisation counts beyond the present case.

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