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# Factors Related to Study Progress Among First-Year Agriculture Students

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The first study year at university predicts the progress and quality of later studies. The aim of our study was to explore factors that affect first-year agriculture students. In the end of their first year, 49 students answered a questionnaire measuring self-efficacy, approaches to learning, and study-related burnout. They also reported the factors that enhanced or impeded their studies. According to their approaches to learning, students were clustered into three profiles. One of these represented successful students with an organized approach, strong self-efficacy and little burnout, and another a more unorganized group. The third group had a dissonant profile and suffered from the highest burnout levels. The enhancing factors most often mentioned were peer support and regular assignments. These were recognized by the organized group. The most common impeding factors were activities outside of studies, recognized by the unorganized group, and high workload, recognized mostly by the dissonant group. Pedagogical implications are discussed.

Transition from secondary school or working life to higher education is a critical phase in a person's life. It is likely to arouse a variety of psychological responses that have an impact on students' well-being and study success. Studying at university requires self-regulation and independence that is new for many students. At the same time, teachers as well as administrators of higher education institutions expect that students will successfully meet that university program's requirements for progressing that is typically measured by accumulation of passed courses or credits (Duff, 2004), and reaching the high-level understanding related to the substance and skills to be learnt. Currently, the political concern in several countries is focusing on the students' transition from secondary education to higher education, recognizing the first academic year as particularly challenging, but also a strong predictor of future academic study performance (Eurydice, 2011; Jenert et al., 2015; Tinto, 2015; Trautwein & Bosse, 2017). Understanding the aspects affecting students' learning and study progress would enable the detection of students at risk of delay in progress or potential dropout, which again would enable instructors to provide tailored support early enough. Therefore, better understanding of factors that promote or impede students' academic performance is of utmost importance for higher education institutions.

This study looks at a group ($N$ = 49) of students transitioning into university studies in agriculture and focuses on factors that promote or impede their performance in the first year. It is novel in that it takes a multi-faceted approach to investigating the factors that affect student progress. The study uses quantitative and qualitative data together, it combines students' own perceptions with psychological measurements, it employs a person-oriented perspective to simplify multi-dimensional data, and it takes into account potential gender differences. Agricultural sciences have an interest not only in food production and farming, but also in nature, the environment, sustainability, and several possibilities for specialization. These topics are highly important for the future of the globe, including sustainable development and climate change. Cheung et al. (2020) have stated that "there is not a one-size-fits-all approach to different student populations when it comes to enhancing their learning experiences. As far as we know, agriculture students have earlier been the focus of a similar study topic only in a short paper (Kymäläinen et al., 2019), while faculty-level studies (e.g. Parpala et al., 2010) include many student groups with different scientific and motivational backgrounds.

## Approaches to Learning

One of the most studied factors influencing the academic study progress is students' approaches to learning. They can be categorized into three different dimensions: a deep approach, a surface approach, and organized studying. The deep approach refers to a student's attempt to reach profound understanding related to the topics to be learnt including analysing and relating of ideas (Entwistle & Ramsden, 1983; Marton & Säljö, 1997). The surface approach relates to memorising without aiming at understanding, and thereby acquiring more fragmented knowledge structures (Entwistle & McCune, 2004; Marton & Säljö, 1976). Organized studying (Entwistle & Ramsden, 1983) refers to the ability to manage time and effort (Entwistle & McCune, 2004). Organized studying resembles a concept of self-regulation that is students' ability to plan and monitor their studying (Zimmerman & Schunk, 2012).

Students' approaches to learning are related to students' study pace and their perceptions of impeding and enhancing factors in a sense that the deep approach and organized studying are typically found to be related to faster progress in studies (Duff, 2004; Haarala-Muhonen et al., 2011; Lindblom-Ylänne & Lonka, 1999). However, not all previous studies have supported

this finding (see e.g., Karagiannopoulou & Milienos, 2015). In previous studies, students have mentioned, for example, problems in time management (Rytkönen et al., 2012) or working at a job (Hailikari & Parpala, 2014) as impeding, and peer support, pre-set schedules (Rytkönen et al., 2012), and higher perceived interest toward studying and teaching (Hailikari & Parpala, 2014) as enhancing factors of their studies. However, the same factors may be experienced as either enhancing or impeding studying depending on the students' approaches to learning, and for example paid working was not as problematic factor for students with good organizing skills (Hailikari & Parpala, 2014; Ruohoniemi & Lindblom-Ylänne, 2009).

Another important observation regarding the approaches to learning is that individuals may use different combinations of these approaches, and that this may affect significantly how they perceive their study environment. This has prompted researchers to apply latent profile analysis to uncover distinct student profiles with respect to how strongly they emphasized the different approaches to learning (e.g. Fryer & Vermunt, 2018; Heikkilä et al., 2011; Parpala et al., 2010; Parpala et al., 2022). For example, Parpala et al. (2022) examined Danish student profiles in several disciplines and found a profile emphasizing deep and organized approach in all disciplines. Students in this profile achieved better in their studies than students in other profiles, except in economics.

Moreover, it has been found that students with different profiles react differently to the teaching-learning environment (e.g., Parpala et al., 2010; Ruohoniemi et al., 2010). Hailikari et al. (2018) used this type of person-oriented approach to investigate differences in students' perceptions of factors enhancing or impeding their studies. They found for example that students emphasizing a surface approach benefitted from pre-set timetables and were hindered by motivational problems, while unorganized students mentioned challenges related to the student community. Recently, Asikainen et al. (2020) used a similar approach to investigate the susceptibility to study-related burnout of different student profiles. Their results include the observation that students in a "surface approach" profile had a higher risk of study burn-out than students in other profiles, but unorganized students were not at a high risk as long as they were "applying a deep approach."

## Self-Efficacy Beliefs and Study-Related Burnout

Self-efficacy is a concept that refers to the belief that individuals have it in their own capabilities to "organize and execute the courses of action required to manage prospective situations" (Bandura, 1997, p. 3). Previous research has shown that students' self-efficacy beliefs are related to their academic success and retention, because they influence the effort and diligence individuals invest in certain activities, particularly when facing obstacles and difficulties or when confronted with problems and disappointments (Bandura, 1993; Devonport & Lane, 2006). In addition, it is assumed that self-efficacy predicts students' approaches to learning and academic performance in a sense that higher self-efficacy beliefs are related to deep approach and better success in university studies (van Dinther et al., 2011; Parpala et al., 2022). Furthermore, strong self-efficacy beliefs reduce stress in demanding situations (Kyndt et al., 2019) and hence affect students' well-being.

Higher-education students' well-being has increasingly started to concern researchers during recent years (Asikainen et al., 2020). According to a national survey at higher education level, one-third of all Finnish students had an increased risk of burnout, while 11.5% suffered from an obviously increased risk (Kunttu et al., 2017). The number of students with obviously high risk for study-related burnout has increased over the last few years, and women are typically more exhausted compared to men (Kunttu et al., 2017; Salmela-Aro & Upadyaya, 2017).

Study-related burnout comprises three components: exhaustion due to perceived study demands, a cynical and detached attitude toward one's studies, and feelings of inadequacy referring to a diminished sense of competence as a student (Maslach et al., 2001; Salmela-Aro et al., 2009; Schaufeli et al., 2002). According to previous studies, study-related exhaustion as a multifaceted phenomenon and workload *per se* does not automatically lead to burnout, but factors, such as students' perceptions concerning the teaching-learning environment (Meriläinen, 2014) and teacher behavior (Cecen & Ozturk, 2007) have an impact on students' feelings of exhaustion. On the other hand, this seems to work also the other way round in the sense that exhausted students seem to evaluate their teachers and learning environments more critically compared to students who have a greater sense of well-being.

## Aim of the Study

To understand more thoroughly which factors foster or hinder academic study success and well-being among students in a disciplinary specific context, agricultural sciences, we examined these students' approaches to learning, study-related burnout level and self-efficacy beliefs, together with self-worded perceptions of enhancing and impeding factors affecting their study progress at the end of the first year of study. We adopted a mixed-method, person-oriented approach through the use of Likert-scale measurements together with profile analysis and open-ended questions via content analysis. The research questions of the study are as follows:

1. How are first-year agricultural sciences students' approaches to learning, self-efficacy beliefs, and study-related burnout related to each other and with study progress?
2. What factors do these students perceive as enhancing or impeding their study progress?
3. What kind of profiles can be identified based on these students' approaches to learning?
4. How do students with different profiles differ in their study progress, self-efficacy, risk of study burnout, and the perceived enhancing or impeding factors to their study progress?

## Methodology

### Participants and Context

The questionnaire was sent in May 2019 to 76 students taking the course "Sustainable agricultural production: From field to table and back" at the end of the first study year. In total, 58 students answered the questionnaire, and 49 gave their informed consent to use the data for research purposes. Thus, a total of 49 first-year students (female n = 31; male n = 18; mean age 24, stdev ±4.1 years) majoring in agricultural sciences made up the participants of this study.

University admission is restricted in Finland, and only a limited number of students are accepted into the system each year. Universities use different selection criteria, and in the Bachelor's Programme of Agricultural Sciences these currently include an admission path based on a matriculation exam as well as a university entrance examination path as main routes, and a minor, secondary path based on earlier studies.

In the first year, all students in the BSc Programme of Agricultural Sciences take common courses. These include introduction to the BSc Programme, chemistry, mathematics, physics, physiology, foreign language, digital skills, as well as the basics of animal science, plant production, ecology, sustainability, soil science, machinery, and economics in agriculture. At the beginning of studies all students make a personal study plan (PSP) with the help of their study counsellors. In the PSP, the preliminary plan for the specialization is taken into account; the specialization is defined at the end of the first study year.

### Study Procedure and Measures

Several study programmes at universities across Europe have developed tools enabling automatic and systematic monitoring of learning, study habits, and academic progression at certain 'checkpoints.' One of these tools is 'HowULearn' (University of Helsinki, 2016). The data were collected from the university's HowULearn survey that is given to every student at the end of their first year (the end of the Spring term). The data used in this study consist of students' responses to Likert-scale items measuring students' approaches to learning, self-efficacy, and study-related burnout. Their responses to open-ended questions regarding enhancing and impeding factors to their studies; as well as registry data for their gender and acquired study credits.

We used three sections of the HowULearn Questionnaire (previously named 'Learn Questionnaire') (Parpala & Lindblom-Ylänne, 2012), focusing on students' approaches to learning (SAL), self-efficacy (SE), and study-related burnout (SB). Student's approaches to learning variables were measured with a scale based on the experiences of teaching and learning questionnaire (ETLQ) (Entwistle et al., 2002) and validated in the Finnish university context (Parpala et al. 2013). Student's approaches to learning contains three subscales, corresponding to a deep approach, a surface approach, and organized studying, with four items to each subscale on the Likert scale from 1 to 5. Scales assessing approaches to learning are widely used and validated in Finnish and international contexts (e.g. Postareff et al., 2018; Ruohoniemi et al., 2017; Rytkönen et al., 2012; Herrmann et al., 2016). Their internal consistency reliabilities have been found adequate (composite reliability generally above 0.7) in these contexts (e.g., Parpala et al., 2013, $N$ = 2,509 Finnish, 2,710 British students; Herrmann et al., 2016, $N$ = 4,377 Danish students). Concerning SE, a scale in the HowULearn questionnaire (Parpala & Lindblom-Ylänne, 2012) has been constructed based on the motivated strategies for learning questionnaire (Pintrich et al., 1993). Five items, using the Likert scale from 1 (totally disagree) to 5 (totally agree), were modified to suit the academic context. Additionally, proneness to SB was measured using the school burnout inventory (SBI) (Salmela-Aro et al., 2009). The SBI scale contains three subscales, corresponding to exhaustion (4 items), cynicism (3 items), and inadequacy (2 items), but it can also be used as a single scale to measure study-related burnout (Salmela-Aro et al., 2009), and this approach was used in the current study. The SB items were measured using the scale 0–5 (0 = totally disagree, 1 = disagree, 2 = somewhat disagree, 3 = somewhat agree, 4 = agree, 5 = totally agree), so their sum ranges from 0–45.

Two open-ended questions were added to the standard questionnaire given to agriculture sciences students for the purposes of this study. Translated into English, they were "Which factors in your own opinion have enhanced the most your learning or progress of your studies?" and "Which factors in your own opinion have impeded the most your learning or progress of your studies?"

Students' study progress was measured via the accumulated number of study credits earned during the

first study year (similarly as Asikainen et al., 2014, and Kymäläinen et al., 2019), by the end of term, at 31 July 2019. We decided to use this measure since it is a simple score that is meaningful from the student's as well as from the institution's point of view, and experience has shown that it reflects the study progress in the first year at the target university better than, for example, the grade-point average. The standard goal for credits earned is 60 credits per academic year (Ministry of Education and Culture, 2018). Gender data was obtained from the student registry as a binary variable. We acknowledge that this value does not necessarily reflect every participant's gender identity; however, this shortcoming is unlikely to have a significant effect on the statistical analysis.

## Data Analysis

### *Qualitative Analysis*

A content-based analysis was used for the answers of the open questions concerning the enhancing and impeding factors. Since the open questions were used for the first time with students of agricultural sciences, a basic classification of the answers was considered appropriate in order to recognize and evaluate the enhancing and impeding factors.

The enhancing and impeding factors were divided into two groups: those related to teaching and those related to the student's own actions (Rytkönen et al., 2012). The students' answers were first classified to the enhancing and impeding factors following the questionnaire by Rytkönen et al. (2012). New factors ("Exercises or assignments during the course," "Electronic teaching material and applications," and "Friends and family" as enhancing factors; and "High workload" and "Poor pedagogical support" as impeding factors) were added because all open answers from the present study could not be located in the factors by the earlier studies by Rytkönen et al. (2012) and Hailikari and Parpala (2014). Accordingly, some factors ("Working" as an enhancing factor and "Internship or studying abroad" as enhancing and impeding factors, both by Hailikari and Parpala [2014]), were removed because there were no answers belonging to them. The number of factors was further reduced by combining factors so each factor included at least three mentions. The subgroup "Faculty and Department" used by Rytkönen et al. (2012) is not the most familiar level from the point of view of our students, and thus we finally combined those answers into the subgroup "Teaching." Most answers could be easily placed in a certain factor, but in qualitative data some were difficult to locate (e.g. "Different excursions to regions and foreign countries," located in "Interesting and supportive teaching," "Managing a new study style is demanding because there is more freeness than in earlier schools," and "Lack of basic skills of the student, e.g., Excel," located in "Poor pedagogical support," "Being sick," or "Own personality" located in "Activities outside studies").

Enhancing factors (Table 1) related to teaching were *study structures* (meaning study programmes, timetables, and personal study plans; abbreviated as 'Struct'), *interesting and supportive teaching* ('Teach'), *peer support* ('Peer'), *exercises or assignments during the course* ('Assign'), and *electronic teaching material and applications* ('Electr'). Enhancing factors related to students' own actions were *diligence and organized studying* ('Dilig'), *own motivation and history* ('Motiv'), and *friends and family* ('Friend').

Impeding factors (Table 2) related to teaching were *teaching times* (abbreviated as 'Time'), *difficult or unmotivating topics and high requirements* ('Requir'), *high workload* ('Load'); *poor pedagogical support* ('Supp'); and *poor digital skills of the teacher* ('Digit'). Impeding factors related to student's own actions were *problems of motivation or concentration* ('Conc'), *difficulties in time management* ('Manag'), and *activities outside studies* ('Outs').

The versatility of the students in giving input for the subgroups and factors varied a lot: e.g., 15 students gave two different inputs and seven students gave one input, while 13 students did not answer the open questions at all (13:0, 7:1, 15:2, 9:3, 3:4, 1:5, respectively).

The primary author, who was most acquainted with the study field, performed the analysis. An inter-rater analysis was accomplished with the third author, using 20% of the data, and inter-rater reliability was found to be 93% related to the enhancing factors, and 88% for the impeding factors. Subsequently, all authors revisited the statements and agreed on their final classification.

### *Statistical Analysis*

Data from the Likert-scale items were first combined to form scale sums (SB items) or averages (other items). The items have been used extensively in the Finnish university context, so there was reasonable confidence in the validity of the scales. Internal consistency was checked using Cronbach's alpha, with the following results for each variable: deep approach, $\alpha = 0.78$; surface approach, $\alpha = 0.79$; organized studying, $\alpha = 0.67$; self-efficacy, $\alpha = 0.78$; study-related burnout, $\alpha = 0.87$. All values are acceptable, although the one for organized studying was slightly low.

Means, variances, and Pearson's correlation coefficients were first calculated for all variables in order to obtain a basic understanding of the relationships between the variables. Next, a latent profile analysis (LPA) (Lazarsfeld & Henry, 1968) was performed for the student approaches to learning variables (SAL), that is, a deep approach, a surface approach, and organized

**Table 1**
*Frequencies of the Enhancing Factors and Examples of Students' Answers to the Open Questions*

| Factor related to… (n; % of the mentions of the main group) | Factor (n; % of the mentions of the main group) [abbreviation] | Examples |
|---|---|---|
| Teaching (n = 32; 69.6%) | Study structures: study programs, timetables and PSPs (3; 6.5%) [Struct] | "I have followed the study plan"<br>"Clear study plan in the first study year"<br>"PSP" |
| | Interesting and supportive teaching (6; 13.0%) [Teach] | "Meaningfulness of some courses"<br>"I feel that the study topics are interesting"<br>"Different excursions to regions and foreign countries"<br>"Constructive feedback from assignments" |
| | Peer support (10; 21.7%) [Peer] | "Cooperation and studying together"<br>"Willingness of other students to help and share expertise"<br>"Discussions with other students in the same branch" |
| | Exercises or assignments during the course (8; 17.4%) [Assign] | "Weekly assignments and other similar things because they make me review during the course, before the exam"<br>"Assignments and exams during the course," "Small essays/questions and multiple-choice tasks during the course" |
| | Electronic teaching material and applications (5; 10.9%) [Electr] | "Web-based studying, streaming of lectures in Moodle, regular Moodle-assignments"<br>"Moodle where you can always check how things are, normally also timetables are there"<br>"Web exams and that the course materials (slides, books) are in the web"<br>"Clear lecture slides" |
| Student's own actions (n = 14; 30.4%) | Diligence and organized studying (5; 10.9%) [Dilig] | "Setting goals, seeing the final outcome,"<br>"Making timetables"<br>"Going to lectures and making assignments during the course"<br>"Rational time management, participating in lectures, own work"<br>"Planning" |
| | Own motivation and history (4; 8.7%) [Motiv] | "Own motivation"<br>"Earlier experience from the branch of studies"<br>"My earlier studies have partly supported studies at the university"<br>"Interest toward agriculture" |
| | Friends and family (5; 10.9%) [Friend] | "Friends"<br>"External pressure"<br>"Practical support of family, e.g., in childcare" |

*Note.* n = 46.

**Table 2**
*Frequencies of Impeding Factors and Examples of Students' Answers of Open Questions*

| Factor related to… (n; % of the mentions of the main group) | Factor (n; % of the mentions of the main group) [abbreviation] | Examples |
|---|---|---|
| Teaching (22; 59.5 %) | Teaching times (3) [Time] | "Location of courses in the term"<br>"Strange handing in of work times"<br>"Overlap in courses" |
| | Difficult or unmotivating topics, high requirements (3; 8.1%) [Requir] | "Difficult topic"<br>"Unmotivating and difficult topic prevents understanding"<br>"High demands" |
| | High workload (7; 18.9%) [Load] | "Too much to do at the same time decreases my motivation"<br>"Too many exams and tasks make me feel exhausted"<br>"Too wide and demanding courses related to the available study time" |
| | Poor pedagogical support (5; 13.5%) [Supp] | "Tasks with which I was left alone"<br>"Slow feedback from teacher"<br>"Teacher does not answer emails"<br>"Old-fashioned lecturing style ... no group work to learn professional social and group work skills" |
| | Poor digital skills of the teacher (4; 10.8%) [Digit] | "Failure in streaming and recording of lectures"<br>"Very poor lecturers without digital skills"<br>"No proper streaming, no tasks in Moodle to test knowledge during the course"<br>"Poor slides without text" |
| Student's own actions (15; 40.5%) | Problems of motivation or concentration (3; 8.1%) [Conc] | "Lack of time and ability to concentrate due to life circumstances"<br>"I have been thinking whether this is the right branch for me"<br>"Lack of motivation" |
| | Difficulties in time management (4; 10.8%) [Manag] | "Doing tasks in the nick of time"<br>"Lack of time and motivation due to life"<br>"I don't have enough time to study"<br>"Difficulties in managing times, being ill" |
| | Activities outside studies (8; 21.6%) [Outs] | "Combining work and studies meaning management of personal finances, social life not in balance with time used for studies"<br>"Lively student life and tasks in student organizations or social events have taken time from studies"<br>"Friends" |

*Note.* n = 37.

studying. For this analysis, tidyLPA package (Version 1.0.8) (Rosenberg et al., 2018) for the R programming language (Version 4.0.2) was used. Latent profile analysis is a clustering method fitting a Gaussian finite mixture model via an expectation-maximization algorithm. Its purpose is to provide a person-oriented view of the data by identifying clusters of individuals with similar behaviour regarding the three SAL dimensions. More precisely, LPA assumes that the observed data is a random sample from a combination of a finite number of (possibly overlapping) normal distributions, called clusters, classes, or profiles. We chose to let the algorithm estimate freely the variances and covariances for each profile (so-called "model 6" in the tidy LPA terminology), as we had no reason to expect that the profiles would have similar dependencies between the variables.

To understand how different profiles obtained from the LPA differed in terms of self-efficacy, study-related burnout, and study progress, analysis of variance was performed on each of these variables. Finally, cross-tabulation was used to investigate how the profiles differed in terms of perceived enhancing and impeding factors resulting from the qualitative analysis.

## Results

We computed the means and standard deviations of all quantitative variables, together with Pearson correlation coefficients (Table 3). It was noted that self-efficacy and a deep approach to learning had rather large means (4.15 and 3.83 on a scale from 1 to 5, respectively) and their standard deviations were in turn small (0.47 and 0.61, respectively). Otherwise the means and variances were in a typical range.

For the correlation coefficients, the strongest correlations were exhibited between self-efficacy and other variables: self-efficacy correlated positively with a deep approach ($p < 0.001$), negatively with a surface approach ($p = 0.001$), and also negatively with study-related burnout ($p = 0.002$). Correlations were also found between a surface approach and other variables, namely a moderate positive correlation between a surface approach and study-related burnout ($p = 0.016$), a weaker negative correlation between a surface approach and study credits ($p = 0.074$), and a still weaker positive correlation between a surface approach and organized studying ($p = 0.13$). Other correlation coefficients were very weak, between -0.2 and 0.2. (All $p$-values here are unadjusted.)

More than half (59.2%, $n = 29$) of students in our data had reached the 60-credit annual goal. Quite close to the goal were students (18.4%, $n = 9$) who had earned 50–59 credits. A tenth (10.2%, $n = 5$) of the students had earned somewhat more than half of the goal (30–39 credits), while 12.2% ($n = 6$) had earned 40–49 credits.

The means of quantitative variables were also compared between genders. Two notable differences were found. For study credits, the mean for female students was greater than that for men: 63.60 against 53.55 ($t[47] = 2.86$, $p = .006$, two-sided, 95% CI [2.99, 17.09]). On the other hand, the mean of organized studying for female students was also greater than for men: 3.37 against 2.94 ($t[47] = 1.96$, $p = .056$, two-sided, 95% CI [-0.01, 0.86]).

In the answers to the open questions, the majority of mentions of enhancing factors (69.6%, 32 mentions out of 46) concerned teaching-related issues and the rest (30.4%) were related to the students' own actions (Table 1). The most mentioned group of enhancing factors was peer support (21.7%, 10 mentions out of 46), and exercises or assignments during the course was the second most common (17.4%, eight mentions).

Similarly, the majority of mentions of the impeding factors (59.5%, 22 mentions out of 37) concerned teaching-related issues in total, while fewer (40.5%) answers were related to the students' own actions (Table 2). However, the most mentioned single impeding factor, activities outside of studies (21.6%, eight mentions out of 37), was in the group of students' own actions, while high workload in the teaching-related issues was almost as common (18.9%, seven mentions).

Latent profile analysis was conducted to the student approaches to learning (SAL) variables (deep approach, surface approach, organized studying) with two, three, and four profiles to be looked for. Table 4 shows the fit indices that were used to help decide the most suitable profile count. The log-likelihood values describe the goodness of fit, and they increased along with the profile count. However, the Akaike (AIC) and Bayesian (BIC) information criteria add a penalty according to model complexity (number of estimated parameters) and the BIC seemed to favour the solution with two profiles. Entropy describes the accuracy of classifying individuals into distinct profiles, and all solutions had an acceptable value of entropy (Wang et al., 2017). Finally, the bootstrapped likelihood ratio test estimates whether a solution is likely to be a better fit than the one with one fewer profiles. This test did not discern between the models.

The fit indices do not give a clear indication about the most suitable number of profiles, so we looked for another basis for the choice. Two profiles would give the most parsimonious model, but it would not offer much information about the sample. On the other hand, in the four-profile solution (the smallest profile) would only contain five individuals (out of a total of 49), which we found to be too small a group to be analysed further.

**Table 3**
*Means, Standard Deviations, and Correlations with Confidence Intervals of the Quantitative Variables*

| Variable [scale] | M | *SD* | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|---|
| 1. Deep approach [1–5] | 3.83 | 0.61 | | | | | |
| 2. Surface approach [1–5] | 2.65 | 0.79 | -.13 [-.39, .16] | | | | |
| 3. Organized studying [1–5] | 3.21 | 0.76 | .08 [-.20, .36] | .22 [-.07, .47] | | | |
| 4. Self-efficacy [1–5] | 4.15 | 0.47 | .49** [.24, .68] | -.45** [-.65, -.20] | .11 [-.17, .38] | | |
| 5. Study-related burnout [0–45] | 15.96 | 8.81 | .02 [-.27, .30] | .34* [.07, .57] | -.11 [-.38, .18] | -.43** [-.64, -.17] | |
| 6. Study credits [0->] | 59.91 | 12.69 | .08 [-.21, .35] | -.26 [-.50, .03] | .10 [-.19, .37] | .01 [-.27, .29] | -.02 [-.30, .27] |

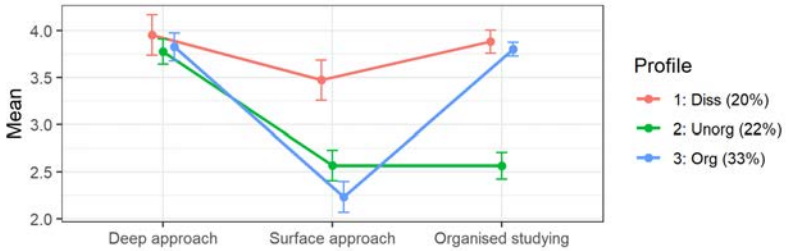
*Note.* For each correlation, values in square brackets indicate the 95% confidence interval. Significance levels are unadjusted: * p < .05. ** p < .01.

**Table 4**
*Fit Indices for the LPA with 2, 3 and 4 Profiles (Classes)*

| Profile | LogLik | AIC | BIC | Entropy | Prob. min | N min | BLRT p |
|---|---|---|---|---|---|---|---|
| 2 | -141 | 320 | 356 | .79 | .93 | .43 | -- |
| 3 | -132 | 323 | 378 | .88 | .94 | .20 | .63 |
| 4 | -121 | 320 | 394 | .94 | .97 | .10 | .33 |

*Note.* From left to right, the indices are log-likelihood, Akaike information criterion, Bayesian information criterion, entropy, minimum probability for most likely profile membership, proportion of the sample assigned to the smallest profile, and the *p* value for the bootstrapped likelihood ratio test.

**Figure 1**
*The Three-Profile Solution with Variable Means, Profile Labels and Profile Proportions*




*Note*. Error bars signify standard errors. Diss = Dissonant profile, Unorg = Unorganized students, Org = Organized students.

Hence, we settled on the solution with three profiles (Figure 1).

Profile 2 was characterized by having a low value of organized studying (Figure 1). Therefore, this profilewas named *Unorganized students* (Unorg, 12 females, 11 males). On the other hand, profiles 1 and 3 had similar values in organized studying and deep approach, and differed mainly in terms of surface approach. Profile 3 had a low value in surface approach, and was named *Organized students* (Org, 10 females, 6 males). As Profile 1 had a high value in all three variables, we labeled it a *Dissonant profile* (Diss, 9 females, 1 males), signifying organized studying but with a surface approach. Notably, the profile consisted almost exclusively of female students. Values for the deep approach did not vary very much between any of the profiles.

To study the differences between students in the three profiles, we first performed an analysis of variance for the quantitative variables: study-related burnout, self-efficacy and study credits (Table 5). Assumptions of homogeneous variance and normal distribution of residuals for these variables were checked by inspection of scatter plots and normal quantile-quantile plots, and found to hold adequately.

Study-related burnout (SB) differed most strongly between the profiles ($F[47,1]) = 9.32$, Holm-corrected $p = 0.01$). The Dissonant profile had more SB than students in the other profiles, and Organized students had the least SB. Self-efficacy also differed between the profiles ($F[47,1]) = 5.92$, Holm $p = 0.04$), in the opposite order to SB. Acquired study credits followed the same trend, but with much weaker differences ($F[47,1]) = 1.23$, Holm $p = 0.27$).

Tukey's range test was performed as a post-hoc test for SB and self-efficacy. For SB, the test showed statistically significant pairwise differences between the extremal profiles 1 (OrgSurf) and 3 (Org) ($p = 0.01$, 95% CI [-17.8 -1.74]). For self-efficacy, statistically significant pairwise differences were not found.

For the study credits, the differences between profiles were small. Indeed, there were students in all three profiles that had earned 50 or more study credits. However, the Organized students (Org) stand out in that all students in that profile had earned 40 or more credits, and this was not the case for the other two profiles.

Finally, in Tables 6 and 7, we tabulate how many times the enhancing or impeding factors were mentioned by the students in each profile.

Among the enhancing factors, "peer support" was mentioned several times in all profiles. Otherwise, the different profiles shared different mentioned factors. Dissonant profile (Diss) as well as Unorganized students (Unorg) mentioned "interesting and supportive teaching" several times, whereas Organized students (Org) did not mention this factor. On the other hand, both Organized students and Dissonant profile mentioned "exercises and assignments during the course" more often than Unorganized students. For enhancing factors, students in all profiles seemed to emphasize teaching-related factors, apart from Dissonant profile (Diss), who mentioned "diligence, organized studying" most often of all factors.

For impeding factors, the differences between profiles were more striking. The only factor mentioned by the Unorganized students (Unorg) more than once was "activities outside studies, whereas this factor was mentioned only once by the other profiles. Similarly, the only factors mentioned more than once by the Dissonant profile (Diss) were "difficult or unmotivating topics, high requirements," and "high workload," whereas these factors were less often or not at all mentioned in the other profiles. In contrast, the Organized students (Org) were not strongly focused on any particular factor: they mentioned "poor pedagogical support" three times, and four other factors twice.

## Discussion

Transition to higher education is a difficult process for many students (Briggs et al., 2012; Christie et al., 2008). In several universities having enough teachers per student is challenging. This is why understanding the factors that enhance or impede students' study progress during the first study year at university is of utmost importance. The phenomenon is complex, because several factors have an effect on students' study progress. Therefore, we focused particularly on students' approaches to learning, self-efficacy beliefs, and study-related burnout measuring them with Likert-scale items. Additionally, because students' own voices are relatively seldom heard, we employed open-ended questions to investigate students' views about enhancing and impeding factors affecting the fluency of their studies. This study is one of the first attempting to investigate the factors affecting students' study progress with a multimethod approach. Additionally, previous research in the context of agricultural sciences does not exist.

The results showed that a deep approach to learning was prevalent in the student population, as this variable had a high mean and small variance. Students' study-related burnout was related to a surface approach, which is something that needs attention considering that a surface approach typically leads to weaker learning results. The result contributes to the body of research about the role of academic wellbeing in students' learning (Vlachopanou & Karagiannopoulou, 2021). On the other hand, students' self-efficacy beliefs were high in general. Stronger self-efficacy beliefs were positively related to a deep approach and negatively to a surface approach and study-related burnout. The results are in line with previous studies, which have convincingly

**Table 5**
*Results of the Analysis of Variance of the Quantitative Variables Across the Three Profiles*

| Variable | Dissonant Profile | | Unorganized Students | | Organized Students | | $F(47,1)$ | $p$ | Holm $p$ | $\eta^2$ |
|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | Mean | SD | | | | |
| Study-related burnout | 30.2 | 9.28 | 25.8 | 7.87 | 20.4 | 8.02 | 9.32 | .004 | .01 | .16 |
| Self-efficacy | 3.9 | 0.50 | 4.0 | 0.47 | 4.3 | 0.40 | 5.92 | .02 | .04 | .11 |
| Study credits | 57.0 | 16.10 | 59.4 | 12.00 | 62.5 | 11.70 | 1.23 | .27 | .27 | .02 |

*Note.* The significance values were adjusted using Holm's correction, and effect size was measured eta-squared.

**Table 6**
*Enhancing Factors Mentioned by Students in Each Profile.*

| Profile | Teaching | | | | | Student's Own Actions | | | Sum | Mentions /Student |
|---|---|---|---|---|---|---|---|---|---|---|
| | Struct | Teach | Peer | Assign | Electr | Dilig | Motiv | Friend | | |
| Dissonant Profile | 0 | 3 | 2 | 3 | 2 | 4 | 2 | 1 | 17 | 1.70 |
| Unorganized Students | 1 | 4 | 3 | 1 | 1 | 0 | 1 | 2 | 13 | 0.57 |
| Organized Students | 2 | 0 | 5 | 4 | 2 | 1 | 1 | 2 | 17 | 1.06 |

*Note.* Study structures (Struct); Interesting and supportive teaching (Teach); Peer support (Peer); Exercises and assignments during the course (Assign); Electronic teaching material and applications (Electr); Diligence and organized studying (Dilig); Own motivation and history (Motiv); Family and friends (Friend).

**Table 7**
*Impeding Factors Mentioned by Students in Each Profile*

| Profile | Teaching | | | | | Student's Own Actions | | | Sum | Mentions /Student |
|---|---|---|---|---|---|---|---|---|---|---|
| | Time | Requir | Load | Supp | Digit | Conc | Manag | Outs | | |
| Dissonant Profile | 1 | 3 | 5 | 1 | 1 | 0 | 1 | 0 | 12 | 1.20 |
| Unorganized Students | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 7 | 12 | 0.52 |
| Organized Students | 1 | 0 | 2 | 3 | 2 | 2 | 2 | 1 | 13 | 0.81 |

*Note.* Teaching times (Time); Difficult or unmotivating topics, high requirements (Requir); High workload (Load); Poor pedagogical support (Supp); Poor digital skills of the teacher (Digit); Problems of motivation or concentration (Conc); Difficulties in time management (Manag); Activities outside studies (Outs).

shown that self-efficacy plays a strong mediating and predicting role in relation to students' achievement (Asikainen et al., 2020; van Dinther et al., 2011; Kymäläinen et al., 2019). The majority of our students had progressed with their studies relatively well, earning a satisfactory number of study credits during their first study year, and unlike in certain previous studies, their study progress was not that clearly related to students' approaches to learning (Parpala et al., 2022).

A significant gender difference was found regarding study credits, with female students obtaining more credits on average than males. Furthermore, female students showed a slightly stronger tendency toward organized studying in our sample. This kind of gender behaviour has been hinted at by Misra and McKean (2000), who reported that female students were more effective in time management than men, and by Smith and Miller (2005), who found that female students scored higher in "achievement strategy," which bears a similarity to organized studying (Biggs, 1987).

We used open questions for examining factors enhancing or impeding progress of studies. This method was similar to the studies by Ruohoniemi et al. (2010) and Hailikari et al. (2018). Several enhancing and impeding factors in our results were not included in the corresponding lists used in earlier studies (Rytkönen et al., 2012; Hailikari & Parpala, 2014), in which ready-made options were given for the student respondents. On the other hand, our results contained items grouped in new factors or factors related to these earlier studies but mentioned from a new point of view or emphasized differently. For example, the enhancing factor "Electronic teaching materials and applications" in our study could have a similar content as "Flexibility" used in the study by Rytkönen et al. (2012). In our data, students used concrete wording arising from their experiences and points of view.

We classified the answers of the open questions in two main groups: "teaching" and "students' own actions." Although this division was not made in the study by Hailikari et al. (2018), many similar categories were identified both in that and in our study, e.g. our "study structures" vs "course planning" in their study; or "peer support" and "friends and family" in our study vs "social factors" in their study. Two main groups "faculty-level procedures" and "teaching practices" used in the study by Hailikari and Parpala (2014), as well as three groups "planning of teaching," "teaching," and "teacher" used e.g. in the study by Ruohoniemi et al. (2010), were in our study combined into "teaching" from the perspective of the students' point of view .

In our study "peer support" was the most common enhancing factor, "exercises or assignments" during the course the second most common. Peer support was selected as an important enhancing factor also in the opinions of the study of bioscience students in study year I ($n$ = 188) by Rytkönen et al. (2012). In the study of students of the Faculty of Arts and Humanities and the Faculty of Social Sciences (study years I and III, $n$ = 736), peer support was the fourth most important factor after interest and enthusiasm about one's field, self-regulation skills, and goal-orientation. In the study by Rytkönen et al. (2012) the most important enhancing factors focusing on the students' actions were self-help, diligence, and flexibility, which may include similar student's thinking than in our factors "diligence, organized studying," and "own motivation and history."

In our study the most mentioned impeding factors were "Activities (of the student) outside of studies" and "High workload" as a feature of teaching. In the study by Hailikari et al. (2018), problems related to number of courses and working as an activity outside of studies were the two most commonly mentioned impeding factors, while workload was mentioned, but clearly more seldom. In the study by Rytkönen et al. (2012), students' personal lives were seldom mentioned as impeding factors, which is different to our study and the study by Hailikari et al. (2018). In the study by Rytkönen et al. (2012), common impeding factors were difficulty in time management, course overlap, inappropriate course schedules, and lack of motivation, which all also appeared in our results.

A profile analysis was performed with respect to students' approaches to learning, and a solution with three profiles was chosen after comparing different models. After this, we investigated differences between the profiles in terms of study-related burnout, self-efficacy, study credits, and what factors they perceived as enhancing or impeding their studies.

Organized students (Profile Org) could be considered "model students;" their approach to learning was deep and organized, their self-efficacy was high, and burnout inclination low. They were able to obtain 60 study credits in their first year, which gave them a good start for their studies. It seems that, having an organized approach to studying, they saw the value in regular course assignments and exercises which helped them maintain a steady working pace. They also saw value in peer support and were not at all worried about the requirement level, as they had high confidence in their abilities. They also felt able to criticize teachers' pedagogical and digital skills if these did not seem up to the task.

Unorganized students (Profile Unorg) had an unorganized approach to studying, and they also exhibited more of a surface approach than Organized students. Their self-efficacy was lower and study-related burnout higher in comparison. They were barely able to reach 60 credits in their first year, but they required a lot of support and encouragement from the teaching environment. Probably because of their unorganized approach, they did not see the benefit in regular course

exercises, and the biggest impediment to their studying was non-study related challenges, such as work or family life.

Dissonant profile (Profile Diss) is a paradoxical group in that they had high values in all three approaches. Indeed, although they had the highest value in a surface approach, they also had the highest value in a deep approach, and hence could be said to have had a dissonant approach to learning (Meyer, 2000; Parpala et al., 2022). They suffered from the highest burn-out levels among the three profiles, and they struggled most in obtaining study credits. Their self-efficacy was even slightly lower than that of the Unorganized students. However, they endeavoured to study in an organized fashion, so they felt they benefitted from regular course assignments, but their own diligence had more value to them than to the Organized students. They also felt they benefitted from encouragement and support, as did the Unorganized students. Their confidence was low, and they experienced high requirements and a heavy workload more adversely than students in the other profiles.

Some other recent studies, notably those by Hailikari et al. (2018), Asikainen et al. (2020), and Parpala et al. (2022), have taken a similar person-oriented approach as in this article. Regarding the profile composition, the study by Parpala et al. (2022) has some notable similarities with our results. They compared profiles in several disciplines (not agriculture or life sciences), and the profile structures they found in law, political science, and psychology resemble the one found in this study. They also found invariably a "deep organized" profile that resembles our Organized students (Org). Parpala et al. (2022) also compared achievement and self-efficacy between the profiles, and found, similarly to this study, that the "deep organized" students (in other fields than economics) succeeded best in their studies and had the greatest self-efficacy. Also, their "dissonant" profiles had the lowest self-efficacy, similar to our result.

Compared to the profiles of Asikainen et al. (2020), our Organized students resemble their "model" profile called "students applying a deep approach," and our Unorganized students resemble their "unorganized students applying a deep approach." The former profile had least study-related burnout and most obtained study credits in both studies, and the latter profile fared poorer in both respects. It is notable that Asikainen et al.'s (2020) "organized students" showed high levels of study-related burnout, which the authors attributed to the lack of a deep learning approach. This would be in line with our study, where the students having a more surface-oriented profile (Diss) experienced the highest value of study-related burnout.

In terms of the enhancing and impeding factors, we can compare our results with those of Hailikari et al. (2018). They named four student profiles, of which "Students applying a deep approach" corresponds roughly to our Organized students (Org), and "Unorganised students applying a deep approach" to our Unorganized students (Unorg). The first mentioned profiles did not show notable similarities. However, the Unorganized profiles resemble each other in that both find activities outside studies impeding to their progress, and neither mentioned high workload as a particular challenge.

Our Dissonant profile (Diss) raises some questions, and it would be interesting to understand better what lies behind taking up such a learning approach. Is it lack of time or motivation that encourages a strategy of 'rote learning' that seems less time-consuming from an organized perspective but actually leads to poor results? Or is it a faulty expectation that university studies would resemble grade-school studies, where this kind of surface-organized strategy paid off for these students? Or is it some lack of skills such as study skills or self-regulation that makes these students experience the workload as especially exhausting, leading to the adoption of a surface approach (see e.g., Kreber, 2003; Lizzio et al., 2002)? It is also suggested that these students may struggle to evaluate their own learning (Parpala et al., 2022). All in all, our findings strengthen the assumption, presented also in other studies utilizing a person-oriented approach, that learning approaches are intermediate or transitional positions on the spectrum and not possible to be categorized exclusively (Parpala et al., 2022). Curiously, the students in the Dissonant profile were almost exclusively female. Misra and McKean (2000) noted that for female college students, effective time management *did no*t lower academic stress as expected, finding also that female students were more anxious and did not find leisure time as satisfying as male students. In a manuscript under review, Rämö et al. (2022) have found that with engineering students, surface approach and organized studying were higher in females than males. In our cohort, female students on the whole performed better than male students measured by study credits, but perhaps there exists a subset of mostly female students that are prone to some form of over-anxiety.

Despite its contribution, this study faces some limitations that need to be taken into account, when considering the reliability, impact, and generalizability of the results. First, our sample size was small, focusing on a specific group of students. It would be suggestable to repeat the study with a larger sample size and also in other contexts. The number of profiles in the profile solution, in particular, could not be sufficiently corroborated with the small sample. It was possible to derive statistically significant differences between the profiles, but we could not say how robust the profiles would be in another context or whether they should be

subdivided further. Indeed, some earlier studies have come up with slightly different kinds of profiles in larger samples. Previous studies have established that students' engagement and study-related burnout changes during their studies, and therefore the relationship should be studied using a longitudinal approach (Salmela-Aro & Read, 2017).

Based on the results of this study, the students vary in terms of their needs after the first study year, and these differences have implications for how instruction should be organized at universities to enable different students to thrive in their studies. On one hand, there are plenty of students who progress well in their studies, are committed to deep learning, and feel themselves to be capable and well. However, we also have students who seem to suffer from a clustering of problems and challenges in their studying. For example, a surface and a dissonant approach to learning seemed to be related with weaker well-being and problems with study progress. Since burnout symptoms do not decrease but are likely to increase during studies (Salmela-Aro & Read, 2017), students with a higher risk of serious problems should be identified early enough to provide timely counselling and support for them.

Based on our study, several means can be suggested to support students' fluent study progress. Supported by the qualitative results, particularly peer support should be endorsed and exercises or assignments included in courses. However, the other enhancing factors such as good study structures, interesting and supportive teaching, and good digital skills and electric teaching material, are also important and can be affected by management and teachers of the programme, as well as by the university administration. Interesting and supportive teaching was observed to be the most important for the dissonant profile as well as for unorganized students.

Similarly important is avoiding teaching-related impeding factors by improving teaching times, focusing on motivating topics, regulating requirements, avoiding too high a workload, and ensuring that the students' pedagogical support includes the qualified use of digital means. It is more difficult for teachers to influence student-related factors, e.g., activities outside studies. In this case, it is important to support the self-regulation and time management skills of the students. The need for fostering students' time and effort management skills were highlighted also by Parpala et al. (2022). Indeed, supporting these skills would probably be most beneficial to unorganized students. Students in the dissonant profile might also benefit from this, because having an organized approach does not guarantee that the first-year student also understands what kind of study skills are relevant in the university context. The utilization of personal student feedback (via personal links in emails sent to each student) is important, e.g. by integrating the students' reflections into a learning diary during a course.

Our results indicate that more research is needed related to factors affecting students' study progress and well-being during early university studies. The focus should be on the needs of different students in terms of their learning, study progress, and well-being. Our results offer insights for higher education developers and teachers to design learning environments that support the high-level learning and well-being of future experts.

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