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Understanding the shift: exploring motivational and contextual factors affecting the adoption of learning approach

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ABSTRACT

This research delves into exploring shifts in students' learning approach profiles within the context of accounting education. Specifically, this study investigates the influence of motivational factors (achievement goals and expectations of learning accounting) and teaching-learning environment-related aspects (course workload and teaching quality) in explaining changes in deep – and surface-dominated learning profiles. This study draws upon data from 122 students enrolled in an introductory accounting course. Latent profile analysis is employed to identify distinct profiles of students' approaches to learning at course outset and upon completion. Findings based on logistic regression substantiate that students are likely to adopt a surface-dominated learning profile instead of a deep-dominated learning profile in three scenarios. These are (i) decrease in mastery goal orientation, (ii) increase in performance goal orientation, and (iii) students' view of teaching quality as suboptimal. This study offers introductory accounting course educators a profound understanding of enhancing students' learning experience to foster deep learning.

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Introduction

Can motivational and contextual factors explain shifts in student approaches to learning (SAL) profiles in an introductory accounting course? In addressing our research question, we use a person-oriented approach. We consider achievement goals and expectations of learning accounting as motivational factors; teaching quality and perceived appropriate workload are contextual factors.

We participate in an ongoing debate regarding SAL stability vs. variability. As representations of learning profiles differ across disciplines (Parpala et al., 2022), we shed light on SAL profiles in accounting. Noteworthy, no studies have examined SAL

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shifts during accounting courses, considering motivational factors; few have considered contextual factors (Jackling, 2005). Recognising and comprehending these connections is crucial for educators as they strive to tailor courses effectively to foster a deep learning approach among students.

We use the mean scores of 122 students for deep and surface learning approaches in a six-week introductory accounting course as inputs and apply latent profile analysis (LPA) and Bayesian information criteria (BIC). We thus identify an empirically and theoretically robust solution comprising two latent profiles: deep-dominated and surface-dominated at the outset and upon course completion. With a logistic regression model, we test the effects of motivational and contextual factors on profile shifts.

The introductory accounting course is crucial because it provides essential accounting information applicable to all business students for planning and decision-making. It can influence students' decisions to pursue further accounting studies and shape their perceptions of accounting and the accounting profession (Geiger & Ogilby, 2000; Issa et al., 2022; Sugahara & Dellaportas, 2018). The transition from high school to university is a significant change for first-year students, requiring them to adapt to a new learning environment and modify their learning habits, strategies, perceptions, and identities (Hoi, 2023; Krause & Coates, 2008). Initial university courses are crucial for facilitating this transition, retaining students, and establishing the foundations for academic success (Korhonen et al., 2019; Krause, 2005; Krause & Coates, 2008). Accordingly, focusing on first-year business students in their initial accounting course enhances the likelihood of detecting SAL changes, even in short-duration courses because their perceptions and learning strategies are still developing (Krause & Coates, 2008).

Our empirical findings indicate that, initially, most students belonged to the deep-dominated profile (83) compared to the surface-dominated one (39). However, by the end of the course, this distribution changed, with more students in the surface-dominated profile (64) than in the deep-dominated one (58). These empirical findings show that 32, over a third of initially deep-dominated profile students, later adopted a surface-dominated profile. When we continue to examine the subset of students who initially adopted a deep-dominated profile (83), using logistic regression, we find the following predictors for shifting to a surface-dominated profile: a decline in the mastery goal, a strengthened performance goal, and a student considers that teaching quality was low.

Contributions

Our study uniquely contributes to the literature on the connections between students' learning approaches and achievement goals. In this research in response to Duff and Mladenovic's (2015) call to use actual SAL data, we confirm that shifts from deep-dominated to surface-dominated learning profiles occur when the mastery goal weakens and the performance goal strengthens. Additionally, to the best of our knowledge, we are the first to statistically examine the association between mastery and performance goals and SAL changes in accounting education, providing new insights into this relationship.

Second, we further explore how teaching quality and workload perception influence the adoption of surface-dominated profiles. Unlike Diseth (2007), who linked high workload and a high surface approach rate, our study finds that, among accounting students, poor teaching quality, rather than perceived workload, drives the shift from deep to

surface learning. This study extends Jackling's (2005) accounting education work by statistically analysing these effects. Third, our study examines how expectations of learning accounting influence SALs. We extend the argument in Duff and Mladenovic (2015) by providing evidence that expectations of learning accounting play a minimal role in shifting students from deep – to surface-dominated profiles. Finally, through LPA, we track SAL profile stability in an introductory accounting course. We observe a significant shift from deep-dominated to surface-dominated profiles; to the best of our knowledge, ours is the first study to examine such shifts in this context.

From a practical point of view, understanding how first-year students shift their SAL profiles will likely provide insights into deep learning-enhancing teaching methods. Supporting first-year accounting students in experiencing deep learning is essential as it encourages them to adopt this approach in future courses (Turner & Baskerville, 2013).

The remainder of the paper is structured as follows. Section Two presents first the theoretical background of the study and then continues with the development the hypotheses. Section Three, methodology, describes the data and the model. Section Four presents the results of primary analyses, robustness checks, and additional analyses. Section Five presents the discussion and finally Section Six concludes the study.

Theoretical background and hypotheses development

Changes in students' approaches to learning and the Biggs 3P model

Among university students, traditional SAL dichotomisation involves two categories: deep learning and surface learning; they are contrasting and mutually exclusive (Biggs, 1987; Entwistle & McCune, 2004; Entwistle & Ramsden, 1983; Marton & Säljö, 1976). The consensus is that a deep learning approach is desirable. Students who adopt a deep learning approach seek to derive meaning from the subject matter, establishing connections with prior knowledge, experiences, and ideas, through a critical examination. A deep learner has a personal commitment and interest in the subject and tries to profoundly understand it. Students who use a surface learning approach rely on rote learning and memorisation in isolation from other ideas; hence, they fail to observe the relation among information (Biggs, 1987). A surface learner's intention may be to acquire only sufficient knowledge with minimum effort to complete the task or pass the subject (Biggs, 1987).

The third learning approach – organised studying (strategic learning) – was later introduced in addition to these two. Organised studying is related to students' efforts to obtain the highest possible grades, organise time and distribute effort as efficiently as possible (Entwistle & McCune, 2004). Following major part of studies addressing changes in learning approaches, this study focusses on the two traditional SALs: deep and surface learning approaches (Asikainen & Gijbels, 2017). This choice enables us also to better discuss with prior literature.

The Biggs 3P model, a widely referenced model in teaching and learning, sets SALs at the core of an integrated teaching and learning process (Biggs et al., 2001). The model illustrates this process as an integrated system comprising three main phases: presage, process, and product. Presage factors comprise student-related factors (for example, ability, gender, maturity, prior knowledge, and expectations of learning accounting) and teaching context-related factors (for example, teaching quality, workload,

assessment, objectives) (Biggs et al., 2001; Duff & Mladenovic, 2015). Presage factors influence the adoption of SALs (process), i.e. whether a student will adopt a deep or surface approach to learning. Finally, SALs affect the quality of learning outcomes (product). Congruent with education literature in other disciplines, accounting education has provided considerable evidence that academic performance, i.e. product, is positively associated with deep learning and negatively with surface learning (Byrne et al., 2002; Duff, 2004; Elias, 2005; Everaert et al., 2017; see Everaert et al., 2017, for a review of SAL studies in accounting education). Nevertheless, less is known about the factors affecting SAL changes.

Prior literature has reported that SALs are commonly dynamic and that students can switch between them even during a course (Asikainen & Gijbels, 2017; Laurillard, 1984; Ramsden, 1991). The duration was 8 weeks in Geitz et al. (2016), 12 weeks in Hall et al. (2004) and Volet et al. (1994), and 13 weeks in Quinnell et al. (2012). Regarding how SALs change, however, the evidence is inconclusive. The following directions have been reported within accounting education. The use of the deep learning approach increased (Ballantine et al., 2008; English et al., 2004; Hall et al., 2004; Jackling, 2005), exhibited no change (Wynn-Williams et al., 2016), and decreased (English et al., 2004; Gow et al., 1994). The use of the surface learning approach increased (Ballantine et al., 2008; Wynn-Williams et al., 2016), displayed no change (English et al., 2004; Jackling, 2005), and decreased (Hall et al., 2004). All these studies except Gow et al. (1994) and Jackling (2005) report on the impacts of educational teaching interventions designed to foster a deep learning approach in accounting courses. Regarding potential reasons for SAL changes, Gow et al. (1994) and Jackling (2005) propose but do not test a possible association between changes in the deep learning approach and changes in students' views of workload and teaching quality.

Appendix 1 summarises all (six in total) accounting education studies addressing changes in deep and surface approaches to learning that we identified from the literature. It also includes examples of studies focusing on undergraduate-level higher education in other disciplines. Non-accounting higher education studies similarly report inconclusive findings, with numerous studies indicating both increase and decrease in both deep and surface learning approaches. An obvious reason for inconclusive findings on SAL changes is provided by Haggis (2003), among others, who argue that approaches can only be understood within a context.

This study employs the 3P model and focuses on the presage and process factors. Student-related motivational factors (achievement goals and expectations of learning accounting) and contextual factors (perceived workload and teaching quality) are accordingly used as presage factors. In choosing these specific motivational factors for our model, we are inspired by Varunki et al. (2017); they report associations between these and SAL changes. Regarding the selection of contextual factors, we follow Gow et al. (1994) and Jackling (2005); they have suggested associations between these factors and SAL changes but have not tested these. Other commonly used student-related presage factors, such as gender, maturity, and prior academic ability, are considered as control variables. The third P of the Biggs 3P model (product), the association between the deep learning approach and course performance, is investigated in the additional analysis.

Figure 1 presents a summary of our hypotheses, while Table 1 provides an overview of the limited prior literature related to these hypotheses. As depicted in the upper section

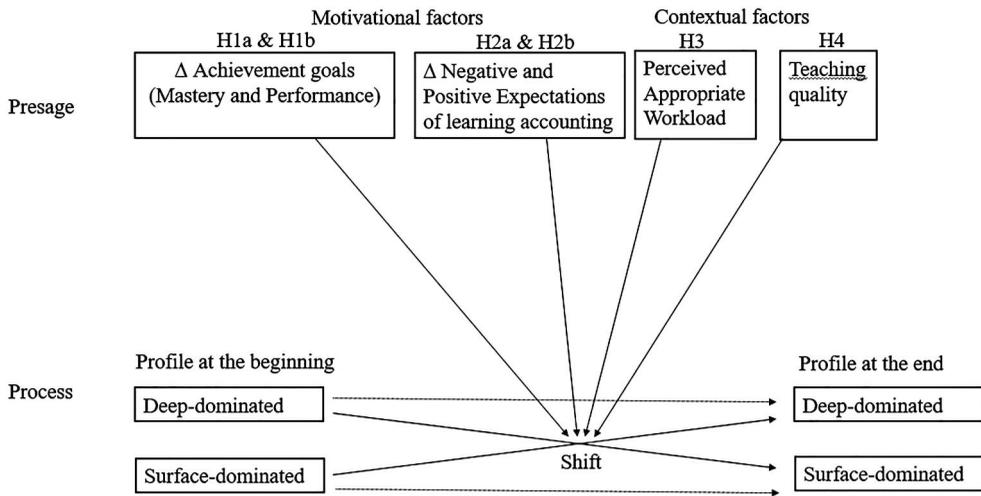


Figure 1. Summary of the hypotheses.

of Figure 1, we examine motivational and contextual factors as presage factors, following Biggs' 3P model. The lower section in the figure illustrates our process factors. Using a person-oriented approach (Niemi-virta et al., 2019, p. 567; Parpala et al., 2022), we construct SAL profiles at the beginning and the end of the course. Based on previous SAL literature, we anticipate this approach will identify a deep-dominated profile and a surface-dominated one. Because of the extensive literature that separates SALs into deep and surface approaches, we assume a dichotomic and 'theory-driven' separation of SALs into deep-dominated and surface-dominated profiles. As described in the methodology section, we will also empirically verify, using LPA, whether our assumption of deep-dominated and surface-dominated profiles holds true. Our primary interest lies in potential shifts from the initial profile to a different profile by the end of the course. If students exhibit such profile shifts, we investigate whether changes in motivational or contextual factors can explain these shifts.

We focus on changes in motivational constructs rather than their levels because we anticipate that initial process factors reflect the influence of motivational factors. Consistently, process factors at the end of the course reflect the influence of motivation at that time. Therefore, changes in motivational factors seem to be appropriate constructs to explain shifts between beginning and end SAL profiles. This approach does not apply to students' evaluations of appropriate workload and teaching quality as students are largely unaware of these aspects at the beginning of the course. They gain awareness of them throughout the course. Thus, the end-of-course questionnaire reveals changes in their evaluation of workload and teaching quality over the course duration.

Hypotheses development for motivational and contextual factors influencing SAL changes

Prior studies suggest several factors that could explain SAL changes. These reasons can be related to motivational factors (adopted achievement goals and perceptions of the topic

Table 1. Studies about reasons for changes in deep and surface learning approaches.

	Accounting literature	Non-accounting literature
Mastery goal (H1a)	-	<ul style="list-style-type: none"> • Varunki et al. (2017): mastery goal – oriented students had decreased or increased their deep approach • De Clercq et al. (2013): mastery goal orientation increases students' deep processing • Phan (2013): students' mastery goal orientation and deep learning approaches increase simultaneously.
Performance goal (H1b)	-	<ul style="list-style-type: none"> • Varunki et al. (2017): performance goal – oriented students had decreased or increased their deep approach
Positive expectations of study subject (H2a)	-	<ul style="list-style-type: none"> • Varunki et al. (2017): deep increased if the subject found intriguing
Negative expectations of study subject (H2b)	-	<ul style="list-style-type: none"> • Varunki et al. (2017): deep decreased if the topic perceived less interesting and less meaningful • Coertjens et al. (2016): negative perceptions associated with transition towards surface approach
Workload (perceived) (H3)	<ul style="list-style-type: none"> • Jackling (2005) proposes (but does not test) possible association between changes in students' perceptions of workload and change in deep approach • Gow et al. (1994) proposes (but does not test) that decrease in deep approach during the first-year can be related to high workload 	<ul style="list-style-type: none"> • Varunki et al. (2017): deep decrease associated with perceived high workload
Teaching quality (H4)	<ul style="list-style-type: none"> • Jackling (2005) proposes (but does not test) possible association between changes in students views of teaching quality and change in deep approach • Gow et al. (1994) proposes (but does not test) that decrease in deep approach during the first-year can be related to low teaching quality 	<ul style="list-style-type: none"> • Postareff et al. (2014, 2015): no association with change in deep • Asikainen et al. (2014): transitioning to a more positive view of teaching is associated with an increase in the deep approach.

The studies by Varunki et al. (2017); Coertjens et al., 2016, and Postareff et al. (2014, p. 2015) are course-specific, whereas the others are not. Studies using intervention approaches have not been included, because they are not directly related to these hypothesised reasons. Regarding intervention studies in accounting education, English et al. (2004) and Hall et al. (2004), suggest that educational interventions foster a deep learning approach to learning in accounting courses. Furthermore, Ballantine et al. (2008) observed increase in the deep learning approach but it was deemed insignificant, while a notable rise in the surface learning approach was found. In addition, Wynn-Williams et al. (2016) found in their intervention study that students' deep learning did not increase, whereas surface learning increased.

studied) and contextual factors related to teaching and learning environments (perceived workload and teaching quality). Accordingly, we develop hypotheses about the associations of these motivational and contextual factors with changes in deep – and surface-dominated learning profiles.

Motivational factors

Achievement goals

Achievement goal theory (AGT) is one of the most prominent theories in motivation-related education research (Senko et al., 2011). This theory was developed to enhance

our understanding of students' achievement-related motivations and behaviours (Dweck, 1986; Nicholls, 1984). AGT originally had two goal orientations: performance approach goal and mastery approach (Dweck & Leggett, 1988). Whereas those with a performance approach goal orientation desire to outperform others, students with a mastery goal approach strive to learn as much as possible and to truly master the task (Harackiewicz et al., 1998; Hulleman et al., 2010; Nicholls, 1984). Mastery-oriented students are inherently motivated, which coincides with the deep approach to learning. Consistently, students with a performance approach are extrinsically motivated, as are students with a surface approach to learning. In disciplines other than accounting, various studies have provided support to these associations. Students who have adopted a mastery goal orientation appear to use deep learning approaches to master the study material (Geitz et al., 2016; Palos, 2020; Pintrich et al., 2003; Remedios & Richardson, 2013). Performance goal-oriented students reportedly use surface processes in their learning (Elliot et al., 1999; Palos et al., 2024; Senko et al., 2013). Geitz et al. (2016) reported that performance goal-oriented students can adopt deep learning. Remedios and Richardson (2013) also found that mastery goals were negatively associated with surface learning.

Three studies have addressed associations between SAL changes and achievement goals. De Clercq et al. (2013) and Phan (2013) surveyed students in three consecutive academic years and suggested that mastery goal orientation increases students' subsequent deep processing. Varunki et al. (2017) found in their small-scale interviews that both mastery goal-oriented and performance goal-oriented students could increase or decrease their deep approach (statistically untested). In addition, Dull et al. (2015) establish a conceptual connection between SALs and achievement goals, proposing that future accounting research should further explore this relationship. They suggest that such studies could employ survey instruments from both AGT and SAL domains, to quantitatively assess these variables. This approach would enable researchers to identify and clarify the nature of the interaction between achievement goals and SALs in the specific context of accounting.

Importantly, Harackiewicz et al. (1997) argue that students' achievement goals are situationally specific; hence, they can change in different contexts. To the best of our knowledge, accounting education scholars have failed to explore the role of achievement goals in explaining changes in SALs. Therefore, we argue that these associations should be examined in an accounting education context.

Given the lack of accounting context evidence, the following hypotheses are formulated:

H1a: Increased mastery goal orientation strengthens students' deep-dominated learning profiles during an accounting course.

H1b: Increased performance goal orientation strengthens students' surface-dominated learning profiles during an accounting course.

Expectations of learning accounting

Students' expectations are essential in learning (Duff & Mladenovic, 2015; Lucas, 2000; Lucas & Meyer, 2005). Nevertheless, many students come to introductory accounting courses with negative stereotypical perceptions about accounting; see Mladenovic

(2000) for a literature review. Unfortunately, these stereotypical perceptions influence students' expectations of learning accounting and lower their performance (Ferreira & Santoso, 2008; Huikku et al., 2022).

Regarding SALs, Lucas and Meyer (2005) found that students who expected accounting to be useful in their future work tended to adopt a deep learning approach. Duff and Mladenovic (2015) employed a profile analysis using a cluster analytical method. They divided a sample of first-year undergraduate students in Australia into three clusters based on their expectations of learning accounting. Students in the 'world of engagement' cluster had positive expectations of learning accounting; such students tended to adopt a deep learning approach. In contrast, those belonging to the cluster of negative expectations of learning accounting ('world of detachment') tended to adopt a surface learning approach. In addition, their third cluster has an average profile, with subscale scores that lie in general terms between the other two clusters. Our study conceptually aligns with Duff and Mladenovic (2015), exploring why many accounting students adopt a surface learning approach. However, their study differs significantly in methodology as they collect SAL information only once from each student and do not address changes over time. Their study is synchronic while ours is diachronic.

Regarding accounting, apparently, prior studies have not addressed the association between expectations of studying accounting and SAL changes. Varunki et al. (2017) is similar to ours in that they examine SAL changes; however, they do so within a different context, namely a pharmacy course, and with limited interview data. They found that pharmacy students' use of the deep learning approach decreased when the subject matter seemed less interesting and meaningful but increased when students recognised topic relevance and found it intriguing. Similarly, Coertjens et al. (2016), in their study on the variability of students' approaches across three theology courses over two consecutive semesters, discovered that negative perceptions of interest and study topic relevance led to shifts towards a surface learning approach.

Based on the above discussion about associations between expectations of learning accounting and SALs, we posit that positive expectations about accounting increase motivation to engage in accounting studies, whereas negative expectations decrease such motivation. The following hypotheses are accordingly formulated:

H2a: Increased positive expectations of learning accounting strengthen students' deep-dominated learning profiles during an accounting course.

H2b: Increased negative expectations of learning accounting strengthen students' surface-dominated learning profiles during an accounting course.

Contextual factors

Workload

Contextual factors within the learning environment influence students' learning approaches (Biggs, 1989). Prior research emphasises the importance of understanding how students perceive their learning environment (Biggs, 1985; Lizzio et al., 2002; Ramsden, 1991). Various inventories have been used to assess these perceptions and their links to SALs. Examples are the Course Perceptions Questionnaire (CPQ) (Entwistle & Ramsden, 1983) and its updated versions, the Course Experience Questionnaire

(CEQ) (Ramsden, 1991; Wilson et al., 1997), and the Experiences of Teaching and Learning Questionnaire (ETLQ) (Entwistle et al., 2002; Entwistle & McCune, 2004).

This study follows Lizzio et al. (2002) in focusing on workload and teaching quality as key factors for evaluating course learning environments. The CEQ also considers other aspects, such as clear goals and standards, appropriate assessment, and emphasis on independence (Lizzio et al., 2002; Wilson et al., 1997). Research indicates that a perceived heavy workload often correlates with a surface learning approach (Diseth et al., 2006; Entwistle & Ramsden, 1983; Kember et al., 1996; Kember and Leung (1998); Kreber, 2003; Lindblom-Ylänne et al., 2019; Lizzio et al., 2002). Wilson et al. (1997) and Diseth et al. (2006) identified a positive relationship between an appropriate workload and a deep learning approach. However, studies by Karagiannopoulou and Christodoulides (2005) and Kyndt et al. (2011) reported no significant association between workload and SALs. These mixed results highlight the complexity of the relationship; some studies link perceived workload to surface and deep learning, while others determine no connection. On the relationship between perceived workload and SAL changes, limited literature exists. Jackling (2005) is the only study in accounting education to address this issue, exploring but not testing whether SAL changes align with changes in workload perception. Furthermore, Gow et al. (1994) provided evidence from interviews with accountancy students that a heavy workload could decrease deep learning in the first year of study. In a non-accounting context, Varunki et al. (2017) found that, when the workload was high, deep learning decreased. Students reported challenges such as insufficient time to absorb information, excessive information, as well as difficult textbooks and terminology (Varunki et al., 2017).

In summary, empirical evidence on the link between SAL changes and perceived workload is scarce and inconclusive, and these associations have not been tested in accounting education studies. Based on this discussion, we propose the following hypothesis:

H3: Appropriate workload strengthens students' deep-dominated learning profiles during an accounting course.

Teaching quality

Understanding students' views of teaching quality is crucial as previous research has highlighted a link between teaching quality and learning approaches. Studies indicate that students' views of good teaching are associated with deep learning approaches, while poor teaching correlates with surface learning approaches (Asikainen et al., 2014; Diseth et al., 2006; Karagiannopoulou & Milienos, 2015; Lizzio et al., 2002).

Regarding SAL changes, in her accounting education study, Jackling (2005), without empirically testing, suggested a relationship between teaching quality and changes in the deep learning approach. Supporting this, Gow et al. (1994) provided interview-based evidence that lower teaching quality diminishes the deep learning approach. Albeit in a non-accounting setting, Asikainen et al. (2014) proposed that students' improved views of teaching quality correlate with increased deep learning. However, in their multidisciplinary study that did not include accounting, Postareff et al. (2015) found no clear evidence linking teaching quality and learning approaches.

Furthermore, intervention-based educational research (Biggs & Rihn, 1984, for example) suggests that new teaching and assessment methods can enhance deep learning

and reduce surface learning (Gordon & Depus, 2002; Hall et al., 2004; Walker et al., 2010). Katajavuori et al. (2020) demonstrated that flipped learning increased deep learning approaches and decreased surface approaches.

We assume that many accounting courses do not include interventions for active students. Still, prior non-intervention-type accounting education studies have not statistically investigated potential associations between SAL changes and teaching quality. Accordingly, recognising that the learning context varies across scientific disciplines, this study aims to test the following hypothesis based on findings from other fields:

H4: High teaching quality strengthens students' deep-dominated learning profiles in an accounting course.

The literature reviewed above shows that our knowledge about the reasons associated with the changes in SALs is limited. Specifically, in accounting education, this research theme is practically overlooked by scholars. We seek to address this issue by investigating whether motivational and contextual factors explain shifts in student approaches to learning (SAL) profiles in an introductory accounting course.

Methodology

This methodology section presents the data and study participants, the measurement instruments, data analysis strategy, and control variables.

Data and participants

We obtained data from first-year undergraduate students taking a mandatory introductory accounting course at a university in Finland. Course teaching methods included lecturing by two instructors (two-hour lessons twice per week) and solving cases in small teams. The total assessment of the course performance (max. 106 points) comprised a final course examination (max. 60 points), two open-book mid-term examinations (max. 20 points), and teamwork points (max. 26 points). The final examination comprised calculations (24 points), brief essays (28 points), and multiple-choice questions (8 points). Students were randomly assigned to teams at the beginning of the course. Total teamwork points consisted of teamwork (max. 15 points), participation in class exercises to discuss their teamwork (max. 6 points), and an individual reflection on the teamwork (max. 5 points).

Data was gathered from students who enrolled in the course in 2017, when it was offered. The course occurred during the last half of the first semester; hence, by the time it started, first-year students had only attended two months of higher education studies. Like most introductory courses in business schools worldwide, this was a mass course; it introduced students to the basics of financial and management accounting.

A survey questionnaire elicited information about SALs, achievement goals for the introductory accounting course, and their expectations of learning accounting. To obtain a high response rate, this questionnaire was designed to be short but comprehensive. To transfer all the data to an analysable form – for example, bringing the questionnaire data into Excel – one researcher did the coding, and another researcher double-checked for accuracy. This survey was conducted twice in a six-week course (in the

First collection of survey questionnaire data ^{a)} Second collection of survey questionnaire data ^{b)}



^{a)} For this study, SALs were collected by Parpala and Lindblom-Ylänne (2012), which is modified from the students' Approaches to Learning and Studying Inventory (ALSI) (Entwistle & McCune, 2004) in the first lecture (i.e., at the beginning of the course). In addition, achievement goals (AGQ-revised were collected by Elliot and Murayama [2008]), and students' expectations of learning accounting (constructed based on inventory by Duff and Mladenovic [2015]) were collected.

^{b)} In addition to SAL, achievement goals (AGQ-revised by Elliot and Murayama [2008]), students' expectations of learning accounting (constructed based on inventory by Duff and Mladenovic [2015]) and the views of teaching quality and appropriate workload were collected in the last lecture (i.e., at the end of the course).

Figure 2. The collection of survey questionnaire data during the six-week introduction to accounting course.

first and last lecture) to measure change in three factors: SALs, achievement goals, and expectations of learning accounting; see Figure 2. Data about students' views of teaching quality and appropriate workload was also collected in the last lecture.

The initial sample size was 321, representing all students who registered for the course; 38% were women. Students who were not primarily studying business (for example, students studying in another faculty) and those who were not first-year students were excluded, leaving us with 264 student observations. The survey questions administered at the beginning and end of the course focused on SALs, achievement goals, and expectations of learning accounting. 165 students participated in the initial survey, comprising 105 male students (64%) and 60 female students (36%). To effectively track changes over time, the same students needed to respond to the survey at the end of the course. Complete datasets were obtained from 122 students; see Figure 3. Most of these students were men (79, 65% of the sample). The 43 female students represented 35% of the sample. While most survey responses were comprehensive, (only) three students left one or more survey questions unanswered. For these cases, missing data points were imputed using the mean values of the corresponding survey items. A self-selection bias was tested by comparing the gender, age, and high school grade point averages (HSGPAs) of these 122 students with all first-year business students (264 students) to check whether our sample was relevant to the population. Results from non-tabulated t-tests revealed no significant differences between these two groups regarding gender and age, whereas HSGPAs appeared to be higher for our survey respondents ($p = 0.02$). The average HSGPA for these 122 students was 26.3 points, and for 264 students 24.0 points. HSGPAs are controlled for in the main analysis. There were no international students in the sample.

None of the authors was a teacher or student of the course. We received funding for research expenses only from independent funds that have had no impact on the design, conduct, or report of the study. The surveys targeted all first-year business students; hence, no known sample selection biases that may diminish potential biases in the study exist.

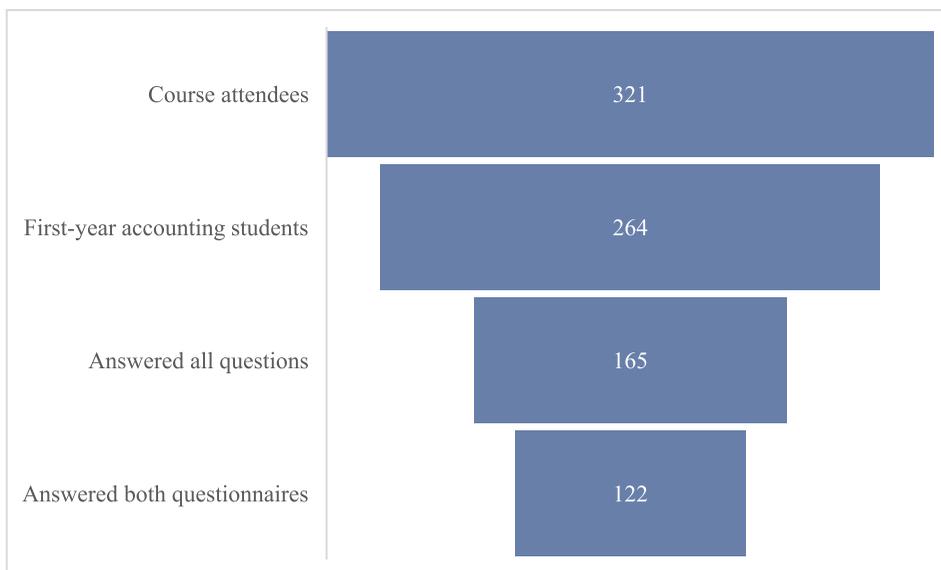


Figure 3. Sample development.

This research project is committed to upholding the highest ethical standards as described in the research ethics guidance of the university and guidelines from *The ethical principles of research with human participants and ethical review in the human sciences in Finland (TENK)*. We obtained ethics research guidance and approval for data collection and storage from persons in charge of research ethics at our university. We also asked permission separately from each student participating in the survey; permission was indicated on the cover page of the research questionnaires. The voluntary nature of participation was highlighted. Students who decided to participate had a chance to complete the questionnaire at the beginning of the lecture. All lecturing was paused during that time. Therefore, participating students did not have to sacrifice their free time outside classes and did not miss lecture content. We also assured participants of response confidentiality and anonymity protection. To diminish data-related risks, we adopted various measures. Our research does not pose any risks to participants. Our subsequent reports have been and will be presented only for large groups of students; from these reports, reading information regarding separate individuals is impossible.

Measurement instruments

For surveying SALs, we used a modified version of the LEARN questionnaire by Parpala and Lindblom-Ylänne (2012). The original version is from the students' Approaches to Learning and Studying Inventory (ALSI) (Entwistle & McCune, 2004). Achievement goal questions are from the Achievement Goal Questionnaire (AGQ) revised by Elliot and Murayama (2008). Questions on students' expectations of learning accounting are based on the inventory by Duff and Mladenovic (2015). Table 2 provides all the specific questions in the questionnaire.

To investigate the appropriateness of perceived workload, a core statement ('In general, the workload of the course is appropriate') was posed, and three closely related questions were generated (Table 2), both inspired by prior literature (Kember, 2004; Lizzio et al., 2002; Ramsden, 1991; Wilson et al., 1997). Various ways to operationalise teaching quality exist; see, for example, Parpala et al. (2011). Similarly, to handling perceived workload appropriateness, to investigate teaching quality, we posed a core question ('Overall, I am pleased with the teaching of the course') and another closely related question, both of which were inspired by Lizzio et al. (2002), Ramsden (1991) and Wilson et al. (1997) (Table 2).

For perceived workload or teaching quality measurement, we did not fully use prior inventories, such as the CPQ (Entwistle & Ramsden, 1983), CEQ (Ramsden, 1991; Wilson et al., 1997), and ETLQ (Entwistle et al., 2002; Entwistle & McCune, 2004). This decision was for three reasons. We wanted to focus on the core element of workload (i.e. its perceived appropriateness) and teaching quality. Second, we wished to keep the questionnaire short. Finally, we aimed to ensure reasonable response rates in the survey questionnaire by keeping participants' interest and attention intact; participants could complete responding to a questionnaire within approximately 15 minutes.

Analysis strategy

Data analysis proceeded in three steps. Firstly, we verified factor structures and factor reliabilities of seven items. These were students' approaches to learning, mastery achievement goals, performance achievement goals, positive expectations of learning accounting, negative expectations of learning accounting, perceived workload, and teaching quality. Thereafter, mean variables were constructed. Table 2 shows measurement items that underlie mean variables used in the empirical analysis. Each mean variable has two to four measurement items, with a Likert scale ranging from one to five. Therefore, the theoretical scales of the mean of variables range from 1 to 5.

Secondly, to identify subgroups of students with distinct approaches to learning, we performed a LPA. LPA is a statistical technique rooted in latent class modelling, a subset of structural equation modelling (Vermunt & Magidson, 2005). LPA seeks to identify homogeneous subgroups within a heterogeneous population, based on patterns of responses to observed variables. It assumes unobservable or latent subgroups that can be inferred from observed variables. In the context of this study, LPA could uncover latent profiles of students, based on their questionnaire responses about their approaches to learning. By assigning students to distinct profiles, LPA allowed us to explore how different subgroups may exhibit unique patterns (Lubke & Muthén, 2007) of approaches to learning.

According to Parpala et al. (2022), the literature on student learning has mainly focused on the relationships between variables and not on learning profiles. However, previous research has demonstrated that a person-oriented approach is effective in understanding variation among undergraduate students; it uncovers their learning profiles (Asikainen et al., 2020; Hyytinen et al., 2024; Parpala et al., 2022; Tuononen et al., 2020). Lonka et al. (2021) describe person-oriented profiles as consisting of students with a similar profile in a set of variables that are classifiable as one type. Recent person-oriented studies advocate model-based approaches such as latent class clustering and LPA, offering advantages such as statistical criteria for determining the appropriate number of classes (Nylund et al., 2007). The BIC constitutes a pivotal tool for model

Table 2. Construction of mean variables and Cronbach's alphas at the end of the course (n = 122).

Mean variables Measurement items	Range	Factor loadings	Cronbach's α
Deep approach to learning (SAL) <i>Deepmean</i>	1–5		0.754
Ideas I came across in my course reading often set me off on long chains of thought.		0.595	
I looked at the evidence carefully to reach my own conclusion about what I was studying.		0.540	
I tried to relate new material, as I was reading it, to what I already knew on that topic.		0.737	
I tried to relate what I have learnt in this course to what I have learned in other courses.		0.750	
Surface approach to learning (SAL) <i>Surfacemean</i>	1–5		0.765
I often had trouble making sense of the things I have to remember.		0.728	
Much of what I learned seemed no more than lots of unrelated bits and pieces in my mind.		0.538	
Topics were presented in such complicated ways that I often could not see what was meant.		0.723	
Often I had to learn over and over things that didn't really make much sense to me.		0.509	
Mastery achievement goal (AG) <i>Mastery approach</i>	1–5		0.764
My aim is to completely master the material presented in this class.		0.666	
My goal is to learn as much as possible.		0.572	
I am striving to understand the content of this course as thoroughly as possible.		0.900	
Performance achievement goal (AG) <i>Performance approach</i>	1–5		0.968
I am striving to do well compared to other students.		0.907	
My aim is to perform well relative to other students.		0.930	
My goal is to perform better than the other students.		0.948	
Positive expectations of learning accounting <i>Positive expectations</i>	1–5		0.782
I have a strong desire to excel in my academic achievement.		0.620	
I expect that I will enjoy accounting studies.		0.718	
I want to see the meaning behind accounting numbers in a business context.		0.515	
I would be interested in exploring the social and economic importance of accounting.		0.661	
Negative expectations of learning accounting <i>Negative expectations</i>	1–5		0.601
My goal is just to get through the accounting course with as little effort as possible.		0.644	
I have no personal interest in accounting and expect accounting to be boring.		0.742	
I am worried about learning accounting.		0.377	
Workload <i>Appropriate workload</i>	1–5		0.807
In general, the course workload is appropriate.		0.890	
On average, the course is more laborious than others (reversed).		0.458	
The amount of work required for the exercises in the course is appropriate.		0.760	
The course is too laborious (reversed).		0.771	
Teaching quality <i>Teaching quality</i>	1–5		0.711
I am generally satisfied with the teaching methods of the course.			
Overall, I am pleased with the teaching of the course.			

Table 2 presents the construction of the mean variables, their standardised factor loadings and Cronbach's alphas at the end of the course. The Cronbach's alpha values at the beginning of the course were similar to those reported here. Consequently, the beginning-of-course data has not been included separately to avoid redundancy. In confirmatory factor analysis, a minimum of three measurement items per factor is typically required (Koran, 2020). As a result, factor loadings for Teaching Quality are not reported in this analysis.

selection and comparative assessment (Schwarz, 1978). In the current study, the BIC enabled us to form profiles without arbitrary splits, yielding classifications that reflected the true empirical clustering of students.

Thirdly, after we identified the optimal profile solution, predictors of profile membership were incorporated into the final analysis. By using logistic regression, we examined the ability of motivational and contextual variables to predict the shift away from a deep learning profile during the course.

Control variables

In the third step of our analysis, potential influences of gender, maturity, and prior academic ability were controlled by including the following three variables: female, age, and HSGPA.

Female was coded as ‘1’ if a student was female and ‘0’ otherwise. Some studies have found that women adopt a surface learning approach more often than men; examples are Sadler-Smith (1996); and Severiens and ten Dam (1998). Others suggest that women score higher for deep learning approaches than men; instances are Booth et al. (1999) and Gledhill and Van der Merwe (1989). Everaert et al. (2017) and de Lange and Mavondo (2004) report that male students in an accounting education context displayed a high level of surface learning. Additionally, regarding achievement goals, Huikku et al. (2022) found that male students tended to adopt performance approach goals in an introductory accounting course more often than female students. Furthermore, female students reportedly adopt mastery approach goals (Bouffard et al., 1995; D’Lima et al., 2014; Elliot & McGregor, 2001; Harackiewicz et al., 1997; Harackiewicz et al., 2002). Regarding the association between achievement goals and SALs, Palos (2020) found that female students with a mastery goal approach were highly likely to adopt a deep approach to learning. Furthermore, regarding the gender effect on the association between expectations of learning accounting and SALs, Lucas and Meyer (2005) reported that, for both male and female accounting students, the enjoyment of studying accounting and the relevance of accounting for their future careers are linked to deep learning.

Age captures maturity and is a determinant of preferences, attitudes towards studying, and self-regulation (Rankin et al., 2003). Prior studies have suggested that mature, i.e. older, students have a high tendency to adopt a deep learning approach (Duff, 1999, 2004; Sadler-Smith, 1996).

HSGPA: Students’ ability may affect their SAL choice. Everaert et al. (2017) found that high-ability students tend to adopt a deep learning approach. We measured prior academic ability, using the HSGPA (cf. Diseth, 2007; Diseth et al., 2010) provided by the university in question.

Results

The construction of the mean variables

Table 2 reports the construction of the mean variables, standardised factor loadings, and Cronbach’s alphas at the end of the course; see variable definitions in Appendix 2. Cronbach’s alphas can vary from zero, indicating no internal consistency, to one, denoting perfect internal consistency. The Cronbach’s alpha of *Deepmean* was 0.754 and that of *Surfacemean* 0.765. They are almost identical to those in Everaert et al. (2017), who report a Cronbach’s alpha of 0.76 for the deep learning approach and 0.75 for the surface learning one. Cronbach’s alpha values of 0.7 or higher indicate acceptable internal consistency (Taber, 2018). Cronbach’s alphas of *Mastery* (0.764), *Performance* (0.968), *Positive expectations* (0.782), *Appropriate workload* (0.807), and *Teaching quality* (0.711) exceeded the benchmark value of 0.7. Non-tabulated Cronbach’s alpha values at the beginning of the course were similar to the preceding values. However, *Negative expectations* had poor internal consistency at the beginning of the course (Cronbach’s

alpha 0.473) and at the end (0.601). Due to relatively low internal consistency, empirical results regarding *Negative expectations* should be interpreted with caution.

Latent profile analysis (LPA)

Table 3 summarises log-likelihood values, degrees of freedom, and the BIC for three models with an increasing number of SAL classes (from one class to three classes). Here, the BIC, a measure of model fit that balances goodness of fit with model complexity, was calculated for each model. The formula is $BIC = -2 * \log\text{-likelihood} + k * \log(n)$. Lower BIC values indicate a better trade-off between fit and complexity. In BIC values, researchers look for an ‘elbow point’, yielding the lowest values identifying the optimal number of classes (cf. Burnham & Anderson, 2004; Schwarz, 1978). A two-class solution emerged as the best fit for the data because BIC values were lowest at the beginning and the end of course. BIC values of this two-class solution are in bold in Table 3.

Descriptive statistics

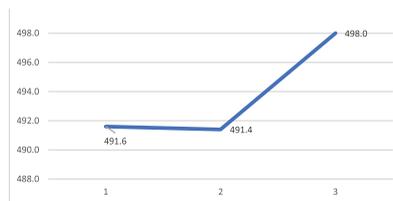
Table 4 presents descriptive statistics for *Deepmean* and *Surfacemean* before latent profile formation (Panel A), deep-dominated and surface-dominated profiles at the beginning of the course (Panel B) and end (Panel C), and for all variables in hypotheses testing (Panel D). Mean scores for deep and surface variables, sourced from Parpala and Lindblom-Ylänne (2012), are depicted in Panels A, B, and C. Panels B and C display profiles identified via the BIC; the deep-dominated profile had higher deep learning mean scores, while

Table 3. Latent profile analysis (n = 122).

Panel A: Profiles at the beginning of the course.

Model	ll(model)	df	BIC
1 Profile	-236.2	4	491.6
2 Profiles	-228.9	7	491.4
3 Profiles	-225.0	10	498.0

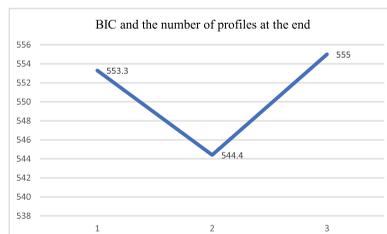
Figure 3a. Number of profiles at the beginning of the course



Panel B: Profiles at the end of the course.

Model	ll(model)	df	BIC
1 Profile	-267.0	4	553.3
2 Profiles	-255.4	7	544.4
3 Profiles	-253.5	10	555.0

Figure 3b. Number of profiles at the end of the course



Panel A describes the log likelihoods, degrees of freedom, and Bayesian Information Criteria for one profile, two profile and three profile solutions at the beginning of the course. Panel B does the same for at the end of the course. From the lowest **bolded** BIC-values, we can see that the best number of profiles is two at the beginning and end of the course. The line charts (Figure 3a and 3b) to the right of Panels A and B show that the BIC value increases substantially if three profiles were selected instead of two.

the surface-dominated one reflected an incoherent learning pattern, particularly evident in higher mean scores of surface approach measurement items. Panel D provides crucial statistics for hypothesis testing, including 83 deep profile observations from Panel B.

In Panel A, we can see that the variable *Deepmean* was significantly higher at the beginning of the course (mean 3.84) than at the end (3.66). The *p*-value of the difference of means test is significant at a 1% confidence level. The mean of *Surfacemean* did not change at a 5% confidence level from the beginning of the course (2.23) to the end (2.36).

In Panel B, the mean value of the variable *Deepmean* exhibits a pronounced difference at the beginning of the course, with the first profile registering a notably higher mean of 4.19 in contrast to that of the second profile (3.11). Consequently, the first profile was labelled as the deep-dominated profile. The disparity in *Deepmean* means between the two profiles was highly statistically significant (*p*-value < .001). Conversely, the mean value of the variable *Surfacemean* in the second profile is higher (2.59), when juxtaposed with that of the deep-dominated profile (2.06). The second profile was accordingly labelled as the surface-dominated profile. The distinction in *Surfacemean* means between the two profiles was also highly statistically significant (*p*-value < .001).

Panel C exhibits analogous disparities in the profiles at the end of the course. Specifically, the mean value of *Deepmean* is markedly higher, 4.15 within the deep-dominated

Table 4. Descriptive statistics and t-tests.

Panel A. Mean variables before the formation of (deep-dominated and surface-dominated) profiles (n = 122)								
Mean variable	At the beginning of the course			At the end of the course			Test for differences	
	Mean	Median	Std.Dev	Mean	Median	Std.Dev	t-value	p-value
<i>Deepmean</i>	3.84	4.00	0.63	3.66	3.75	0.67	2.20	0.028**
<i>Surfacemean</i>	2.23	2.25	0.64	2.36	2.25	0.78	1.45	0.149*
n	122			122			122	

Panel B. Deep-dominated and surface-dominated profiles at the beginning of the course (n = 122)								
Mean variable	<i>Deep-dominated</i> (profile)			<i>Surface-dominated</i> (profile)			Test for differences	
	Mean	Median	Std.Dev	Mean	Median	Std.Dev	t-value	p-value
<i>Deepmean</i>	4.19	4.25	4.40	3.11	3.25	0.36	14.35	<.001***
<i>Surfacemean</i>	2.06	2.00	0.53	2.59	2.50	0.73	4.53	<.001***
n	83			39			122	

Panel C. Deep-dominated and surface-dominated profiles at the end of the course (n = 122)								
Mean variable	<i>Deep-dominated</i> (profile)			<i>Surface-dominated</i> (profile)			Test for differences	
	Mean	Median	Std.Dev	Mean	Median	Std.Dev	t-value	p-value
<i>Deepmean</i>	4.15	4.00	0.30	3.21	3.25	0.60	10.80	<.001***
<i>Surfacemean</i>	1.91	1.88	0.45	2.78	2.75	0.79	7.40	<.001***
n	58			64			122	

Panel D. Profile shift from deep-dominated profile to surface-dominated profile (n = 83)								
	Stay in <i>deep-dominated</i> profile (n = 51)			Shift to a <i>surface-dominated</i> profile (n = 32)			Test for differences	
	Mean	Median	Std.Dev	Mean	Median	Std.Dev	t-value	p-value
Δ Mastery	-.066	0.000	0.389	-.219	0.000	0.533	1.51	0.135
Δ Performance	0.009	0.000	0.414	0.198	0.000	0.803	1.41	0.162
Δ Positive expectations	-.010	0.000	0.381	-.055	0.000	0.374	0.53	0.600
Δ Negative expectations	0.054	0.000	0.372	0.375	0.333	0.513	3.30	<.001***
Appropriate workload	3.583	3.750	0.572	3.148	3.250	0.775	2.94	0.004***
Teaching quality	4.039	4.000	0.662	3.313	3.250	1.030	3.92	<.001***
Female	0.216	0.000	0.415	0.406	0.000	0.499	1.88	0.064*
Age	20.784	20.00	1.527	20.469	20.00	2.125	0.79	0.434
HSGPA	26.941	30.00	10.304	27.250	32.00	12.45	0.12	0.903

profile, in contrast to that of the surface-dominated profile, 3.21. The observed discrepancy in the means of the *Deepmean* variable between these two profiles was statistically highly significant (p -value < .001). The mean value of *Surfacemean* at the end of the course is consistently greater within the surface-dominated profile (2.78), compared to that of the deep-dominated profile (1.91). The disparity in the means of *Surfacemean* across these two profiles is also highly significant (p -value < .001).

Panel D of Table 4 shows data from 83 students classified as deep-dominated profile ones at the beginning of the course. Here, insights are offered into means, medians, standard deviations, and t-tests regarding students who maintained a deep-dominated profile until the end of the course versus those who shifted to the surface-dominated profile. Among the 83 students with a deep-dominated profile at the beginning of the course, a notable proportion, 32 (39% of the total), transitioned to the surface-dominated profile by course conclusion. Seven students transitioned from a surface-dominated profile to a deep-dominated profile by course completion, i.e. they increased their use of the deep learning approach.

Another noteworthy observation from panel D is the identification of three variables wherein statistically significant disparities emerge between students who persist with the deep-dominated profile and those who transition to the surface-dominated profile. Specifically, students who transition from the deep-dominated profile to the surface-dominated profile exhibit a higher mean score for Δ *Negative expectations* of learning accounting (0.375 compared to 0.054) and a lower mean score in terms of two factors: *Appropriate workload* (3.148 as opposed to 3.583) and *Teaching quality* (3.313 compared to 4.039). Δ represents the change in scores of negative expectations from the beginning of the course to the end of the course (the end of the course score minus the beginning of the course score). Importantly, all the above three differences attain a high level of statistical significance, with p -values falling below the threshold of 0.01. Other deltas (Δ *Positive expectations*, Δ *Mastery* and Δ *Performance*), which will be presented in the next sections, are also calculated like Δ *Negative expectations*.

Correlations

Table 5 shows Pearson correlations for students who belonged to the deep-dominated profile at course onset ($n = 83$). The variable *Shift from deep* demonstrated a positive correlation, significant at the 5% level or higher, with the variable Δ *Negative expectations* (with a coefficient of 0.34). This positive correlation suggests that an increase in negative expectations of learning accounting may drive students who initially adopt a deep learning approach to shift away from it. Negative expectations likely undermine intrinsic motivation and reduce the likelihood of pursuing a deep understanding of the subject. Conversely, the variables *Appropriate workload* (coefficient - 0.31) and the students' views of *Teaching quality* (coefficient - 0.40) manifested a negative correlation, significant at the 5% level or better, with the variable *Shift from deep*. The negative correlation of *Appropriate workload* indicates that students who perceive the course workload as appropriate are less likely to shift from a deep to a surface learning profile. An appropriate workload may facilitate sustained deep engagement by reducing cognitive overload. A negative correlation of *Teaching quality* implies that students that consider teaching quality high are less likely to move away from a deep learning profile.

Table 5. Pearson correlations using students in deep-dominated Profile at the beginning of the course (n = 83).

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) <i>Shift from deep</i>	1.00									
(2) Δ Performance	0.16 (0.16)	1.00								
(3) Δ Mastery	-0.17 (0.13)	0.32* ($<.01$)	1.00							
(4) Δ Positive expect.	-0.06 (0.60)	0.02 (0.85)	-0.03 (0.82)	1.00						
(5) Δ Negative expect.	0.34* ($<.01$)	0.01 (0.95)	-0.12 (0.27)	-0.15 (0.17)	1.00					
(6) <i>Appropriate workload</i>	-0.31* ($<.01$)	-0.10 (0.37)	0.04 (0.69)	0.15 (0.17)	-0.38* ($<.01$)	1.00				
(7) <i>Teaching quality</i>	-0.40* ($<.01$)	-0.05 (0.63)	0.12 (0.27)	0.18 (0.10)	-0.37* (0.00)	0.48* ($<.01$)	1.00			
(8) <i>Female</i>	0.20 (0.06)	0.04 (0.74)	-0.32* ($<.01$)	0.01 (0.92)	0.16 (0.15)	-0.43* ($<.01$)	-0.56* ($<.01$)	1.00		
(9) <i>Age</i>	-0.09 (0.43)	0.22* (0.05)	-0.04 (0.70)	-0.02 (0.84)	-0.11 (0.32)	-0.07 (0.54)	0.19 (0.08)	-0.15 (0.18)	1.00	
(10) <i>HSGPA</i>	0.01 (0.90)	-0.07 (0.53)	0.04 (0.69)	0.07 (0.51)	0.02 (0.86)	0.11 (0.31)	-0.01 (0.94)	0.12 (0.29)	-0.31* ($<.01$)	1.00

Pearson correlations have been computed for a sample size of 83, which will be utilised in testing the hypotheses.

* indicates significance at the 0.05 level or better. *P*-values corresponding to the correlation coefficients are enclosed in parentheses. Detailed variable definitions can be found in Appendix 2.

Additionally, Δ Mastery is positively correlated (coefficient 0.32) with Δ Performance. The positive correlation between mastery and performance goals suggests a potential motivational synergy, where mastery-oriented students also pursue performance goals. As proposed by Elliott and Story (2017), intrinsic motivation and feedback perception tied to mastery goals might complement the external benchmarks emphasised in performance goals, fostering simultaneous growth in both orientations. *Appropriate workload* is negatively correlated (coefficient - 0.38) with Δ Negative expectations. This negative correlation implies that students who perceive the workload as appropriate tend to report fewer increases in negative expectations about learning accounting. A balanced workload likely prevents the buildup of negative perceptions, fostering a more positive attitude toward the subject matter. *Teaching quality* is negatively correlated (coefficient - 0.37) with Δ Negative expectations and positively correlated (coefficient 0.48) with *Appropriate workload*. The negative correlation (*Teaching quality* and Δ Negative expectations) suggests that higher teaching quality is associated with fewer increases in negative expectations. High teaching quality likely alleviates concerns and maintains students' motivation. The positive correlation between *Teaching quality* and *Appropriate workload* implies that a better teaching quality aligns with perceptions of an appropriate workload. Effective teaching may enhance the clarity and manageability of course content, making the workload seem appropriate.

Hypotheses testing

Table 6 presents the outcomes of hypothesis testing conducted through a logistic regression analysis, with a sample size of 83 students with a deep-dominated profile at course onset. The dependent variable in this logistic regression model, denoted as *Shift from deep*, was dichotomously coded as '1' for students categorised within the

Table 6. Hypotheses testing using Logit regression (n = 83). The dependent variable is Shift from deep.

	(1) Full model	(2) Stepwise
Δ Mastery (H1a)	-1.619** (0.036)	-1.086* (0.093)
Δ Performance (H1b)	1.118** (0.048)	.882* (0.072)
Δ Positive expectations (H2a)	0.324 (0.659)	
Δ Negative expectations (H2b)	0.903 (0.182)	1.219* (0.052)
Appropriate workload (H3)	-0.746 (0.164)	
Teaching quality (H4)	-1.014** (0.028)	-.846** (0.012)
Female	-1.073 (0.193)	
Age	-0.140 (0.388)	
HSGPA	0.013 (0.620)	
Intercept	8.283* (0.071)	2.219* (.089)
Pseudo R ²	0.23	0.20

Table 6 presents the logistic regression results for hypothesis testing in column 1 (full model). The sample utilised for testing comprises the 83 observations corresponding to the Deep-dominated profile at the beginning of the course. The outcome variable of the logistic regression comprises 32 observations coded as '1' (representing 83 observations initially in the Deep-dominated profile minus 51 observations remaining in the Deep-dominated profile at the course's conclusion, plus seven students that transitioned from Surface-dominated to Deep-dominated profile), and 51 observations coded as '0' (representing observations classified in the Deep-dominated profile both at the beginning and end of the course). In column two, stepwise logistic regression is depicted, wherein variables are added incrementally based on a significance criterion of their coefficients (0.2). This aims to ascertain a more parsimonious model with fewer irrelevant predictors. Significance levels are denoted as follows: *** indicating significance at the 0.01 level or better, ** indicating significance at the 0.05 level or better, and * indicating significance at the 0.10 level or better. Definitions for variables can be found in Table 2.

deep-dominated profile at the beginning of the course. They transitioned to the surface-dominated profile at its conclusion. We had 32 such students. The expression 'shift from deep' specifically refers to the 32 students who transitioned from a deep-dominated learning profile to a surface-dominated one by the end of the course. Conversely, students who maintained their membership in the *Deep-dominated* profile from course outset to conclusion were coded as '0,' with 51 individuals falling into this category. Here, from our empirical analysis, we excluded those 39 students with a surface-dominated profile.

The first column of Table 6 presents the results from the logistic regression model, which included all hypothesised predictor variables (Δ Mastery, Δ Performance, Δ Positive expectations, Δ Negative expectations, Appropriate workload, and Teaching quality) and control variables (Female, Age, and HSGPA) (Full model). A notable finding is that a negative coefficient for Δ Mastery (-1.619) indicates that an increase in *Mastery* reduces the likelihood of a *Shift from deep*, supporting H1a. In simpler terms, students who shift from the *Deep* profile tend to have declining levels of *Mastery*. Conversely, the positive regression coefficient for Δ Performance (1.118) suggests that a *Shift from deep* is associated with an increase in *Performance*, supporting H1b. Additionally, *Teaching quality* is significantly related to *Shift from deep*, with a negative coefficient (-1.014), indicating that a lower view of teaching quality predicts the occurrence of a *Shift from*

deep. This finding supports H4. However, the other hypothesis variables (Δ Positive expectations, Δ Negative expectations, and *Appropriate workload*) are non-significant at the 5% level in the full model, meaning that the empirical results fail to support H2a, H2b, or H3.

Furthermore, a stepwise logistic regression analysis is presented, maintaining only those predictor variables with a minimum p -value threshold of 0.20 in the Wald test (non-tabulated). The results of full and stepwise regression models are presented to allow informed judgments about trade-offs between model complexity and predictive power. Compared to the full regression model that includes all predictor variables, significant predictor variables remain notably consistent. However, change in negative expectations (Δ Negative expectations) becomes weakly significant at a 10% confidence level. Moreover, the pseudo-explanatory power of the stepwise regression model, quantified at 0.20, exhibits only a marginal decrease relative to that of the full model, 0.23.

Figure 4 summarises the key empirical findings of this study, by displaying the hypothesis variables (representing presage variables according to Biggs' 3P model) at the top and SAL profiles at the bottom. Our approach focused on the 83 students who had a deep profile (representing a process variable) at the beginning of the course, with 51 remaining in the same profile and 32 shifting to a surface-dominated profile by the end of the course. Among the 83 students classified with a deep-dominated learning profile at the beginning of the course, 51 (61%) remained in the deep-dominated profile by the end of the course, while 32 (39%) shifted to a surface-dominated profile. This shift indicates a transition away from deep learning, which represents a notable change in the learning approach.

Students who remained in the deep-dominated profile exhibited higher levels of mastery goal orientation and positive perceptions of teaching quality and workload appropriateness. Conversely, students who shifted from the deep-dominated to the surface-dominated profile displayed significant increases in performance goal orientation and negative expectations of learning accounting. In addition, they considered that

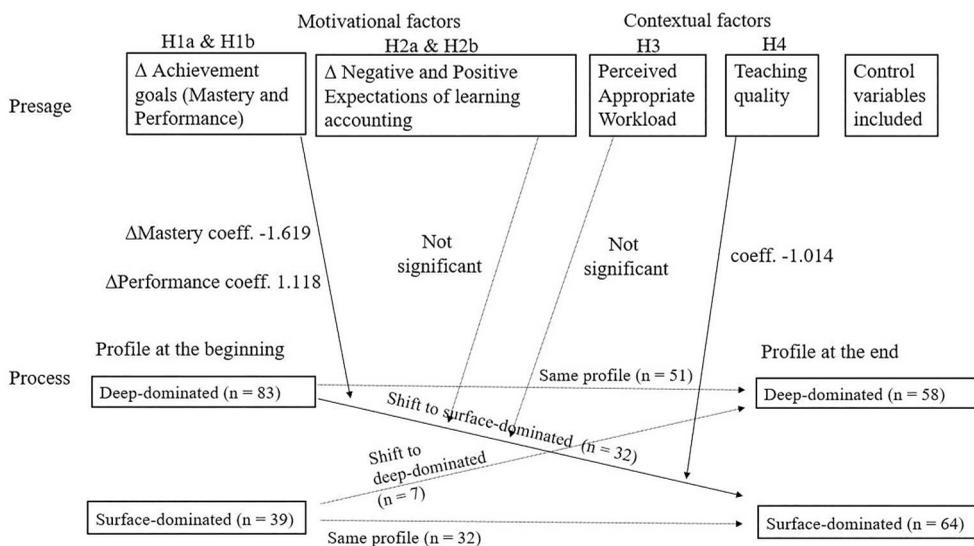


Figure 4. Summary of the empirical results.

teaching quality and workload appropriateness were lower. These results highlight the dynamic nature of students' learning approaches and importance of motivational and contextual factors in influencing shifts in learning profiles during the course.

Additionally, some students ($n = 7$) transitioned from a surface-dominated profile to a deep-dominated one. We considered including these 7 students in the empirical analysis using multinomial regression; due to the limited variability representing these students within the model, however, we found such inclusion infeasible. This imbalance would have hindered the accurate and reliable estimation of the effects of the variable, potentially compromising the robustness of the regression analysis and leading to unreliable or biased estimates. Therefore, we decided to use a logistic regression model in the analysis.

Robustness test and additional analysis

This section presents robustness tests and additional analyses conducted to validate the reliability of our findings and to provide insights into the relationships and dynamics underlying the observed results.

Due to the observed suboptimal internal consistency of the construct denoted as *Negative expectations* (as indicated in Table 2), a supplementary analysis was conducted. Therein, instead of the construct of *Negative expectations*, the models were re-estimated employing the three measurement items comprising *Negative expectations*; that is, testing was separately conducted for each measurement item. Noteworthy, (non-tabulated) empirical results remained qualitatively the same as those previously reported.

In analysing simple and (non-tabulated) partial correlations, we followed Amirkhan et al. (2020). In this additional analysis, we attempted to reconcile the regression coefficients of the multivariate test and correlation coefficients in the correlation table. It was observed that when Δ Performance (Δ Mastery) is accounted for, the correlation between the *Shift from deep* and Δ Mastery (Δ Performance) becomes significantly more negative. When Δ Mastery is accounted for, the correlation between *Shift from deep* and Δ Performance becomes more positive, but the change is insignificant in conventional confidence levels. When Δ Mastery is accounted for, the negative correlation between *Shift from deep* and *Appropriate workload* becomes significantly smaller. These directional changes provided by a partial correlation analysis are consistent with the differences between correlation coefficients and regression coefficients.

Most prior literature on SALs has focused on the deep learning approach and on explaining factors contributing to high-quality learning outcomes and successful studying (Lindblom-Ylänne et al., 2019). We conducted an additional analysis of the association between the deep approach to learning and course examination points because of the importance of the deep learning approach in higher education. We found, in congruence with Byrne et al. (2002), Duff (2004), and Everaert et al. (2017), that a deep approach to learning (*Deep*) is positively associated with examination points. Another finding was that, when the variable surface approach to learning (*Surface*) was added to the same model, the coefficient of a deep approach to learning (*Deep*) remained statistically significant.

Further, regarding additional analysis, we compared the means of the following student groups based on their learning approach, aiming to provide deeper insights into process and outcome variables. Group 1: Students who shifted from deep to

surface learning ($n = 32$), Group 2: Students who remained in deep learning ($n = 51$), Group 3: Students who shifted from surface to deep learning ($n = 32$) and Group 4: Students who remained in surface learning ($n = 7$). The non-tabulated ANCOVA results indicated no significant differences among Δ Mastery (H1a) and Δ Performance (H1b) groups. However, a statistically significant difference was observed in Teaching Quality (H4) across the groups, with Group 2 (students who remained in the deep learning profile) reporting the highest mean. This result strengthens our findings of the critical role of high teaching quality in maintaining a deep learning approach. It should be noted that in Table 6, *Teaching Quality* also demonstrates the lowest p -value (0.028) among predictors.

Discussion

This study investigated reasons for changes in SALs during a first-year six-week introductory accounting course. More specifically, we were inspired by suggestions and our observations that studies on accounting education (Gow et al., 1994; Jackling, 2005) and non-accounting education were scarce (Asikainen et al., 2014; Varunki et al., 2017). Thus, this study addressed the research question ‘Can motivational and contextual factors explain shifts in SAL profiles in an introductory accounting course?’

First, we investigated students’ SAL profiles at the beginning and end of the course. Based on the mean scores of deep and surface learning approaches among 122 students and BIC in LPA, we identified two latent profiles: deep-dominated and surface-dominated. This study identified that most students (68%; 83 of 122) adopted a deep approach to learning at course onset, but as many as 39% of those students shifted away from the deep learning approach by the end of the course. These findings reflect dynamic learning behaviour among first-year undergraduates. The evident shift from a deep-dominated profile aligns with findings from English et al. (2004); they observed a decrease in the deep learning approach among first-year accounting students. This shift mirrors findings in education studies across various disciplines during first-year courses (Quinnell et al., 2012; Volet et al., 1994).

In the final phase, using logistic regression, we investigated whether a shift from a deep-dominated profile to a surface-dominated one could be explained by changes in motivational factors (achievement goals and expectations of learning accounting) and contextual factors (perceived workload and teaching quality).

In line with the hypotheses set, our logistic regression analysis provides significant statistical evidence to maintain that students exhibiting a declining level of mastery goal orientation, increasing performance goal orientation, and a view of a lower quality of teaching tend to shift from a deep-dominated profile to a surface-dominated one during a course. However, no statistical support emerged for our two other hypotheses, that a shift from a deep-dominated profile is associated with a decrease in positive expectations of learning accounting or a perceived inappropriate workload.

This study extends accounting education literature by providing valuable empirical evidence to the limited knowledge on SAL changes in higher education, specifically showing the pivotal role of goal orientations and teaching quality views in these changes. Prior accounting education studies have not tested potential associations between changes in SALs and (1) achievement goals, (2) expectations of learning

accounting, (3) perceived workload, and (4) teaching quality. Furthermore, to the best of our knowledge, ours is the first study to examine whether students change SAL profiles in an accounting course. We provide novel information about the formation of SAL profiles and the adaptability of different SAL profiles during the same introductory accounting course. Our results underscore the rapidity with which substantial shifts in SAL profiles can occur, even over relatively brief time intervals, and highlight the potential for fluidity in students' learning orientations.

Regarding achievement goals, a noteworthy positive association was identified between a reduction in mastery goals and shifting away from the deep-dominated profile. This finding is consistent with prior literature reporting that students with a mastery goal orientation appear to use deep learning approaches (Geitz et al., 2016; Palos, 2020; Pintrich et al., 2003; Remedios & Richardson, 2013). Students pursuing mastery goals find the learning process inherently rewarding, and students adopting a deep approach to learning are intrinsically motivated.

No prior accounting education study investigates whether achievement goals (mastery or performance goals) are associated with SAL changes. Nevertheless, Varunki et al. (2017) obtained mixed results in their qualitative study of pharmacy students and reported that mastery goal-oriented students had decreased or increased their deep learning approach during a course. De Clercq et al. (2013) and Phan (2013), using quantitative methods, found that a mastery goal orientation increases students' subsequent deep processing, but they did not investigate that on a course level. Our findings at a course level are congruent with their observations and suggest that decreased mastery goal orientation decreases students' use of the deep learning approach.

We observed that an increase in performance-oriented goals is associated with a shift away from a deep-dominated profile at the beginning of the course to a surface-dominated profile by the end of the course. This insight is in line with prior literature suggesting that performance goal-oriented students adopt surface learning approaches (Geitz et al., 2016; Palos, 2020; Pintrich et al., 2003; Remedios & Richardson, 2013). It further emphasises the influence of goal orientations on the nature of SALs. Extrinsic motivation underlies performance goals and a surface approach to learning, both of which emphasise achieving specific outcomes, such as high grades or recognition, rather than understanding and mastering the material. This outcome-focused mindset is a hallmark of extrinsic motivation, wherein external rewards drive behaviour.

Varunki et al. (2017) found mixed results and reported that performance goal-oriented students had decreased or increased their use of the deep learning approach, whereas our study reports that increased performance goal orientation is strongly associated with a decrease in the deep learning approach. Therefore, we may reasonably assume that prioritising performance goals, which may yield swift outcomes, could prompt students to embrace surface learning strategies. These results extend the literature on prior non-accounting education, by providing statistical evidence for this association in a course context. Furthermore, this study contributes to previous education research by being, to the best of our knowledge, the first to statistically examine the association between performance goal orientation and SAL changes. Overall, this study adds to the literature on accounting education by showing that SAL-related and achievement-related motivational constructs change in tandem in an introductory accounting course.

Few studies have examined the relationship between teaching quality and SAL changes. We found that a view of low teaching quality increases the likelihood of a shift away from the deep-dominated profile. This result is congruent with non-tested propositions by Gow et al. (1994) and Jackling (2005) in accounting education literature. It also confirms Asikainen et al.'s (2014) findings that higher teaching quality is associated with an increase in the deep learning approach. However, those studies were not course specific. Our study extends the literature on accounting education by furnishing statistically tested evidence on the association between teaching quality and SAL changes in this context. This study further expands prior findings of non-accounting education research by demonstrating that correlation between teaching quality and changes in the deep learning approach can occur even during a course.

Moreover, our findings indicate that changes in positive expectations of learning accounting do not significantly influence shifts between deep-dominated and surface-dominated profiles, while changes in negative expectations are weakly related to changes in SAL profiles. More specifically, we found only weak statistical support for a previous claim that increase in negative expectations of learning accounting during a course is associated with a shift away from a deep-dominated profile. This study adds to prior accounting literature by showing this association and corroborates findings by Coertjens et al. (2016) and Varunki et al. (2017) in other disciplines.

Conclusions

Our study uniquely contributes to the literature exploring connections between students' learning approaches and achievement goals. Dull et al. (2015) investigated motivational concepts shared by both the AGT and the SAL framework, without SAL data in the context of introductory accounting, and they called for future research to use actual SAL data for deep and surface learning scales. In response, our study adopts a student-oriented approach to confirm that shifts from a deep-dominated learning profile to a surface-dominated one occur when mastery goals weaken and performance goals strengthen. Our findings align with that of Dull et al. (2015, p. 167), who observed that students employ surface learning strategies to pursue performance goals. Furthermore, to the best of our knowledge, this study is the first to statistically examine the association between performance goal orientation and SAL changes, offering a fresh perspective on the topic.

Second, we also contribute to understanding the quality of teaching and perception of appropriate workload as well as adopting a surface-dominated profile instead of a deep-dominated one. Diseth (2007) observed that psychology students' high workload predicted low deep and high surface approaches. When we also considered teaching quality, we observed that a shift of accounting students from deep-dominated to surface-dominated was unaffected by a perception of an inappropriate workload but affected by poor teaching quality. We add to Jackling's (2005) study, by statistically testing the effects of workload and teaching quality on SAL changes. In our study, compared to the perception of an inappropriate workload, teaching quality emerges as a more significant factor influencing shifts from a deep-dominated profile to a surface-dominated one.

Third, our study helps to understand how expectations of learning accounting affect SALs. Duff and Mladenovic (2015) involved a one-time collection of expectations of learning accounting from undergraduate first-year accounting students; we collected

student perceptions twice during an introduction to accounting course. Their results reveal that students with negative expectations of studying accounting are likelier to adopt ineffective learning strategies. In our context, wherein we simultaneously consider achievement goals, expectations of learning accounting play a weak role or none in explaining students' shifts from deep-dominated to surface-dominated profiles.

Fourth, we contribute to understanding SAL profile stability in an accounting course. Through LPA, we identified two distinct profile solutions at the beginning and end of the course. The consistency of these profile solutions allows us to track the number of students who remain in the same profile versus those who transition from one profile to another. Notably, over the duration of the course, we observe a significant shift among students from a deep-dominated to a surface-dominated profile. To the best of our knowledge, this study is the first to examine such shifts in SAL profiles during an accounting course.

From the practical point of view, understanding how students approach their studies aids in promoting the adoption of suitable approaches and enhancing students' learning outcomes. Thus, our findings have important implications for educators and institutions. Students adopting a deep learning approach tend to seek an understanding of a subject in its broader context and relate their learning to prior experiences and ideas (Entwistle & Ramsden, 1983; Marton & Säljö, 1976). Therefore, an objective of faculties is to guide students in selecting and maintaining a deep learning approach to studying. Ensuring high teaching quality and appropriate workload management at a faculty can help maintain an environment conducive to deep learning approaches. This study has highlighted the importance of teaching quality in influencing SALs. An environment with low teaching quality may lead students to adopt surface learning strategies, possibly as a coping mechanism. This finding emphasises the significance of what is taught and how it is delivered.

Numerous strategies exist to enhance teaching quality in response to the concern that students are increasingly adopting a surface learning approach, with a corresponding decrease in deep learning and weakening of mastery goals. To counter this trend, business schools can implement targeted interventions, such as academic advising, mentoring programmes, or study skills workshops, to assist students in developing and maintaining effective learning behaviours throughout their academic journey (Hall et al., 2004). One such possibility is an 'on-campus practicum' similar to how Lizzio and Wilson (2004) used third-year student consultants entering a client-consultant relationship with first – and second-year students, triggering positive learning outcomes and deeper approaches to learning for third-year students. In addition, teachers could advance teaching quality by attending pedagogical training, collecting and analysing feedback from students, identifying and appreciating different learning styles of students, using technology in the classroom, and benchmarking teaching methods and course contents with other teachers.

Our results show that shift from a deep-dominated learning profile is associated with students' weakening master goal approach. Scholars suggest several aspects that could promote mastery goal orientation at a course (e.g. Ames, 1992a, 1992b; Anderman & Anderman, 2009; Dull et al., 2015; Epstein, 1989; Lüftenegger et al., 2014). These aspects could include varied and multidimensional tasks and learning methods, assigning decision-making roles to students about important course related things (e.g. course content, methods, and assessment format), individualised recognition and feedback of a progress during the course to improve learning, establishment of working groups for cooperative learning, and giving students opportunities to regain points in exercises by correcting mistakes.

Our study is not without limitations. We have observed changes in SALs occurring in six weeks in first-year students' lives. Six weeks is a relatively short period, especially compared to those in many other studies. In addition, first-year students' perceptions and learning strategies may not have fully stabilised yet at this stage, and accordingly, changes in SALs may to some extent be a part of students' transition process from high school to university studies. In addition, our focus is on explaining factors influencing the change from a deep to surface profile; for this particular purpose, we use a relatively small sample size ($n = 83$). Accordingly, our results need to be interpreted with caution. More studies about SAL changes should address these changes during courses of varied length and student numbers.

Additionally, this study was conducted using Finnish data. University students may react very differently to varied learning environment worldwide. This study observed no significant correlation between decrease in the deep learning approach and perceived workload. Hernesniemi et al. (2017), in their comparative study of Finnish and Chinese university students, identified differences in perceptions of what constitutes an appropriate workload. Consequently, the findings of this research may hold greater validity in a European setting than in an Asian one. Future research should further explore this cultural aspect.

Regarding future research, Lindblom-Ylänne et al. (2013, p. 242) argued that mixed methods can create an additional measurement point. Interviews following earlier measurement points would enable richer interpretation of students belonging to different SAL profiles. Importantly, scholars could also conduct interview-based follow-up studies to scrutinise in more detail their survey results about students' reasons to shift from a deep learning approach to a surface learning approach. Moreover, examining the generalisability of these findings to different educational contexts could provide a comprehensive understanding of the dynamics of learning approaches among first-year students. One exciting avenue of future research would be to examine changes in students' learning approaches in the conceptual framework of engagement, antecedents, and consequences by Kahu (2013), including structural influences, psychological influences, student engagement, as well as proximal and distant consequences.

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Appendices

Appendix 1. Summary of accounting studies addressing SAL changes and examples of non-accounting studies (1994-2024)

	Accounting Education	Sign.	Course-specific data	1st year course	Intervention	Nr & Timing of measurement	Duration (between 1st and last trial)	Discipline of students
<i>Deep increase</i>								
Hall et al., 2004	Yes	Sign.	Yes	Yes	Yes	2: Beginning and end of the course	12 weeks	Accounting
Ballantine et al., 2008	Yes	Not sign.	Yes	No	Yes	2: Week 3 (final year) & end of the acad. year	The whole acad. year	Accounting (Business)
Jackling, 2005	Yes	Sign.	No	No	No	3: 1st, 2nd, 3rd year	2 years	Accounting
Asikainen et al., 2014	No	Sign.	No	No	No	2: Spring 1st & 3 rd year	2 years	Bioscience
Gordon & Depus, 2002	No	Sign.	No	No	Yes	3: During 3 academic years	2–3 years	Teacher
<i>No deep change</i>								
Wynn-Williams et al., 2016	Yes	Not sign.	Yes	No	Yes	2; Beginning and end of the course	1 semester	Accounting
Coertjens et al., 2016	No	Not sign.	No	No	No	2: During two semesters	2 semesters	Theology
Edmunds & Richardson, 2009	No	Sign.	No	No	No	2: During 1st and 3 rd year	2 years	Bioscience, Bus. and Soc.
<i>Deep decrease</i>								
English et al., 2004	Yes	No test	Yes	Yes	Yes	2: Week 1 and end of first year	The whole academic year	Accounting (Business)
Gow et al., 1994	Yes	No test	No	No	No	4: Beg. of 1st, 2nd, and 3rd year & end of 3rd	3 years	Accounting (& Other subj.)
Lietz & Matthews, 2010	No	Sign.	No	No	No	3: 1st, 2nd, and 3rd year	2 years	Arts
Lindblom-Ylänne et al., 2013	No	Sign.	Yes	No	No	2: Beginning and end of the course(s)	1 semester	Mathematics, Theology
Quinnell et al., 2012	No	Sign.	Yes	Yes	No	2: Beginning and end of the course	13 weeks	Biology
Volet et al., 1994	No	Sign.	Yes	Yes	No	2: Beginning and end of the course	12 weeks	Economics
Wilding & Andrews, 2006	No	Sign.	No	No	No	2: 1 month bef. entry and middle of 2nd year	1,5 years	Arts, Sc., Hist/ Soc. Sc.

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	Accounting Education	Sign.	Course-specific data	1st year course	Intervention	Nr & Timing of measurement	Duration (between 1st and last trial)	Discipline of students
<i>Surface increase</i>								
Ballantine et al., 2008	Yes	Sign.	Yes	No	Yes	2: Week 3 (final year) & end of the year	The whole academic year	Accounting (Business)
Wynn-Williams et al., 2016	Yes	Sign.	Yes	No	Yes	2; Beginning and end of the course	1 semester	Accounting
Geitz et al., 2016	No	Sign.	Yes	Yes	No	3: Weeks 0, 4 and 8	8 weeks	Marketing
Wilding & Andrews, 2006	No	Sign.	No	No	No	2: 1 month bef. entry and middle of 2nd year	1,5 years	Arts, Sc., Hist/ Soc. Sc.
<i>No surface change</i>								
English et al., 2004,	Yes	No test	Yes	Yes	Yes	2: Week 1 and end of first year	The whole academic year	Accounting
Jackling, 2005	Yes	Not sign.	No	No	No	3: 1st, 2nd, 3rd year	2 years	Accounting
Edmunds & Richardson, 2009	No	Not sign.	No	No	No	2: During 1st and 3 rd year	2 years	Bioscience, Bus., and Soc.
<i>Surface decrease</i>								
Hall et al., 2004	Yes	Sign.	Yes	Yes	Yes	2: Beginning and end of the course	12 weeks	Accounting
Coertjens et al., 2016	No	Sign.	No	No	No	2: During two semesters	2 semesters	Theology
Gordon & Depus, 2002	No	Sign.	No	No	Yes	3: During 3 academic years	2–3 years	Teacher
Rodriguez & Cano, 2007	No	Sign.	No	No	No	2: Measured 1st year and 3rd year	2 years	Teacher

Appendix 2. Variable definitions

Variable	Description
<i>Deepmean</i>	Deep approach to learning defined as in LEARN questionnaire used by Parpala and Lindblom-Ylänne (2012) ¹⁾
<i>Surfacemean</i>	Surface approach to learning defined as in LEARN questionnaire used by Parpala and Lindblom-Ylänne (2012) ¹⁾
<i>Shift from deep</i>	Indicator for profile shift from deep-dominated profile to surface-dominated profile
<i>Deep-dominated</i>	Students' learning profile based on LPA.
<i>Surface-dominated</i>	Students' learning profile based on LPA.
<i>Mastery</i>	Mean of the raw scores constructed from 'Achievement Goal Questionnaire revised' (AGQ-revised) by Elliot and Murayama (2008), as described in Appendix 2.
Δ Mastery	Increase in MASTERY APPROACH (the end of the course score minus the beginning of the course score).
<i>Performance</i>	Mean of the raw scores constructed from 'Achievement Goal Questionnaire revised' (AGQ-revised) by Elliot and Murayama (2008), as described in Appendix 2.

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Variable	Description
Δ Performance	Increase in <i>PERFORMANCE APPROACH</i> (the end of the course score minus the beginning of the course score).
<i>Positive expectations</i>	Mean of the raw scores constructed based on inventory by Duff and Mladenovic (2015), as defined in Appendix 2.
<i>Negative expectations</i>	Mean of the raw scores constructed based on inventory by Duff and Mladenovic (2015), as defined in Appendix 2.
Δ Positive expectations	Increase in <i>POSITIVE EXPECTATIONS</i> (the end of the course score minus the beginning of the course score).
Δ Negative expectations	Increase in <i>NEGATIVE EXPECTATIONS</i> (the end of the course score minus the beginning of the course score).
<i>Appropriate workload</i>	Mean of the raw scores of the questionnaire items, as described in Appendix 2.
<i>Teaching quality</i>	Mean of the raw scores from a questionnaire filled by students, as described in Appendix 2.
<i>Female</i>	Equals to 1 if the student is female and zero if the student is male.
<i>Age</i>	Students age (years).
<i>HSGPA</i>	High school grade point average.

1) Original version: The students' Approaches to Learning and Studying Inventory (ALSI) (Entwistle & McCune, 2004) and Experiences of Teaching and Learning Questionnaire (ETLQ) (Parpala et al., 2011). See the questions in Table 2.