

Approaches to studying: changes during a three-year undergraduate study program

Gry Mørk, Astrid Gramstad, Lene A. Åsli, Linda Stigen, Susanne G. Johnson, Trine A. Magne, Tove Carstensen, Milada C. Småstuen & Tore Bonsaksen

To cite this article: Gry Mørk, Astrid Gramstad, Lene A. Åsli, Linda Stigen, Susanne G. Johnson, Trine A. Magne, Tove Carstensen, Milada C. Småstuen & Tore Bonsaksen (2022): Approaches to studying: changes during a three-year undergraduate study program, Scandinavian Journal of Educational Research, DOI: [10.1080/00313831.2022.2148274](https://doi.org/10.1080/00313831.2022.2148274)

To link to this article: <https://doi.org/10.1080/00313831.2022.2148274>



© 2022 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group



Published online: 21 Nov 2022.



Submit your article to this journal [↗](#)












View related articles [↗](#)



View Crossmark data [↗](#)

Approaches to studying: changes during a three-year undergraduate study program

Gry Mørk ^a, Astrid Gramstad ^{b,c}, Lene A. Åsli ^b, Linda Stigen ^d, Susanne G. Johnson ^e, Trine A. Magne ^{a,f}, Tove Carstensen ^f, Milada C. Småstuen ^g and Tore Bonsaksen ^{a,h,i}

^aDepartment of Health, Faculty of Health Studies, VID Specialized University, Stavanger, Norway; ^bUiT – The Arctic University of Norway, Tromsø, Norway; ^cCentre for Care Research North, Tromsø, Norway; ^dNorwegian University of Science and Technology (NTNU), Gjøvik, Norway; ^eFaculty of Health and Function, Western Norway University of Applied Sciences, Bergen, Norway; ^fNorwegian University of Science and Technology (NTNU), Trondheim, Norway; ^gDepartment of Nursing and Health Promotion, Prosthetics and Orthotics, Faculty of Health Sciences, OsloMet – Oslo Metropolitan University, Oslo, Norway; ^hDepartment of Occupational Therapy, Prosthetics and Orthotics, Faculty of Health Sciences, OsloMet – Oslo Metropolitan University, Oslo, Norway; ⁱDepartment of Health and Nursing Sciences, Faculty of Social and Health Sciences, Inland Norway University of Applied Sciences, Elverum, Norway

ABSTRACT

Whether higher education students' approaches to studying are amenable to change, is disputed. In this study, Norwegian occupational therapy students' (n = 263) approaches to studying were assessed annually across the three-year course, with the aim of exploring changes during the undergraduate study program. Sociodemographic information and the *Approaches and Study Skills Inventory for Students* were completed. Changes during the follow-up period were analyzed using linear mixed models for repeated measures. A significant increase in deep approach scores and a decrease in surface approach scores during the study program was revealed. The strategic approach remained unchanged, but with a difference between education institutions. Overall, the study suggests that the students' approaches to studying changed in a positive direction during the study program. Attention should be given to students at risk of adopting a surface approach to studying and to the individual and contextual elements influencing study behaviors.

ARTICLE HISTORY



Received 17 August 2021
Accepted 1 November 2022

KEYWORDS

Approaches to learning; higher education; linear mixed models; occupational therapy; students

Introduction

In occupational therapy education there is a tradition for active learning and varied learning activities. This tradition concurs with the profession's philosophy that humans are occupational beings who learn best by doing occupations that fit their individual capacities and have meaning for them (Wilcock, 2000). In line with the Minimum Standards for the Education of Occupational Therapists (World Federation of Occupational Therapists, 2016) a variety of teaching methods are used, including traditional lecture-based instruction, case studies, problem-based-, team-based- and project-based learning (Gramstad et al., 2020). Considering these varied learning activities, emphasizing student activity and collaborative learning, a development towards more productive study

CONTACT Gry Mørk  gry.mork@vid.no  Department of Health, Faculty of Health Studies, VID Specialized University, Stavanger, Norway.

© 2022 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group
This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited, and is not altered, transformed, or built upon in any way.

approaches during the three-year education program, seems possible. However, studies of change in occupational therapy students' study approaches are lacking.

The Students' Approach to Learning (SAL) tradition is founded on the phenomenographical studies by Marton and Säljö (1976). This research tradition focuses on how students engage in learning and handle learning tasks, often by analysis of self-reported data (Biggs, 2001; Entwistle, 2009). The main approaches to learning: *the deep, surface and strategic approaches*, represent three different ways students relate to learning and are associated with qualitatively different learning outcomes (Biggs, 2001; Entwistle & Ramsden, 2015; J. T. E. Richardson, 1997). When using a deep approach to learning, the student wants to understand and engage in the main themes and principles inherent in the learning materials, doing so by using strategies appropriate for creating meaning. By contrast, the surface approach to learning refers to the student selectively memorizing to get the task done, motivated by the desire to avoid failing exams while using minimal effort. While the deep and surface approach describes the students' engagement in learning, the strategic approach is concerned with how students organize their learning (Entwistle, 2018; Kember et al., 1999). Students using a strategic approach, are competitive and study towards the aim of producing the best possible exams results through well-organized studying and alertness to assessment requirements (Biggs, 2001). This strategy may rely on a combination of deep and surface behaviors. Researchers in this field have used two different expressions, namely "approaches to learning" and "approaches to studying". In this study, we use the expression "approaches to studying", placing emphasis on our assessment of study behaviors, not the outcome of such behaviors (learning).

Over the last 20 years, empirical research has shown better clinical and academic performance outcomes from using deep and/or strategic study approaches, as well as poorer outcomes of surface approach behaviors (Diseth, 2007a; Herrmann et al., 2017; M. Richardson et al., 2012; Salamonson et al., 2013; Ward, 2011a, 2011b). Students' approaches to learning are influenced by student characteristics, as well as factors in the learning environment (Baeten et al., 2010; Biggs & Tang, 2011; Vermunt, 2005). For example, older students have been found to study more in line with the deep approach and less in line with the surface approach, compared to younger students (Beccaria et al., 2014; Diseth, 2007b; Douglas et al., 2020; J. T. E. Richardson, 1997; Rubin et al., 2018; Salamonson et al., 2013; Zeegers, 2001), while female students have been more inclined to use strategic approach behaviors, compared to male students (Bonsaksen et al., 2017; Nguyen, 2016; Smith & Miller, 2005). Learning environment factors are commonly considered important for students' approaches to studying (J. T. E. Richardson, 2010). A recent study of occupational therapy students found that several aspects of the learning environment (generic skills, workload and clarity of goals and standards) were significantly associated with the students' study approaches (Mørk et al., 2020).

The evidence related to within-person changes in study behaviors over time is mixed, and the degree to which approaches to studying represent a stable, predisposed trait, or a state depending on the context, is debated (Nijhuis et al., 2008; Vermetten et al., 1999). Therefore, researchers should distinguish between the student's general predisposition towards a particular approach (with which he or she enters the education program), and the student's development of his or her study approach during the education program; a development which is possibly related to the particular learning context (Wierstra et al., 2003). Nonetheless, it may still be challenging for researchers in longitudinal studies to distinguish between individual and contextual elements influencing stability or change in students' study approaches (Postareff et al., 2014; Vanthournout et al., 2013).

Researchers have found that study approaches are changeable over time, due to various contextual effects or individual development. For example, some studies have indicated positive development (increased deep and/or strategic scores and decreased surface scores) (Asikainen et al., 2014; Hall et al., 2004; Walker et al., 2010), whereas other studies have found change in the undesired direction with decreased deep scores and/or increased surface scores (Ballantine et al., 2008; Gijbels et al., 2009; Piumatti et al., 2021; Prat-Sala & Redford, 2010; Wilding & Andrews, 2006). Postareff et al. (2018) found that changes in deep and surface approach scores varied from one course to another. Yet again, other studies have revealed no significant change over time (Chen et al.,

2015; Edmunds & Richardson, 2009). The mixed results from previous research, lead Asikainen and Gijbels (2017) to the conclusion that there is no clear evidence to support the assumption of a gradual change towards employing more deep approach to studying.

Considering the link between productive study approaches (i.e., deep and strategic approaches) and clinical and academic performance outcomes, educators would have an interest to know if – and possibly, how – they can support their students to adopt productive study approaches. However, the results of previous research pertaining to changes in approaches to studying have been ambiguous. Studies on occupational therapy students appear to have largely used a cohort comparison approach – thus, potential temporal changes in study approaches are yet to be explored. This study, investigating longitudinal changes in occupational therapy students' approaches to studying, adds to the knowledge base concerned with study approaches in higher education by using students in occupational therapy education as the case example.

Study aim

This study aimed to increase the knowledge about occupational therapy students' approaches to studying and assess how these approaches developed across the three-year course of the undergraduate study program. The research question was: To what degree do students' study approaches change over time?

Materials and methods

Design and study context

The study is part of an investigation of Norwegian occupational therapy students' perceptions of the learning environment (Bonsaksen et al., 2019; Thordardottir et al., 2022; Thygesen et al., 2020), their approaches to studying (Dalomba et al., 2020; Gramstad et al., 2020; Mørk et al., 2020; Thørrisen et al., 2022) and their academic performance (Bonsaksen et al., 2021).

The context of this study is the six occupational therapy programs in Norway with class sizes between 24 and 77 students. These bachelor's degree programs have a duration of 3 years, which includes a minimum of 1/4 clinical practice (known as fieldwork). In each of the education programs, students participated in diverse learning activities such as traditional lectures, seminars, case studies, problem-based, team-based, and project-based learning, and individual self-organized studies. Although all of these programs build on and are regulated by the national qualification framework (Ministry of Education and Research, 2014), the educational institutions adjust the relevant curriculum according to their educational profile and local differences. For that reason, the programs differ in terms of class sizes, educational profiles, clinical practice and admission requirements. The study employed data from the students in their first, second and third year of study. The data collections were conducted with one-year interval at each of the education programs, about midway into each study year.

Participants, recruitment, and response rate

Students from each of the six occupational therapy education programs in Norway were recruited. A member of faculty distributed the questionnaires and consent forms to students, and the students completed the questionnaires by paper and pencil. From the six education programs, 305 students were eligible to participate. At the first assessment, 187 students participated (61.3% response rate), while 168 (55.1% response rate) and 200 (response rate 65.6%) participated in the second and third years, respectively. In total, 118 students participated in each of the three assessments, 58 students participated twice, and 87 students participated at only one assessment. A total of 263 students (response rate 86.2%) participated at a minimum of one assessment. These 263 students were included in the current study sample. [Table 1](#) displays an overview of participants in each of the study years by education program.

Measurement

Sociodemographic background and education-related variables

Information regarding sociodemographic background (age and gender) and education (education institution and individual study efforts; the latter operationalized as hours spent on independent study during a typical week) was collected as part of the questionnaire.

Approaches to studying

Study approaches were measured with the *Approaches and Study Skills Inventory for Students* (ASSIST) (Entwistle et al., 2013), and the students used a previously validated Norwegian translation of the instrument (Diseth, 2001). The ASSIST consists of 52 statements to which the respondent is asked to rate his or her level of agreement (1 = disagree, 2 = disagree somewhat, 3 = unsure, 4 = agree somewhat, 5 = agree). The instrument has a three-factor structure (Dalomba et al., 2020), a structure recently confirmed in a cross-cultural study of undergraduate occupational therapy students (Bonsaksen et al., 2019). The items are organized accordingly into three main scales (the *deep*, *strategic*, and *surface* approaches to studying). Scale scores are calculated by adding the scores on the relevant items. Internal consistency estimates (Cronbach's α) were calculated while the students were in the first year of study. Cronbach's α for the study approach scales were 0.71 (deep approach), 0.84 (strategic approach), and 0.76 (surface approach) (Gramstad et al., 2020; Mørk et al., 2020).

Data analysis

All data were entered into the computer program IBM SPSS Statistics (Version 26). Descriptive analysis on all variables was performed, using means (M), standard deviations (SD), frequencies and percentages as appropriate. Changes during the follow-up period were analyzed using linear mixed models (LMM) for repeated measures. Unlike traditional ANOVA approaches for repeated measures analysis, LMM allows for estimating trajectories despite missing scores at single occasions. These models use all available data to estimate possible within-subject dependencies, and no imputation is necessary provided that the missing at random assumption is fulfilled (Ibrahim & Molenberghs, 2009). Thus, the procedure of using all available data reduces the possibility of selection bias, which would be higher if only completers (i.e., students who participated each year) were included. Separate linear mixed effect models were fitted to assess the development on each of the three study approach scales, and to assess whether the pattern of development differed by education institution. Dependencies within individuals were modeled using unstructured covariance matrix. In addition to time and education institution, possible confounders (age, gender and study efforts) were entered as fixed effects. The results are presented as the overall effect (F-test) of a given variable over the whole study period, the estimated marginal means (means adjusted for all covariates included in the model) and regression coefficients b with 95% confidence intervals (CI). All the analyses were considered exploratory so no correction for multiple testing was performed and p -values <0.05 were considered statistically significant.

Table 1. Participants in each of the study years by education program.

	First study year	Second study year	Third study year
Trondheim	56	53	54
Oslo	24	31	47
Sandnes	31	25	30
Bergen	33	24	24
Gjøvik	19	18	24
Tromsø	24	17	21
Total	187	168	200

Ethics

The Norwegian Center for Research Data gave their approval for collecting, storing and utilizing the data (project no. 55875). The students were informed that completion of the questionnaires was voluntary, that their responses would be treated in confidence, and that there would be no negative consequences from opting not to participate in the study. All participants provided written informed consent.

Results

Participants

The 263 participants represented six different education institutions in Norway, located in Oslo ($n = 69$, 26.2% of the total sample), Bergen ($n = 41$, 15.6%), Trondheim ($n = 64$, 24.3%), Sandnes ($n = 35$, 13.3%), Tromsø ($n = 28$, 10.6%) and Gjøvik ($n = 26$, 9.9%). The great majority of the sample ($n = 207$, 78.7%) was women, while 55 (20.9%) were men (one participant did not report his/her sex). In the sample, the mean age was 23.0 years ($SD = 4.9$ years) and the number of hours spent on independent study during a typical week was 8.7 h ($SD = 6.0$ h).

Approaches to studying

The students' estimated marginal means of the deep, strategic, and surface approach scales are displayed in Table 2. All estimated means are presented according to time of assessment and are adjusted for their participants' age and study efforts. Table 3 displays the results from the analyses of the deep, strategic, and surface approach scales, respectively. The listed p -values represent the overall impact of a given covariate and a given scale. Thus, when the F-test is statistically significant (p -values < 0.05) a given covariate is statistically significantly associated with the outcome (given scale) when the whole study period is considered.

Deep approach

In a multivariate model adjusted for gender, age, education institution, time, and study efforts, most of these covariates were statistically significantly associated with the deep approach scores. Male students scored on average two points higher compared to females ($b = 2.44$, 95% CI [0.20; 4.67], $p = 0.033$). For each year the students were older, they scored about 0.4 points higher on deep approach scale ($b = 0.39$; 95% CI [0.20; 0.58], $p < 0.001$) and each hour of increased study efforts was associated with an 0.2 points higher level of deep approach ($b = 0.21$; 95% CI [0.05; 0.37], $p = 0.009$). Overall, the students scored almost two points lower the first compared to the last assessment point ($b = -1.71$, 95% CI [-2.74; -0.68], $p = 0.001$), but only a half point lower at the second compared to the last assessment point ($b = -0.48$, 95% CI [-1.41; 0.45], *ns*). Thus, significant change in the level of deep approach only occurred between the first and the second time of assessment.

Table 2. Study approach scales (estimated marginal means) at the three assessment points.

Study approaches	Years of study		
	1st year M (95% CI)	2nd year M (95% CI)	3rd year M (95% CI)
Deep approach	56.7 (55.4-58.0)	57.9 (56.6-59.2)	58.4 (57.1-59.7)
Strategic approach	70.9 (69.4-72.5)	70.9 (69.3-72.4)	70.9 (69.5-72.4)
Surface approach	47.3 (45.9-48.8)	45.1 (43.6-46.6)	44.7 (43.1-46.2)

Note. The estimated marginal means are adjusted for age and study efforts.

Table 3. Study approach scale scores: tests of fixed effects.

Variables	Deep approach		Strategic approach		Surface approach	
	F statistics	<i>p</i> -value	F statistics	<i>p</i> -value	F statistics	<i>p</i> -value
Intercept	368.67	< 0.001	565.91	< 0.001	336.89	< 0.001
Age	15.88	< 0.001	0.15	0.70	6.63	< 0.05
Sex	4.61	< 0.05	4.91	< 0.05	1.12	0.29
Study efforts	6.95	< 0.01	17.19	< 0.001	1.70	0.19
Education institution	1.40	0.23	3.63	< 0.01	0.69	0.63
Time	5.40	< 0.01	0.00	> 0.99	10.1	< 0.001

Note. 'Education institution' refers to differences in scale scores between the education institutions. 'Time' refers to changes in scale scores over time.

Strategic approach

In a multivariate model adjusted for gender, age, education institution, time and study efforts, gender and study efforts remained independently significantly correlated with scores on the strategic approach scale. Male students scored on average 2.9 points lower compared to females ($b = -2.86$, 95% CI $[-5.40; -0.32]$, $p = 0.028$) and each hour increase in study efforts was associated with about 0.4 points increase in the level of strategic approach ($b = 0.38$, 95% CI $[0.20; 0.56]$, $p < 0.001$). When assessing and comparing the estimated marginal means, significant differences emerged among the institutions. The highest estimated means (>70) were observed for students in Gjøvik, Sandnes and Trondheim, while the lowest (<70) were for students in Oslo, Tromsø and Bergen. However, the scales remained almost unchanged over the whole observation period.

Surface approach

In a multivariate model adjusted for gender, age, education institution, time, and study efforts, only time and student age were significantly correlated with the surface approach scores. On average, the students scored about 2.7 points higher the first year compared to the last year ($b = 2.69$; 95% CI $[1.36; 4.01]$, $p < 0.001$), but only a half point higher in the second year compared to the last year ($b = 0.45$; 95% CI $[-0.77; 1.66]$, *ns*). Thus, significant change in the level of surface approach only occurred between the first and the second time of assessment. Older students scored lower compared to the younger ones ($b = -0.29$; 95% CI $[-0.50; -0.07]$, $p = 0.011$).

Discussion

This study examined changes in occupational therapy students' approaches to studying across the three-year course of the undergraduate study program. Contrary to Asikainen and Gijbels (2017) conclusion, the results from this study showed that the deep approach scale scores increased, and the surface approach scale scores decreased over time, thus indicating a gradual change towards more deep approach to studying during the education trajectory. The strategic approach score scales remained unchanged across time, however, a difference between education institutions was revealed. Age, gender, and time spent on independent studying was associated with the study approach scores in a mostly predictable pattern, reflecting results from previous research.

Increased deep approach scores and decreased surface approach scores

As it may be easier to induce a surface approach than a deep approach to studying (Biggs & Tang, 2011; Diseth, 2007b; Marton et al., 1997), the detected changes on the deep and surface approach scales are particularly desired results. Student-centered environments have predicted a deep approach to learning, while teacher-centered environments have predicted a surface approach (Beausaert et al., 2013). Thus, contextual factors need to be considered when aiming to create a more student-centered learning environment. For example, faculty and staff should strive to

maintain appropriate student workload and information load, provide sufficient support, set clear learning goals and create possibilities for independent studying (Baeten et al., 2010). Designing the curriculum to include writing tasks that require reflection and independent engagement can also have an impact on students' adoption of a deep rather than a surface approach to studying (English et al., 2004). Research has suggested that a surface approach to learning is encouraged by poor teaching quality (Diseth, 2007a), unclear standards and goals as well as inappropriate workload (Lizzio et al., 2002; Mørk et al., 2020). Fryer and Vermunt (2018) suggested that students who adopt a surface approach, and are left to their own devices, are unlikely to improve. Thus, in line with the many studies suggesting an impact of the learning environment on students' study behaviors, we wondered whether the students' positive study approach development might be related to corresponding positive change in the learning environment. However, another study from the same project showed a decrease on some of the learning environment scales, specifically "Emphasis on independence" and "Good teaching" (Stigen et al., 2022). The positive changes in the students' study approach ratings may therefore be a result of their increased maturity and their adapting to the student role and the tasks and requirements of the education program (Thordardottir et al., 2022), rather than a result of positive changes in the learning environment. The gradual processes from novice to advanced learner may positively influence engagement in group work and teaching forms such as team-based learning. Engagement in such learning activities might strengthen the feeling of commitment to the group. Explaining ideas to other group members and engaging in case discussions can enhance a deep approach to learning (Pires et al., 2020), as can also the promotion of a safe and supportive social climate among students and between teachers and students (Tho et al., 2020). Deep learning may also be enhanced by increasing students' awareness of how to learn, possibly through learning activities by which the students themselves construct meaning (Fyrenius et al., 2007).

The students gained limited fieldwork experience before the first assessment point (Gramstad et al., 2020), while fieldwork was used increasingly throughout the subsequent parts of the education programs. Clinical practice can urge higher-level cognitive processes giving rise to new understanding and increasing problem solving- and decision making skills (Donaghy & Morss, 2007). The occupational therapy students' development, increasing the deep and decreasing the surface approach to studying, may therefore be related to a change in the dominant forms of teaching environment – from an emphasis on the theoretical environment in the classroom to an increased emphasis on the clinical environment with "real" patients. This is in line with previous research suggesting that a contextualized understanding, conceivably derived more easily from experiences in clinical practice, might stimulate deep study behaviors (Asikainen et al., 2014; Entwistle, 2018).

Lastly, reducing the surface approach to studying may be more beneficial for students than increasing the deep approach (Ward, 2011b). Our previous study, based on first-year data only, showed that better exam grades were associated with higher scores on strategic approach and lower scores on surface approach, while no association was found between the students' exam grades and their scores on the deep approach scale (Bonsaksen et al., 2021). There is also evidence that students with high ratings on deep approach to studying combined with low ratings on organized studying are more likely to exhibit poor academic achievement, operationalized as low grade point average and delayed graduation (Haarala-Muhonen et al., 2017). Therefore, the theoretically proposed benefit from deep study behaviors may be overrated, and not necessarily enough to succeed in studies (Asikainen et al., 2014; Parpala et al., 2022). Possibly, a relationship between deep study approach ratings and better academic outcomes may depend on the students' organizing study skills (Haarala-Muhonen et al., 2017; Parpala et al., 2022), in other words; their level of strategic approach to studying.

Unchanged strategic approach scores, but differences between educational institutions

Across the three-year period, the strategic approach score scales among the occupational therapy students remained unchanged. The definition of the strategic approach has changed from less

competitive, and more in terms of utilizing organized effort (Entwistle, 2018). Nevertheless, there are arguments for an ego enhancement by achievement, as indicated by having long-term life goals such as wealth and status life goals (Wilding & Andrews, 2006). Good exam performance may be seen as instrumental for achieving such outcomes. Biggs (2001) argued that the motive behind the strategic approach relates more strongly to personality, compared to deep and surface approaches. In support of this reasoning, Postareff et al. (2018) found that across five different courses the strategic study approach had less within-student variation compared to the deep and surface approaches. The researchers, therefore, argued that the strategic study approach is less context-specific and possibly more strongly related to individual characteristics. Understanding levels of strategic study approach to be largely determined by individual factors would contribute to explain the consistent levels of strategic approach across the three study years.

In this study, we found differences between the education institutions regarding the students' strategic approach to studying. The data are insufficient to conclude about the reasons for these differences. However, one viable explanation is that students in the six education institutions had different initial levels of the strategic approach to studying when entering the study program. In fact, the analysis of the first-year students showed that the differences – higher strategic scores among students in Gjøvik, Sandnes and Trondheim – were exactly the same at the outset of the education program (Gramstad et al., 2020). Thus, leaning towards the theory suggesting that strategic approach behaviors are largely trait-based (Biggs, 2001; Postareff et al., 2018) we may conceive the overall differences on this approach as a continuation of the initial differences between the students at the six education institutions.

Sociodemographic covariates to study approaches

In this study, men had significantly higher scores on deep approach and lower on strategic scores than women. Female students' higher scores on the strategic approach confirms the results of our previous study based on first-year data only (Mørk et al., 2020) and have also been reported in other studies of occupational therapy students (Bonsaksen et al., 2017). Higher deep approach scores among men are in line with the results obtained by Sadler-Smith (1996), while diverging results have also been reported (Heijne-Penninga et al., 2008; Rubin et al., 2018; Salamonson et al., 2013). Consistent with findings in previous research (Beccaria et al., 2014; Diseth, 2007b; Douglas et al., 2020; J. T. E. Richardson, 2013; Rubin et al., 2018; Salamonson et al., 2013; Zeegers, 2001), older students had higher scores on deep approach to studying and lower scores on surface approach, compared to younger students. Lastly, in line with a previous study on occupational therapy students (Bonsaksen et al., 2017), we found statistically significant associations between higher scores on the deep and strategic approach scales and spending more time on independent study. Strategic approach behaviors, comprising skills in managing time and effort, have previously been found to be positively related to study progression (Asikainen et al., 2014). Thus, there is a logical association between favoring productive study approaches and spending more time on independent studying, and they may both be important for students' progression during the educational course. As previously suggested, attention should be paid to assisting students develop their study skills and time management skills (Asikainen et al., 2020; Haarala-Muhonen et al., 2017), particularly since organizing skills may be difficult to develop (Parpala et al., 2022; Postareff et al., 2018).

Study limitations and suggestions for future research

Our study has some limitations. It is based on the students' self-evaluations of their approaches to studying, and self-evaluations are always susceptible to social desirability bias – respondents may respond in the way they feel is more socially acceptable. However, the study approaches were measured with three well-established scales, and Cronbach's alphas were good for all scales thus implying good internal validity.

Exploring changes in students' approaches to studying is challenging and some may argue that three measurement points is scarce. At least three measurement points are needed to explore linear growth trajectories and four measurement points to investigate quadratic growth models (Singer et al., 2003; Vanthournout et al., 2013). We have strived to reach a balanced study design allowing for longitudinal analysis without imposing excessive strain on the participating students.

The study allowed for describing the developmental pattern of students' approaches to studying over the course of three years, but our understanding of why students developed like they did is limited. To address this issue, future studies may incorporate qualitative interviews with students that can be used as supplement to questionnaire-based data collection. In addition, investigating how students change their approach to studying in higher education should emphasize context to a larger degree. Therefore, future research on study approaches may focus on the course-, topic- or task level, which would allow for a detailed analysis of how study approaches are related to highly specific contextual variables (Asikainen & Gijbels, 2017).

The study is also limited by its focus on each of the separate study approach scales, and not on the profiles of students – that is, the students' combination of scores on all three study approaches. For instance, Vanthournout et al. (2013) advocated for the consideration of individual differences when investigating developmental trajectories in students' approaches to studying. Recent research has also demonstrated that different combinations of approaches to studying are important in explaining students' academic achievement (Fryer & Vermunt, 2018).

Another limitation of the study is using only one group of professional healthcare students, as all the participants were occupational therapy students enrolled in undergraduate programs in Norway. The specific sample characteristics suggest that the population of students to which the results of this study can be generalized, is limited. Therefore, future studies may focus on other disciplines and may also include comparative analyses of change patterns in different groups of students. In addition, we do not have data concerned with non-responders that might allow for a comparison of participants and non-participants.

Finally, we have compared responders and non-responders at assessment 2 (T2) and assessment 3 (T3) compared to assessment 1 (T1) on selected baseline variables and ASSIST baseline scores. There were no statistically significant differences between students who answered at T2 and baseline, and students who answered at T3 and baseline, regarding selected baseline variables (age, sex, study effort and education institution). The proportion of students enrolled from the different educational institutions varied over time and was significantly different at T2 and T3, compared to baseline (both $p < 0.01$). However, the ASSIST scores at baseline did not differ between those who answered at baseline and assessment 2 ($p = 0.667$), and between those who answered at baseline and assessment 3 ($p = 0.907$). Based on the above, we concluded that we could assume MAR (missing at random) and thus use LMM without any imputation. Model based imputation was not needed given the MAR assumption was fulfilled (Ibrahim & Molenberghs, 2009). Thus, we consider our results still representative for the original target population despite the relatively high level of missingness.

Conclusion and implications

This study aimed to examine changes in occupational therapy students' approaches to studying across the undergraduate study program, with the research question; to what degree do students' study approaches change over time? While the students' scores on strategic approach remained unchanged, the deep approach scores increased, while their scores on surface approach decreased. Overall, therefore, the study suggests that the approaches to studying are changeable, and that they did in fact change in a positive direction throughout the course of the study. Particular attention should be given to students at risk of adopting a surface approach to studying and the kinds of learning environments that best support productive study behaviors. Such environments may comprise supportive relationships between students, and between students and educators, and may also

focus on eliciting teaching and learning experiences that are directly linked to clinical professional practice.










Acknowledgements

The authors thank the students who volunteered to take part in this study. In addition, the authors thank Vår Mathisen (UiT – The Arctic University of Norway, Tromsø), Adrian W. Gran (Western Norway University of Applied Sciences, Bergen) and Kjersti Velde Helgøy (VID Specialized University, Stavanger), who contributed to the data collection for this study.

Disclosure statement

The authors declare that they have no conflicts of interest. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

ORCID

Gry Mørk  <http://orcid.org/0000-0001-6887-7333>
 Astrid Gramstad  <http://orcid.org/0000-0002-2301-5067>
 Lene A. Åsli  <http://orcid.org/0000-0002-5476-0019>
 Linda Stigen  <http://orcid.org/0000-0001-6803-3579>
 Susanne G. Johnson  <http://orcid.org/0000-0002-2500-8952>
 Trine A. Magne  <http://orcid.org/0000-0003-2063-6009>
 Tove Carstensen  <http://orcid.org/0000-0002-7619-6623>
 Milada C. Småstuen  <http://orcid.org/0000-0001-8947-8649>
 Tore Bonsaksen  <http://orcid.org/0000-0001-6315-1111>

References

- Asikainen, H., & Gijbels, D. (2017). Do students develop towards more deep approaches to learning during studies? A systematic review on the development of students' deep and surface approaches to learning in higher education. *Educational Psychology Review*, 29(2), 205–234. <https://doi.org/10.1007/s10648-017-9406-6>
- Asikainen, H., Parpala, A., Lindblom-Ylänne, S., Vanthournout, G., & Coertjens, L. (2014). The development of approaches to learning and perceptions of the teaching-learning environment during bachelor level studies and their relation to study success. *Higher Education Studies*, 4(4), 24–36. <https://doi.org/10.5539/hes.v4n4p24>
- Asikainen, H., Salmela-Aro, K., Parpala, A., & Katajavuori, N. (2020). Learning profiles and their relation to study-related burnout and academic achievement among university students. *Learning and Individual Differences*, 78, 1–7. <https://doi.org/10.1016/j.lindif.2019.101781>
- Baeten, M., Kyndt, E., Struyven, K., & Dochy, F. (2010). Using student-centred learning environments to stimulate deep approaches to learning: Factors encouraging or discouraging their effectiveness. *Educational Research Review*, 5(3), 243–260. <https://doi.org/10.1016/j.edurev.2010.06.001>
- Ballantine, J. A., Duff, A., & Larres, P. M. (2008). Accounting and business students' approaches to learning: A longitudinal study. *Journal of Accounting Education*, 26(4), 188–201. <https://doi.org/10.1016/j.jaccedu.2009.03.001>
- Beusaert, S. A. J., Segers, M. S. R., & Wiltink, D. P. A. (2013). The influence of teachers' teaching approaches on students' learning approaches: The student perspective. *Educational Research*, 55(1), 1–15. <https://doi.org/10.1080/00131881.2013.767022>
- Beccaria, L., Kek, M., Huijser, H., Rose, J., & Kimmins, L. (2014). The interrelationships between student approaches to learning and group work. *Nurse Education Today*, 34(7), 1094–1103. <https://doi.org/10.1016/j.nedt.2014.02.006>
- Biggs, J. (2001). *Enhancing learning: A matter of style or approach?* Lawrence Erlbaum Associates Publishers.
- Biggs, J., & Tang, C. (2011). *Teaching for quality learning at university*. (4th ed. Vol. 5): Open University Press.
- Bonsaksen, T., Gramstad, A., Mørk, G., & Johnson, S. G. (2019). Perceptions of assessment in Norwegian occupational therapy students. *Journal of Occupational Therapy Education*, 3(3), 1–13. <https://doi.org/10.26681/jote.2019.030302>
- Bonsaksen, T., Magne, T. A., Stigen, L., Gramstad, A., Åsli, L. A., Mørk, G., Johnson, S. G., & Carstensen, T. (2021). Associations between occupational therapy students' academic performance and their study approaches and perceptions of the learning environment. *BMC Medical Education*, 21(1), 496. <https://doi.org/10.1186/s12909-021-02940-0>

- Bonsaksen, T., Sadeghi, T., & Thørrisen, M. (2017). Associations between self-esteem, general self-efficacy, and approaches to studying in occupational therapy students: A cross-sectional study. *Occupational Therapy in Mental Health*, 33(4), 326–341. <https://doi.org/10.1080/0164212X.2017.1295006>
- Bonsaksen, T., Småstuen, M. C., Thørrisen, M. M., Fong, K., Lim, H. B., & Brown, T. (2019). Factor analysis of the approaches and study skills inventory for students in a cross-cultural occupational therapy undergraduate student sample. *Australian Occupational Therapy Journal*, 66(1), 33–43. <https://doi.org/10.1111/1440-1630.12504>
- Bonsaksen, T., Thørrisen, M. M., & Sadeghi, T. (2017). Occupational therapy students in Norway: Do their approaches to studying vary by year in the program? *The Open Journal of Occupational Therapy*, 5(4), 1–12. <https://doi.org/10.15453/2168-6408.1339>
- Chen, Y., Henning, M., Yelder, J., Jones, R., Wearn, A., & Weller, J. (2015). Progress testing in the medical curriculum: Students' approaches to learning and perceived stress. *BMC Medical Education*, 15(1), 147. <https://doi.org/10.1186/s12909-015-0426-y>
- Dalomba, E., Stigen, L., Johnson, S. G., Mørk, G., Gramstad, A., Magne, T. A., Carstensen, T., Åsli, L. A., & Bonsaksen, T. (2020). Psychometric properties and associations between subscales of a study approach measure. *Nursing & Health Sciences*, 22(4), 941–948. <https://doi.org/10.1111/nhs.12750>
- Diseth, Å. (2001). Validation of a Norwegian version of the approaches and study skills inventory for students (ASSIST): Application of structural equation modelling. *Scandinavian Journal of Educational Research*, 45(4), 381–394. <https://doi.org/10.1080/00313830120096789>
- Diseth, Å. (2007a). Approaches to learning, course experience and examination grade among undergraduate psychology students: Testing of mediator effects and construct validity. *Studies in Higher Education*, 32(3), 373–388. <https://doi.org/10.1080/03075070701346949>
- Diseth, Å. (2007b). Students' evaluation of teaching, approaches to learning, and academic achievement. *Scandinavian Journal of Educational Research*, 51(2), 185–204. <https://doi.org/10.1080/00313830701191654>
- Donaghy, M., & Morss, K. (2007). An evaluation of a framework for facilitating and assessing physiotherapy students' reflection on practice. *Physiotherapy Theory and Practice*, 23(2), 83–94. <https://doi.org/10.1080/09593980701211952>
- Douglas, H. E., Rubin, M., Scevak, J., Southgate, E., Macqueen, S., & Richardson, J. T. E. (2020). Older women, deeper learning: Age and gender interact to predict learning approach and academic achievement at university. *Frontiers in Education*, 5(158), 1–12. <https://doi.org/10.3389/educ.2020.00158>
- Edmunds, R., & Richardson, J. T. E. (2009). Conceptions of learning, approaches to studying and personal development in UK higher education. *British Journal of Educational Psychology*, 79(2), 295–309. <https://doi.org/10.1348/000709908X368866>
- English, L., Luckett, P., & Mladenovic, R. (2004). Encouraging a deep approach to learning through curriculum design. *Accounting Education*, 13(4), 461–488. <https://doi.org/10.1080/0963928042000306828>
- Entwistle, N. J. (2009). *Teaching for understanding at university: Deep approaches and distinctive ways of thinking*. Palgrave Macmillan.
- Entwistle, N. J. (2018). *Student learning and academic understanding: A research perspective with implications for teaching*. Academic Press.
- Entwistle, N. J., McCune, V., & Tait, H. (2013). *Approaches and study skills inventory for students (ASSIST). Report of the development and use of the inventories*. https://www.researchgate.net/profile/Noel_Entwistle/publication/260291730_Approaches_and_Study_Skills_Inventory_for_Students_ASSIST_incorporating_the_Revised_Approaches_to_Studying_Inventory_-_RASI/links/0c9605309dcd0be973000000
- Entwistle, N. J., & Ramsden, P. (2015). *Understanding student learning*. Routledge.
- Fryer, L. K., & Vermunt, J. D. (2018). Regulating approaches to learning: Testing learning strategy convergences across a year at university. *British Journal of Educational Psychology*, 88(1), 21–41. <https://doi.org/10.1111/bjep.12169>
- Fyrenius, A., Wirell, S., & Silén, C. (2007). Student approaches to achieving understanding—approaches to learning revisited. *Studies in Higher Education*, 32(2), 149–165. <https://doi.org/10.1080/03075070701267194>
- Gijbels, D., Coertjens, L., Vanthournout, G., Struyf, E., & Van Petegem, P. (2009). Changing students' approaches to learning: A two-year study within a university teacher training course. *Educational Studies*, 35(5), 503–513. <https://doi.org/10.1080/03055690902879184>
- Gramstad, A., Åsli, L. A., Johnson, S. G., Magne, T. A., Carstensen, T., Mørk, G., Stigen, L., & Bonsaksen, T. (2020). Approaches to studying: A cross-sectional comparison of occupational therapy students in six education programs in Norway. *The Open Journal of Occupational Therapy*, 8(2), 1–9. <https://doi.org/10.15453/2168-6408.1683>
- Haarala-Muhonen, A., Ruohoniemi, M., Parpala, A., Komulainen, E., & Lindblom-Ylänne, S. (2017). How do the different study profiles of first-year students predict their study success, study progress and the completion of degrees? *Higher Education*, 74(6), 949–962. <https://doi.org/10.1007/s10734-016-0087-8>
- Hall, M., Ramsay, A., & Raven, J. (2004). Changing the learning environment to promote deep learning approaches in first-year accounting students. *Accounting Education*, 13(4), 489–505. <https://doi.org/10.1080/0963928042000306837>

- Heijne-Penninga, M., Kuks, J. B., Hofman, W. A., & Cohen-Schotanus, J. (2008). Influence of open- and closed-book tests on medical students' learning approaches. *Medical Education*, 42(10), 967–974. <https://doi.org/10.1111/j.1365-2923.2008.03125.x>
- Herrmann, K., Bager-Elsborg, A., & McCune, V. (2017). Investigating the relationships between approaches to learning, learner identities and academic achievement in higher education. *Higher Education*, 74(3), 385–400. <https://doi.org/10.1007/s10734-016-9999-6>
- Ibrahim, J. G., & Molenberghs, G. (2009). Missing data methods in longitudinal studies: A review. *Test*, 18(1), 1–43. <https://doi.org/10.1007/s11749-009-0138-x>
- Kember, D., Wong, A., & Leung, D. Y. (1999). Reconsidering the dimensions of approaches to learning. *British Journal of Educational Psychology*, 69(3), 323–343. <https://doi.org/10.1348/000709999157752>
- Lizzio, A., Wilson, K., & Simons, R. (2002). University students' perceptions of the learning environment and academic outcomes: Implications for theory and practice. *Studies in Higher Education*, 27(1), 27–52. <https://doi.org/10.1080/03075070120099359>
- Marton, F., Hounsell, D., & Entwistle, N. J. (1997). *The experience of learning: Implications for teaching and studying in higher education*. Scottish Academic Press.
- Marton, F., & Säljö, R. (1976). On qualitative differences in learning: I—outcome and process*. *British Journal of Educational Psychology*, 46(1), 4–11. <https://doi.org/10.1111/j.2044-8279.1976.tb02980.x>
- Ministry of Education and Research. (2014). *The Norwegian qualifications framework for lifelong learning*. https://www.nokut.no/siteassets/nkr/20140606_norwegian_qualifications_framework.pdf
- Mørk, G., Magne, T. A., Carstensen, T., Stigen, L., Åsli, L. A., Gramstad, A., Johnson, S. G., & Bonsaksen, T. (2020). Associations between learning environment variables and students' approaches to studying: A cross-sectional study. *BMC Medical Education*, 20(1), 120. <https://doi.org/10.1186/s12909-020-02033-4>
- Nguyen, T. M. (2016). Learning approaches, demographic factors to predict academic outcomes. *International Journal of Educational Management*, 30(5), 653–667. <https://doi.org/10.1108/IJEM-06-2014-0085>
- Nijhuis, J., Segers, M., & Gijsselaers, W. (2008). The extent of variability in learning strategies and students' perceptions of the learning environment. *Learning and Instruction*, 18(2), 121–134. <https://doi.org/10.1016/j.learninstruc.2007.01.009>
- Parpala, A., Mattsson, M., Herrmann, K. J., Bager-Elsborg, A., & Hailikari, T. (2022). Detecting the variability in student learning in different disciplines—A person-oriented approach. *Scandinavian Journal of Educational Research*, 66(6), 1020–1037. <https://doi.org/10.1080/00313831.2021.1958256>
- Pires, E. M. S. G., Daniel-Filho, D. A., de Nooijer, J., & Dolmans, D. H. (2020). Collaborative learning: Elements encouraging and hindering deep approach to learning and use of elaboration strategies. *Medical Teacher*, 42(11), 1261–1269. <https://doi.org/10.1080/0142159X.2020.1801996>
- Piumatti, G., Abbiati, M., Gerbase, M. W., & Baroffio, A. (2021). Patterns of change in approaches to learning and their impact on academic performance among medical students: Longitudinal analysis. *Teaching and Learning in Medicine*, 33(2), 173–183. <https://doi.org/10.1080/10401334.2020.1814295>
- Postareff, L., Lindblom-Ylänne, S., & Parpala, A. (2014). Explaining university students' strong commitment to understand through individual and contextual elements. *Frontline Learning Research*, 2(1), 31–49. <https://doi.org/10.14786/flr.v2i1.63>
- Postareff, L., Mattsson, M., & Parpala, A. (2018). The effect of perceptions of the teaching-learning environment on the variation in approaches to learning – between-student differences and within-student variation. *Learning and Individual Differences*, 68, 96–107. <https://doi.org/10.1016/j.lindif.2018.10.006>
- Prat-Sala, M., & Redford, P. (2010). The interplay between motivation, self-efficacy, and approaches to studying. *British Journal of Educational Psychology*, 80(2), 283–305. <https://doi.org/10.1348/000709909X480563>
- Richardson, J. T. E. (1997). Meaning orientation and reproducing orientation: A typology of approaches to studying in higher education? *Educational Psychology*, 17(3), 301–311. <https://doi.org/10.1080/0144341970170305>
- Richardson, J. T. E. (2010). Perceived academic quality and approaches to studying in higher education: Evidence from Danish students of occupational therapy. *Scandinavian Journal of Educational Research*, 54(2), 189–203. <https://doi.org/10.1080/00313831003637972>
- Richardson, J. T. E. (2013). Approaches to studying across the adult life span: Evidence from distance education. *Learning and Individual Differences*, 26, 74–80. <https://doi.org/10.1016/j.lindif.2013.04.012>
- Richardson, M., Abraham, C., & Bond, R. (2012). Psychological correlates of university students' academic performance: A systematic review and meta-analysis. *Psychological Bulletin*, 138(2), 353–387. <https://doi.org/10.1037/a0026838>
- Rubin, M., Scevak, J., Southgate, E., Macqueen, S., Williams, P., & Douglas, H. (2018). Older women, deeper learning, and greater satisfaction at university: Age and gender predict university students' learning approach and degree satisfaction. *Journal of Diversity in Higher Education*, 11(1), 82–96. <https://doi.org/10.1037/dhe0000042>
- Sadler-Smith, E. (1996). Approaches to studying: Age, gender and academic performance. *Educational Studies*, 22(3), 367–379. <https://doi.org/10.1080/0305569960220306>

- Salamonson, Y., Weaver, R., Chang, S., Koch, J., Bhathal, R., Khoo, C., & Wilson, I. (2013). Learning approaches as predictors of academic performance in first year health and science students. *Nurse Education Today*, 33(7), 729–733. <https://doi.org/10.1016/j.nedt.2013.01.013>
- Singer, J. D., Willett, J. B., & Willett, J. B. (2003). *Applied longitudinal data analysis: Modeling change and event occurrence*. Oxford university press.
- Smith, S. N., & Miller, R. J. (2005). Learning approaches: Examination type, discipline of study, and gender. *Educational Psychology*, 25(43), 43–53. <https://doi.org/10.1080/0144341042000294886>
- Stigen, L., Mørk, G., Carstensen, T., Magne, T. A., Gramstad, A., Johnson, S. G., Småstuen, M. C., & Bonsaksen, T. (2022). Perceptions of the academic learning environment among occupational therapy students – changes across a three-year undergraduate study program. *BMC Medical Education*, 22(1), 313. <https://doi.org/10.1186/s12909-022-03291-0>
- Tho, N. D., Trang, N. T. M., & Gregory, S. (2020). Positivity and quality of college life of business students: The mediating role of learning approaches. *Studies in Educational Evaluation*, 66, 100908. <https://doi.org/10.1016/j.stueduc.2020.100908>
- Thordardottir, B., Stigen, L., Magne, T. A., Johnson, S. G., Gramstad, A., Gran, A. W., Åsli, L. A., Mørk, G., & Bonsaksen, T. (2022). Student perceptions of the learning environment in Norwegian occupational therapy education programs. *Scandinavian Journal of Occupational Therapy*, 29(1), 25–32. <https://doi.org/10.1080/11038128.2020.1831058>
- Thorrissen, M. M., Mørk, G., Åsli, L. A., Gramstad, A., Stigen, L., Magne, T. A., Carstensen, T., Johnson, S. G., Brown, T., Lim, H. B., Fong, K. N. K., & Bonsaksen, T. (2022). Student characteristics associated with dominant approaches to studying: Comparing a national and an international sample. *Scandinavian Journal of Occupational Therapy*, 29(1), 13–24. <https://doi.org/10.1080/11038128.2020.1831056>
- Thygesen, H., Gramstad, A., Åsli, L. A., Stigen, L., Magne, T. A., Carstensen, T., & Bonsaksen, T. (2020). Associations between learning environment factors and student satisfaction among occupational therapy students. *Irish Journal of Occupational Therapy*, 48(2), 91–100. <https://doi.org/10.1108/IJOT-10-2019-0015>
- Vanthournout, G., Coertjens, L., Gijbels, D., Donche, V., & Van Petegem, P. (2013). Assessing students' development in learning approaches according to initial learning profiles: A person-oriented perspective. *Studies in Educational Evaluation*, 39(1), 33–40. <https://doi.org/10.1016/j.stueduc.2012.08.002>
- Vanthournout, G., Donche, V., & Gijbels, D. (2013). (Dis) similarities in research on learning approaches and learning patterns. In D. Gijbels, V. Donche, J. T. E. Richardson, & J. D. Vermunt (Eds.), *Learning patterns in higher education* (pp. 11–32). Routledge.
- Vermetten, Y. J., Lodewijks, H. G., & Vermunt, J. D. (1999). Consistency and variability of learning strategies in different university courses. *Higher Education*, 37(1), 1–21. <https://doi.org/10.1023/A:1003573727713>
- Vermunt, J. D. (2005). Relations between student learning patterns and personal and contextual factors and academic performance. *Higher Education*, 49(3), 205–234. <https://doi.org/10.1007/s10734-004-6664-2>
- Walker, R., Spronken-Smith, R., Bond, C., McDonald, F., Reynolds, J., & McMartin, A. (2010). The impact of curriculum change on health sciences first year students' approaches to learning. *Instructional Science*, 38(6), 707–722. <https://doi.org/10.1007/s11251-009-9092-y>
- Ward, P. J. (2011a). First year medical students' approaches to study and their outcomes in a gross anatomy course. *Clinical Anatomy*, 24(1), 120–127. <https://doi.org/10.1002/ca.21071>
- Ward, P. J. (2011b). Influence of study approaches on academic outcomes during pre-clinical medical education. *Medical Teacher*, 33(12), e651–e662. <https://doi.org/10.3109/0142159X.2011.610843>
- Wierstra, R. F., Kanselaar, G., Van der Linden, J. L., Lodewijks, H. G., & Vermunt, J. D. (2003). The impact of the university context on European students' learning approaches and learning environment preferences. *Higher Education*, 45(4), 503–523. <https://doi.org/10.1023/A:1023981025796>
- Wilcock, A. A. (2000). Development of a personal, professional and educational occupational philosophy: An Australian perspective. *Occupational Therapy International*, 7(2), 79–86. <https://doi.org/10.1002/oti.108>
- Wilding, J., & Andrews, B. (2006). Life goals, approaches to study and performance in an undergraduate cohort. *British Journal of Educational Psychology*, 76(1), 171–182. <https://doi.org/10.1348/000709904X24726>
- World Federation of Occupational Therapists. (2016). *Minimum standards for the education of occupational therapists* (10th ed.). World Federation of Occupational Therapists (WFOT).
- Zeegers, P. (2001). Approaches to learning in science: A longitudinal study. *British Journal of Educational Psychology*, 71(1), 115–132. <https://doi.org/10.1348/000709901158424>