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Students' learning approaches as a factor of academic achievement at selected public universities: A cross-sectional study

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Introduction: Excellence in anesthesia education has been advocated to meet the current and future needs of society. Universities play a key role in creating a conducive climate for learning and facilitating the development of expected competencies among graduates. This study assessed students' learning approaches and their relationship with their academic achievement at two selected public universities in Ethiopia.

Materials and methods: A cross-sectional study was conducted on 123 anesthesia students. All 3rd- and 4th-year students were recruited for the study. Study Skills Inventory for Students (ASSIST) was used to assess students' learning approaches. Perceived performance, cumulative grade point average (cGPA), and 100 MCQ items were used to assess academic achievement. Data were entered into Epi-data and exported to SPSS for statistical analysis. An independent *t*-test was used to determine the presence of a difference in academic achievement across learning approaches. Bivariate and multivariable linear regressions were fitted to assess the association of students' characteristics and learning approaches with their academic achievement. A *P*-value of less than 0.05 was used to declare the statistical significance.

Result: There were no statistically significant differences between the groups on most of the learning approaches and academic achievement measures. In multivariable linear regression, university entrance exam results, students' perception of the definition of learning, and a deep approach to learning were found to be the predictors of students' academic achievement ($\beta = 0.004$ and $P = 0.03$, $\beta = 0.14$ and $P = 0.015$, and $\beta = 0.13$ and $P = 0.023$), respectively.

Conclusion: In this study, students mainly follow deep approaches to learning, and there were no statistically significant differences between the groups on most of the learning approach measures and academic achievements.

Entrance exam results, positive perception of the definition of learning, and a deep approach to learning were found to be positive predictors of academic achievement. Emphasis has to be given to improving students' learning approaches for better academic achievement and success.

KEYWORDS

academic achievement, higher education, learning approach, students' performance, university students

Introduction

Learning approaches are strategies applied to learning that are critical to success, considered essential for acquiring good grades, and useful for learning throughout one's life. Researchers and experts identified three types of learning approaches that students can follow in higher education institutions (Smith and Colby, 2007; McLoone and Oluwadun, 2014; Brown et al., 2015). These include deep, surface, and strategic approaches to learning. The surface learning approach is memorizing, syllabus-bound, and exam-oriented, whereas the deep approach to learning is seeking for meaning, relating ideas, and using evidence in learning. A deep approach to learning can help students to understand the concept and improve their academic performance. Students may follow the surface learning approach due to fear of failure, stress, and lack of purpose. The third approach is strategic learning, which focuses on using either deep or surface learning approaches depending on the context or situation accordingly. This approach is efficient in terms of time and space, which emphasizes achieving the best grades (D'cruz and Rajaratnam, 2018). However, such a strategy is motivated by fear of failure and exam-oriented (Abedin et al., 2013; McLoone and Oluwadun, 2014; Brown et al., 2015).

Research on how students learn started in Sweden, where Marton and Saljo (1976) identified surface and deep approaches to learning. These researchers recommended higher education educators to advocate and support students to follow deep approaches to learning to enable students to understand concepts and retain knowledge for future application. According to these researchers, the curricula of higher education should be shifted from a teacher-centered approach to a student-centered approach using constructive alignment of learning outcomes with appropriate content, teaching, and assessment methods to enhance student's learning and academic performance (Wang et al., 2013; McLoone and Oluwadun, 2014; Ali, 2018). In a student-centered curriculum, students are given greater responsibility for their own learning. The role of educators in such a curriculum is facilitating, mentoring, and being a role model and critical friend for their students (Hsieh et al., 2015).

Students who use a deep learning approach are intrinsically motivated to learn and focus on understanding the study

material, whereas students who use a surface learning approach memorize facts without understanding the subject matter fully. Intrinsically motivated students with deep learning approaches learn for understanding and mastery, intending to correlate new knowledge with existing knowledge with a focus on the application of knowledge (D'cruz and Rajaratnam, 2018; Mladenovici et al., 2021).

The expansion and development of health science education in Ethiopia was gradual before the 1990s until it gets accelerated thereafter (Misganaw et al., 2022). As a result, several undergraduate and graduate programs have been opened in health science fields in the country and the number of institutions running health science programs has increased. In line with the expansion of programs in health science colleges, curricula for health science programs underwent several metamorphoses.

There are variable experiences globally regarding the bachelor's degree training program in anesthesia, with training duration ranging from 24 to 60 months depending on entry behavior and expected scope of practice. The training duration for those who join the program from a clinical background (e.g., nursing, midwifery, pharmacy, or clinical officer) is usually lower than those joining directly from high school.

According to recent studies (Kinnear et al., 2013; Milenovic et al., 2018), there are five African countries providing bachelor's degrees in anesthesia programs, with a direct entry from high school. Sudan and Ethiopia provide this training in 48 months (4 years); Rwanda, Burundi, and Zambia in 60 months (5 years). However, the curriculum content, scope of practice, and working conditions/level of supervision of these graduates from these different countries are quite different. For instance, in Zambia, bachelor non-physician clinical officer anesthesiologists are trained for 3 years to become general clinical officers and then for a further 2 years in anesthesia before they are qualified (Kinnear et al., 2013). The scope and supervision level of practices across these countries vary significantly (Rosseel et al., 2010; Kinnear et al., 2013; Meara et al., 2015; Kibwana et al., 2016; Federspiel et al., 2018; Edgcombe et al., 2019; Law et al., 2019).

The Ministry of Education of Ethiopia in collaboration with different stakeholders has given due emphasis to revise

the curricula of undergraduate health programs, including the anesthesia program, to foster quality of education in health professionals' training. Currently, a competency-based innovative and modularized curriculum is being advocated by health science education experts. Following this recommendation, Debre Tabor University has adapted an innovative competency-based curriculum since 2013. The essential features of this curriculum are problem-solving, community-based education, integration, and early clinical exposure. This is a paradigm shift from a teacher-centered approach to the student-centered approach to learning and teaching, which leads to learning how to learn, learning by doing, and life-long learning skills (Bould et al., 2012).

However, these curricula are not harmonized, and institutions are still using different curricula for the same program throughout the country. Since all anesthesia students attending their education at different institutions have the same goal, the learning approaches need to be assessed to create a conducive learning approach to enable students to efficiently achieve the desired competencies. Thus, assessing students' learning approaches and academic achievement is very much relevant for anesthesia schools to improve students' performance and success (Sengupta et al., 2017). Moreover, there is minimal or no evidence in Ethiopia regarding higher education students' learning approaches and how these relate to their academic achievements. Therefore, this study assessed the learning approaches and academic achievement, and the relationship between students' characteristics, learning approaches, and academic achievement of undergraduate anesthesia students from two purposely selected universities in Ethiopia. The evidence generated from the study is expected to contribute to the curriculum development, implementation, and review process, and ultimately to the overall improvement of the quality of anesthesia education.

Materials and methods

Study design and area

The institution-based correctional study was conducted at two public universities in Ethiopia, namely, Debre Tabor University (DTU) and University of Gondar (UoG).

In contrast to the national harmonized curriculum being implemented in other institutions, DTU executes a competency-based hybrid innovative curriculum built on the strengths of the traditional curriculum, used in the rest of anesthesia schools of Ethiopian public universities, by incorporating innovative and transformative features highlighted in the SPICES model (student-centered, problem-based, integrated, community-based, and systematic). This is a new educational strategy for curriculum development, which include (1) competency-based curriculum design; (2) vertical and horizontal integration of the

courses and clinical experiences into a conceptually meaningful structure; (3) use of innovative educational strategies, such as problem-based learning (PBL); and (4) early and longitudinal clinical and community exposure (Misganaw et al., 2022).

At the time of data collection, in DTU, a total of 67 students were attending the undergraduate anesthesia program from 1st to 4th year. In contrast, UoG has the oldest anesthesia school with a conventional curriculum, along with other Ethiopian public universities providing anesthesia program. At the time of data collection, 140 anesthesia students were studying in the school of anesthesia at UoG.

Study population

All 3rd- and 4th-year anesthesia students who were willing to participate and those who did not fail to pass a particular class were included. Totally, 123 students participated in the study from the two institutions, i.e., 32 and 91 from DTU and UoG, respectively. The minimum sample size calculated using the G*power 3.0.10 software at a 0.05 margin of error and 0.8 power, however, was 68. We decided to increase the number of study participants beyond the calculated sample size and recruited 123 eligible students to increase the power of the study.

Study variables

The dependent variables were learning approaches measured using the ASSIST tool and students' perceived performance, cGPA, and MCQ test. We adopted the ASSIST tool to our context to measure students' approaches to learning on mainly three dimensions referred to as main scales; deep, strategic, and surface-apathetic (Entwistle, 1991; Genn, 2001; Brown et al., 2015; D'cruz and Rajaratnam, 2018). The 3rd-year students were excluded from the MCQ test because the difference in curriculum made it difficult to assess both groups of students with the same questions. The cGPA of students was obtained from the registrar of the respective universities.

The independent variables were sociodemographic variables, including students' age, gender, religion, region, residency (rural or urban), and income, and institution-related variables such as entrance exam result in grade 12, choice of department, and institution.

Data collection tool

Approaches and study skills inventory for students

We adopted the ASSIST tool to determine the approach and study skills of anesthesia students. The inventory contains 67 statements, and respondents indicate their agreement with

each statement, using a five-point Likert scale. It consists of four sections. The first section is a six-item measurement of the student's own conception of what the term "learning" means to them. The second section consists of 52 statements related to mainly three dimensions, namely, deep, strategic, and surface-approach. The tool measures students' approaches to learning on mainly three dimensions referred to as main scales: deep, strategic, and surface-approach (Entwistle, 1991; Genn, 2001; Brown et al., 2015; D'cruz and Rajaratnam, 2018).

This questionnaire has been designed to allow students to describe, in a systematic way, how they go about learning and studying. The technique involves asking students a substantial number of questions, which overlap to some extent, to provide good overall coverage of different ways of studying. This tool measures students' learning approaches from three perspectives. These are the perception of students on the definition of learning, approaches to learning, and preference to adopt different ways of learning or course (Abedin et al., 2013).

Data collection process

Data on personal and sociodemographic information, learning approaches, and perceived performance were collected by self-administered questionnaires with a face-to-face approach at both institutions on the same day and time. Similarly, 100 MCQ written exam was administered for 4th-year students in both institutions on the same day and time. The cumulative grade point average (cGPA) of students was obtained from the registrar of respective universities anonymously after written informed consent has obtained from each student.

All of the data collection tools were prepared in English because the study participants were from all ethnic groups in Ethiopia having diversified mother tongue (language), which makes translation very difficult. To enhance students' understanding of the tool, we advised them to use a dictionary and/or ask data collectors for unclear terms/statements during data collection time.

Data analysis

Data with complete information were entered into Epi-data version 4.20 and exported to SPSS (version 20) computer software for analysis. Distributions of variables were checked for normality using histograms, skewness, outliers, Shapiro-Wilk test, and Levine's equality of variance tests. Frequencies, cross tabulations, independent sample *t*-tests, and bivariate and multivariable linear regression were computed and reported using tables and narratives. Mean \pm standard deviation (SD) of learning approach and academic achievement measures were used to compare the groups. The relationship between sociodemographic characteristics and learning approaches to

academic achievement was computed using bivariate and multivariable linear regression. A *p*-value of <0.05 at a 95% confidence interval was used to declare statistical significance.

Ethical considerations

Ethical approval was obtained from the Jimma University Institute of Health Sciences Ethical Review Board (IRB). Then permission letter was submitted to the departments of anesthesia at Debre Tabor University and the University of Gondar. The purpose and importance of the study were explained to the participants, and written informed consent was obtained from each study participant before data collection. Participants were informed that there would be no positive or negative rewards for participating or not participating in the study. Data were collected anonymously to ensure the confidentiality of participants' information.

Results

Sociodemographic characteristics of the study participants

All 3rd- and 4th-year anesthesia students (32 from DTU and 91 from UoG) participated in this study with a 100% response rate. In the following table, chi-square tests were used to compare the categorical variables, whereas mean and standard deviation were used for the continuous variables (Table 1). Previous studies have suggested that the academic achievements of students can be influenced by students' performance in high school, choice of program, monetary support, and other personal and sociodemographic variables (Al-Ansari and El Tantawi, 2015; Takeuchi, 2022). Therefore, we compared these variables among the two institutions before comparing learning approaches and academic achievements between the two groups.

As we can see from the above table, there was no statistically significant difference in the sociodemographic characteristics of the study participants.

Learning approaches

Students were asked to rate the level of agreement/disagreement on the given statements of learning approaches, the definition of learning, and preferences for different types of courses or teaching methods on a five-point Likert scale and compared between the two groups.

This study revealed no statistically significant differences between the groups in their perception of the definition of learning and learning approaches. However, students'

TABLE 1 Sociodemographic characteristics of the study participants at Debre Tabor University (DTU) and University of Gondar (UoG), 2021.

Variables	Group		P-value
	DTU (N = 32)	UoG (N = 91)	
Age (mean ± SD)	22.06 ± 1.19	22.31 ± 1.31	0.35
Sex (%) Male	71.9	74.7	0.81
Female	28.1	25.3	
Entrance result (mean ± SD)	485.66 ± 15.63	504.84 ± 18.07	0.12
Choice of dept (%) 1st choice	96.9	91.2	0.44
Not 1st choice	3.1	8.8	
Year (%) 3rd year	59.4	47.3	
4th year	40.6	52.7	0.30
Residence (%) Urban	28.1	41.8	
Rural	71.9	58.2	0.20
Region (%) Amara	100.0	91.2	
Others	0.0	8.8	0.11
Religion (%) Orthodox	100.0	94.5	
Other	0.0	5.5	0.32
Income (mean ± SD)	379.69 ± 516.16	417.58 ± 306.9	0.62

SD, standard deviation; DTU, Debre Tabor University; UoG, University of Gondar; N, number; %, percent.

preference to attend different courses or different ways of teaching showed a significant difference between the groups ($P = 0.015$) with an effect size of 0.55 (Table 2). No statistically significant differences were observed in the learning approaches based on gender.

Academic achievement

The academic achievements of anesthesia students were assessed using perceived performance (PP) on a five-point Likert scale, 100 MCQ exams (only for 4th-year students), and cumulative grade point average (cGPA). Variances were homogeneous for these measurements in the two groups as assessed by Levine's test for equality of variances ($P = 0.44$, 0.81, and 0.14, respectively). According to this study, there were no statistically significant differences between the groups in academic achievements (Table 3).

Relationship of sociodemographic characteristics with academic achievement (cumulative grade point average)

Sociodemographic variables with a p -value of ≤ 0.25 on the bivariate regression were selected for multivariable linear regression. On multivariable analysis, students' entrance exam

results showed a strong positive association with the cGPA of students ($\beta = 0.004$, $P = 0.03$) (Table 4).

Relationship of students' learning approaches with their academic achievement (cumulative grade point average)

The association of learning approaches with academic achievement (cGPA) was also computed using multivariable linear regression. The analysis revealed that the perception of anesthesia students on the definition of learning revealed a strong relationship with students' cGPA ($\beta = 0.148$ and $p = 0.015$), whereas surface learning approaches showed a strong negative relationship with cGPA ($\beta = -0.17$ and $p = 0.023$) (Table 5).

As we can see from the above table, the more the students have a positive perception of the definition of learning, the more they score in academic achievement. In contrast, students who follow surface approaches to learning will score lower in academic achievement.

Discussion

The main aim of this study was to assess the learning approaches being used by undergraduate anesthesia students and identify predictors of academic achievement in two selected public universities in Ethiopia. The study revealed that anesthesia students from both universities preferred to follow deep and strategic approaches to learning than surface approaches to learning. Students following deep approaches to learning are internally motivated and inclined to understand the material by taking an active part in their own learning (Abedin et al., 2013; Bhat and Khandai, 2016). This could be because anesthesia students have the orientation to manage high-risk cases independently after graduation, and teaching learning is more practical. The other possible explanation is that students may prefer deep approaches to learning when they have a positive perception of their educational environment and when they feel the program they are attending is important (Cebeci et al., 2013). Even though the program of studies is not similar, the finding of this study is in line with studies conducted in India (D'cruz and Rajaratnam, 2018) and Turkey (Cebeci et al., 2013) in which students preferred deep approaches to their learning.

This study showed no statistically significant differences in the perception of students regarding the definition of learning, deep learning, strategic, and surface learning approaches between the two groups of students. However, a statistically significant difference was found between the two groups regarding the preferences for different ways of teaching or courses. According to this finding, students from DTU tend

TABLE 2 Comparison of learning approaches of anesthesia students at Debre Tabor University (DTU) and University of Gondar (UoG), 2021.

Variable	Group	N	Mean ± SD	P-value	T	df	Effect size
Definition of learning	UoG	91	4.08 ± 0.59	0.09	-1.69	121	0.59
	DTU	32	4.28 ± 0.50				
Deep approaches	UoG	91	3.72 ± 0.55	0.35	-0.96	121	0.2
	DTU	32	3.83 ± 0.55				
Strategic approaches	UoG	91	3.64 ± 0.56	0.09	-1.66	121	0.35
	DTU	32	3.83 ± 0.50				
Surface approaches	UoG	91	3.5 ± 0.55	0.9	-0.12	121	0
	DTU	32	3.5 ± 0.56				
Course preferences	UoG	91	3.68 ± 0.60	0.01*	-2.47	121	0.55
	DTU	32	3.98 ± 0.47				

UoG, University of Gondar; DTU, Debre Tabor University; N, number; SD, standard deviation; *, statistically significant.

TABLE 3 Comparison of anesthesia students' academic achievement at Debre Tabor University (DTU) and University of Gondar (UoG), 2021.

Academic achievement	Group	N	Mean ± SD	P-value	T	df	Effect size
MCQ result	UoG	47	51.96 ± 10.8	0.06	-1.92	58	0.60
	DTU	13	58.46 ± 10.7				
Perceived performance	UoG	91	3.79 ± 0.87	0.14	-1.47	121	0.30
	DTU	32	4.06 ± 0.91				
cGPA of participant	UoG	91	3.23 ± 0.34	0.91	0.11	121	0.02
	DTU	32	3.22 ± 0.40				

N, number; SD, standard deviation.

to prefer to follow different ways of learning or courses than students from UoG ($p = 0.015$).

Similar to most of the learning approach measures, there were no statistically significant differences in anesthesia students' perceived performance, MCQ results, and cGPA. This similarity might be either due to the small sample size in this study might have failed to detect the differences or could be due to similarity in the perception of students on the learning approaches or both.

We used cumulative grade point average (cGPA) to correlate the academic achievement of anesthesia students with personal characteristics and learning approaches because we believed that cGPA is a better measurement of students' long-term academic achievement. In this study, university entrance exam results showed a statistically significant positive association with their academic achievement (cGPA) ($\beta = 0.004$, $p = 0.03$). In line with our findings, even though several psychological, cognitive, social, and personal factors can affect the academic achievement of students, some researchers in education agree that students' high school performance and entrance exam results are better predictors of their academic performance in university studies (Rheault and Shaferlich-Coulson, 1988; Häkkinen, 2004; Olani, 2009; Hamaideh and Hamdan-Mansour, 2014).

Regarding the learning approaches of anesthesia students, the perception of the students on the definition of learning showed a statistically significant positive association with cGPA, whereas the surface learning approach was negatively associated with cGPA ($\beta = 0.14$, $P = 0.01$ and $\beta = -0.17$, $P = 0.023$), respectively. This implies that students who prefer using the

surface learning approach are more likely to score lower grades (cGPA) than those who follow deep approaches to learning. Even though it is not statistically significant, deep approaches to learning showed a positive association with cGPA. Furthermore, the use of strategic learning approaches and preference for different teachings and/or courses showed a negative association with cGPA.

The positive relationship between learning approaches and academic achievement is supported by studies conducted on different undergraduate health science programs (Lizzio et al., 2002; Al-Ansari and El Tantawi, 2015; Park et al., 2015; Ahmed et al., 2018; D'cruz and Rajaratnam, 2018; Mørk et al., 2020). In addition, students' habits of study also have a significant impact on their academic achievement (Abraham et al., 2008). Thus, the learning approaches and study skills of students are very essential in achieving better grades and the desired competencies of graduates (Cebeci et al., 2013; D'cruz and Rajaratnam, 2018).

Strengths and limitations

This is the first study in Ethiopia that has tried to assess the learning approaches as a correlate of academic achievement using standardized tools. The limitations of this study could be a lack of randomization in selecting the study participants and poor control of other factors affecting students' approaches to learning and academic achievement, which could affect the generalizability of the findings.

TABLE 4 Multivariable linear regression of sociodemographic variables with cumulative grade point average (cGPA) of anesthesia students at Debre Tabor University (DTU) and University of Gondar (UoG), 2021.

Variables	Unstandardized coefficients		95% CI	P-value
	β	SE		
Constant	1.54	0.83	-0.09–3.18	0.06
Entrance result	0.00	0.00	0.00–0.00	0.03*
Religion	0.20	0.16	-0.11–0.52	0.21
Residency	0.07	0.06	-0.05–0.21	0.25
Year of study	0.06	0.06	-0.06–0.20	0.97
Choice of dept.	-0.13	0.12	-0.38–0.11	0.29

Model, backward; β , unstandardized beta coefficient; SE, standard error; $R^2 = 0.033$; maximum VIF = 1.16. *Statistically significant association.

TABLE 5 The relationship between anesthesia students' learning approaches and academic achievement [grade point average (cGPA)] at Debre Tabor University (DTU) and University of Gondar (UoG), 2021.

Variables	Unstandardized coefficients		95% CI	P-value
	β	SE		
Constant	2.70	0.27	2.15–3.24	0.00
Definition for learning	0.14	0.06	0.03–0.26	0.01*
Deep approaches	0.13	0.07	-0.02–0.28	0.08
Strategic approaches	-0.01	0.08	-0.18–0.15	0.86
Surface approaches	-0.17	0.07	-0.32–0.02	0.02*
Preference of different course	-0.08	0.07	-0.22–0.05	0.22

Max. VIF = 1.89; $R^2 = 0.10$; β , beta coefficient (unstandardized); SE, standard error; CI, confidence interval; *, strong association.

Conclusion

The learning environment, the curriculum being used, and personal motivation to learn can all influence the learning approach and academic achievement. The learning approach can be divided into three, namely, surface-level, strategic, and deep approaches (Al-Qahtani, 2015; Mladenovici et al., 2021).

This study found that students from both schools prefer to learn in-depth and strategically rather than superficially. The results of the university entrance exams, having a more favorable image of what learning is and having deep learning approaches were found to be good predictors of students' academic achievement on multivariable linear regression.

According to this study, students who follow deep approaches to learning could achieve better grades than their

counterparts. According to this study, pupils who use in-depth learning strategies may outperform their peers in terms of grades. For higher academic success and achievement, anesthesia instructors should put more effort into assisting their students in adopting deep learning strategies. They must check to see if their students are eager to learn and not only focused on exams. Additionally, deep learning methodologies are encouraged for graduates to be competent and creative. More research is needed to help teachers and curriculum designers determine how best to allocate resources and revise the curriculum while considering students' learning styles.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by Jimma University, Ethical Review Board. The participants provided their written informed consent to participate in this study.

Author contributions

TN contributed to the conception, design, write-up, data analysis, interpretation, and manuscript preparation. ME and GH contributed to reviewing, design, interpretation, and editing. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/feduc.2022.965573/full#supplementary-material>

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