# RESEARCH

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# Measuring academic self-efficacy and learning outcomes: the mediating role of university English students' academic commitment



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# Abstract

Studying determinant factors for effective learning communities has become a priority for sustainable education in Yemen. Yet, comprehensive knowledge of academic self-efficacy (ASE), academic commitment (AC), and learning outcomes (LOs) variables is limited in higher education, particularly. This research aimed to examine the role of these variables in enhancing the learning attainments of Yemeni university students by studying the direct impacts of ASE and AC on LOs, the influence of ASE on AC, and, lastly, how AC mediates the relationship between ASE and LOs. The research employed a meticulously validated measurement model encompassing 12 ASE items, 10 LOs items, and 27 AC items, using robust statistical methods such as EFA, CFA, and SEM. The study engaged 611 students aged 19–27. Empirical findings confirmed the significant impact of ASE on AC and LOs, as well as the impact of AC on LOs, both of which serve as vital factors in the academic context. Moreover, the research identified an indirect influence of ASE on LOs mediated through AC. On the other hand, the results concerning the demographic variables indicated significant differences between gender and age groups, as well as between age and educational level groups. However, no differences were found when comparing gender and level groups or when considering gender, age, and level together for ASE and LOs. In contrast, for students' AC, all comparisons were significant except for the gender and age comparison. The study offers valuable insights into educational practices and policies and concludes with practical recommendations to enhance the academic environment, informed by these study outcomes.

**Keywords:** Academic self-efficacy, Academic commitment, Learning outcomes, Mediation variable

# Introduction

Enhancing the quality of higher education is crucial for promoting both long-term and inclusive growth (Pleśniarska, 2019). This helps boost productivity, innovation and competitiveness as the main drivers of development (Brekke, 2020). In 2016, the average rate of higher education attainment in Europe was 39.1%, and eighteen



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Member States met or exceeded the 40% Europe 2020 objective (Radulescu et al., 2018). However, the Arab countries are far from achieving their national targets. In 2020, most Arab nations' educational gross graduation remained below. Qatar has the lowest educational achievement, with just 7.89%, followed by Morocco (18.70%), Oman (23.23%), Tunisia (26.34%), Palestine (32.28%), Bahrain (38.56%), Algeria (39.33%), and Saudi Arabia (46.64%) (The UNESCO Institute for Statistics, 2022).

In Yemen, this is also evident. The country has experienced political instability (Muthanna et al., 2022; Taher et al., 2022) and popular uprisings under the civil war for the last seven years (AlMunifi & Aleryani, 2021), which has influenced university students' dropping out and decreased students' numbers compared to their numbers before the civil war (AlMunifi & Aleryani, 2021). Yemen has been racked by violent conflicts and ongoing crises for years, leading to psychological ill-being among students and damaging students' levels and achievements (UNICEF, 2021). Nevertheless, Policymakers are attempting to carve out a niche in the context of a high-quality education system. Yemeni policymakers aim to construct an educational system that places a high value on learning outcomes.

They have yielded new significant issues to students' psychological side, which can strongly predict learning achievements. First, they recognized that self-efficacy (SE) seems to play a more prominent role because it is tied to functioning rather than a universal attribute (Bandura, 1994, 1997; Zimmerman et al., 1992). Academic selfefficacy (ASE) is a crucial motivating component within a self-regulated learning framework. More precisely, SE is an important mechanism for academic performance and self-regulatory learning strategies (Coutinho & Neuman, 2008; Diseth, 2011; Mega et al., 2013; Pintrich, 2004). Second, policymakers acknowledged the role of students' academic commitment to learning. The reason is that academic commitment (AC) is a positive construct and is viewed as an essential factor in persistence and retention in higher education (Strauss & Volkwein, 2004) and can mediate students' perceptions of the quality of teaching and their later academic achievement. In addition, AC can be realized and identified by students' positive attitudes towards learning, the value of learning alternatives, and distinct sense of personality (Human-Vogel & Rabe, 2015). Developing competent students is crucial for sustainable development in higher education in Yemen. However, there appears to be a lack of clarity surrounding these issues to improve the quality of Yemeni education, leaving Yemeni policymakers with critical concerns such as: How do students' ASE and AC affect students' learning outcomes (LOs)? How could ASE affect students' LOs through their commitment to learning? The Yemeni and international researchers have not thoroughly questioned and analyzed these issues. The current study included ASE, LOs, and AC as factors. Finding out the relationship between these variables is essential in Yemeni higher education.

The current study addresses the following research questions.

- 1- What are the relationships among ASE, AC, and LOs?
- 2- What is the role of AC as a mediator variable between ASE and LOs?

Furthermore, the hypotheses are constructed as follows:

- 1. There is a direct effect of academic self-efficacy (ASF) on learning outcomes (LOs).
- 2. There is a direct effect of ASF on academic commitment (AC) of students.
- 3. There is a direct effect of AC on LOs of students.
- 4. There is an indirect effect of ASE on LOs through AC.

Additionally, to examine the demographic variables, it is hypothesized that: "There is a statistically significant difference in academic self-efficacy, learning outcomes, and academic commitment according to gender, age, and level. Additionally, there are statistically significant differences among (gender-age), (gender-level), (age-level), and (gender-age-level) in the dimensions of academic self-efficacy, learning outcomes, and academic commitment".

### Literature review

Within the social cognitive theory (SCT) framework proposed by Bandura (1977), SE is well-known as an individual's inner beliefs and judgments of their abilities and confidence to successfully perform and cope with a variety of different tasks, be it narrow or general (Bandura, 1986). Considering that SE is domain-specific, it was a key crucial mediator of cognitive motivation (Walker et al., 2006), affecting activity selection and the level of persistence needed to achieve goals (Alzoubi et al., 2016). It, therefore, deserved special consideration in both learning and skill development (Bandura & Schunk, 1981).

#### Defining academic self-efficacy

From this background, ASE can be referred to as the belief that a learner possesses about his/her intellectual abilities to attain academic achievement and successful performance of academic tasks at a designated level (Elias & MacDonald, 2007). ASE reflects students' psychological growth that enhances their knowledge, and develops their intrinsic interest in academic subject matter, skills and abilities; hence, it is a significant key factor in their learning process and academic performance (Alt, 2015). More recently, ASE has been perceived as "a dynamic motivational belief that influences the goals we set, how hard we persist, and the amount of effort we employ" (DiBenedetto & Schunk, 2022).

The wide application and the increasing interest in ASE in academic settings resulted in a variety of psychometric scales that were developed and validated to measure learners' ASE related to the material covered in a specific course or activities (Elias & Loomis, 2000; Wood & Locke, 1987). These instruments were developed by examining the definitions in psychology, social sciences, and education theories. Based on our review, two categories of self-efficacy assessment scales were found: the traditional versus the real-time assessment's scales. While the former is usually administered (through surveys, inventories, or questionnaires) following a learning event or in anticipation of an activity, and elicits thought and memory recall from students, the latter is administered through the use of technology by recording students' behavior during a learning event neither prior nor anticipated future one (DiBenedetto & Schunk, 2022). Bandura's (2006) Generalized Self-Efficacy Scale, Zimmerman and Martinz-Pons (1990) Mathematics and Verbal Self-Efficacy Scales are among many other instruments. Nielsen et al. (2017) also developed a five-item general academic self-efficacy scale (GASE) to quantify an individual's all-encompassing confidence in their capacity to handle the responsibilities and prepare necessary for an academic degree. Recently, the ASE Scale meant to measure students' development of Internal and external emotion management, their auto -regulatory behavior and Collegiality was developed by Bulfone et al. (2020).

#### **Defining learning outcomes**

The concept of LOs has been pivotal in the educational system and imperative to the overall progress of learners. It meant what a learner is expected to know, comprehend, and display after a period of the learning process (Kennedy, 2006; Moon, 2002). Moreover, LOs are usually described in terms of knowledge, skills, abilities, attitudes, and understanding that an individual would possess upon completing a learning process (Kennedy, 2006). In the extensive literature review, several studies substantiated the LOs of learners (Caspersen et al., 2017; Liu et al., 2012; Shafait et al., 2021) and also identified the relationships between concepts, perceptions, approaches to encourage deep quality learning for its graduates. In fact, learning outcomes were recently questioned by Zhoc et al. (2018). The authors designed a scale which contributed to the students' development of LOs about cognitive, social and self-growth outcomes.

## Defining academic commitment

A recently researched area that found its place in educational studies is AC. With limited research in the academic context compared to interpersonal contexts, AC is often used interchangeably with engagement in the sense that the more university students were dedicated to their academic performance, the more they would be committed and engaged in both academic and social activities (Tinto, 1975). Additionally, "...commitment to the self or to a particular identity, rather than to an external objective" (Human-Vogel & Rabe, 2015, p. 62) is what AC entails, involving a self-regulation identity level grounded in coherent future self-construal. On the other hand, Strydom et al. (2010) limited their definition of AC to students' pursuits, devoting their time to education. However, time and effort were only indicators of AC; three other components connected to the psychological state of the students and the academic context measure their AC, namely affective, continuance and normative commitments (Meyer & Allen, 1984).

Later, Human-Vogel and Rabe (2015) conceptualized students' AC in an investment model to understand their attrition and retention at university, based on the Rusbult et al. (1998) model. According to them, AC is based on five levels: (1) the level of commitment, according to which study perseverance is evaluated; (2) the level of students' satisfaction with their academic pursuits; (3) the perceived quality of alternatives to studying; (4) investment in time and effort they devote to their studies, as well as (5) meaningful commitment as an expression of who they are and what they value (Human-Vogel & Rabe, 2015).

#### Theoretical framework of the study

Many existing studies in social sciences, psychology and education examined the correlation between ASE and LOs. There is strong evidence that ASE positively correlates with students' LOs (Galyon et al., 2012; Honicke & Broadbent, 2016). Theoretically, scholars believe that academic performance and obtaining good grades are among the most important objectives for students at every school level (Hayat et al., 2020). Consequently, learners' beliefs about their capabilities and the outcome of their efforts significantly can influence their behaviours (Bandura, 1983; Corno & Mandinach, 1983; Weiner, 1985; Schunk, 1989). Following the same line of thought, several theoretical and empirical evidence indicated that self-efficacy can influence motivation, learning and academic achievement (Brown et al., 1989; Pajares, 1996) This denoted those learners with high SE skills produced higher academic outcomes. Similarly, the longitudinal study of Damian et al. (2017) asserted that keeping a sharp focus on ASE indicated optimal attainment of the LOs of learners.

A wealth of literature maintained that ASE is a predictor of students' behavior, and their motivational level for learning and LOs (Al-khresheh, 2023; Byrne et al., 2014; Pajares & Urdan, 2006). According to Bandura (1989), learners with high ASE levels were more likely to improve their LOs by enhancing their persistence and motivation, which enabled them to master thought-provoking tasks. This position was extensively documented by empirical research showing that ASE positively correlated to students' academic performance and persistence in college (Lent & Hackett, 1987; Multon et al., 1991). Another study on 214 university students revealed that ASE directly and positively correlated with students' academic performance (Alyami et al., 2017). More recently, a Malaysian study in 2020 illustrated a significant relationship between the learner's selfefficacy and his/her mathematical achievement in problem-solving skills. Similarly, Azar et al. (2010) found positive correlations between self-efficacy on mathematics outcomes. Further research by Kim (2005) validated the hypothesis that SE beliefs can powerfully influence student academic achievement. In light of these studies, it can be stated that students with high levels of ASE are most likely to spend more effort on a learning task, thus resulting in greater levels of LOs.

Undeniably, immense interest in studying the correlations between AC and LOs became the focal point for many scholars and researchers (Gazki & Delavar, 2019). Again, AC was found to affect academic performance; in other words, learners who were committed to their studies performed better scores and demonstrated higher levels in the completion of their tasks (Bandura, 1989; Multon et al., 1991). Thus, AC is viewed vital predictor of student retention, academic achievement, and success (Griep, 2021).

A growing body of research investigating students' AC and ASE found that they positively correlated with positive LOs (Galyon et al., 2012). Students who were more confident in their academic talents were more willing to take proactive initiatives regarding their academic careers (Brown et al., 1989).

To better delineate the relationships between ASE, LOs and AC, the theoretical framework for the considered study was based on the theory of social cognition (Bandura, 1977). Accordingly, students' ASE was demonstrated by incorporating the four dimensions: internal and external emotion management, auto-regulatory behaviour and collegiality (Bulfone et al., 2020). With particular reference to the relationship between ASE, AC and LOs, this theoretical framework also drew on self-regulation theory, notably due to the assumption that students regulate their behaviour by the constraints of their commitments (Human-Vogel & Rabe, 2015). The learning outcomes scale for the present study was the cognitive (critical, analytical and creative thinking); social (communication skills, leadership, and teamwork) and self-growth outcomes (time management and critical self-reflection) of

the Yemeni students, adopted from Zhoc et al. (2018). Besides, the factor student academic commitment scale was conceptualized in terms of the underlying dimensions: students' level of commitment, level of satisfaction they develop from their studies, quality of alternatives, in addition to the level of investment and meaning-fulness students make in their studies (Human-Vogel & Rabe, 2015), adapted from Rusbult et al. (1998) model.

All in all, the primary goal of this literature review is to explore previous studies that highlight the presence of shared elements among ASE, LOs, and AC. In pursuit of this objective, as the teacher facilitates learning in the classroom and remains committed to making it happen, learners do everything they can to be ready and eager to learn. This implies that the higher the productivity of teachers, the more dedicated they become to their profession, ultimately leading to improved student LOs. Conversely, students' commitment and SE are crucial in enhancing their learning processes.

While a body of literature showed that ASE directly correlates with LOs and AC, most of the previously mentioned studies overlooked the mediating effect of AC. For example, Vogel and Human-Vogel (2016), as well as the systematic review of 59 sample studies conducted by Honicke and Broadbent (2016), which investigated ASE and LOs among university populations from 2003 to 2015, identified several mediating and moderating factors such as effort regulation, deep processing strategies and goal orientations, but failed to establish the mediating role of AC between ASE and LOs. Additionally, to the best of the researchers' knowledge in this study, there is a scarcity of studies that have investigated the mediating role of academic commitment (AC) between perceived academic self-efficacy (ASE) and learning outcomes (LOs). More specifically, despite a plethora of research highlighting the effect of ASE on LOs, there is a dearth of scholarly exploration regarding its impact in the Yemeni educational environment. For Yemeni higher education students, these elements are not just critical for academic success but also for personal growth, professional development, and contributing to the socio-economic development of Yemen. They foster resilience, enable better coping with adversity, and prepare students for impactful involvement in both their local communities and the wider global context.

Therefore, conducting a more accurate analysis of ASE, AC, and LOs in the Yemeni academic context is necessary. Figure 1 below illustrates the proposed model of the current study.

#### Method

Given the need for Yemeni higher education to explain the concepts of self-efficacy, learning outcomes, and academic commitment among university students to optimize the learning process, promoting student success, and preparing individuals for future challenges, these concepts provide a framework for educators and institutions to create a supportive and effective learning environment that benefits both students and society at large.

To achieve the overarching goal of this study, the target population consisted of students from Sana'a University, selected as a case study representing Yemeni universities.



Fig. 1 The proposed model

## **Research design**

Based on the nature of the study, which initially involved collecting and analysing quantitative data (questionnaires), along with control and demographic variables, we employed a causal-comparative research design. The primary aim is to assess whether the independent variable influenced the outcomes, represented by the dependent variable, either directly or indirectly through the mediation variable, using a comparative analysis of two or more groups, as outlined by Frey (2022). The researchers collected data on students' ASE, AC, and LOs at Sana'a University in Yemen because this design suited the study's objectives.

#### Participants

This study was conducted over three public English departments in different faculties: Faculty of Literature, Faculty of Languages and Faculty of Education during the academic year 2021–2022. The study sample was selected using the systematic random method on university students to ensure that the sample accurately reflects the broader population from which it originates. Systematic sampling minimizes the chance of introducing bias by employing a systematic approach (Subramani et al., 2014). Also, researchers used the statistical equation for sample selection and determined the sample size of the research as follows:

 $S = X^2 N P(1 - P) \div d^2 (N - 1) + X^2 P(1 - P)$  (Zulkipli & Ali, 2018).

 $S = Sample Size; X^2 = Chi - square or Z-Score = (1.96)^2; N = Population Size; P = expected prevalence or proportion = 0.50; d = Margin of Error = 0.05.$ 

The sample, which consisted of 611 university students, among whom 318 (52%) were females and 293 (48%) were males, was deemed sufficient to represent the research population accurately. The sample students were between 19 and 27 years of age, with the group's mean value at 1.684 and SD at 0.629. As explained in Table, they were selected

from levels 1–4 and applied by three lecturers as volunteers for this research at the same departments. The study data were generated from survey questionnaires distributed to the students by volunteers who work in the same departments. Written agreement was obtained from the Xi'an Eurasia University, School of Humanities and Education, Research Ethics Review Committee to interact with and collect data for research purposes, ensuring ethical compliance. Consequently, students were informed and consented to data collection. Additionally, it was made clear that all information would be kept private and used only for the objectives of this study.

#### **Research instruments**

The instruments selected for this study, academic self-efficacy (ASE) (Bulfone et al., 2020), learning outcomes (LOs) (Zhoc et al., 2018), and academic commitment (AC) (Human-Vogel & Rabe, 2015), were chosen based on the researchers' review of the literature and previous studies.

The original questionnaires contained (14, 14, 30) items, respectively. All questionnaires' items were measured on a 5-point Likert scale from 5 to 1, scoring (Strongly agree = 5, Agree = 4, Neutral = 3, Disagree = 2, and Strongly disagree = 1). In this study, researchers processed the study's tools, which included 58 items overall and comprehensively explored the factor structure in the current sample. Before implementation, five experts reviewed all questionnaires items to ensure the surface validity of the research tools. They suggested excluding some items to reduce the response error, e.g., "Dominating shame when your frailties have highlighted in front of the class" form ASE, "Lifelong learning" from LOs, and "I feel content with my studies" from the AC. Also, they proposed using some minor corrections for other items as long as the questionnaires were well-known and had previously been used in other countries. A pilot test was used to back up the panel's opinions and confirm the initial psychometric properties (validity and reliability). The results showed the Cronbach's Alpha ( $\alpha$ ) = 0.757, 0.831, 0.793 respectively and the square root of  $\alpha$  that used to determine the validity =  $\sqrt{\alpha}$  = 0.870, 0.911, 0.891 respectively, which indicated that reliability and validity values were acceptable (Smits et al., 2017; AL-Oadri & Wei, 2021).

The researchers investigated the construct validity and reliability using EFA and CFA for each questionnaire and each factor as follows.

## Academic self-efficacy (ASE)

As ASE became more popular in academic contexts, various psychometric instruments were created to assess students' ASE concerning a particular course or part of course content (Chemers et al., 2001).

In order to ensure the sample's suitability for the current study, the results displayed a KMO value of 0.656 for the ASE scale of 13 items. According to Kaiser (1974), factor analysis may be performed when the KMO value is higher than 0.6 (Orçan, 2018). However, Field (2009) suggested that KMO values above 0.6 were acceptable. In this study, the KMO value found higher than that predicted by previous research (Field, 2009; Orçan, 2018). The data with multiple variables had a normal distribution, as the Chi-squared statistics reported after the BST. The BST also considerably impacts the investigation results (Chi-Square=2104.773;  $\rho < 0.001$ ). The items and factors were

confirmed using CFA (Chi-Square = 264.534;  $\rho < 0.001$ ). Considering that one item's loading was less than 0.50, it was excluded (Blaikie, 2003; Orcan, 2018). The final version of the ASE scale components of 12 items was distributed on four factors: (Internal Emotion Management=3 items; External Emotion Management=3 items; Auto-regulatory Behaviour = 3 items; Collegiality = 3 items). Following fit indices to evaluate the overall goodness of fit of the model were indicated to good model when CFI = 0.902, TLI=0.900, IFI=0.903, GFI=0.993, SRMR=0.053, and RMSEA=0.071(AL-Qadri et al., 2022). The value of Cronbach alpha has been calculated based on the four-factor model for developing the ASE scale. The Cronbach's alpha ( $\alpha$ ) for each factor was Internal Emotion Management=0.798, External Emotion Management=0.740, Autoregulatory Behaviour = 0.790, and Collegiality = 0.712. Composite Reliability (CR) was Internal Emotion Management=0.881, External Emotion Management=0.797, Auto -regulatory Behaviour = 0.873, and Collegiality = 0.753. All of the previously specified numbers for this measure are appropriate and acceptable ratios (Hair et al., 2014; Heale & Twycross, 2015). On the other hand, Internal Emotion Management was at 0.712, External Emotion Management was at 0.682, Auto-regulatory Behaviour was at 0.70, and Collegiality was at 0.60. The AVE above 0.50 demonstrates good convergent validity (Hair et al., 2014).

#### Learning outcomes (LOs)

LOs is one of the key concerns in the educational system and an imperative to the overall progress of learners (Zhoc et al., 2018). To ensure the sample' suitability for the current study for item 13 measuring ASE, the results showed a KMO value of 0.678. According to Kaiser (1974) and Orçan (2018), when the KMO value is higher than 0.6, factor analysis could be performed; however, Field (2009) suggested that KMO values above 0.6 were acceptable. The KMO value reported in this investigation was above the values predicted by previous findings (Field, 2009; Orcan, 2018). The Chi-squared statistics attained after the BST showed the normal distribution of the data with many variables. The results of the study are also strongly impacted by the BST (Chi-Square = 1233.104;  $\rho < 0.001$ ) and suggest that excluding two items which were their loading was less than 0.40 (Orçan, 2018). CFA was applied to confirm the items and factors (Chi-Square = 150.253;  $\rho$  < 0.001). Also, two more items were excluded due to their loading of less than 0.50 for conforming the validated items (Blaikie, 2003; Orçan, 2018). The final version of the learning outcomes scale components of 10 items is distributed on three factors: (Cognitive outcomes = 4 items; Social outcomes = 3 items; Self-growth outcomes = 3 items). Following fit indices to evaluate the overall goodness of fit of the model were indicated to good model when CFI=0.909, TLI=0.904, IFI=0.910, GFI=0.995, SRMR=0.058, and RMSEA = 0.054 (AL-Qadri et al., 2022). Reliability was calculated using Cronbach's alpha based on the three-factor model for developing the Academic self-efficacy scale. The Cronbach's alpha ( $\alpha$ ) for each factor was Cognitive outcomes = 0.843, Social outcomes = 0.725, and Self-growth outcomes = 0.773. Composite Reliability (CR) was Cognitive outcomes = 0.835, Social outcomes = 0.752, and Self-growth outcomes = 0.795. All of the mentioned values are suitable and acceptable ratios for this measure (Heale & Twycross, 2015). These results are also in line with Tavakol & Dennick (2011) findings. On the other hand, average variance extracted (AVE) Cognitive outcomes = 0.663, Social

outcomes = 0.509, and Self-growth outcomes = 0.516. The AVE is higher than 0.50, indicating good convergent validity (Hair et al., 2014).

#### Academic commitment (AC)

In the sense that university students are more committed to their academic success, the terms "academic commitment" and "academic engagement" are interchangeable (Galyon et al., 2012).

In order to ensure the sample's suitability for the current study, the results showed a KMO value of 0.690 for the AC scale, which consists of 30 items. According to Kaiser (1974), factor analysis may be performed when the KMO value is higher than 0.6 (Orçan, 2018). However, Field (2009) suggested that KMO values above 0.6 were acceptable. The KMO value found in this study is higher than that predicted by previous studies (Field, 2009; Orçan, 2018). The data with various variables had a normal distribution, as demonstrated by the Chi-squared statistics reported after the BST. The study's conclusions are also strongly impacted by the BST (Chi-Square = 3173.751;  $\rho < 0.001$ ) and suggesting that to exclude two items which were their loading less than 0.40 (Orcan, 2018). CFA was applied to confirm the items and factors (Chi-Square = 958.344;  $\rho < 0.001$ ). Results confirmed the validated items with acceptable loading for each item (Blaikie, 2003; Orcan, 2018). The final version of the AC scale components of 27 items was distributed on five factors: (Level of commitment = 5 items; Satisfaction=6 items; Quality of alternatives = 3 items; Investment = 5 items; Meaningfulness = 8 items). Following fit indices to evaluate the overall goodness of fit of the model were indicated to good model when CFI = 0.917, TLI = 0.889, IFI = 0.902, GFI = 0.911, SRMR = 0.060, and RMSEA = 0.062 (AL-Qadri et al., 2022; Heale & Twycross, 2015). Cronbach's alpha has been calculated based on the five-factor model for developing the ASE scale. The Cronbach's alpha ( $\alpha$ ) for each factor was Level of commitment = 0.765, Satisfaction = 0.703, Quality of Alternatives = 0.721, Investment = 0.818, and Meaningfulness = 0.823. Composite reliability (CR) was Level of commitment = 0.768, Satisfaction = 0.709, Quality of alternatives = 0.798, Investment = 0.861, and Meaningfulness = 0.861. All of the mentioned values are suitable and acceptable ratios for this measure (Heale & Twycross, 2015; Watkins, 2017). These results are also in line with Tavakol and Dennick (2011) findings. On the other hand, average variance extracted (AVE) was Level of commitment = 0.630, Satisfaction = 0.509, Quality of Alternatives = 0.582, Investment = 0.694, and Meaningfulness = 0.711. The AVE is higher than 0.50, indicating of good convergent validity (Hair et al., 2014).

#### Procedures

The current study was carried out to measure Yemeni University students' ASE, LOs and AC and investigate the relationships among all these variables. It is pointless to put significant effort into conducting a study if the conclusions are not somewhat valid and dependable, as efficacy assessments cannot be made with confidence in such a situation (AL-Qadri et al., 2022; Boudouaia et al., 2022). To that end, the researchers conducted several steps before the final questionnaire was administered to the sample of the study. They included sending the scales to the panel members (experts and specialists) to ensure the surface validity of the questionnaires, conducting a pilot test to support the

panel members' feedback, assessing construct validity and reliability for each scale, along with its fit indices, using EFA, CFA for the measurement model, and SEM for the study model. All values are presented in the instruments section for each sub-questionnaire specifically, and the SEM values are presented in the results section in response to the study hypotheses.

Once the final version was deemed satisfactory, the questionnaire was distributed to 650 Yemeni students who volunteered to participate in this study. Participants were selected from levels 1–4, as detailed in Table 1, and were engaged by three lecturers who volunteered for this research from the same departments. The research data were collected using survey questionnaires, which were distributed to the students by volunteers working in the same English departments across various faculties: the Faculty of Literature, the Faculty of Languages, and the Faculty of Education. Only 611 answered it, and therefore, constituted the final sample from the population. Researchers considered the study's data analysis using some statistical programmes: SPSS 22 to conduct exploratory factor analysis (EFA) and obtain descriptive statistics, JASP for confirmatory factor analysis (CFA), and Smart PLS to determine the structural equation model (SEM) for assessing both the direct and indirect effects among the study variables, along with all relevant coefficients in the present study. All statistical methods were clarified in the results section for each variable or hypothesis.

#### Results

The present study used three questionnaires due to the nature of the study for measuring the relationships among the study main variables: ASE, LOs, and AC. The factor determined to be best suited to the data was four based on the designated Eigenvalues; the

Demographic variables	Frequency	Percentage	М	SD	
Gender	611	100	1.520	0.499	
Male	293	48			
Female	318	52			
Level	611	100	2.270	1.068	
Level1	175	28.6			
Level2	209	34.2			
Level3	114	18.7			
Level4	113	18.5			
Age	611	100	1.684	0.629	
20 and less	248	40.6			
21–23	308	50,4			
24 and above	55	9			
Status	611	100	1.270	0.522	
Single	469	76.8			
Married	119	19.5			
Informal relationship	23	3.8			
Discipline	611	100	2.217	0.805	
Faculty of Literature	146	23.9			
Faculty of Languages	186	30.4			
Faculty of Education	279	45.7			

Table 1 Participants' characteristic	CS
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Variables α rho_A CR	α	rho_A	CR	AVE	Discriminant validity		
		1	2	3			
ASE	0.751	0.792	0.759	0.596	0.772		
LOs	0.787	0.811	0.796	0.607	0.700	0.779	
AC	0.707	0.706	0.759	0.537	0.661	0.645	0.733

Table 2 Construct reliability and validity of the study model

*a* Cronbach's Alpha, *CR* composite reliability, *AVE* average variance extracted, *ASE* academic self-efficacy, *Los* learning outcomes, *AC* academic commitment. The values in the diagonal bolded are the square root of AVE of the construct

 Table 3
 Direct effect among the study variables

Hypotheses	Direct effect	β	SE	t-test values	p Values	Decision
H1	$ASE \rightarrow LOs$	0.212	0.052	3.099	0.002	Supported
H2	$ASE \rightarrow AC$	0.400	0.096	4.098	0.001	Supported
H3	$AC \rightarrow LOs$	0.612	0.189	5.125	0.000	Supported

four factors structure, three factors structure, and five factors structure were higher than 1, could be extracted, indicating 51.679%, 41.991%, and 40.364% respectively among total variance for the ASE, LOs, and AC respectively. Total Variance Explained was more than 40% with all items loaded simultaneously in factor analysis, indicating no significant common method bias (Jonker & Vosloo, 2008; Ki & Hon, 2008). Removed items were illustrated in the method section due to items' loadings that were less than 0.40 (Blaikie, 2003; Orçan, 2018). These results prove that the study tool is appropriate for factor analysis (Orçan, 2018).

# Structure model

The existing study models applied the quantitative technique with a casual comparative research design. Partial least squares structural equation modelling (PLS-SEM) technique was used to analyse the data through the Smart PLS 3.0 software package (Ringle et al., 2005).

Following fit indices to evaluate the estimated model which indicated to good model when SRMR=0.061, d\_ULS=0.933, d\_G=0.392, Chi-Square ( $x^2$ )=5365.203, NFI=0.905, and rms Theta=0.109 (AL-Qadri et al., 2022; Heale& Twycross, 2015) and confirmed the measurement model validation. Table 2 illustrated the construct reliability, validity, and discriminant validity. All values were acceptable and confirmed the model quality (Orçan, 2018; Heale & Twycross, 2015).

The second stage involved the structural model's analysis. In a series of steps, the hypotheses were tested. The direct effects of ASE on LOs and AC were looked at first. Investigating AC's direct effects on LOs was the following stage. The Bootstrap resampling method with 5000 resamples Ringle et al. (2005) was used to measure the significance of direct paths and estimate standard errors. As per the results shown in Table 3 and Fig. 2, there is a significant positive and direct effect of ASE on LOs ( $\beta$ =0.212, t=3.099, *p* ≤ 0.002), H<sub>1</sub> therefore is accepted. ASE has a significant and positive effect on AC ( $\beta$ =0.400, t=4.098, *p* ≤ 0.001), and H<sub>2</sub> is accepted. AC has a significant and positive effect on LOs ( $\beta$ =0.612, t=5.125, *p* ≤ 0.001), hence H<sub>3</sub> is accepted.



Table 4 Indirect effect of predictor variable

Hypotheses	Indirect effect	β	SE	t-test values	p Values	Decision
H4	$ASE\!\to\!AC\!\to\!LOs$	0.164	0.007	2.099	0.036	Supported

#### **Mediation analysis**

The approach of Preacher and Hayes (2008) was followed for mediation analysis as it is the more rigorous procedure to test mediating effects and is more suitable to use with the PLS-SEM bootstrapping technique (Hair et al., 2014). To examine the mediation of AC, the method of Preacher and Hayes (2008) was applied, and p-values for indirect effects were obtained through bootstrapping with 500 resamples (Preacher & Hayes, 2008). The results indicate that there is a significant indirect effect of ASE on LOs through the mediation variable (AC) ( $\beta$ =0.164, t=2.099, p ≤ 0.036). The results were substantiated and show that the effect of ASE on LOs passes partially through students' AC. Results of the mediation analysis are presented in Table 4 and Fig. 2.

#### Demographic variables' comparisons

This part contains some descriptive statistics illustrating the multivariate analysis of variance (MANOVA) that evaluates the comparisons among the demographic variables for gender, Age, and level. Selected these variables due to their normal distributions. Table 5 explains that there is a statistically significant difference between gender variable (males and females), Age (20 and less, 21–23, 24 and above), and level (level1, level2, level3, level4) for ASE, LOs, and AC. On the other hand, multivariate analysis by Pillai Test was used for comparing (gender and age); (gender and level); (age and level); (gender-agelevel). According to ASE and LOs, the comparisons were statistically significant differences between (gender and age), and (age and level). However, there were no statistically significant differences between (gender and level), and (gender—age—level). In contrast,

Variable	Cases	df	Approx. F	Trace pillai	Num df	Den df	р
ASE	(Intercept)	1	6160.155	0.977	4	592.000	< 0.001
	Gender	1	5.725***	0.037	4	592.000	< 0.001
	Age	2	16.255***	0.198	8	1186.000	< 0.001
	Level	3	13.097***	0.243	12	1782.000	< 0.001
	Gender 米 age	2	3.833***	0.050	8	1186.000	< 0.001
	Gender 米 level	3	1.032	0.021	12	1782.000	0.416
	Age 🛠 level	2	3.211***	0.042	8	1186.000	0.001
	Gender <b>*</b> age <b>*</b> level	2	1.668	0.022	8	1186.000	0.102
	Residuals	595					
LOs	(Intercept)	1	7718.294	0.975	3	591.000	< 0.001
	Gender	1	7.678***	0.037	3	591.000	< 0.001
	Age	2	25.488***	0.228	6	1184.000	< 0.001
	Level	3	15.419***	0.216	9	1779.000	< 0.001
	Gender 米 age	2	2.849**	0.028	6	1184.000	0.009
	Gender 米 level	3	1.355	0.020	9	1779.000	0.203
	Age 🛠 level	2	11.393***	0.109	6	1184.000	< 0.001
	Gender <b>*</b> age <b>*</b> level	2	0.730	0.007	6	1184.000	0.626
	Residuals	595					
AC	(Intercept)	1	9010.637	0.987	5	591.000	< 0.001
	Gender	1	4.175***	0.034	5	591.000	< 0.001
	Age	2	7.569***	0.120	10	1184.000	< 0.001
	Level	3	14.141***	0.320	15	1779.000	< 0.001
	Gender 米 age	2	1.147	0.019	10	1184.000	0.323
	Gender 米 level	3	1.719*	0.043	15	1779.000	0.041
	Age 🛠 level	2	1.960*	0.033	10	1184.000	0.034
	Gender <b>*</b> age <b>*</b> level	2	2.159*	0.036	10	1184.000	0.018
	Residuals	595					

Table 5	MANOVA	of demogra	phic	variables
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\*\*\*  $\rho < 0.001$ ; \*\*  $\rho < 0.01$ ; \*  $\rho < 0.05$ 

all the comparisons had statistically significant differences except (for gender and age) according to the AC of students.

## Discussion

This research study investigated the significant differences between ASE, LOs, and AC variables in Yemeni students. The participants were students from Sana'a University studying in three different Faculties: Faculty of Literature, Faculty of Languages and Faculty of Education. The research considered the direct effect of ASE on LOs, a direct effect of ASE on AC, and the direct effect of AC on LOs. It also examined the mediating role of ASE on LOs through AC. Moreover, the current study displayed the effect of the three antecedent aforementioned three variables on age, level and gender.

Results showed a positive effect of ASE on LOs; this finding contributes to the existing literature and confirms past research studies. For instance, it endorsed with a study indicating that learners complied with difficult tasks and solved activities by adopting effective strategies which most often compelled a higher degree of ASE (Walker et al., 2006). Understandably, numerous studies in literature emphasized the necessity for increased focus on the rational role of the multidimensional concept of ASE, particularly in educational institutions (Bandura and Schunk, 1981; Cain & Dweck, 1995; Ching, 2002; Damian et al., 2017; Genc et al, 2016; Jackson, 2002; Linnenbrink & Pintrich, 2003; Zhoc et al., 2018). Consistent with this perspective, a study of students' perception of learning and academic quality demonstrated that students with high ASE were academically more oriented to learning dedicated significant time to complete their assignments (Richardson, 2006), whereas students who convened academic barriers or repeated instances of failure experiences tend to disengage swiftly, diminishing their opportunities for meaningful participation in the learning journey (Mercer et al., 2011). Undeniably, substantial body of research corroborates the positive influence of ASE the learning process and performance; however, there exists paucity of research delving into this particular domain (Honicke & Broadbent, 2016; Komarraju & Nadler, 2013; Yusuf, 2011; Zhang, 2014). Conversely to our findings, a research study into the relationships of SE, motivation and language learning beliefs among EFL students in Turkey disclosed an inverse correlation. Particularly, it identified negative relationships between motivation to learn English and SE beliefs held by students (Ersanli, 2015). He asserted that high SE and negative expectations regarding LOs' were substantiated. Additional research of EFL students' perceptions of SE and their beliefs about learning English exhibited medium scores of SE in English. Moreover, they expressed strong convictions of the influential role that motivation on their learning endeavors Genc et al., 2016). Hence, it is important to recognise that there could be potential misalignment between SE beliefs and LOs (Jackson, 2002; Pajares, 1996). The results obtained in this study may urge Yemeni universities or course designers to revisit the overall educational teaching practices for better and more effective learning attainments. However, more research is warranted to explore further academic aspects and other strategies and their relationships with teaching practices.

Findings also indicated the positive direct effect of ASE on AC. The results are in line with Vogel and Human-Vogel's (2016) study, which found that good grades of South African university students might be due to the positive association between their levels of SE, meaningfulness and their level of AC. Although limited research on Yemeni students is available, studying the consensus of students' academic educational abilities is vital in higher education. Specifically, several authors suggested that psychological factors such as one's ability to self-regulated learning (Bjork et al., 2013), ASE (Zajacova et al., 2005) AC (Human-Vogel & Rabe, 2015) and teachers' commitment (Choudhury & Chechi, 2021), is pertinent to academic performance. It is reasonable to expect a strong positive effect of ASE on AC; however, the results of our findings may inspire other researchers to draw on further explorations, such as what sorts of cognitive components of commitment learners should make. Besides, policymakers and educators in Yemen might consider incorporating the findings of the study into the educational teaching curricula by addressing where students may need assistance.

Furthermore, the study endorsed positive the effect of AC on LOs. Following a thorough analysis of the relevant literature, limited evidence existed regarding the relationship between AC and LOs, specifically in higher education. However, a large body of research indicated that AC may induce students' academic success (Gazki & Delavar, 2019; Jepson & Forrest, 2006; Sheard & Golby, 2007). Alternatively, Tinto (1975) pointed out that commitment and engagement are interconnected concepts; in other words, most learners are socially and academically engaged, and the most likely are committed to exerting academic achievements. Likewise, (Human-Vogel and Rabe (2015). described that engagement could be considered as a consequence of commitment. Students' engagement is believed to promote desirable LOs (Kim & Kim, 2021). Interestingly, our results support the idea suggested by earlier authors who indicated that academic commitment is an important predictor for learners' achievement, retention and achievement (Van den Bogaard, 2012; Willcoxson et al., 2011). The finding of the study establishes the groundwork for improved future educational practices, which in turn can aid in developing personalized learning plans, and ensuring students stay motivated in their studies.

Another primary objective of the study was to investigate the indirect effect of ASE on LOs through AC. The results showed positive correlations. Even with the literature on AC in higher education, the research findings confirm past studies that maintained the positive role of both SE and commitment in academic achievements (Van Dinther et al., 2011). In a nutshell, the association between the variables indicates that AC addresses how learners regulate their ability to do well academically. To put it differently, AC significantly influences learners' engagement and involvement and can contribute to their self-regulated abilities to successfully carry out their studies. However, more research is needed to inspect the dynamic nature of the relationships between these factors over the countless challenges in the Yemeni teaching context.

# **Demographic variables**

The following description found that the comparisons between gender variables groups, level variable groups, and age categories, ASE, LOs and AC were significant. The results of the effect of ASE denoted a significant correlation in gender, age, level and gender with age. This result supported the existing studies exploring gender, age, and level differences. For instance, a meta-analysis of 187 studies conducted by Huang (2013) showed that in the analysis of the degree of ASE in gender differences, males, in contrast to females, generated higher levels. Additionally, the same study (2013) pointed out that gender differences occurred between 15 and 18 years old and students of 23 or above. Furthermore, this research study provided strong, consistent evidence that gender in ASE is significantly represented by male students (Liu et al., 2020).

Conversely to the current research study, Carroll et al. (2009) analyzed the construct relations of SE, academic aspirations, and delinquency on the academic achievement of 11 to 18- year-old students from ten schools in two cities in Australia. Results confirmed that there was no significant effect of age on the academic achievements of learners. This was not the case in the research of Multon et al. (1991) and Zimmerman and Martinez-Pons (1990), which yielded that mature students had better opportunities in the assessment of their academic capabilities due to their long learning experiences at school. Moreover, Ersanli (2015) postulated that gender does not show significance in EFL students' ASE beliefs. Additionally, the current research showed that LOs show significant differences in gender, age and level. Supporting the result of the level variable, many studies suggested that student engagement is highly and significantly linked to grades (Astin, 1977, 1993) and persistence rates (Pike et al., 1997).

Another study, which predicted academic success in higher education, reported that mature-age students showed a positive final degree compared to young undergraduates.

Moreover, female students, in contrast to males, showed a significant rate in academic assessment measures (Sheard, 2009). Following the results of the current study, the researchers argued that research is scarce in comparing two variables using the MANOVA method. However, the study found significant relationships between (gender and age), (age and level) variables, and non-significantly between (gender and level), (gender, age and level) variables due to the effect of level variable on gender and age regarding ASE and LOs of students. In contrast, the comparisons were significant between all variables except the comparison between (gender and age) in the AC variable. Perhaps students whether old or young constantly encounter problems and difficulties that in turn should be overcome; thus, one's capabilities differ and are under question (Carroll et al., 2009).

# Conclusion

Nowadays, university students should compete for academic and technology-based knowledge than ever. For that, university teachers ought to implement viable ASE and AC and enhance the LOs of students (Jia, 2022). This research describes the direct and indirect effects among the main study variables, emphasizing the importance of ASE, LOs, and AC in higher education (Jia, 2022; Liu et al., 2020; Seifalain & Derakhshan, 2018).

Addressing the lack of evidence studying the mediating role of AC between the perceived ASE and LOs, this study offers a greater understanding of students' ASE, AC, and their LOs in Yemeni higher education universities. This exploration aims to uncover the relationships that impact these study variables directly and indirectly, as well as to clarify the comparisons among demographic variables such as gender, age, and level, both individually and in relation to each other. The results indicate that ASE has a direct and positive impact on students' LOs, while AC also plays a significant role in enhancing LOs. Additionally, the study suggests a full mediation model, showing that ASE influences LOs not only directly but also indirectly through AC.

Furthermore, the research highlights significant differences among gender groups, age, and level for ASE, LOs, and AC. It also discovered statistically significant differences between the comparisons of gender and age, as well as age and level. However, there were no statistically significant differences between gender and level or among gender, age, and level in ASE and LOs. In contrast, all comparisons were statistically significant differences, except for gender and age, according to the AC of students. These findings provide valuable insights for educators and policymakers, emphasizing the importance of fostering ASE and AC to improve students' learning outcomes. Moreover, they underscore the need for inclusive educational strategies that consider demographic differences to enhance the overall educational experience in Yemeni higher education institutions.

# Limitations and future implications

There are caveats in our study that remain to be addressed. Although the research was conducted in one particular city in Yemen, Sana'a, findings might differ if applied across multiple universities in other regions in Yemen. The present research emphasized three main variables: ASE, LOs, and AC only and was limited to three demographic variables: age, gender and level, if these concepts were scrutinized with other psychological variables such as students' emotional intelligence, meta-cognitive

beliefs, learning environment, social values, economic status, social status, parental, varied trajectories could be obtained. Undeniably, the study design was dependent on one single method to measure the effects. Thus, it is suggested to consider experimental studies methods to avoid mono-biases and allow drawing firm conclusions. Despite these limitations, this study is one of the first conducted in Yemen, and it may encourage researchers and scholars to initiate similar investigations in Arab countries.

Based on the key findings of the study, we can draw both theoretical and practical implications. These findings pave the way for expanding theoretical frameworks on academic self-efficacy (ASE), learning outcomes (LOs), and academic commitment (AC) in education. They also guide practical implementations for enhancing these attributes in students through teaching strategies. The current study significantly advances our understanding of the ASE, LOs, and AC scales, particularly in the context of university students from Yemen. A multi-factor structure has been rigorously validated, which encompasses various student attitudes towards ASE, LOs, and AC. This structure may exert a powerful influence on learners, motivating them to improve their academic self-efficacy and commitment to better learning outcomes. Additionally, it can guide teachers and educators in developing programmes or assessment tools to enhance the educational productivity of learners.

Besides, the study provided valuable insights that can be used to enhance the quality of higher education in Yemen, ultimately benefiting both individual students and the country as a whole. It is important to conduct comprehensive research to understand the specific dynamics and challenges in the Yemeni context and tailor interventions accordingly. Moreover, it can guide teachers and educators in developing programmes or assessment tools to enhance the educational productivity of learners. Additionally, it can inform policy, improve educational practices, and contribute to global efforts to enhance access to quality education and promote student success, all while recognizing and respecting the local context and culture.

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#### Author contributions

AHA-Q: Conceived and designed the experiments, performed the experiments, analyzed and interpreted the data, and wrote the paper. SM: Contributed reagents, materials, and analysis tools; revised and proofread the paper. NS: Performed the experiments, revised the paper, and designed the experiments. AB: Contributed reagents and materials; conceived the experiments.

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#### Data availability

Data will be made available on request.

#### Declarations

#### Ethics approval and consent to participate

The Xi'an Eurasia University, School of Humanities and Education, Research Ethics Review Committee's written agreement was obtained to interact with and collected data for research purposes to ensure the ethical issue.

#### **Consent for publication**

Informed consent was gathered from all participating students. Confidentiality was maintained by not requesting names or any other information that would identify the students involved. The subjects were informed of their right to withdraw from the investigation at any time.

#### **Competing interests**

The authors declare no competing interests.

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