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Prediction the Academic Self-efficacy based on Incremental Intelligence Mindset, Motivational Beliefs and Academic Competence

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ABSTRACT

Objective: This study investigates the interplay between incremental intelligence mindset, motivational beliefs, academic competence, and academic self-efficacy among university students. The primary objective is to explore how these psychological factors collectively influence academic adjustment

Methods: In a correlation study, a sample of university students (n=300) from Islamic Azad University of Marvdasht, participated in the research, providing responses to validated self-report questionnaires.

Results: The results reveal that the proposed model, consisting of incremental intelligence mindset, motivational beliefs, and academic competence, significantly explains academic adjustment ($F=8.52$, $p<0.001$). Furthermore, the model explains 47.9% of the variance in academic self-efficacy (R-squared=0.49). Specifically, incremental intelligence mindset ($\beta=0.25$, $p<0.001$), motivational beliefs ($\beta=0.38$, $p<0.01$), and academic competence ($\beta=0.23$, $p<0.010$) positively and significantly predict academic self-efficacy.

Conclusions: These findings highlight the substantial impact of these factors on students' self-perceived academic efficacy. The implications of these results are profound for educational institutions and practitioners. Understanding the influential role of incremental intelligence mindset, motivational beliefs, and academic competence in shaping academic self-efficacy can inform targeted interventions to enhance students' academic experiences and outcomes.

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Introduction

As per the principles of social constructivism, learning can be understood as an interactive social process where complex interpersonal interactions facilitate the sharing of knowledge (Amineh & Asl, 2015). In educational settings, two primary interpersonal dynamics come into play: the relationship between instructors and students, characterized by instructor support, and the connections formed among students, referred to as student-to-student connectedness. Consequently, comprehending how students perceive instructor support and student-to-student connectedness is crucial for fostering and sustaining students' Academic Self-Efficacy. Instructor support is defined as students' perception of their instructors showing a genuine interest in their learning and a willingness to assist them in their educational journey, encompassing helpful instructional behaviors and practices. These include delivering clear guidance and feedback on assignments, addressing student misconceptions, offering learning resources, and providing constructive suggestions on their performance (Lombardo & Kantola, 2021).

It's worth noting that instructor support has a significant impact on students' self-efficacy judgments. Numerous studies have demonstrated that instructor support plays a vital role in enhancing and maintaining students' self-confidence in learning (such as the research by (Eakman et al., 2019; Li et al., 2020) and their engagement in student-centered learning (refer to E. (Baird et al., 2022). For instance, in the realms of mathematics and science, students who feel adequately supported by their instructors tend to exhibit a higher sense of competence and active participation (Louis & Mistele, 2012). Additionally, Gutiérrez and Tomás (2019) identified a positive correlation between students' perceived instructor support and their students' self-efficacy in traditional face-to-face instruction. Multiple factors influence the self-efficacy of university students. One of these factors is the entity view of intelligence.

According to Dweck's social-cognitive model of achievement motivation, the concept of "Implicit Theories of Intelligence" (ITI) pertains to one's beliefs about the nature of intelligence, specifically whether it is perceived as fixed or adaptable. These fundamental beliefs play a pivotal role in how individuals interpret the outcomes of events, how they respond to these outcomes, and their capacity to regulate their learning behaviors. In particular, they influence the strategies students employ when dealing with academic setbacks (Costa & Faria, 2018).

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The viewpoint that intelligence is fixed, known as the "entity view of intelligence," has been closely associated with two types of achievement goals: performance-approach goals, which involve trying to outperform others, and performance-avoidance goals, which focus on avoiding looking incompetent compared to peers. In contrast, the "incremental view of intelligence" or "growth mindset" aligns with mastery goals, which emphasize the development of competence through skill mastery during the learning process (Adamsone et al., 2020; Costa & Faria, 2023).

From a social-cognitive perspective, ITI offers a framework for understanding how students make sense of and interpret the outcomes of events (Sarwar et al., 2022). ITI allows us to explore how students view academic failure and whether they attribute their failures to a lack of ability or effort. Moreover, the attributions students make about an event can shape their expectations for future outcomes. Students who hold an entity view of intelligence (a fixed mindset) often prioritize performance goals and may perceive academic failures as highly relevant but incongruent with their goals. Failure can disprove their initial belief that they can achieve their performance goals. Consequently, they may attribute their failure and the negative outcomes to a lack of innate ability rather than insufficient effort. This is because they place a strong emphasis on demonstrating ability and believe that ability is validated through performance (Vechiu & Popa, 2022).

When students view failure as a confirmation of their lack of competence and believe that their abilities cannot be changed, they may perceive the situational demands as insurmountable and beyond their control, especially when compared to their perceived fixed personal resources. When the value of effort is seen as insignificant, it often leads to negative emotions like self-doubt, hopelessness, and helplessness. Consequently, academic competence has an important role in student’s self-efficacy. Numerous individual factors can be influenced by peer interactions, thereby exerting a substantial impact on students' emotional well-being and academic performance. Several studies have explored these mechanisms in samples of children and early adolescents. For instance, research has shown that students' self-concepts serve as a mediator in the relationship between school-related social support from peers, teachers, and parents and students' life satisfaction and overall well-being in an academic setting (Altermatt & Pomerantz, 2003). Additionally, peer relationships have been found to indirectly influence academic

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achievement through various avenues, including students' behavioral and psychological engagement (as demonstrated in research by (Dotterer & Lowe, 2011)), prosocial behavior (Wentzel & Caldwell, 1997) feelings of school belonging (Delgado et al., 2016), and self-beliefs (Buhs, 2005).

Building upon these findings, we propose that the academic self-efficacy would be predicted based on incremental intelligence mindset, motivational beliefs and academic competence in university students. Therefore, it is hypothesized that holding an incremental mindset about intelligence, motivational beliefs and academic competence is positively correlated with the ASE.

Materials and Methods

The research method is correlation that academic self-efficacy is dependent variable and predictors include incremental intelligence mindset, motivational beliefs and academic competence. The participants in this study consisted of 300 undergraduate students enrolled at Islamic Azad University of Marvdasht. The participants were selected using a stratified random sampling technique, ensuring representation from various faculties and academic disciplines within the university. Informed consent was obtained from all participants prior to their involvement in the study.

Measures

The assessment of **academic self-efficacy** in this study utilized the General Academic Self-Efficacy scale (GASE), originally developed by Nielsen et al. (2019). This self-report instrument comprises five items, each rated on a five-point Likert scale, where participants indicate their agreement, with options ranging from 1 (strongly disagree) to 5 (strongly agree). For instance, one sample item in the scale reads, "I have confidence in my ability to succeed in exams if I invest sufficient effort throughout the semester". Akanni and Oduaran (2019) reported the scale's internal consistency, demonstrating acceptable reliability with a Cronbach's alpha coefficient of 0.81. In the present study, an evaluation of the scale's reliability was conducted using Cronbach's alpha, which yielded a coefficient of 0.78.

The examination of the **incremental intelligence mindset** involved the utilization of the 8-item Theories of Intelligence Scale, as developed by Dweck (2002). An illustrative item from this scale reads, "Irrespective of your background, it is entirely possible to enhance your level of intelligence

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significantly." Respondents were instructed to provide their feedback on a 6-point Likert scale, with a rating spectrum from 1 (strongly disagree) to 6 (strongly agree). A higher score on this scale indicated a more pronounced endorsement of the notion of incremental intelligence.

Dweck (2002) attested to the sound reliability and validity of this scale. In the context of the present study, an assessment of the scale's reliability was executed through the computation of Cronbach's alpha, yielding a coefficient of 0.82.

In this study, we employed a modified version of the **Motivated Strategies for Learning Questionnaire (MSLQ)**, originally introduced by Pintrich and Garcia (1994). This self-report tool was designed to assess students' motivational beliefs and their ability to engage in self-regulated learning within classroom settings. The motivation subscale of the MSLQ consisted of 20 items aimed at evaluating various aspects of students' motivational outlook. These items covered their self-efficacy in problem solving, such as the statement "I am confident in my ability to comprehend even the most challenging mathematical problems presented in my mathematics class." Additionally, it encompassed their value beliefs, for example, "I believe I can apply what I learn in problem solving to other courses." The subscale also delved into students' goals during mathematical problem-solving, reflecting statements like "I am inclined to tackle mathematical problems that truly challenge me, as this enables me to acquire new knowledge" or "At present, achieving a high grade on a problem-solving test is highly rewarding to me." Respondents expressed their agreement with these statements on a Likert scale, ranging from 1 ("Strongly Disagree") to 4 ("Strongly Agree"). In this study, an assessment of the scale's reliability was executed through the computation of Cronbach's alpha, yielding a coefficient of 0.78.

To evaluate **academic competence**, in alignment with the approach by Wright and Levitt (2014), participants responded to two queries gauging their confidence in their college graduation and career aspirations. These questions encompassed, "How confident are you in your likelihood of graduating from college?" and "How confident are you in your ability to secure your desired job"? Moreover, the assessment of academic competence was further augmented by employing the competence subscale of the Positive Youth Development Inventory (PYDI) devised by Arnold et al. (2012). This scale incorporated a total of 14 items, each rated on a 5-point Likert scale, with responses ranging from 1, signifying "strongly disagree," to 5, indicating "strongly agree." An illustrative statement from this scale is, "I possess a creative disposition." The summation of these

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item scores yielded a comprehensive competence score, which was subsequently utilized in the data analysis.

Results

Prior to delving into the investigation of the research hypotheses, we conducted assessments to verify the normality assumptions of the variables. In Table 1, the descriptive statistics, such as the means, standard deviations, and correlation coefficients, for the research variables are presented.

Table 1. Descriptive findings and correlation coefficients of the research variables

Variables	Mean	SD	1	2	3	4
1. academic self-efficacy	15.57	2.62	1			
2. incremental intelligence mindset	26.68	3.62	0.58	1		
3. motivational beliefs	54.81	4.61	0.62	0.48	1	
4. academic competence	42.61	4.52	0.57	0.51	0.54	1

As displayed in Table 1, all correlation coefficients among the research variables have been found to be statistically significant. This indicates a positive and significant correlation between incremental intelligence mindset, motivational beliefs, academic competence, and academic self-efficacy.

To predict university students' academic self-efficacy based on their incremental intelligence mindset, motivational beliefs, and academic competence, we employed a multiple regression analysis. In order to assess the independence of the residuals, the Durbin-Watson statistic was applied. With a value of 2.19, falling within the range of 1.5 to 2.5, we can affirm that the assumption of independence of the residuals has been met.

Furthermore, we examined the presence of multiple collinearity among the predictor variables by utilizing tolerance indices and the variance inflation factor (VIF). The results of this examination revealed no deviation from the assumption of multiple collinearity.

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Table 2. Multiple regression analysis results

Indec	B	S.E	Beta	t	p	R	R^2	F	p
Constant	3.51	1.56		3.05	0.001	0.49	0.24	8.52	0.001
incremental intelligence mindset	0.34	0.081	0.25	3.21	0.001				
motivational beliefs	0.42	0.11	0.38	4.21	0.001				
academic competence	0.31	0.074	0.23	2.98	0.001				

In Table 2, the F value was 8.52, which was significant at the alpha level of less than 0.001, which showed that the proposed model was able to significantly explain academic adjustment. The R-squared value was equal to 0.49. which showed that incremental intelligence mindset, motivational beliefs, and academic competence explain 47.9% of the variance of ASE. Beta value for incremental intelligence mindset (β=0.25, $p<0.001$), motivational beliefs (β=0.38, $p<0.01$) and academic competence (β=0.23, $p<0.010$). Based on this, incremental intelligence mindset, motivational beliefs, and academic competence positively and significantly predict academic self-efficacy.

Discussion

Our results provide valuable insights into the relationships between incremental intelligence mindset, motivational beliefs, academic competence, and academic self-efficacy. These findings are central to our understanding of how these factors collectively influence academic adjustment among university students. In this discussion, we delve into the significance and implications of these results, emphasizing their contribution to the existing body of knowledge in the field.

First and foremost, the F value of 8.52, with a significance level of less than 0.001, indicates that the proposed model, comprising incremental intelligence mindset, motivational beliefs, and academic competence, holds significant explanatory power in the context of academic adjustment. This is a noteworthy finding as it underscores the relevance of these psychological constructs in shaping students' academic experiences. The model suggests that a combination of these factors plays a pivotal role in predicting how students adapt to the academic challenges they encounter during their university journey (Khalkhali & Aryanpour, 2013; Lackey, 2014).

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The R-squared value of 0.49 is equally compelling. It signifies that incremental intelligence mindset, motivational beliefs, and academic competence collectively account for approximately 47.9% of the variance observed in academic self-efficacy (ASE). This finding underscores the substantial impact of these factors on students' self-perceived academic efficacy. A substantial proportion of the variation in academic self-efficacy can be attributed to these psychological constructs, highlighting their significance in shaping how students perceive and navigate their academic pursuits.

Of particular importance are the beta values associated with each predictor variable. The beta value for incremental intelligence mindset ($\beta=0.25$, $p<0.001$) suggests a positive and significant predictive relationship between having an incremental intelligence mindset and academic self-efficacy. This finding aligns with the previous studies (Buenconsejo & Datu, 2020; Su et al., 2021) that indicated individuals who believe in the malleability of their intelligence are more likely to possess higher academic self-efficacy. Such individuals tend to approach challenges with the belief that they can develop their abilities through effort and perseverance.

Motivational beliefs, as indicated by the beta value ($\beta=0.38$, $p<0.01$), also demonstrate a positive and significant predictive relationship with academic self-efficacy. According to early studies (Bong, 2004; Esmaeili et al., 2019), students who hold strong motivational beliefs, such as valuing the application of what they learn and setting challenging goals, are more likely to exhibit higher levels of academic self-efficacy. These findings highlight the motivational aspect as a significant contributor to students' perceived competence in their academic endeavors.

In the case of academic competence, as reflected by the beta value ($\beta=0.23$, $p<0.010$), emerged as another significant predictor of academic self-efficacy. Past studies indicated that students who feel academically competent are more likely to possess greater academic self-efficacy (Buch et al., 2015; Honicke & Broadbent, 2016). This underscores the importance of actual academic performance and the belief in one's own competence in influencing academic self-efficacy.

In conclusion, the results of this study emphasize the substantial impact of incremental intelligence mindset, motivational beliefs, and academic competence on academic self-efficacy. These findings provide a foundation for interventions aimed at enhancing students' academic adjustment and self-efficacy. Educational institutions and educators may consider strategies to foster a growth mindset,

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nurture strong motivational beliefs, and bolster academic competence to support students in their academic journey. Additionally, these results contribute to the broader understanding of how psychological factors can positively shape academic outcomes, emphasizing the significance of addressing both cognitive and motivational aspects in education.

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Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving human participants were reviewed and approved by ethics committee of Islamic Azad University. The patients/participants provided their written informed consent to participate in this study.

Author contributions

PH contributed to the study conception and design, material preparation, data collection and analysis. 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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