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Academic Hope as a Predictor of Learning Satisfaction: The Mediating Effect of Academic Grit in Technology-Enhanced Learning Environments

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ABSTRACT

Technology-enhanced learning has transformed contemporary higher education, yet students' satisfaction with digitally supported learning may depend not only on technological resources but also on psychological capacities that enable them to pursue academic goals and persist through challenges. This study explored how academic hope anticipates learning satisfaction when considering the role of academic grit in a technology-integrated learning context. A quantitative cross-sectional research design was used to study 457 postgraduate and undergraduate students from higher education institutions in Punjab and Sindh, Pakistan. The data was collected using an online, structured, and adapted version of the questionnaire, and collated in Microsoft Excel. The data was analyzed using IBM SPSS with a reliability check conducted, as well as Pearson correlation, regression analysis, independent samples-t-test, and the mediation analysis. Based on the analyses conducted, all the relationships investigated were of an affirmative nature and academic hope and academic grit were significantly predictors of learning satisfaction. In addition to predicting learning satisfaction, stronger academic hope was correlated with greater goal directed persistence and more positive learning experiences in technology-integrated contexts. This study extends the understanding of technology-integrated learning by placing emphasis on psychological resources of learners as opposed to the technology and the instructions. The findings show that more satisfying and psychologically supportive technology integrated learning environments may be fostered with strengthening of academic hope and grit.

Introduction

Academic hope is a psychological tool that impacts how students perceive, engage with, and answer to the challenges of an academic setting. Using Snyder's (2002) hope theory, hope consists of both the perceived ability to develop planning pathways to desired goals and overall goal-directed motivation. These attributes are critical to technology-based learning since learners mainly rely on themselves to direct learning and to adjust to different tech settings, and to deal with and stay motivated to do the academic milestones that become more difficult. You could be more persistent if you have strong academic hope, because you may see academic obstacles as more manageable, and you may search for more ways to adapt.

According to previous academic literature, positive outcomes of academic hope include academic engagement, determination, motivation to learn, and flexibility in dealing with the challenges of the learning process. Sadeghi et al. (2021) found that academic hope directly affected the engagement of students in academic activities. Goal-related academic hope serves as a positive psychological tool that helps students remain active in the academic process. Variability in learning requires a high level of motivation and self-regulation. High levels of academic hope have a significant impact on the learning process.

Technology-enhanced learning environments require self-regulation and adaptation to different technologies along with persistence. In the face of challenges, academically hopeful students somehow manage to engage more with available technologies. Expectations of success are not enough for hope. Academic hope offers positive expectations and the ability to persist with flexibility and satisfaction with the resulting experiences within the learning environment.

Academic Grit and Learning Satisfaction

Academic grit includes commitment to pursue long-term goals, despite barriers, difficulties, or failures that may occur in the process. Grit is about perseverance and passion that motivates people to persevere with goal pursuit even in the face of great difficulty. The notion of grit may be even more critical in teaching and learning contexts since grit may inspire students to remain focused on completing tough assignments and finishing a long and rigorous course of study. This is also highly applicable in the context of technology-enhanced learning and self-regulated learning since students need to exercise a great deal of independence when navigating new learning technologies and online environments.

Evidence is accumulating regarding the role of academic grit in enhancing learning. Ekinci and Koç (2023) found that grit and hope were positively associated with some positive psychological outcomes and could thus complement one another in supporting the adaptive functioning of students. It has also been shown that university students with a high level of academic grit exhibit better academic adaptation and satisfaction. This may be attributed to the fact that persistent students are more likely to cope with the challenges of academic work and are able to experience a sense of achievement. Thus, students with a high level of academic grit, who persistently invest effort in their learning, are more likely to develop a positive appraisal of their learning experiences.

In technology-supported learning environments, academic grit may foster the satisfaction of learning by aiding students to persist in dealing with technological, academic, and organizational problems. Students with high grit are more likely to continue participating in online activities, try to solve the problems they encounter, and adjust their learning strategies rather than abandoning the learning process. Such a successful persistence may improve students' subjective appraisal of their competence, achievement, and progress, thereby providing a greater level of satisfaction with the learning process. Consequently, academic grit is an important psychological factor in understanding the different levels of satisfaction experienced by students in similar technology-supported learning environments.

The Mediating Role of Academic Grit

The role of academic grit as a psychological mediator may help explain the relationship between academic hope and learning satisfaction. Students with greater academic hope set more significant academic goals, develop multiple goal pathways, and maintain the goal-directed motivation needed to reach those goals. This motivational type may lead students to persevere in the face of academic and/or technological barriers, therefore, developing (further) their academic grit. In this case, hope may provide the motivational drive, while grit provides the perseverance to transform that motivation into a habit of persistent academic behavior.

The next phase of academic grit may be how it shapes students' evaluations of their learning. Students who remain diligent with challenging activities and dedicated to their academic goals may be more likely to experience a sense of progress, achievement, and the satisfaction of competence, which are all potential contributors to learning satisfaction. Recent studies have pointed to the meaningful relationships among hope, grit, academic adaptation, and satisfaction-related outcomes, thereby providing a rationale for considering these constructs in an integrated fashion. However, most of the existing studies have addressed the relationships in a largely disconnected manner, thus leaving a substantial gap on how academic hope may positively influence learning satisfaction through the development of academic grit.

This mediating perspective is essential in learning environments with technology enhancements, whereit often becomes necessary for learners to demonstrate persistence, self-regulation, flexibility along with their technological skills. Digital learning provides flexibility and accessibility, but students have to remain motivated when they face the challenges of technology, work demands, and supervision that is low and/or absent, and when they use unfamiliar tools. Analyzing academic

grit as a mediator will give a more complete understanding of how academic hope can be turned into more of a learning outcome, and it will add to the existing research about the mental components of successful learning with technology that has been enhanced.

Research Objectives

- To examine the effect of academic hope on learning satisfaction among students in technology-enhanced learning environments.
- To determine the relationship between academic hope and academic grit among students in technology-enhanced learning environments.
- To examine the mediating effect of academic grit on the relationship between academic hope and learning satisfaction.

Research Questions

- What is the effect of academic hope on learning satisfaction among students in technology-enhanced learning environments?
- What is the relationship between academic hope and academic grit among students in technology-enhanced learning environments?
- Does academic grit mediate the relationship between academic hope and learning satisfaction among students in technology-enhanced learning environments?

Problem Statement

Technology-infused education is critical for modern post-secondary education. Tech integration does not guarantee satisfactory outcomes for students or even positive educational experiences. Research has identified multiple factors that impact students' satisfaction with learning tech integration, such as psychological factors, technology, and pedagogy. Among other things, technostress and limited resources can impede students' satisfaction and motivation. (Examining the Adoption of Technology-Enhanced Learning, 2024; Susanto et al., 2026). While some research has identified tech factors and perceived pros as predictors of satisfaction, there has been relatively less research on students' positive psychological resources, particularly academic hope and academic grit, as an integrated explanatory framework. The existing literature has identified a positive relationship between hope and grit among students (La Sunra et al., 2026), and there has been research on satisfaction, focusing on hope, and other mediators, such as the satisfaction of life (Santillán-García et al., 2025). There is a clear gap in the literature, however, when addressing whether academic hope predicts learning satisfaction in tech-supportive environments and, maybe more importantly, whether academic grit explains it. This gap is important as students characterized by hope clarity set academic goals and identify pathways to goal fulfillments. Grit characterizes students' ability to sustain effort to achieve academic goals, especially when learning becomes dominated by and reliant on technology. Therefore, the present study aims to extend the integration of these psychological traits by examining academic hope as a predictor of learning satisfaction and academic grit as a potential mediator. This adds depth and breadth to the study of students' satisfaction in technology-enhanced learning environments.

Significance of the Study

Currently, most studies focus on the technology used in learning environments and how it impacts students' satisfaction. This study aims to shift the focus from the technology to the psychology, and even more specifically, how students experience satisfaction in learning environments supported by technology. There is evidence that the technology integrated in learning posits an impact on students' satisfaction and also on their motivation and engagement in learning. Other studies have examined the relationship between academic hope and grit among university students and have shown that there is a relationship between the two. Research has also shown that hope is positively related to satisfaction with the learning process. Even though previous studies have viewed other variables such as life satisfaction as mediating factors, the present study hopes to add to the theory by examining whether academic grit is a mediating factor in the relationship between hope and satisfaction in the learning process. From a practical point of view, the results of the study may provide university educators and administrators with the knowledge needed to design learning environments which may support students' goal-directed

motivation and perseverance in their learning and positive learning experiences. The study may also help develop student support strategies that combine psychological resources and technology-enhanced learning.

Literature Review

Technology-Enhanced Learning (TEL) refers to a range of learning technologies as building blocks in the educational process. These include digital resources, online learning platforms, learning management systems, and virtual environments to name a few. Learning management systems (LMS) have become an essential building block in many learning spaces. According to the literature, satisfaction in online learning is not necessarily due to the presence of technology in the learning process. Rather, satisfaction is a result of technology-mediated learning's quality, usability, interaction, instructional design, and the psychologically-based learning experience. The study Examining the Adoption of Technology-Enhanced Learning in Universities (2024) indicated that student-university misfit in TEL environments was positively associated with student satisfaction and motivation as well as negatively associated with student performance. They also indicated that technostress partially explained the aforementioned relationships. This study indicates that technology can be useful in designing learning experiences. Poorly designed or unsupported learning technologies may result in frustration and satisfaction.

Student interaction and engagement are particularly important dimensions of satisfaction within a technology-enhanced environment. Yousaf et al. (2023) looked at online learning in a sample of Pakistani students and found positive student satisfaction and learning experiences with online learning. Al-Khatib et al. (2024) examined online learning and satisfaction of students in several different geographical areas and found that the presence of technology on its own is notsatisfactory, but that learning environments that encourage participation and that are interactive and engaging are important. These findings mirror what Yin et al. (2021) found in their study. (2024) notes that learning satisfaction is related to technology acceptance within virtual learning environments, and that cognition and social-emotional processes are involved. This means that students' satisfaction with learning relates to how students engage cognitively and emotionally with technology-mediated learning processes.

It appears from the available literature that learning satisfaction is a complex concept in technology-based/enhanced learning environments. This includes factors such as the technology employed and its usability, the quality of the instructional design, the level of interaction and engagement during the learning process, psychological comfort and ease with technology-mediated learning, and learners' ability to adjust to technology in learning environments. Maqableh et al. (2023) report a considerable amount of variation in the satisfaction with online education in different contexts, suggesting that understanding technology-based learning is not a matter of providing technology. There are several recent research initiatives to analyze the satisfaction of technology in learning environments. Acceptance of technology is one of these initiatives, while others focus on psychological comfort (technostress) during technology use and the quality of instruction. There is a relative lack of focus on the protection of positive psychology, which is needed for learners to remain satisfied and persistent in these environments. Focusing on the combination of learning satisfaction, academic hope, and academic grit provides a new perspective on the satisfaction of learners in technology-mediated learning environments and on internal motivational factors of learners.

Academic Hope and Learning Satisfaction

Academic hope has developed as an essential component of educational psychology because it describes students' capacity to formulate significant educational goals, spot ways to achieve these goals, and remain goal-orientated and task motivated in the face of obstacles. As cited by Prihandoko, L et al. (2025), hope consists of two main nuances: agency thinking and pathway thinking. Agency thinking refers to the motivational force that fuels goal-directed thinking and pathway thinking denotes the subjective ability to formulate methods that help achieve the goal. In the classroom, students expressing higher academic hope tend to exhibit higher engagement and greater perseverance and employ more adaptive coping strategies, all of which contribute to a better and more rewarding educational experience. More recent research by Qi, A. (2025) adds that academic hope is an area-specific psychological attribute of motivation that markedly affects students' motivation and achievement, and their overall functioning in the academic domain.

The last few years have seen an upsurge in scholarly interest in the relation between academic hope and learning satisfaction. Learning satisfaction pertains to students' overall experience within their education, be it quality of teaching, observations about their progress, the learning activities they undertook, and the overall emotional state that they experienced. As declared by Bi, J et al. (2024), hope has a direct and an indirect relation to academic satisfaction. Their findings indicate that students characterized by higher hope are satisfied to a greater extent with their academic experiences. In their study involving students at the university level, students with hope experienced learning-related difficulties in a more positive light, and stayed motivated, resulting in a greater sense of fulfillment and increased satisfaction with learning. Similarly, Park and Jung (2020)

state that hope connects positive life outlooks to academic satisfaction. They believe that students with more hope likely have better attitudes toward their academic experiences.

In self-regulated learning environments, academic hope has an important role because the student often has to regulate their learning and use new technology to deal with and work around various digital-based learning and academic challenges. Hopeful people typically view challenges as required to be dealt with, but as less of a big deal, and will attempt to find different ways to deal with challenges when faced with online and technology-based learning challenges. According to Khpalwak et al., (2024), hope mutually benefits academic achievement, psychological well-being and educational satisfaction because it helps people remain focused on their long-term goals while having a positive outlook toward their future. Further, as stated in a review by Wang et al. (2022), hope influences motivation and self-regulation and brings about optimism and satisfaction in the learner. Thus, from the existing literature, the academic hope resource has a role to play in learning satisfaction when combined with the cognitive and emotional forms of resilience in self-regulated learning environments.

Academic Hope and Academic Grit

Academic hope and academic grit are closely aligned psychological tools that help students remain focused while working toward the goal of achieving their ambitions. Academic hope is a student's belief that they can identify academic pathways to achieve their goals and that they have the agency to pursue those pathways. Academic grit is the perseverance and determination to reach long-term academic goals, even through hardship. Khormaei (2025) argued that academic hope is a more specific type of hope that has more explanatory power over academic outcomes in that it captures the goal-directed hope of students in educational environments. In that sense, a student who is hopeful enough to think that they can identify a means and ways of achieving a given academic goal and accommodate the necessary motivational energy to achieve it is more likely to exhibit grit in the face of difficult demands of the academic environment. Hence, academic hope can be a motivator for the development of academic grit.

Recent empirical evidence suggests a correlation between hope and academic grit. In their study of 425 students, La Sunra et al. (2026) found hope predicted academic grit, and hope and social support accounted for 44.3% of the variance in students' academic grit. Ramli et al. (2024) found a similar positive correlation, along with 301 students, supporting the assumption that students' positive hope is a predictor of greater determination and grit towards activities of academic nature. These observations align with the findings Seymour et al. (2025) reported about first-year university students where hope was positively correlated with academic grit, proving that students that are hopeful are likely to be grittier and more persevering during academic challenges.

This relationship between academic hope and grit is particularly applicable in flexible learning environments facilitated by technology. Students often have to learn, regulate themselves, and adapt to new digital tools and technologies. An academically hopeful student is more likely to take a problem-based perspective when dealing with technological or academic constraints. This perspective is supported by, for example, research by Harpaz et al. (2024), who observed that academic grit is associated with positive academic outcomes at university level, and that academic grit could even be the channel through which negatively correlated resources of students could be converted into positive academic outcomes. Consequently, existing literature shows how hope in an academic setting may stimulate grit, though it also indicates the importance of additional research exploring this further in the context of technology-assisted learning.

Research Gap

Although scholars have identified how technology-based learning may foster students' satisfaction by means of technological, pedagogical, and psychological factors, a great deal of literature is still lacking when it comes to how technology-based learning may be stimulating positive psychological resources of students. Positive academic psychological resources, such as hope, remain unexplored in most studies on Technology-based learning. It has been researched and reported that hope correlates with positive academic engagement and outcomes, while recent studies indicate a correlation between hope and grit among university students. Additionally, it has been shown that academic grit correlates positively with academic satisfaction and students' overall well-being (Lodi et al., 2026). Scholars, however, have mostly researched how hope, grit, and satisfaction correlate separately or through diverse mediating mechanisms. Little scholarly work has focused on the mechanism presented within Technology-based learning, in which students need to demonstrate persistence, motivation, and adaptability to resolve both academic and technological barriers in order to reach their goals to complete the intended learning process. It remains to be researched whether positive hope directly correlates with satisfaction of learning and whether grit accounts for this relationship. Filling this gap in studies may complement educational psychology and Technology-based learning by providing a Theory of mind model in which hope aids to achieve satisfaction within learning that is Technology-based and mediated.

Research Hypotheses

H1: There is a significant positive relationship between academic hope, academic grit, and learning satisfaction among students in technology-enhanced learning environments.

H2: Academic hope significantly predicts learning satisfaction among students in technology-enhanced learning environments.

H3: Academic grit significantly mediates the relationship between academic hope and learning satisfaction among students in technology-enhanced learning environments.

Conceptual Framework

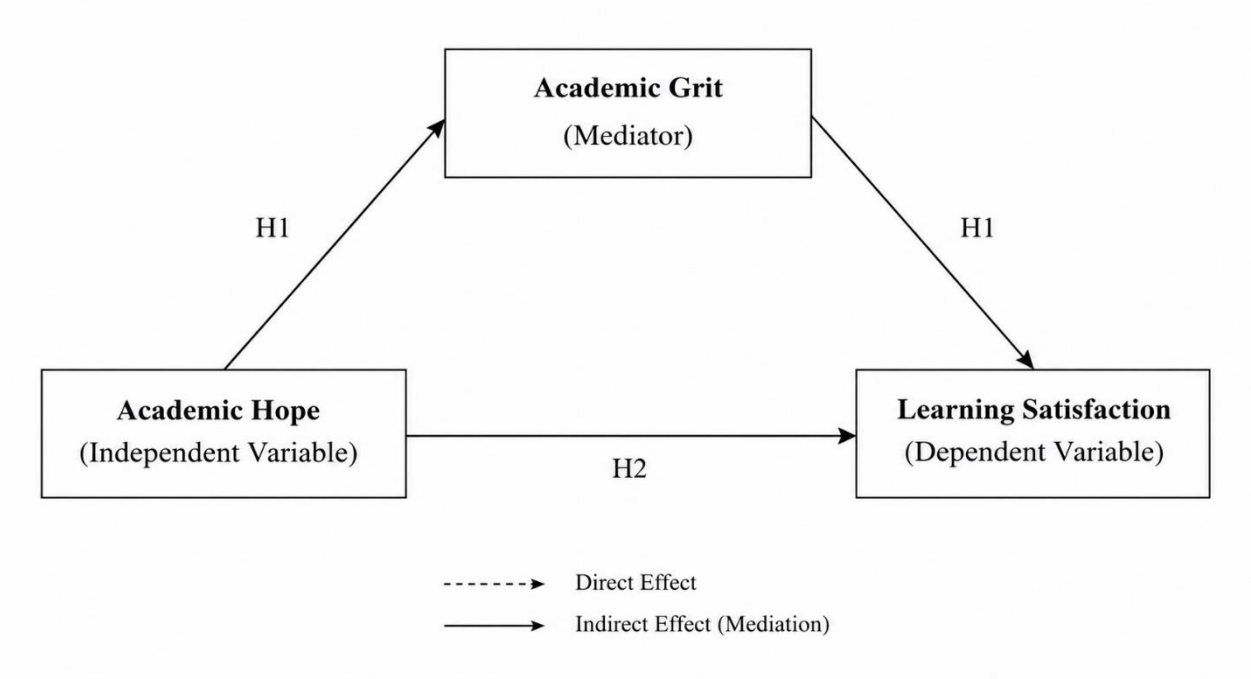

Fig. 1 Conceptual Framework

Methodology

Research Design

This study employed a quantitative, cross-sectional research design to examine the interrelationships among academic hope, academic grit, and learning satisfaction in technology-enhanced learningenvironments. Given the need for answering numerical questions and for the statistical analysis thereof, the survey-based questionnaire approach was adopted. Data were collected from students one time, while they were engaged in technology-enhanced learning through online learning, learning management systems, educational tools and other technology-based instructional arrangements. Within this context, the researcher considered the quantitative approach to be most appropriate, to measure the constructs and to examine the level of association between academic hope and grit and satisfaction with learning.

Population of the Study

The population of the study comprised the undergraduates of the higher education institutions in Punjab and Sindh, Pakistan, who had experienced technology-enhanced learning. This study focused on major educational areas within Punjab and Sindh to get a sample that represented the diversity of educational and institutional environments. The study was focused on students at the aforementioned universities, namely Bahauddin Zakariya University, Multan; University of the Punjab, Lahore; University of Sargodha, Sargodha; University of Karachi, Karachi; University of Sindh, Jamshoro; and Shah Abdul Latif University, Khairpur. These universities offered public sector higher education within the two provinces, and provided a balanced context in which students' psychology in technology-based learning could be researched.

Target Audience

University students who were actively enrolled and at all levels of tertiary education were purposively considered; those with experience using technology in learning, as technology-integrated learning promotes interaction with digital tools, e-learning resources, online chats, virtual class meetings, and varied technological tools in learning. As such, participants were expected to possess adequate experience with technology-integrated learning to answer survey questions on their academic hope, academic grit, and the satisfaction they derive from the learning process.

Sampling Technique

A purposive non-random sampling method was employed to select study participants based on the study criteria. This approach was appropriate considering that the study required participants who had confronted learning technologies. Participants were contacted and provided with the survey instrument through the social media and online communication platforms of the respective universities. The objective was to collect data from participants in different fields and levels of learning who fulfilled the criteria of having faced learning technologies.

Sample Size

From the 511 participants who responded to the survey, 457 participants were included in the analysis after data cleaning. As their satisfaction with learning process was assessed among participants from Punjab and Sindh, Pakistan, the sample size was appropriate for the correlational, regression, and mediation analyses. This was based on the fact that the study involved the relationship among several psychological constructs that were measured on an interval or ratio scale.

Data Collection Procedure

Data collection was accomplished through an online, self-administrated, and structured questionnaire that was designed based on previously published research. It was converted into a Google Forms Survey to assist in the autonomous electronic data collection of participants from universities in Punjab and Sindh. The Google Forms survey was shared to target audiences through communication groups on social media and through academic networks. Participation in the survey was voluntary, and the purpose of the study was explained. The online survey could be completed on various devices including, computers, tablets, and smart phones. Completing the survey was easy for participants located in other areas due to the online nature of the survey.

Measurement Instruments

The hope for academic achievement was measured by the Academic Hope Scale (AcHS). This scale was developed and validated by Khormaei et al. (2024), and it was built to measure hope within the context of academic situations. The Academic Hope Scale has 27 items and is composed of four dimensions: hope for future opportunities, hope for future skills, hope that school is meaningful, and hope for future competencies. According to Khormaei et al. (2024), evidence regarding the reliability and validity of this scale for the target audience of university students was provided. The items measuring hope for academic achievement were adjusted to fit the participants of technology-enhanced learning.

An academic-domain grit measurement was constructed by utilizing a standard grit definition of perseverance and passion toward long-term objectives. This measurement was taken from Duckworth et al. (2007) who first summarized this concept and illustrated the importance of grit within the framework of educational accomplishment. Because an academic version of the grit measurement tool was employed in this study, each of the items specifically addressed the students' persistence and efforts pertaining to their academic goals. Focusing on the academic component was important because, in the case of the assessment of grit, domain-specific measures offer more precise measurements of perseverance. Further studies have endorsed the validity of academic grit measures and shown positive associations between grit and academic outcomes and satisfaction (Clark & Malecki, 2019; Lin et al., 2024).

A learning satisfaction measurement was built using an adapted student learning satisfaction survey. The survey was built using the Students' Learning Satisfaction Questionnaire (SLSQ) measuring students' satisfaction with certain elements of their learning. The SLSQ was developed with 26 items measuring the satisfaction of students with different aspects of their learning, and underwent an analysis of its construction and reliability (Learning Satisfaction: Validity and Reliability Testing for Students' Learning Satisfaction Questionnaire, 2014). The items in this survey were adapted to describe students' satisfaction with learning in technology-enhanced learning environments.

All three instruments were formatted using a structured questionnaire with a Likert-Type response scale. Where necessary, wording was adjusted for some items so respondents could relate statements to their experiences as university students utilizing technology-based learning within the framework of this study. The final version of the questionnaire was reviewed for completeness, relevance, and context. After that, the reliability of the scales was analyzed within this sample using Cronbach's alpha.

Ethical Considerations

Throughout the entire process, the ethical principles were upheld. Prior to completing the questionnaire, respondents were made aware of the study's goal and design. Participants understood they could refuse to take part and leave the study immediately, free of penalty. The responses that were provided did not contain any names. Upon collection of data, it was kept confidential, and the sole purpose of the data collection was to support research of a scholarly nature; it did not extend beyond that. Part of the online questionnaire was statements about informed consent. Respondents would only progress to the actual questionnaire after stating they were willing to participate. The research was conducted as per the ethical principles of voluntary participation, informed consent, confidentiality, and responsible management of data.

Data Preparation and Analysis

Once data were collected, the responses in Google Forms were exported and arranged into an Excel file. The dataset was assessed for completeness, duplicate responses, inconsistent and/or incorrect responses, and coding errors. After the preliminary data cleaning, the dataset was saved into IBM SPSS Statistics for further analysis. Variables were given numeric codes and composite scores were computed for measures of academic hope, academic grit, and learning satisfaction as per the scoring methods of their respective measures.

To present the respondents' characteristics and the main study variables, a summary statistics routine was performed. For the categorical demographic variables, frequencies and percentages were reported, whereas for the continuous study variables, the means and standard deviations were reported. Additionally, the internal consistency of the adopted measures of academic hope, academic grit, and learning satisfaction was assessed with the aid of Cronbach's alpha reliability coefficients.

The Pearson product–moment correlation analysis was performed to assess the relationship and the direction of academic hope, academic grit, and learning satisfaction. This analysis was performed to assess the relationship of academic hope with academic grit and learning satisfaction, and to examine the relationship of academic grit with learning satisfaction.

To further quantify the impact of academic hope on learning satisfaction, multiple linear regressions were performed. The aforementioned variables were entered into the multiple linear regressions, such that academic hope was the predictor variable, and learning satisfaction was the outcome variable. Relevant statistics of the model unstandardized and standardized coefficients, the level of significance, R^2 and other statistics related to the model were employed to analyze the effects of academic hope on learning satisfaction, and, in doing so, define the span of learning satisfaction of students.

The relationship between academic hope and learning satisfaction, mediated by academic grit, was analyzed by a mediation analysis. The analysis was performed under the framework of Hayes' PROCESS Macro for SPSS, Model 4, such that academic hope was the predictor, academic grit was the mediator, and learning satisfaction was the outcome. The indirect effect was evaluated by bootstrapping. The effect of mediation was deemed to be substantiated when the bootstrapped interval for the indirect effect did not contain zero. Thus, the study aimed to ascertain whether academic hope was related to learning satisfaction through the grit of the students.

Independent samples t-tests and one-way ANOVA were used as supplementary analyses when comparing the results of demographic groups. An independent samples t-test was appropriate when the demographic variable included two groups. One-way ANOVA was used when the variable included three or more groups. When a statistically significant overall ANOVA result was achieved, Tukey's HSD (or some other appropriate post-hoc procedure) was used to discern which groups differed significantly in terms of the average level of academic hope, academic grit, and learning satisfaction. Each of these group difference analyses was conducted as a supplementary analysis of the proposed model and was not the primary analysis.

Before the results of the analyses were discussed, the assumptions for the statistical tests were evaluated. These assessments included the linearity of relationships, the normality of variables and residuals, the independence of observations, the constancy of variance (homoscedasticity), and the absence of significant multicollinearity for regression analysis. Where hypothesized, effect sizes and confidence intervals were reported to enhance the interpretation of the results.

Table 1: Demographic Profile of Respondents (N = 457)

Demographic Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	242	52.95
	Female	215	47.05
Age	18–20 years	116	25.38
	21–23 years	164	35.89
	24–26 years	119	26.04
	27 years and above	58	12.69
Educational Level	Undergraduate	255	55.80
	Postgraduate	202	44.20
Province	Punjab	271	59.30
	Sindh	186	40.70
Technology-Enhanced Learning Experience	Less than 1 year	102	22.32
	1–2 years	154	33.70
	3–4 years	132	28.88
	More than 4 years	69	15.10

Demographic results show that the study collected responses from 457 respondents, including 242 (52.95%) males and 215 (47.05%) females, indicating almost equal representation of both genders. The highest number of respondents were in the age group of 21-23 (n = 164, 35.89%), followed by 24-26 (n = 119, 26.04%), 18-20 (n = 116, 25.38%), and 27 years and above (n= 58, 12.69%). In terms of educational level, 255 respondents (55.80%) were undergraduates and the remaining 202 (44.20%) were postgraduates. In terms of geographical distribution, 271 respondents (59.30%) were from Punjab and the remaining 186 (40.70%) were from Sindh. Considering the experience in learning that is facilitated by technology, the largest group had 1-2 years of experience (n = 154, 33.70%), while the remaining had 3-4 years (n = 132, 28.88%), less than a year (n = 102, 22.32%), and more than 4 years (n = 69, 15.10%). From the demographic data, it can be concluded that the respondents were from both genders, various age groups and levels of education, and students from both Punjab and Sindh with different levels of experience in learning facilitated by technology.

Table 2: Correlation Among Academic Hope, Academic Grit, and Learning Satisfaction (N = 457)

Variables	1	2	3
1. Academic Hope	1	.584**	.621**
2. Academic Grit	.584**	1	.667**

Variables	1	2	3
3. Learning Satisfaction	.621**	.667**	1

Note. p < .01 (2-tailed).

Results from the Pearson correlation indicate that there is a significant, positive correlation between academic hope and grit, (r = .584, p < .01). Respectively, this indicated that students that exhibited more academic hope, also reported more grit. Additionally, positive, significant correlations exist between academic hope and learning satisfaction (r = .621, p < .01). This shows that potentially greater hope already correlates with more satisfaction and better learning experiences within a technology enhanced learning environment (TELE). Further, positive, significant correlations also exist between grit and learning satisfaction (r = .667, p < .01). Ultimately, in this study, satisfactory relationships exist between the three study variables and strongly support the relationships presented in the study.

Table 3: Multiple Regression Analysis Predicting Learning Satisfaction (N = 457)

Predictor	B	SE	β	t	p
Constant	0.874	0.214	—	4.08	< .001
Academic Hope	0.612	0.047	.621	13.02	< .001

Model Statistics	Value
R	.621
R^2	.386
Adjusted R^2	.384
F	169.52
p	< .001

Multiple regressions show that in technology-enhanced learning environments, learning satisfaction of students is positively and significantly predicted by academic hope (ß = .621, t = 13.02, p < .001). The model accounted for 62.1% of the variance in learning satisfaction and 38.6% of the total variance (R^2 = .386). The regression model was significant, F(1, 455) = 169.52, p < .001, indicating that academic hope was significant in predicting students' learning satisfaction. The regression coefficients were positive, and therefore students reporting higher academic hope levels reported higher learning satisfaction. In this regard, the regression analysis substantiated the predictive relationship between academic hope and learning satisfaction.

Table 4: Gender Differences in Academic Hope, Academic Grit, and Learning Satisfaction (N = 457)

Variable	Male (n = 242) Mean ± SD	Female (n = 215) Mean ± SD	t	df	p
Academic Hope	3.61 ± 0.64	3.48 ± 0.67	2.08	455	.038
Academic Grit	3.57 ± 0.61	3.42 ± 0.65	2.53	455	.012
Learning Satisfaction	3.69 ± 0.63	3.51 ± 0.68	2.91	455	.004

The independent-samples t-test showed gender differences across all study variables. In regards to academic hope, males (M = 3.61, SD = 0.64) showed significantly more hope than females (M = 3.48, SD = 0.67), t(455) = 2.08, p = .038, and males (M = 3.57, SD = 0.61) again showed more grit than females (M = 3.42, SD = 0.65), t(455) = 2.53, p = .012. Males (M = 3.69, SD = 0.63) again exhibited more learning satisfaction than females (M = 3.51, SD = 0.68), t(455) = 2.91, p = .004. These findings indicate that males were more hopeful, gritty, and satisfied with their learning than females in technology-enhanced learning environments.

Discussion

The relationship of these three components (academic hope, academic grit and learning satisfaction) was studied within learning contexts enhanced with technology. From the available data, a common pattern of positive relationships was noted among the three variables. Positive relationships with academic hope and grit, and learning satisfaction, were noted, respectively. Learning satisfaction was also found to be positively related with academic grit. From the regression analysis, positive academic hope was noted to predict learning satisfaction, and positively influenced the variable to a great extent. Overall, regarding the technology enhanced learning environments, the factors influencing students' learning in these contexts can not be analyzed based on the technologies and the instructional design only. Other factors, which cannot be ignored, relate to the students' psychological resources. In the context of contemporary educational studies, these resources relate to self-regulation, motivation, and emotions, in students' adaptation to technology mediated learning environments.

The connection of academic hope with academic grit is positive, suggesting students who had more hopeful academic goal – directing attitudes had more academic grit. This is in accordance with Derakhshan, A et al. (2024) in their study of 425 participants. They found academic grit was positively linked with hope, and hope along with social support accounted for 44.3% of the variability of academic grit. On similar lines, Zhang, Y (2022) studied 301 participants and an association between academic hope and academic grit was found. The participants, who demonstrated hope towards the accomplishment of their academic goals, remained hopeful in the face of obstacles and remained persistent. Therefore, the findings of the current study, along with numerous others, suggest that hope acts as a motivational factor towards academic persistence. In learning environments enhanced with technology, this relationship may be of special significance, as learners have to continuously push forward, manage multiple digital resources, and adapt to unexpected changes in technology as well as obstacles caused by a lack of either technology or the required knowledge. Students who are of the opinion that academic goals can be meaningful and attainable, along with believing that many pathways are available to achieve academic goals, will remain persistent.

The findings also showed a positive association between hope and satisfaction with learning. In regression analysis, hope was found to be a significant predictor of satisfaction with learning. This finding is consistent with recent research by Chen et al. (2025) on 879 students in Ecuadorean public universities. Chen et al. found hope to be related to satisfaction with academics, and predictive of satisfaction via life satisfaction. Their results showed hope and life satisfaction to be predictors of academic satisfaction, and accounted for 24.6 percent of variation in academic satisfaction. The two findings are consistent, and show hopeful learners may be more satisfied with academics, and set important goals; see available alternative routes when barriers occur; and be more committed to the goal of satisfaction within academics. The first advance contributes to research by shifting focus to satisfaction with learning in technology enhanced learning. Learning involves elements of self-directed learning, which students must deal with when engaged in technology-based activities. This research argues academic hope can help learners perceive more of the challenges they are presented with as manageable obstacles to success (in the learning experience), as opposed to academicfailure.

Another major finding was the strong positive correlation between academic grit and learning satisfaction. Students who showed more academic grit reported a greater satisfaction for their learning. This finding is consistent with the recent study by Rees, C (2024). It is also consistent with the studies of Izadpanah, S. (2024). Specifically, they showed that academic grit was related to positive adaptation and life satisfaction among Brazilian undergraduate students, and was mediated by academic adaptation. Persistence contributes to academic achievement, but more importantly, it is related to the psychology and behavior of students in the process and evaluation of learning. In technology-integrated learning environments, students who are persistent are more likely to continue participating in learning activities online, find ways to solve technology-related dilemmas, complete difficult academic tasks, and replace strategies that failed to learn when the previously adopted strategies have not been successful. This may bring a greater sense of satisfaction for learning.

The regression results confirmed that academic hope was an important factor in predicting learning satisfaction. Positive standardized regression coefficients showed that, in the case of greater academic hope, students reported greater satisfaction. This also confirmed earlier correlation results by showing the relationship extended beyond a simple bivariate relationship. This finding is also important because learning satisfaction (in general) is usually attributed to the learning environment or the

technology used, while this finding indicates an internal psychological resource. In line with this, many studies conducted on technology-enhanced learning have shown that students' satisfaction is influenced by their perceptions of learning activities, participation, performance, interaction, and the overall learning environment. Therefore, the present findings show that, in addition to the infrastructure, technology-based learning may not provide a satisfying learning experience. The students' ability to set and pursue meaningful academic goals and their motivation to do so may determine how they will engage with the opportunities and challenges that technology-enhanced education poses.

The findings collectively suggest that academic grit could be an intermediate step via which academic hope helps to foster learning satisfaction. Hope and grit are close but distinct constructs. Hope helps students to develop motivational intent and to perceive planning pathways for attainment. Grit pertains to the perseverance and effort needed to achieve a goal. If students have academic hope, they are likely to keep believing in their capacity to accomplish academic objectives and to keep trying, even if some hurdles stand in their way. This motivates academic persistence and strengthens grit. The gritty student will experience more accomplishment, which will enhance learning satisfaction. Although the current data provide correlations and regressions, the mediation hypothesis has to await a formal analysis of indirect effects using the bootstrapping method. Still, the relations among all three constructs provide a reasonable basis for the proposed mediation model.

The proposed psychological pathway also corresponds with recent mediation research on hope and academic satisfaction. Adeshola, I et al. (2023) found that life satisfaction mediated part of the relationship between hope and academic satisfaction, which shows hope translates to academic satisfaction via an intermediary psychological path. This study advances this research by offering academic grit as a more proximal psychological mechanism. In contrast to life satisfaction, which reflects an overall general life evaluation, academic grit pertains to persevering effort and persistence in the face of academic goals. This psychological trait is well suited to the research on technology-enhanced learning, since students are usually required to persevere through many obstacles, develop a self-regulated learning system, and cope with many technological obstacles. For this reason, this mediation research extends from a general well-being pathway to a more direct and proximal academic motivational pathway.

Conclusion

This work adds to the literature on technology-mediated learning and academic hope, grit, and learning satisfaction with evidence of their interdependence. In surveying current tech-centric learning methods, we found that participants who evidenced more academic hope noted more academic grit and learning satisfaction, and academic grit was found to correlate with satisfaction with learning. Furthermore, in these participants, academic grit was a positive predictor of satisfaction with learning, so having the ability to formulate personal academic goals, perceive routes to those goals, and retain interest and focus on goal achievement is likely to foster a more positive assessment of the technology integrated learning framework. These findings are congruent with recent data that indicate the role of hope in boosting academic grit and the direct correlation of academic satisfaction with hope in the university student population.

In summary, this study is the first to note that employing technology firmly within the learning process is as much about the integration of digital tools as it is about the presence of students' psychological tools. While academic hope may serve the function of directing goal commitment, academic grit may sustain persistence when participants meet an obstacle while attempting to overcome the academic challenge, or when they encounter a roadblock while using the technology. In line with the above, higher education institutions must invest in the tech-mediated learning framework and psychologically support motivation, along with digital technology integration. Since the present study employed a cross-sectional, quantitative research design, the relationships described should not be considered as causal in nature. It is imperative to conduct longitudinal, and experimental studies as successors to this research to describe the impact of academic hope and grit on satisfaction with learning. New studies confirm that hope and adaptive coping along with other positive psychological resources play an important role in students' academic functioning and well-being.

Recommendations

1. Strengthen academic hope: Universities should provide goal-setting and motivational activities that help students establish clear academic goals and identify practical pathways for achieving them.

2. Develop academic grit: Educators should incorporate activities that promote persistence, sustained effort, resilience, and constructive responses to academic setbacks.

3. Improve technology-enhanced learning: Institutions should ensure that digital learning platforms are accessible, user-friendly, reliable, and supported by adequate technical assistance.

4. Provide continuous academic support: Faculty members should provide timely feedback, mentoring, and guidance to help students remain motivated and persistent during technology-mediated learning.

5. Promote student engagement: Technology-enhanced courses should incorporate interactive activities, collaborative learning, discussions, and meaningful digital tasks to improve students' involvement and satisfaction.

6. Integrate psychological support: Universities should develop student-support initiatives that strengthen positive psychological resources such as hope, motivation, resilience, and perseverance.

7. Conduct longitudinal research: Future researchers should use longitudinal or experimental designs to examine whether improvements in academic hope and grit produce sustained increases in learning satisfaction.

Future Implications

These findings can help set a standard for future studies in order to understand the importance of academic hope and academic grit on students' satisfaction levels when learning supported by technology. Additional research needs to build on this model by looking at other psychological and contextual variables which could extend the explanation of students' satisfaction including academic self-efficacy, digital competence, metacognitive awareness, technological anxiety, learning engagement, and perceived teacher support. Longitudinal and experimental studies could look at academic hope and academic grit to see if focusing more on these two constructs would enhance learning satisfaction. Research could examine students of various academic subjects, various educational levels, students of different geographic locations, varying types of technology-enhanced learning, and research could also see if the same relationships occur when those different contexts are merged together. These changes could incorporate structural equation modeling and multi-group to create comprehensible models of how students may psychologically fit digital learning. These improvements to research may give more motivation focused innovative technology in the classroom.

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