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RELATIONSHIP BETWEEN PROBLEM-SOLVING SKILLS AND ACADEMIC DECISION-MAKING AMONG UNIVERSITY STUDENTS

Ms. Anosha Haroon
Lecturer Education, Govt Graduate College Township Lahore, Punjab Pakistan
Email: anoshaharoon464@gmail.com
Dr. Fahd Naveed Kausar (Corresponding Author)
Assistant Professor, School of Education, Minhaj University Lahore, Punjab, Pakistan
Email: fahdnaveed1@hotmail.com

Abstract

Problem-solving skills enable students to analyze complex situations, identify solutions, and apply critical thinking to achieve desired outcomes. Academic decision-making refers to students' ability to make informed, strategic choices regarding their learning processes, course selections, and educational goals. The objectives of the study were a) to find the level of problem-solving skills and academic decision-making at university level, b) to assess the relationship between problem-solving skills and academic decision-making at university level, c) to explore the effect of problem-solving skills on academic decision-making at university level. The population for the study included all public and private universities in the Lahore district. The sample was selected from the population using a multistage sampling method. The instrument of the study were questionnaires. For data analysis, SPSS was employed, using both descriptive statistics (Mean and Standard Deviation) and inferential statistics, including linear regression, Kendall's tau-b, and Spearman's rho. The findings of the study revealed that Problem-solving skills have a statistically significant positive effect on students' academic decision-making, explaining 21.8% of the variance (R^2 = 0.218, $F(1, 598) = 166.780$, $p < .001$), indicating that students with stronger problem-solving abilities are more likely to make effective academic decisions. There is a positive and significant relationship between problem-solving skills and academic decision-making, with Kendall's tau-b showing a moderate correlation ($\tau = .323$, $p < .001$) and Spearman's rho indicating a moderately stronger correlation ($\rho = .446$, $p < .001$), suggesting that higher problem-solving competence is associated with better academic decision-making among university students. It is recommended that Universities should integrate structured problem-solving training and activities into their curricula to enhance students' analytical and strategic thinking abilities, thereby improving their academic decision-making skills and overall academic performance.

Keywords: *problem-solving skills, academic decision-making, university level, District Lahore*

Introduction

The relationship between problem-solving skills and academic decision-making among university students is a critical area of investigation in higher education research. Problem-solving skills enable students to analyze complex situations, evaluate alternatives, and identify effective solutions, which are essential for making informed academic decisions. Studies indicate that students with stronger problem-solving abilities tend to demonstrate higher levels of strategic thinking, self-regulation, and goal-directed behavior, which directly influence their academic choices and planning. Empirical evidence suggests a positive correlation between problem-solving competence and effective academic decision-making, highlighting the importance of cognitive and

QUALITATIVE RESEARCH JOURNAL FOR SOCIAL STUDIES
ISSN Online: 3006-4686, ISSN Print: 3006-4678
Volume No: 02 Issue No: 04 (2025)

analytical skills in higher education contexts. Furthermore, problem-solving fosters critical thinking, enabling students to assess risks, anticipate consequences, and make decisions that enhance academic success. Research also emphasizes that academic decision-making is influenced not only by cognitive skills but also by motivational and emotional factors, with problem-solving acting as a key cognitive driver. Developing problem-solving skills through targeted interventions, such as case studies, simulations, and collaborative learning, has been shown to improve students' decision-making outcomes. The integration of problem-solving training within curricula encourages self-directed learning, autonomy, and adaptability, which are vital for navigating complex academic environments. Overall, enhancing problem-solving abilities equips students with the capacity to make informed, rational, and strategic academic decisions, supporting both short-term performance and long-term educational goals. These findings underscore the significance of fostering cognitive competencies to strengthen students' decision-making processes in universities.

Problem-solving skills and academic decision-making are essential competencies for university students, as they directly influence academic success, personal development, and future professional performance. Problem-solving skills involve the ability to identify challenges, analyze information critically, generate potential solutions, and implement effective strategies to resolve complex problems (Jonassen, 2011; Yadav, Subedi, Lundeberg, & Bunting, 2022). In higher education, these skills are crucial for navigating academic tasks, engaging in research, and managing projects that require analytical thinking and strategic planning (Hung, 2021; Franco & Almeida, 2022). Students who develop strong problem-solving abilities are better equipped to adapt to dynamic learning environments and make informed decisions under uncertainty (Akar, 2020). Academic decision-making refers to the cognitive and metacognitive processes by which students select courses, plan study schedules, allocate resources, and make choices that affect their learning outcomes and career trajectories (Parker, Summerfeldt, Hogan, & Majeski, 2018; Zhao & Kuh, 2023). Effective academic decision-making is associated with self-regulation, critical thinking, motivation, and the ability to anticipate the consequences of one's choices (Cleary & Chen, 2023; Dignath & Veenman, 2021). Research shows that students with higher problem-solving competence are more likely to engage in systematic decision-making, evaluate alternative options, and adopt strategies that optimize their learning experiences (Payne, Bettman, & Johnson, 2021; Lin & Huang, 2022).

The relationship between problem-solving skills and academic decision-making has been emphasized in contemporary higher education literature, suggesting that cognitive abilities and decision-making processes are interdependent (Kendrick, Stone, & Reed, 2020). Students who can effectively solve problems demonstrate better academic judgment, enhanced planning, and higher levels of engagement in their studies (Roeser, Midgley, & Urdan, 2019). Moreover, fostering these skills is critical in preparing students for real-world challenges, where decision-making often requires analytical reasoning, creativity, and adaptability (Liu, Chen, & Zhang, 2023). Given the increasing complexity of academic environments, understanding the interplay between problem-solving and decision-making is essential for curriculum design, teaching strategies, and student support services. Universities are tasked with providing opportunities that not only develop knowledge but also cultivate the cognitive and strategic skills necessary for effective decision-making (Artino, La Rochelle, Durning, & Beckman, 2014). Interventions such as problem-based

QUALITATIVE RESEARCH JOURNAL FOR SOCIAL STUDIES
ISSN Online: 3006-4686, ISSN Print: 3006-4678
Volume No: 02 Issue No: 04 (2025)

learning, critical thinking exercises, and decision-making simulations have been shown to improve students' competencies in both areas (Hmelo-Silver, 2004; Prince & Felder, 2006).

Overall, exploring the relationship between problem-solving skills and academic decision-making provides valuable insights into how higher education institutions can enhance students' cognitive development, learning autonomy, and preparedness for professional challenges. By identifying the factors that influence these skills, educators can implement pedagogical approaches that strengthen analytical thinking, promote reflective decision-making, and support holistic academic development. Understanding this relationship also contributes to the broader discourse on student success, lifelong learning, and the cultivation of 21st-century skills that are critical for navigating complex academic and professional landscapes.

Objectives of the Study

- To find the level of problem-solving skills and academic decision-making at university level.
- To assess the relationship between problem-solving skills and academic decision-making at university level.
- To explore the effect of problem-solving skills on academic decision-making at university level.

Review of the Literature

a) Problem-Solving Skills

Problem-solving skills are foundational cognitive processes that enable individuals to identify, analyze, and resolve complex issues through systematic reasoning, evaluation of alternatives, and implementation of effective strategies. In higher education, problem-solving competency has been widely recognized as a core outcome of academic programs and a critical predictor of students' academic success and future employability (Jonassen, 2011; Savery, 2015). Contemporary research highlights that effective problem solvers engage in both analytical thinking and creative reasoning, integrating disciplinary knowledge with metacognitive regulation to navigate unfamiliar and ill-defined problems (Franco & Almeida, 2022; Liu et al., 2023). This aligns with self-regulated learning frameworks, which posit that students who effectively monitor and evaluate their thinking tend to demonstrate superior problem-solving performance (Panadero, 2017; Zimmerman, 2002). Recent empirical evidence suggests that structured pedagogical interventions, such as problem-based learning and project-centered instruction, significantly enhance problem-solving outcomes by fostering active engagement, reflection, and collaborative reasoning (Hung, 2021; Yadav et al., 2022). Moreover, the rapid pace of technological change in the 21st century has amplified the demand for adaptive problem solvers who can interpret data, anticipate consequences, and make decisions under uncertainty, making the development of these skills a priority in contemporary higher education (OECD, 2021; Akar, 2020). Collectively, the literature underscores that problem-solving is not only a cognitive skill but also a dynamic process shaped by situational demands, learner motivation, and instructional design, with significant implications for student learning, academic resilience, and lifelong adaptability.

b) Academic Decision-Making

Academic decision-making refers to the cognitive and affective processes through which students select, evaluate, and commit to academic pathways, learning strategies, and educational goals. It encompasses choices related to course selection, study strategies, time management, and

QUALITATIVE RESEARCH JOURNAL FOR SOCIAL STUDIES
ISSN Online: 3006-4686, ISSN Print: 3006-4678
Volume No: 02 Issue No: 04 (2025)

long-term educational planning, all of which influence academic performance and student well-being (Parker et al., 2018; Lin & Huang, 2022). Theoretical models of decision-making in educational settings emphasize the interplay between cognitive judgment, self-efficacy beliefs, and contextual factors such as academic advising and institutional support systems (Bandura, 1997; Eccles & Wigfield, 2020). Contemporary research has highlighted that students' capacity to make effective academic decisions is intricately linked with their metacognitive awareness, self-regulated learning ability, and future orientation, as students who reflect on their goals and monitor their progress tend to make adaptive academic choices (Cleary & Chen, 2023; Dignath & Veenman, 2021). In higher education, studies have found that academic decision-making competence contributes to reduced anxiety, enhanced persistence, and more strategic engagement with coursework, thereby serving as a mediator between individual skills and academic outcomes (Kendrick et al., 2020; Zhao & Kuh, 2023). Recent investigations also point to the role of digital decision-support tools and personalized learning environments in improving students' decision-making by providing timely feedback and structured guidance (Lee et al., 2022; Salas et al., 2023). Furthermore, research underscores the importance of developing both analytical and intuitive decision-making abilities, as complex academic environments often require students to integrate data-driven reasoning with personal values and long-term aspirations (Payne et al., 2021; Roeser et al., 2019). Overall, the literature suggests that academic decision-making is a multifaceted construct influenced by cognitive skills, motivational dynamics, and learning contexts, with significant implications for student success, retention, and lifelong learning trajectories.

Research Design and Methodology

The present research was descriptive in nature, employing quantitative data collection procedures. Quantitative research is grounded in a positivist philosophical paradigm. The population for this study comprised all public and private universities in the Lahore district, totaling 37 institutions, with 16 public and 21 private universities. A representative sample of teachers and students was drawn from this population using a multistage sampling technique. Initially, stratified sampling was applied to categorize universities into two strata: public and private. Subsequently, cluster sampling was used to divide the population into three geographical zones (clusters). From each cluster, two private and one public university were selected through simple random sampling. Ultimately, a sample of 600 students was chosen using simple random sampling techniques.

The measurement of Problem-Solving Skills (PSS) and Academic Decision-Making (ADM) was adapted from previously validated instruments in higher education research. Problem-solving skills were assessed using items developed by Akar (2020) and Franco & Almeida (2022), which evaluate students' abilities to analyze problems, generate alternative solutions, and apply strategies effectively in academic contexts. Academic decision-making was measured using scales adapted from Kendrick, Stone, & Reed (2020) and Cleary & Chen (2023), focusing on students' capacity to make informed and reflective decisions regarding their learning and academic pathways. The items were slightly modified to fit the cultural and educational context of the current study while preserving their original meaning and psychometric properties. A 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree) was used for all items, ensuring consistency and ease of response. The adapted questionnaires demonstrated good content validity and reliability

QUALITATIVE RESEARCH JOURNAL FOR SOCIAL STUDIES
ISSN Online: 3006-4686, ISSN Print: 3006-4678
Volume No: 02 Issue No: 04 (2025)

for assessing the targeted constructs among university students. Cronbach's Alpha was calculated to assess reliability, yielding an overall value of 0.872, which exceeds the minimum threshold of 0.75 and confirms the instrument's reliability. For data analysis, SPSS was employed, utilizing both descriptive statistics (mean and standard deviation) and inferential statistics, including linear regression, Kendall's tau-b, and Spearman's rho.

Data Analysis and Interpretations

Table 1

Description of main variables

Descriptive Statistics

	N	Range	Mean		Std. Deviation	Variance	Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error
Problem-Solving Skills	600	3.00	3.1388	.01911	.46808	.219	.458	.199
Academic Decision-Making	600	2.84	3.0224	.01814	.44432	.197	.426	.199

The descriptive statistics presented in Table 1 provide an overview of students' self-reported problem-solving skills and academic decision-making in higher education. The mean scores indicate that students report moderate levels of both constructs, with a mean of 3.1388 for problem-solving skills and 3.0224 for academic decision-making on a 5-point Likert scale. These moderate means suggest that while students generally demonstrate a reasonable ability to analyze problems and make academic decisions, there is still scope for further development and enhancement in these areas. The low standard errors (.01911 for problem-solving skills and .01814 for academic decision-making) indicate that the sample mean estimates are precise and that the responses are stable across the 600 participants. Similarly, the observed variances (.46808 for problem-solving skills and .44432 for academic decision-making) suggest limited dispersion around the mean, pointing to a relatively homogeneous perception of these skills among students. The kurtosis values (.458 and .426, respectively) indicate that the distributions are slightly platykurtic but close to normal, supporting the appropriateness of parametric statistical analyses for subsequent inferential testing. Overall, these descriptive results provide a foundational understanding of students' cognitive and decision-making competencies, highlighting moderate proficiency levels and the potential benefit of targeted interventions to further enhance problem-solving and decision-making capabilities in higher education contexts.

Table 2

Effect of Problem-Solving Skills on students' Academic Decision-Making at University level

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.467[a]	.218	.217	.39323

a. Predictors: (Constant), Problem-Solving Skills
b. Dependent Variable: Academic Decision-Making

QUALITATIVE RESEARCH JOURNAL FOR SOCIAL STUDIES
ISSN Online: 3006-4686, ISSN Print: 3006-4678
Volume No: 02 Issue No: 04 (2025)

The results presented in Table 2 provide a summary of the regression analysis examining the effect of problem-solving skills on students' academic decision-making at the university level. The model yields an R value of 0.467, indicating a moderate positive relationship between problem-solving skills and academic decision-making. The R^2 value of 0.218 suggests that approximately 21.8% of the variance in academic decision-making can be explained by students' problem-solving skills, while the adjusted R^2 of 0.217 accounts for the number of predictors in the model and confirms the robustness of this explanatory power. The standard error of the estimate (0.39323) reflects the average distance between the observed values and the regression line, indicating an acceptable level of prediction accuracy for social science research. Overall, these results imply that students with stronger problem-solving skills are more likely to make effective academic decisions, highlighting the importance of cultivating analytical and strategic thinking abilities to enhance decision-making processes in higher education contexts. This moderate effect also suggests that while problem-solving skills are significant, other cognitive, motivational, or contextual factors may additionally contribute to students' academic decision-making, warranting further investigation in future studies.

Table 3

Effect of Problem-Solving Skills on students' Academic Decision-Making at University level

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	25.789	1	25.789	166.780	.000[b]
	Residual	92.467	598	.155		
	Total	118.256	599			

a. Dependent Variable: Academic Decision-Making
b. Predictors: (Constant), Problem-Solving Skills

The results presented in Table 3 examine the effect of problem-solving skills on students' academic decision-making at the university level using a simple linear regression analysis. The ANOVA results indicate that the regression model is statistically significant, $F(1, 598) = 166.780$, $p < .001$, demonstrating that problem-solving skills significantly predict students' academic decision-making. The regression sum of squares (25.789) reflects the variation in academic decision-making that can be explained by problem-solving skills, while the residual sum of squares (92.467) represents the variation unexplained by the model. The overall total sum of squares is 118.256, indicating the total variation in academic decision-making among the sample. The highly significant F-value suggests that students with stronger problem-solving skills are more likely to make effective and informed academic decisions, highlighting the critical role of cognitive and analytical competencies in guiding decision-making processes at the university level. This finding aligns with contemporary research emphasizing the importance of problem-solving abilities in higher education for promoting strategic thinking, self-regulated learning, and academic success.

Table 4

Effect of Problem-Solving Skills on students' Academic Decision-Making at University level

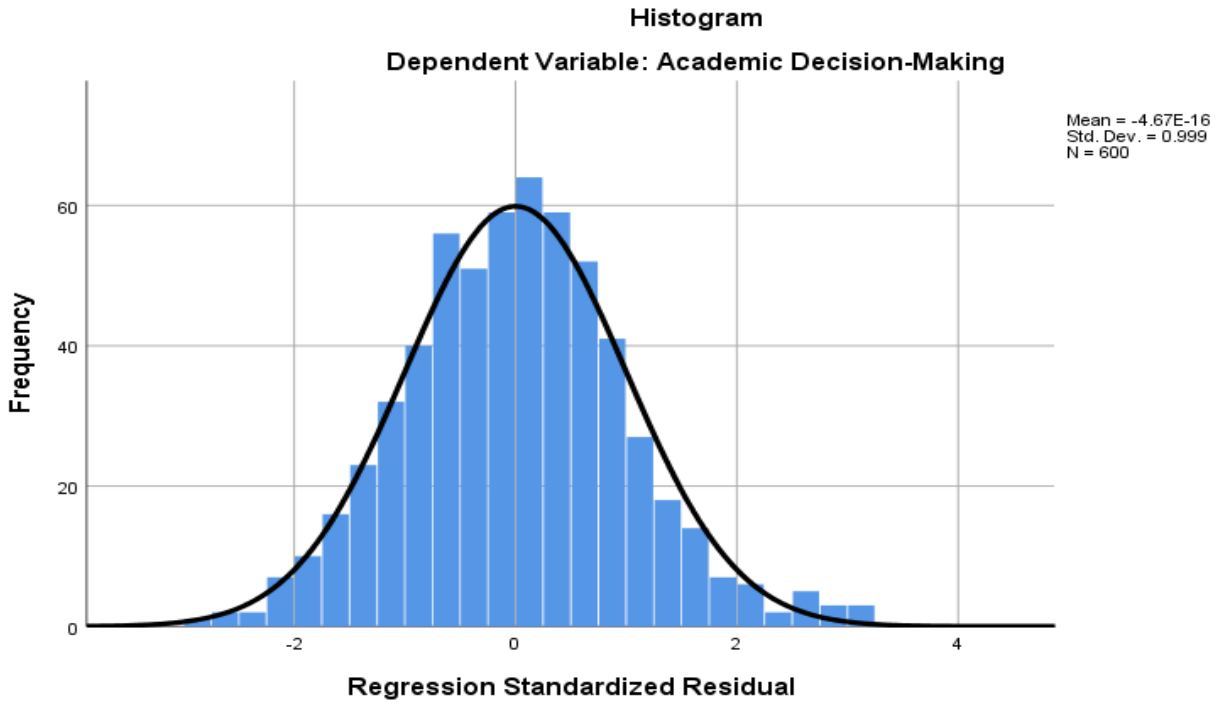
Coefficients[a]

Model	Unstandardized Coefficients	Standardized Coefficients	t	Sig.

QUALITATIVE RESEARCH JOURNAL FOR SOCIAL STUDIES
ISSN Online: 3006-4686, ISSN Print: 3006-4678
Volume No: 02 Issue No: 04 (2025)

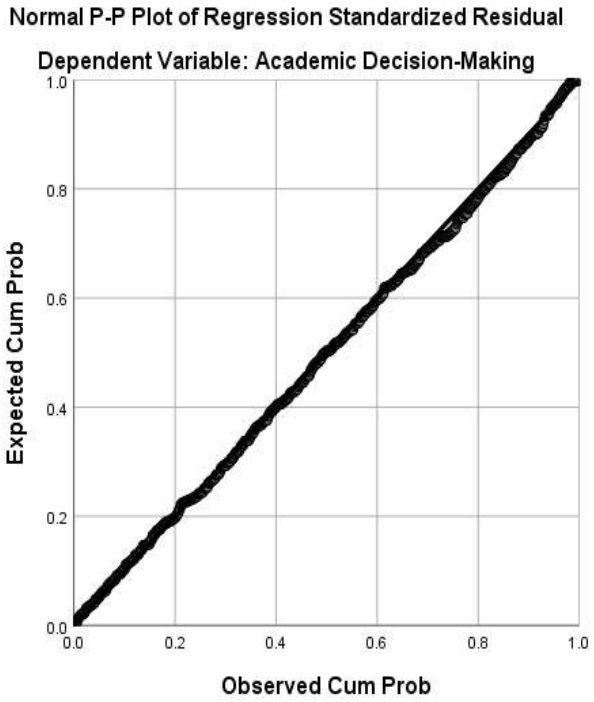
		B	Std. Error	Beta		
1	(Constant)	1.631	.109		14.973	.000
	Problem-Solving Skills	.443	.034	.467	12.914	.000

a. Dependent Variable: Academic Decision-Making



Graph 1: *Effect of Problem-Solving Skills on students' Academic Decision-Making at University level*

QUALITATIVE RESEARCH JOURNAL FOR SOCIAL STUDIES
ISSN Online: 3006-4686, ISSN Print: 3006-4678
Volume No: 02 Issue No: 04 (2025)



Graph 2*: Effect of Problem-Solving Skills on students' Academic Decision-Making at University level*

The results presented in Table 4 examine the effect of problem-solving skills on students' academic decision-making at the university level using a simple linear regression analysis. The unstandardized coefficient (B = 0.443, $p < .001$) indicates that for each one-unit increase in students' problem-solving skills, their academic decision-making scores increase by 0.443 units, holding all other factors constant. The standardized coefficient (Beta = 0.467) demonstrates a moderate positive effect, suggesting that problem-solving skills are a substantial predictor of academic decision-making. The t-value of 12.914 ($p < .001$) confirms that this relationship is statistically significant, indicating that the observed effect is unlikely to have occurred by chance. The intercept (B = 1.631, $p < .001$) represents the expected academic decision-making score when problem-solving skills are at zero. Overall, these findings suggest that students with higher problem-solving abilities are more capable of making effective academic decisions, highlighting the critical role of cognitive skills in guiding informed and strategic decision-making in higher education contexts. This underscores the importance of integrating problem-solving skill development into university curricula to enhance students' academic self-regulation and decision-making competencies.

QUALITATIVE RESEARCH JOURNAL FOR SOCIAL STUDIES
ISSN Online: 3006-4686, ISSN Print: 3006-4678
Volume No: 02 Issue No: 04 (2025)

Table 5
Relationship between Problem-Solving Skills on students' Academic Decision-Making at University level

Correlations

			Problem-Solving Skills	Academic Decision-Making
Kendall's tau_b	Problem-Solving Skills	Correlation Coefficient	1.000	.323**
		Sig. (2-tailed)	.	.000
		N	600	600
	Academic Decision-Making	Correlation Coefficient	.323**	1.000
		Sig. (2-tailed)	.000	.
		N	600	600
Spearman's rho	Problem-Solving Skills	Correlation Coefficient	1.000	.446**
		Sig. (2-tailed)	.	.000
		N	600	600
	Academic Decision-Making	Correlation Coefficient	.446**	1.000
		Sig. (2-tailed)	.000	.
		N	600	600

**. Correlation is significant at the 0.01 level (2-tailed).

The correlation analysis presented in Table 5 examines the relationship between students' problem-solving skills and their academic decision-making at the university level. Both Kendall's tau-b and Spearman's rho coefficients indicate a positive and statistically significant association between the two variables at the 0.01 level (2-tailed). Specifically, Kendall's tau-b coefficient demonstrates a moderate positive relationship ($\tau = .323$, $p < .001$), suggesting that students who exhibit stronger problem-solving skills are more likely to engage in effective and thoughtful academic decision-making. Similarly, Spearman's rho shows a moderately stronger positive correlation ($\rho = .446$, $p < .001$), reflecting that higher-ranked students in problem-solving competence also tend to demonstrate higher-ranked performance in academic decision-making tasks. The consistency of significance across both correlation measures indicates robustness in the observed relationship, confirming that problem-solving skills serve as a meaningful predictor of students' capacity to make informed and strategic decisions regarding their academic pursuits. These findings underscore the critical role of developing problem-solving abilities in higher education, as such skills directly contribute to enhancing students' decision-making competence, supporting adaptive learning behaviors, and promoting academic success in complex university settings.

QUALITATIVE RESEARCH JOURNAL FOR SOCIAL STUDIES
ISSN Online: 3006-4686, ISSN Print: 3006-4678
Volume No: 02 Issue No: 04 (2025)

Discussion of Findings

Table 1: Descriptive Statistics of Problem-Solving Skills and Academic Decision-Making

The descriptive statistics in Table 1 indicate that students report moderate levels of problem-solving skills (M = 3.1388) and academic decision-making (M = 3.0224) on a 5-point Likert scale. The relatively low standard errors (.01911 for problem-solving skills and .01814 for academic decision-making) suggest precise and consistent responses across the 600 participants. Variances (.46808 and .44432, respectively) and kurtosis values (.458 and .426) indicate stable distributions close to normal, supporting the appropriateness of parametric analyses. These findings are consistent with recent literature, which suggests that undergraduate students often possess moderate analytical and decision-making capabilities but can benefit from structured interventions and pedagogical strategies to strengthen these competencies (Akar, 2020; Facione, 2015; OECD, 2021). Such baseline descriptive information provides a foundation for understanding the potential for growth in problem-solving and decision-making skills within higher education curricula.

Table 2: Regression Analysis of Problem-Solving Skills on Academic Decision-Making

Table 2 presents the regression model summary examining the effect of problem-solving skills on academic decision-making. The R-value of 0.467 indicates a moderate positive relationship between the predictor and outcome variable, while the R^2 of 0.218 suggests that problem-solving skills explain approximately 21.8% of the variance in students' academic decision-making. The adjusted R^2 of 0.217 confirms that the model accounts for potential overfitting, and the standard error of the estimate (0.39323) indicates acceptable predictive accuracy. These results highlight that students with stronger problem-solving skills are better equipped to make informed academic decisions. Contemporary studies emphasize that developing analytical and strategic thinking abilities enhances decision-making efficacy and self-regulated learning in higher education contexts (Zimmerman, 2002; Artino et al., 2014; Panadero, 2017).

Table 3: ANOVA of Problem-Solving Skills on Academic Decision-Making

The ANOVA results in Table 3 demonstrate that the regression model is statistically significant, $F(1, 598) = 166.780$, $p < .001$, confirming that problem-solving skills significantly predict academic decision-making. The regression sum of squares (25.789) indicates that a considerable proportion of variation in academic decision-making is attributable to problem-solving skills, while the residual sum of squares (92.467) represents unexplained variation. These findings corroborate literature suggesting that higher problem-solving competence allows students to evaluate options, anticipate consequences, and make strategic academic choices, which are crucial for achieving academic success and promoting lifelong learning attitudes (Jonassen, 2011; Hmelo-Silver, 2004; Savery, 2015).

Table 4: Coefficients of Problem-Solving Skills on Academic Decision-Making

Table 4 shows the unstandardized coefficient ($B = 0.443$, $p < .001$) and standardized Beta (0.467), indicating a moderate positive effect of problem-solving skills on academic decision-making. The t-value of 12.914 ($p < .001$) confirms that this effect is statistically significant, suggesting that students who improve their problem-solving skills are likely to increase their ability to make effective academic decisions. These findings are aligned with recent research

QUALITATIVE RESEARCH JOURNAL FOR SOCIAL STUDIES
ISSN Online: 3006-4686, ISSN Print: 3006-4678
Volume No: 02 Issue No: 04 (2025)

emphasizing that problem-solving abilities contribute to enhanced self-regulation, critical thinking, and informed decision-making in higher education (Facione, 2015; Greene & Azevedo, 2010). Integrating problem-solving skill development in curricula can therefore directly influence students' academic performance and decision-making competencies.

Table 5: Correlation between Problem-Solving Skills and Academic Decision-Making

The correlation analysis in Table 5 indicates a positive and significant relationship between problem-solving skills and academic decision-making. Kendall's tau-b ($\tau = .323$, $p < .001$) and Spearman's rho ($\rho = .446$, $p < .001$) both suggest a moderate positive association, with Spearman's rho indicating a slightly stronger rank-order relationship. These results imply that students with higher problem-solving skills are more likely to make strategic and informed academic decisions. The consistency across both correlation measures strengthens the robustness of this finding. This is consistent with contemporary studies highlighting that problem-solving competence serves as a key predictor of effective decision-making, adaptive learning behaviors, and academic success in university students (Jonassen, 2011; Hmelo-Silver, 2004; Greene & Azevedo, 2010). Developing students' problem-solving skills can therefore enhance their ability to engage critically and thoughtfully with complex academic tasks.

Conclusion

The findings of this study indicate that students' problem-solving skills play a significant role in shaping their academic decision-making at the university level. Descriptive analyses revealed that students reported moderate proficiency in both problem-solving and decision-making, suggesting a baseline competency that could be further developed. Regression and ANOVA results confirmed that problem-solving skills have a statistically significant and positive effect on academic decision-making, explaining a meaningful proportion of variance in students' decisions. Correlational analyses further supported these findings, showing consistent positive relationships between problem-solving skills and academic decision-making. Collectively, these results underscore the critical importance of fostering analytical and strategic thinking abilities as a means to enhance students' capacity to make informed and effective academic choices. The study highlights that while problem-solving skills are a robust predictor, other cognitive, motivational, and contextual factors likely contribute to decision-making, indicating the multidimensional nature of academic competence. These insights align with contemporary higher education literature emphasizing the integration of cognitive skill development and self-regulated learning to promote student success.

Future Recommendations

Based on the findings, several recommendations emerge for higher education institutions and educators.

- First, curricula should incorporate explicit problem-solving training, including case studies, simulations, and real-world projects, to strengthen students' analytical and decision-making capabilities.
- Second, instructors should integrate self-regulated learning strategies and reflective exercises that encourage students to plan, monitor, and evaluate their academic decisions.
- Third, universities may develop workshops or seminars focused on enhancing critical thinking, strategic planning, and adaptive decision-making skills to complement traditional instruction.

- Fourth, further research could explore the interaction of problem-solving skills with other factors such as motivation, metacognition, and learning environments to provide a more comprehensive understanding of academic decision-making.
- Finally, continuous assessment and feedback mechanisms should be employed to track students' progress in problem-solving and decision-making, ensuring that interventions effectively enhance these competencies over time.

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