

Correlations of AI Study Tools Usage, Academic Self-Efficacy, and Career Decision-Making Self-Efficacy among Generation Z Students in Karachi's Private Secondary Schools

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Abstract

Use of AI-powered study tools have changed the learning experience of secondary education in revolutionary ways, but the psychological and career-related aspects of the habits were not researched extensively, especially in a developing environment. This quantitative cross-sectional research study examined the relationships between AI study tools usage, academic self-efficacy and career decision-making self-efficacy among Generation Z students studying in private secondary schools in Karachi, Pakistan. Self-administered questionnaires were used to collect data from 150 students in grade 9 and 10, which were analyzed through descriptive statistics, Pearson correlation analysis, and mediation analysis with Hayes PROCESS Model 4 (5000 bootstrap). The findings demonstrated small yet significant positive correlations between AI study tools usage, academic self-efficacy ($r = .18, p = .028$) and career decision-making self-efficacy ($r = .20, p = .017$). Academic self-efficacy positively correlated with career decision-making self-efficacy ($r = .54, p < .001$), and fully mediated the relationship between AI study tools usage and career decision-making self-efficacy. The findings are context-specific, and emphasize the need of incorporate pedagogically guided AI-based study tools that could help students boost their academic self-efficacy and enhance career-readiness.

Keywords: AI Study Tools Usage, Academic Self-Efficacy, Career Decision-Making Self-Efficacy, Generation Z.

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Introduction

The fast development of artificial intelligence (AI) technologies has continued to transform the way students receive information, interact with academic content, and prepare for a career. Generative AI tools, intelligent tutoring systems, automatic feedback platforms and adaptive learning applications are AI-based study tools that offer personalized learning paths, immediate feedback and increased task-solving efficiency (Zafar et al., 2024). Among learners of Generation Z, who had an early and prolonged experience with digital technologies, AI applications are relevant to the development of learning behaviors and academic interaction (Seemiller & Grace, 2018).

The AI study tools in an ideal educational setting would be purposefully integrated into the learning processes of students through fostering objective knowledge, independent education, and informed academic and career planning. Nevertheless, this is not achieved at all in most practical situations, especially in secondary education within a developing context (Fatima et al., 2014). Recent research has indicated that students commonly use digital technologies in academic tasks such as homework, summarization, and checking answers, and less on maintaining a consistent self-regulated learning or reflective academic engagement (Gabryś-Barker, 2021). The structural barriers identified by Siregar et al. (2025) included an imbalanced institutional support, limited pedagogical support and variation in digital literacy to limit meaningful use of AI in schools. Subsequently, the possible cognitive, motivational, and career-related benefits of AI technologies remain underutilized (Afzal et al., 2025)

According to the Tanveer et al., 2024 that AI-based study tools may improve self-regulation and ASE among students with the help of various approaches, such as customized feedback and adaptive scaffolding. Importantly, there is a substantial amount of evidence to prove that ASE is a strong predictor of CDMSE and affects whether students feel confident to explore career options, goals, and make informed decisions (Betz et al., 1996).

However, these strands of research are mostly developed independently. Few studies investigate how the use of AI study tools can influence both ASE and CDMSE. Such a gap is especially noticeable in non-Western and developing educational environments, in which a significant portion of the available AI-in-education literature targets higher education population, or mainly considers academic performance-related outcomes, which neglect the processes of motivation and career-related advancement to benefit long-term educational and career growth (Siregar et al., 2025). These psychological

processes by which AI influences academic confidence and career readiness are therefore not well understood.

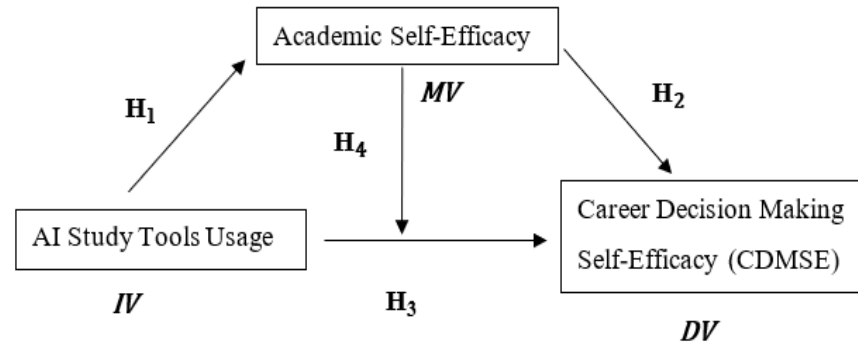
In existing research, with a lack of empirical data that can explain the impact of AI study tools on the self-efficacy belief of students, educational interventions will likely promote the superficial use of technology instead of meaningful learning and independent decision-making. Students may rely on the use of AI tools to complete their tasks without developing confidence in their academic skills or becoming clearer in career planning (Ahmed et al., 2025). At institutional level, teachers and decision-makers lack the evidence to design AI-based learning opportunities that can match the technological innovation with the psychological and developmental needs of students (Selwyn, 2022).

In the context of South Asia's educational institutions, particularly private secondary schools of Karachi, amplify this necessity of the localized research. It is associated with high academic intensity and examination-driven curriculums, solid sociocultural influence of accomplishments (Romela Zaynab et al., 2025). These factors may influence the process of student interaction with AI tools and how this can turn into self-efficacy beliefs. Yet, there is limited empirical research on the use of AI in this socio-cultural context.

Against this backdrop, the current research examines the simultaneous correlates of AI study tools usage with ASE and CDMSE among Generation Z students in the Karachi schools of the private sector (Fatima, Hussain, & Malik, 2014). Based on the concepts of the Social Cognitive Theory (Bandura, 1997) and Social Cognitive Career Theory (Lent et al., 1994), this study establishes ASE as a possible mediating factor between the AI study tools use and career decision-making confidence (Fatima, et. Al., 2014). Through the empirical testing of the direct and indirect associations between these variables, the study will help to expand the theoretical models in the context of AI-supported secondary education.

In addition, this context-sensitive study aims to address international calls for conducting investigations of the psychological impact of educational technologies on a culturally and underrepresented population (OECD, 2021). This study will contribute to the literature by formulating AI study tools usage, ASE, and CDMSE through a single theoretical framework and offer insight that is both informed and practically relevant to educators, school administrators, and policymakers who can use AI tools to advance student academic assurance and career readiness.

Conceptual Framework



Research Objectives

1. To measure the frequency, types, and nature of AI-generated study **tools** usage among Generation Z students in private secondary schools in Karachi.
2. To assess the perceived levels of academic and CDMSE among Generation Z students in Karachi's private secondary schools.
3. To determine the strength and direction of relationships between AI study tools usage, academic and CDMSE in Generation Z students studying in Karachi's private secondary schools.
4. To analyze that ASE mediates the relationship between AI-generated study tools usage and CDMSE among Generation Z students in Karachi's private secondary schools.

Research Questions

1. What is the frequency, types, and nature of AI-generated study tools used by Generation Z students?
2. What is the perceived level of ASE among Generation Z students?
3. Is there a significant relationship between the usage of AI study tools and Generation Z students' ASE?
4. Is there a significant relationship between the usage of AI study tools, ASE, and students' CDMSE?

Hypothesis

H₀: There is no significant relationship between the usage of AI study tools and ASE among Generation Z students in private secondary schools of Karachi.

H₁: There is a significant positive relationship between the usage of AI study tools and ASE among Generation Z students in private secondary schools of Karachi.

H₀: ASE does not significantly influence CDMSE among Generation Z students in private secondary schools of Karachi.

H₂: ASE significantly and positively influences CDMSE among Generation Z students in private secondary schools of Karachi.

H₀: There is no significant relationship between the usage of AI study tools and CDMSE among Generation Z students in private secondary schools of Karachi.

H₃: There is a significant positive relationship between the usage of AI study tools and CDMSE among Generation Z students in private secondary schools of Karachi.

H₀: ASE does not mediate the relationship between AI study tools usage and CDMSE among Generation Z students in Karachi's private secondary schools.

H₄: ASE significantly mediates the relationship between AI study tools usage and CDMSE among Generation Z students in private secondary schools of Karachi.

AI Study Tools in Secondary Education

Using Artificial Intelligence (AI) to tailor educational systems is one of the most radical changes in the pedagogy of the 21st century. To Generation Z, who are the digital natives born in between the mid-1990s and early-2010s, AI does not represent a futuristic idea, but rather an integrated aspect of their educational environments (Mardiah & Nissa, 2024). Competitive academic culture and the increasing technological nature of the Karachi secondary schools are leading to more rapid use of AI-based study tools (Khan et al., 2025). The ability to acquire new knowledge based on the interactions with the user, personalize the learning paths, and deliver real-time and data-driven feedback are the features that shine brightly to differentiate AI study tools and traditional digital

technologies not only in terms of cognitive but also motivational and psychological aspects of learning (Faza & Lestari, 2025). Empirical research suggests that an AI-based learning may be more interactional, efficient, and satisfying, as the instructional material can be customized to the specific needs of a learner. (Anierobi et al., 2025). Adaptive platforms can scaffold the experience of mastery by engaging in repeated practice and providing instant feedback, and generative AI can offer explanatory assistance to gain more complex concepts and encourage higher-order thinking (Roll and Wylie, 2016; Tanveer, Iqbal, and Hussain, 2024).

According to the Pervaiz et al., 2025 their research used an experimental design that evaluated the AI-based tutoring systems in secondary students; this showed that they had significant positive effects on motivation and academic performance. Correspondingly, (Samo et al., 2025) employed a large-scale quantitative survey that indicated that use of AI significantly predicted academic performance ($R^2 = .52$).

However, the implementation of AI tools does not occur with no challenges. Literature points to AI being used instrumentally, e.g. to write homework or generate some content quicker, but not to acquire deep, self-regulated learning skills, which can lead to a lack of intrinsic motivation, and critical thinking (Gabryś-Barker, 2021). In Pakistan, the significant background to the meaningful application of AI to the secondary level is also included by the structural and cultural situations such as examination-based curricula, scarcity of teacher training, and high-parental expectation (Afzal et al., 2025; Siregar et al., 2025).

These results indicate that AI study tools have a great potential in promoting learning outcomes, but their effects are extremely dependent upon pedagogical alignment, student agency, and contextual support that prompts the necessity to pursue studies on both the psychological and pedagogical consequences.

AI Study tools usage and Academic self-efficacy (ASE).

Academic self-efficacy (ASE) refers to the beliefs that learners have concerning their competencies to design and carry out the actions required to accomplish their academic objectives (Bandura, 1997). In the context of the Social Cognitive Theory (SCT) self-efficacy is a major factor shaping motivation, persistence, emotional control, and success.

Theoretically, AI study tools give several ways to enhance ASE. Adaptive systems provide mastery with a built-in adjustment in task difficulty to the capabilities of learners,

automated feedback provides constant reinforcement, and generative AI enhancements may be reduced anxiety by working as virtual tutors (Azevedo & Gašević, 2019). These associations are backed by empirical evidence as students who make use of adaptive AI platforms note an increased awareness of their progress and their learning experiences (knowledge gap) that leads to increased confidence in their academic performance (Tanveer et al., 2024).

However, the use of AI is not always positive. Rodríguez-Ruiz et al. (2025) underscored the fact that less self-efficacious students tend to overuse AI tools and this may reduce the ability to solve problems independently. In addition, AI literacy is crucial; a digitally competent student demonstrates an improved involvement and higher outcomes of using AI (Salhab & Aboushi, 2025).

Although it has a solid theoretical foundation and empirical evidence, the literature (as of now) is largely concentrated on the higher education system, with the situations in secondary schools mostly unexplored, notably in developing nations such as Pakistan. It identifies a research gap in awareness of the effect of AI tools on ASE in individuals who study in exam-oriented educational systems (Romela Zaynab et al., 2025).

Hypothesis 1: *There is a significant positive relationship between the usage of AI study tools and ASE among Generation Z students in private secondary schools of Karachi.*

Academic Self-Efficacy (ASE) and Career Decision-Making Self-Efficacy (CDMSE).

Career decision-making self-efficacy (CDMSE) is the belief in personal competence in doing the tasks required to make informed career decisions such as self-appraisal, exploration, goal setting, planning, and problem-solving (Taylor & Betz, 1983). According to Social Cognitive Career Theory (SCCT), career interests, career choices and persistence are major factors that are predicted by self-efficacy (Lent et al., 1994a). Liu et al. (2024) conducted a survey of high school students to determine the existence of the CDMSE and its impact on learning engagement and discovered that the higher CDMSE, the more proactive academic behaviors. Studies have shown that academic experiences form the key to career related confidence: students with an academic perception of their ability tend to be more active in exploring the career options and making wise choices (Betz & Hackett, 1981).

According to Taufiq Hail et al. (2024), exposure to technologies might increase confidence related to career development in case the technology is introduced in a strategic

way into the educational process. Abdinoor & Ibrahim (2019) used a predictive correlational study design to conduct research on the self-concept, CDMSE, and parental support with senior students of low-income status. CDMSE was found to be the best predictor of career readiness, as opposed to the self-concept and parental support.

Gianakos (2001) said that greater ASE leads to increased CDMSE among adolescents, with decreased career indecision and vocational clarity, whereas low ASE can lead to avoidance and early closure of career possibilities. Students with an academic perception of their ability tend to be more active in exploring the career options and making wise choices (Lent et al., 1994b).

Duru (2022) employed a correlational design to investigate career maturity, CDMSE, and difficulties in decision-making in high school students. The results of the study indicated that higher CDMSE adversely predicted career indecision and partially mediated the association between career maturity and decision-making dilemmas. The cultural factors are also crucial. In South Asia, such as in Pakistan, career choices are shaped by parental expectations and social norms, and economic factors which may come together with self-efficacy beliefs to determine perceived choice (Sirin, 2005; Rizvi and Lingard, 2010). The vast majority of studies about career self-efficacy are not related to using AI, and the corresponding synergy of AI-mediated learning and CDMSE remains largely unexplored.

Hypothesis 2: *ASE significantly and positively influences CDMSE among Generation Z students in private secondary schools of Karachi.*

AI Use study tools and Self-efficacy in career decision-making (CDMSE).

Despite the fact that studies have already started to define the impact of AI on academic experiences of students, there is little direct empirical evidence on how the application of AI study tools relates to career decision-making self-efficacy (CDMSE). Theoretically, AI tools can influence CDMSE by making improvements in academic performance, expanding access to career-related knowledge, and establishing problem-solving competencies that are needed to make informed career decisions (OECD, 2021).

According to some researchers, AI could be directly involved in career formation, such as allowing access to academic opportunities and fields of study, changing the labor market, and capabilities (UNESCO, 2021). Some argue that such an impact of AI on career confidence may be less direct and mediated by ASE and motivational resources of students:

those students, who are academically competent, can interpret and utilize information provided by AI in their career exploration attempts more easily (Li, Ouyang, & Lin, 2025).

According to recent studies, AI literacy and learning attitudes also influence the career interests of students. Indicatively, researchers have found that AI literacy mediates between attitudes towards AI learning and the career interest, indicating that students who are proficient in learning and using AI are better placed to transfer such interests to career-related drives and goals (Kim & Asbury, 2020).

In spite of these hypothetical arguments and indirect evidence, there is limited research on the empirical study of AI study tools use as a direct predictor of CDMSE among a secondary school student population. Although there are these conceptual and indirect relationships, there are limited empirical investigations to test the direct impact of unstructured utilization of AI study tools on the CDMSE in schools. Available evidence indicates that academic performance, self-efficacy, and confidence are highly plausible intermediaries between the impact of AI on career decision-making, although it has not been empirically confirmed.

Hypothesis 3: *There is a significant positive relationship between the usage of AI study tools and CDMSE among Generation Z students in private secondary schools of Karachi.*

ASE as a Mediating Mechanism

The concept of self-efficacy is considered a key psychological process according to the Social Cognitive Career Theory (SCCT) that relates learning experiences to academic and career achievements (Lent et al., 1994b). With the incorporation of AI, ASE (ASE) has the potential to mediate the impacts of AI study tools application on Career Decision-Making Self Efficacy (CDMSE) by enhancing student trust that they can handle academic challenges - a precondition of a confident career exploration. The review of research on AI-based study tools has shown that most of the studies propose positive correlations between the use of technologies and self-efficacy, which implies that students are more likely to feel competent and confident with successful use of AI-based learning environments (Design & Assessment of AI-Based Study tools, 2025)

This mediation-driven pathway is feasible as supported by empirical evidence of associated fields. The aspects of the environment like career adaptability, vocational identity, and academic persistence have been exhibited to display relationships with ASE (Gore, 2006). Self-efficacy has frequently been used to determine how digital technologies

improve to more inclusive motivational, academic, and aspirational outcomes in technology-enhanced learning {Citation}. To illustrate, the research on technology literacy and student engagement proves that ASE is one of the principal psychological processes because of which technology may improve learning involvement, academic self-confidence, and future performance.

As yet, however, no research has specifically aimed to test the entire mediation mechanism between AI study tools usage \rightarrow ASE \rightarrow CDMSE in secondary school environments and within the context of a developing country (such as Pakistan) particularly. This pathway is essential in the analysis of whether AI tools are just facilitating superficial academic tasks or other aspects of psychological transformation that can facilitate educational and professional decision-making over the long term.

Hypothesis 4: ASE significantly mediates the relationship between AI study tools usage and CDMSE among Generation Z students in private secondary schools of Karachi.

Summary of Literature Gaps and Rationale for the Present Study

Available literature shows coherent correlations between self-efficacy and academic/career outcomes and available knowledge of the potential of AI to improve academic confidence. However, there are still gaps: the research of AI-related ASE in secondary school is underrepresented, there are few studies of AI applicability as a mediator in CDMSE, the possibility of mediating through ASE is not well tested, and affective variables, including AI anxiety and literacy, are also poorly explored. In addition, the majority of studies are developed in western and high-income settings. The educational system of Pakistan is unique with curriculum based on exams, strong parental involvement, and unequal technological orientation which influence AI participation and its effects on self-efficacy and career belief. The current study fills the gaps in theoretical, empirical, and contextual literature by incorporating the application of AI tools of study, ASE, and CDMSE into a single framework

Methodology

This research used a quantitative, cross-sectional correlation design. This type of design is appropriate in theory-based research where the goal is to determine

the magnitude and the direction of the relationships and generalize the result to a specific population (Creswell and Creswell, 2018).

The study was carried out in private secondary schools in Karachi, Pakistan. These schools have been selected due to the probability of giving students access to digital technologies and AI-based study tools that are essential to study the application of AI tools in learning settings. Data collection was held in two months in normal instructional weeks to rule out examination weeks, where students could respond in the usual ways of learning as opposed to exhausting stress or workload that had a short-term impact on their responses.

Participants and Data Collection

Students of Grade 9 and 10 formed the study sample as targeted population of Generation Z. The age is also developmental because at this age students become more autonomous in their academic work and start to develop more concrete concepts regarding their future career choices. A multistage sampling technique was used. In the first stage, with the diversity of socio-economic areas of Karachi, private secondary schools were selected to extend contextual representation. To ensure representation from each grade level, a sample of 150 students was selected in the second stage using a stratified technique, which is considered adequate for correlational and mediation analyses (Hair et al., 2019).

Before the main data collection, involving 30 students, a pilot study was conducted to assess the reliability, clarity and contextual suitability of the research instrument. Little wording changes were made based on pilot testing to improve item understanding. The students were voluntarily engaged; their consent, institutional permission was received and participants were guaranteed confidentiality and anonymity to encourage honest answers.

Data Collection Instrument

The tools were consistently able to measure the targeted construct (Hair et al., 2019). The tools were made out of three central parts:

1. AI Study Tools Usage
2. Academic Self-Efficacy (ASE)
3. Career Decision-Making Self-Efficacy (CDMSE).

Each of the items was rated using a five-point Likert scale with an option of 1 = Strongly Disagree up to 5 = Strongly Agree.

AI Study Tools Usage. In this section, the students were evaluated in terms of their use of AI-based and digital study tools within the framework of study planning, efficiency of tasks, assignment support, and studying exam preparation. The construct presents the frequency and functional application of AI-supported learning materials in the academic settings (Zhai et al., 2021).

Academic Self-Efficacy (ASE). ASE is what students believe in their capacity to accomplish academic tasks such as staying focused, doing assignments in time and making efforts to enhance academic performance. The construct is based on the Social Cognitive Theory of Bandura that focuses on the self-efficacy as the essential motive and success factor (Bandura, 1997).

Career Decision-Making Self-Efficacy (CDMSE). The CDMSE evaluates the confidence of the students in their skills to perform career-related activities, including career exploration, occupational information gathering, goal setting, and making career or career-related decisions. The scale is pegged on the framework suggested by Taylor and Betz (1983).

Every questionnaire item was based on validated measures and was adjusted according to the cultural relevance and appropriateness with the Pakistani secondary school students.

Statistical analysis was preceded by the screening of data in terms of completeness and response patterns. Load shedding of questionnaires with too many gaps or a pattern questionnaire was done to preserve data integrity. Cronbach alpha

was used to test internal consistency reliability, and all scales presented acceptable levels of reliability.

Data Analysis

To conduct the analyses, SPSS statistical software was used to carry out descriptive and correlational analyses and mediation analysis of data. The mean, standard deviations, skewness, and kurtosis were used to describe the results of the participants, and to evaluate the characteristics of the scores distribution. To test the correlation between AI Study Tool Usage, ASE, and CDMSE, Pearson correlation analysis was performed. In order to test the hypothesized mediation, a mediation analysis was conducted through regression-based mediation analysis using a mediation analysis macro called PROCESS which works with 5000 bootstraps and has the value of Model 4. The reason why bootstrapping was chosen is that it gives more realistic confidence intervals of the indirect effect and is not sensitive to normality (Hayes, 2018). This method meant that both direct and indirect effects could be determined and gave a strong test of whether ASE mediates the relationship between AI Study Tools Usage and CDMSE.

Findings and Discussions

Reliability Analysis

Before hypothesis testing, the internal consistency of the research instruments was carefully evaluated using Cronbach's alpha. The AI Study Tools Usage (AIU) scale comprises 11 items; a reliability test was performed through SPSS 25 software. According to Hair (2013), if the value of Cronbach's alpha (α) is more than 0.7, the scales can be considered consistent and reliable.

Table: 1

Construct	Cronbach's Alpha	Items
AIU	0.813	11
ASE	0.748	8
CDMSE	0.808	7

Note: AIU = Artificial Intelligence Study Tools Usage, Academic Self-Efficacy = ASE, Career Decision-Making Self-Efficacy = CDMSE

The Reliability statistics of the use of AI study tools (AIU), academic self-efficacy (ASE), and career decision-making self-efficacy (CDMSE) showed good to very good internal consistency indicating consistency and stability in measurement across all items. The AI study Tools usage (AIU) scale indicates that the interaction of students with AI-based study instruments was reliably measured and proven to have a high degree of reliability ($\alpha = .813$). The academic self-efficacy (ASES) scale was acceptable with regard to reliability ($\alpha = .748$), demonstrating the appropriate level of internal consistency in assessing the willingness of students to deal with academic tasks, such as assignment competitiveness and attention control. Further, the career decision-making self-efficacy (CDMSE) has Cronbach's Alpha coefficient value of .808 of a 7-item that is considered good Reliability Statistics. The career decision-making self-efficacy (CDMSE) scale reflects the consistency in the ratings of students' confidence in their ability to handle career-related choices. These findings validate the fact that all the research instruments were reliable enough to perform future descriptive, correlational, and mediation studies. High reliability increases the strength of the study whereby the relationships identified are not likely to be as a result of measurement error, and validity of further inferences is supported (Tavakol and Dennick, 2011).

Characteristics of Participants

Table 2:

Demographic of the Participants

Variable	Category	n (%)
Gender	Female	92 (61.3)
	Male	58 (38.7)
Age (years)	≤ 15	67 (44.7)
	≥ 16	83 (55.3)
Current grade	Grade 9	47 (31.3)
	Grade 10	103 (68.7)
Academic performance (last year)	$< 70\%$	29 (19.4)
	$\geq 70\%$	121 (80.6)

Females constituted a larger proportion of the sample (61.3%) than males (38.7%). With respect to age, more than half of the participants were aged 16 years or older (55.3%), while 44.7% were 15 years or younger. The majority of students were enrolled in Grade 10 (68.7%), whereas 31.3% were studying in Grade 9. In terms of academic performance during the previous academic year, most participants (80.6%) reported

achieving scores of 70% or above, while fewer than one-fifth (19.4%) scored below 70%. Reporting such demographic and performance characteristics provides important context for interpreting the study findings (Creswell & Poth, 2018).

Descriptive Statistics

Table 3

Descriptive Statistics of AI Tools Usage (N = 150)

Scale / Key Items	Min	Max	Mean	SD	Skewness	Kurtosis	Std. Error
AI Tools Usage (AIU)	17	55	36.43	7.64	-0.10	-0.47	.394
Study schedule planning	1	5	2.17	1.03	0.84	0.63	.394
Task efficiency	1	5	3.90	0.94	-0.84	0.41	.394
Summarizing lessons	1	5	3.11	1.23	0.25	-0.32	.394
Generating assignment ideas	1	5	3.07	1.23	0.32	-0.41	.394
Grammar/writing checks	1	5	2.85	1.33	0.43	-0.36	.394
ASE (ASE)	12	40	27.11	5.56	0.11	-0.19	.394
Maintaining study focus	1	5	2.99	0.89	0.42	-0.22	.394
Improving grades via effort	2	5	4.23	0.89	-0.61	0.14	.394
Career Decision-Making SE (CDMSE)	11	35	25.12	5.18	-0.10	-0.47	.394
Job information skills	1	5	3.50	1.16	0.08	-0.23	.394
Goal-aligned subject selection	1	5	3.87	1.02	-0.34	-0.08	.394

The responses of participants were summarized descriptively on the three main scales: AI tools use, ASE (ASE), and CDMSE (CDMSE). In terms of AI study tools use (AIU total), the scores were between 17-55 ($M = 36.43$, $SD = 7.64$), resulting in moderate engagement. The item means varied between 2.17 (study schedule planning) to 3.90 (task

efficiency) with SDs of 0.94 to 1.34. Item Skewness value (-0.84 to 0.84) and alignment of median and mode with the mean indicate the presence of the approximate symmetric distributions.

The scores of academic self-efficacies (ASE total) were 12-40 ($M = 27.11$, $SD = 5.56$), and participants expressed medium-level confidence in academic abilities. Means of individual items ranged between 2.99 (remaining focused during study) and 4.23 (grading better through effort), with SDs of 0.89-1.31. Distributions were almost normal which means that students were competent to handle academic tasks, however, development could be achieved in resilience and adaptive approaches.

Career decision making self-efficacy (CDMSE total) scores were 11 to 35 ($M = 25.12$, $SD = 5.18$) with moderately positive perception of career ability. The range of item means was 3.50 (job information skills) to 3.87 (goal-aligned subject selection), and the distributions were rather normal. These findings imply that the participants are psychologically prepared to incorporate academic performance in future planning, which aligns with studies that associate career self-efficacy with positive adult outcomes.

Overall, the participants were moderately to highly engaged in AI study tools and had enough confidence in making academic and career-related choices.

Table 4

Correlation Analysis

Variables		AIU	CDMSE	ASE
AIU	Pearson Correlation	1	.195*	.180*
	Sig. (2-tailed)		.017	.028
	N	150	150	150
CDMSE	Pearson Correlation	.195*	1	.540***
	Sig. (2-tailed)	.017		< .001
	N	150	150	150
ASE	Pearson Correlation	.180*	.540***	1
	Sig. (2-tailed)	.028	< .001	
	N	150	150	150

The Pearson product-moment analyses were administered to better understand the relationships between AI Study Tools Usage (AIU), Academic self-efficacy (ASE), and career decision-making self-efficacy (CDMSE). The findings revealed that there were positive but statistically significant low-level correlations between AI Study Tools Usage with both self-efficacy measures. In particular, the ASE ($r = .180$, $p = .028$) and CDMSE

($r=.195$, $p=.017$) had a positive correlation with the AI Study Tools Usage. The results imply that students who dedicate more time to study aids with AI are also more likely to say that they feel slightly more confident when approaching academic tasks and making career-related choices, which points to an enabling ability of AI-aided learning to promote self-efficacy in areas.

By contrast, ASE and CDMSE were significantly and moderately correlated ($r=.540$, $p<.001$). Such a strong relationship suggests that the students who believe they are academically competent are significantly more confident in living their career options, which demonstrates the high level of interdependence between beliefs in academic competence and career-related self-efficacy.

Overall, these findings are consistent with Social Cognitive Theory (Bandura, 1997) which highlights mastery experiences to build self-efficacy and Social Cognitive Career Theory (Lent et al., 1994) which is that ASE enlightens career-related self-beliefs. Together, the results confirm Hypotheses 1-3, meaning that AI study tools engagement is associated with academic and career self-confidence, and academic competence is one of the most reliable predictors of CDMSE.

Table 5:
Mediation Analysis

Path	B	SE	t	p	95% CI	Interpretation
AIU → ASE (a)	0.131	0.059	2.22	0.028	0.014 → 0.247	Significant
ASE → CDMSE (b)	0.487	0.065	7.45	<0.001	0.357 → 0.615	Significant
AIU → CDMSE (c')	0.068	0.048	1.44	0.152	-0.026 → 0.162	Not significant
Indirect (a×b)	0.064	0.033	–	–	0.001 → 0.132	Significant

A mediation analysis with PROCESS Macro (Model 4) with 5,000 bootstrapped samples was conducted to test the relationship between academic self-efficacy(ASE) and the relationship between AI Study Tools Usage (AIU) and career decision-making self-efficacy (CDMSE).

AIU was one of the most significant predictors of ASE (path a: $B = 0.131$, $SE = 0.059$, $t = 2.22$, $p = 0.028$), implying that students with positive AI study tool use had a little higher ASE. The prediction of CDMSE by ASE, in turn, was very strong (path b: B

= 0.487, SE = 0.065, $t = 7.45$, $p < 0.001$). The direct influence of AIU on CDMSE, controlling the ASE, was not significant (c' : $B = 0.068$, SE = 0.048, $t = 1.44$, $p = 0.152$).

The significance of the bootstrapped indirect effect was high ($B = 0.064$, 95% CI [0.001, 0.132]) which means that the relationship between AIU and CDMSE is completely mediated by ASE. The total effect of AIU on CDMSE (c path) was significant ($B = 0.132$, 95% CI [0.012, 0.252], $p < 0.05$) before including ASE, supporting the conditions for full mediation. After including ASE, the direct effect (c') was not significant, indicating full mediation. These findings indicate that AI-assisted study tools have an impact on career related confidence by increasing the ASE of the students.

Discussion

Descriptive analyses showed that students are moderately involved with AI study tools and report almost positive attitudes in relation to their academic and career capabilities. These findings are consistent with the existing studies that prove the ability of AI-based technologies to improve the efficiency of specific tasks, deliver immediate and personalized feedback, and facilitate self-regulated learning procedures (Holmes et al., 2019). Tanveer et al. (2024) have pointed out that students who use AI-based instruments to reflect and practice record better academic confidence. The medium scores on ASE used in this paper indicate that students feel that they are competent to undertake academic tasks but also indicates that they can work on areas of resilience, metacognitive awareness, strategic learning activities

The correlation analyses demonstrated the small significant positive correlations of the AI Study Tool Usage with both types of self-efficacy with moderate correlation existing between ASE and CDMSE. These findings align with the theoretical basis of Social Cognitive Career Theory as confidence of academic activities provides a foundation towards career-related self-beliefs (Lent et al., 1994b). Empirically it is also reported that students who are confident about their academic achievements are more likely to make the career choices in a decisive way that is well planned (Chen et al., 2025; Sui et al., 2023). Yet, the comparably limited intensity of the correlation between AI use and self-efficacy is not consistent with the studies that imply the existence of more significant effects of technology-based interventions (Derakhshan and Gao, 2025). Such discrepancy could be due to the differences in context and the methods. Indicatively

The mediation analysis gave a more significant understanding of the process between AI engagement and the use of the AI study tools and CDMSE. Particularly, AI engagement mediated this association completely with the help of ASE meaning that the

latter influences their confidence in their career development indirectly through the promotion of their academic competence. The findings indicate that AI study tools usage influences CDMSE indirectly through ASE. While the total effect (c path) of AIU on CDMSE was significant, the direct effect (c') was not significant after including ASE, confirming that ASE fully mediates this relationship. This observation goes in line with the theoretical assumption that self-efficacy is one of the psychological processes that mediate the relationship between learning experiences and goal-oriented behaviors (Bandura, 1997). It points out that merely increasing the use of AI might be insufficient; pedagogical and reflective aspects of the interaction with AI are of vital importance.

The implications of the results are theoretical. First, they contribute to and expand Social Cognitive Career Theory by offering empirical validation of the fact that ASE moderates the relationship between learning experiences and career-related self-efficacy. Although Lent et al. (1994) implied that academic experiences influence career knowledge, this research clearly establishes the mediating effect of perceived expertise in a digital learning space. Second, the results align with the statements made by Bandura (1997) about centrality of mastery experiences to self-efficacy development, implying that AI tools can be used as platforms to develop mastery experiences.

Particularly, the given research also provides new insights since the researcher focuses on schoolchildren studying in the Pakistani setting, which is underrepresented in the field of AI-education studies. The results indicate that integrating AI tools culturally and contextually can promote academic as well as career self-efficacy and support the significance of creating interventions that would be responsive to the local education systems and needs of students. The contextual contribution is especially crucial in the context of the increasing use of AI tools in classrooms worldwide since it emphasizes possible limits of generalizability and the necessity of taking into account specific educational pressures and technological infrastructure on a local level.

Although these have been contributed, there are findings that differ with other literature in the past. As an illustration, research works carried out in the educational setting have shown that there are direct positive effects of AI on self-efficacy and learning efforts (Derakhshan and Gao, 2025; Chen et al., 2025). The less significant connections in this research can be explained by variations in age of the students, their being accustomed to studying independently, and the level of mentoring they have with the help of AI. It emphasizes the significance to consider the findings through the prism of developmental and contextual issues and validates the fact that the effectiveness of AI technologies is not

universal and are determined by the harmony of technology, pedagogy, and the features of learners.

Summarizing everything mentioned above up, the present research indicates that AI study tools contribute to the improvement of CDMSE mostly because of their influence on ASE. The results highlight the importance of applying AI based on the principle that will appreciate mastery experiences, self-regulated learning, and reflective engagement. They also contribute to the development of theoretical knowledge through the empirical validation of the mediated relationship suggested by Social Cognitive Theory and Social Cognitive Career Theory, where ASE is considered the key factor that connects the learning experiences with the results related to the career.

Limitations

Along with the contributions, the study has a number of limitations that need to be addressed. First, the cross-sectional design limits the possibility of a causal inference. The mediation analysis brings an understanding of the indirect effects; however, longitudinal research is required to determine how the extended AI participation would affect self-efficacy and career planning in the long term. Second, the research was carried out in urban Pakistani private secondary schools that might not be applicable in the rural areas or other education systems with varying resource access. Third, the use of AI study tools was considered as a general construct without differentiating among particular types of AI interventions and their possible different impacts on self-efficacy. Lastly, contextual variables like teacher support, parental involvement and access to technology have not been measured but might have played a role in the observed relationships between AI use and self-efficacy.

Recommendations

Based on the findings, several recommendations for research and practice are proposed:

1. **To Educators and Administrators:** AI devices are to be introduced in the systematic and pedagogical way that prioritizes reflective use, tasks that focus on learning by doing and training on skills. Teachers need to instruct learners to use AI in critical thinking, problem-solving, and independent learning instead of completing tasks.
2. **To Policymakers:** To introduce AI-enhanced learning materials, teachers and counselors must be educated and trained to facilitate their proper implementation. Equitable access to technology should be taken into consideration in policies to prevent the increasing digital gaps that may impact self-efficacy outcomes.
3. **To Future Research:** It is suggested that longitudinal studies will be conducted to determine the long-term effects of constant AI usage on academic performance, self-efficacy formation, and career choice. The experimental designs would help to

determine the efficacy of particular AI interventions, compare the various types of tools, guidance levels, or levels of pedagogical integration. The validity of the findings could be enhanced by triangulation of self-reported human behavior with objective measures, including a log of AI and school-acquired grades.

4. **Reflective and Strategic AI Use:** Future research needs to explore how the combination of developing metacognitive awareness and self-regulated learning and AI tools use can help students to optimize their academic and career self-efficacy. This will assist in determining the best practices involved in making use of AI as psychological and educational scaffold and not an efficiency tool.

Conclusion

In this research, the objective was to explore the correlation between AI study tools usage, ASE, and CDMSE in the context of the city of Karachi in the population of Generation Z among students of private schools. The results give empirical evidence to the effects of digital learning technologies on academic and career outcomes in secondary education.

Findings showed that the proportion of students who used AI study tools moderately and reportedly had quite positive perceptions of the academic and professional competencies. The analyses of reliability ensured that the instruments were internally consistent. The analyses of correlation revealed that there were small but significant positive correlations between the use of AI tools and academic and career self-efficacy. The mediation analysis revealed that, there is a complete mediation between AI study tools usage and CDMSE by ASE, which hints that AI engagement increases career confidence indirectly, through its impact with academic self-beliefs.

The research builds on the previous literature and demonstrates that AI-based applications can improve academic confidence, leading to the increase of CDMSE, especially in the setting of the secondary education where the research has not received much attention (Holmes et al., 2019; Tanveer et al., 2024).

There are however some limitations that should be taken into account. This study has a cross-sectional design that prevents the causal interpretation, and the data sources are self-reported, which can be biased. The study was limited to Karachi private schools, which reduces generalizability. Future research may subsequently take the longitudinal or experimental approach, incorporate objective academic performance variables, and examine the contribution of contextual variables of teacher support, parental involvement, and technology accessibility. Researching on qualitative aspects of AI use in terms of depth, reflection and strategy may help further explain the mechanisms in terms of how AI

use is attached to self-efficacy. Finally, this research indicates that AI study tools have a positive impact on academic and career-related self-efficacy, mainly through improving academic confidence. The results obtained offer valuable empirical evidence to educators and policymakers interested in maximizing the use of AI in high schools and in building theoretical knowledge regarding the channels that digital tools employ to facilitate learning and career planning. Overall, ASE fully mediates the relationship between AI study tools usage and CDMSE, highlighting the critical role of academic confidence in translating AI engagement into career-related outcomes.

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