

Influence of 21st-Century Skills on Academic Resilience among University Students: A Quantitative Cross-Sectional Survey Study

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Abstract

The increasing complexity of higher education has intensified the need for students to acquire competencies that extend beyond traditional academic knowledge. Among these competencies, 21st-century skills including critical thinking, communication, collaboration, creativity, and digital literacy have become essential for enabling students to adapt to rapidly changing academic and professional environments. Simultaneously, academic resilience has emerged as an important psychological and educational construct that enables students to overcome academic setbacks, sustain motivation, and achieve long-term educational success. Despite the growing importance of both constructs, limited empirical evidence has comprehensively examined the influence of 21st-century skills on academic resilience within higher education settings. Therefore, this study investigated the influence of 21st-century skills on academic resilience among university students. A quantitative research approach employing a cross-sectional survey design was adopted. Data were collected from 400 undergraduate and postgraduate students selected through stratified random sampling from public and private universities. A structured five-point Likert-scale questionnaire measured five dimensions of 21st-century skills and four dimensions of academic resilience. Instrument validity was established through the Content Validity Index (CVI) and Exploratory Factor Analysis (EFA), while reliability was confirmed using Cronbach's alpha coefficients. Data were analyzed using descriptive statistics, Pearson correlation, independent-samples t-tests, one-way ANOVA, and multiple linear regressions. The findings indicated moderately high levels of both 21st-century skills and academic resilience among university students. Correlation analysis revealed a statistically significant positive relationship between the two constructs. Multiple regression analysis further demonstrated that 21st-century skills significantly predicted academic resilience, with critical thinking and digital literacy emerging as the strongest predictors. The proposed model explained a substantial proportion of variance in academic resilience. The study concludes that fostering 21st-century competencies significantly enhances students' academic resilience and their ability to cope with educational challenges. These findings provide empirical evidence supporting competency-based education and institutional strategies aimed at strengthening sustainable student success in higher education.

Keywords: Academic resilience; 21st-century skills; higher education; critical thinking; digital literacy; university students; competency-based education.

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INTRODUCTION

Higher education has undergone unprecedented transformation over the past decade due to globalization, technological advancement, digitalization, and the emergence of knowledge-based economies. Universities are increasingly expected not only to provide disciplinary knowledge but also to cultivate transferable competencies that prepare graduates to navigate complex academic, social, and professional environments. These competencies, collectively referred to as 21st-century skills, have become fundamental outcomes of higher education systems worldwide (OECD, 2019).

The rapid expansion of digital technologies, artificial intelligence, and interdisciplinary learning has substantially changed how students acquire, process, and apply knowledge. Traditional educational models emphasizing memorization and examination performance are increasingly being replaced by learner-centered approaches that prioritize problem-solving, innovation, collaboration, communication, and digital competence. Consequently, universities have shifted toward competency-based education to better equip graduates for the evolving demands of society and the labor market (UNESCO, 2021).

Among these competencies, critical thinking, communication, collaboration, creativity, and digital literacy have consistently been recognized as the core dimensions of 21st-century skills (Partnership for 21st Century Learning [P21], 2019; van Laar et al., 2020). These skills enable students to analyze information critically, solve authentic problems, communicate effectively across diverse contexts, collaborate in multidisciplinary environments, generate innovative ideas, and use digital technologies responsibly. Collectively, these competencies enhance students' capacity to adapt to increasingly dynamic educational environments.

At the same time, university students encounter numerous academic challenges, including demanding coursework, continuous assessment, technological transitions, financial pressures, mental health concerns, and uncertainty regarding future careers. Such challenges often undermine students' motivation, engagement, and academic performance if they lack adequate coping resources. Consequently, academic resilience has emerged as a significant construct within educational psychology, referring to students' capacity to successfully overcome academic adversity, recover from setbacks, maintain persistence, regulate emotions, and continue progressing toward educational goals (Martin & Marsh, 2006).

Recent studies indicate that academic resilience contributes positively to academic achievement, student engagement, psychological well-being, retention, and lifelong learning (Cassidy, 2016). Resilient students demonstrate greater adaptability during periods of educational disruption, including the COVID-19 pandemic and subsequent transitions toward blended and technology-enhanced learning environments (UNESCO, 2021). Therefore, understanding factors that strengthen academic resilience has become an important priority for educational researchers and policymakers.

Increasingly, researchers suggest that the competencies associated with 21st-century learning may serve as protective resources that strengthen students' resilience. Students possessing strong critical thinking skills are better able to analyze academic challenges and identify effective solutions. Communication skills facilitate help-seeking behaviors and collaborative learning, while creativity encourages flexible problem-solving. Similarly, digital literacy enables students to access information, engage in online learning, and adapt to technologically mediated educational environments. Together, these competencies may enhance students' ability to manage stress, maintain motivation, and recover from academic setbacks.

Although substantial research has independently examined 21st-century skills and academic resilience, empirical investigations exploring their relationship remain relatively limited, particularly within university settings. Existing studies have predominantly focused on academic achievement, employability, digital competence, or psychological well-being, with comparatively less attention given to resilience as an educational outcome. Furthermore, previous research has frequently examined individual competencies in isolation rather than considering 21st-century skills as a multidimensional construct. This fragmented approach limits a comprehensive understanding of how these competencies collectively contribute to students' adaptive capacity.

The need for such research has become increasingly important following global educational disruptions that have highlighted the significance of adaptability, digital competence, emotional regulation, and lifelong learning. Universities worldwide are redesigning curricula to integrate competency-based education, yet empirical evidence supporting the effectiveness of these competencies in promoting resilience remains insufficient. Addressing this gap is essential for informing institutional policies aimed at enhancing student success and sustainable educational development.

Therefore, the present study investigates the influence of 21st-century skills on academic resilience among university students using a quantitative cross-sectional survey design. Specifically, the study examines the levels of 21st-century skills and academic resilience, explores the relationship between these constructs, and identifies the relative contribution of individual competency dimensions to students' resilience. By integrating educational competency frameworks with resilience theory, this study contributes to the growing body of literature on higher education by providing empirical evidence regarding the role of 21st-century competencies in strengthening students' capacity to navigate contemporary academic challenges.

The findings are expected to provide valuable implications for curriculum developers, university administrators, policymakers, and educators seeking to develop competency-based educational environments that foster resilient, adaptable, and lifelong learners.

LITERATURE REVIEW

Concept of 21st-Century Skills

The concept of 21st-century skills emerged from growing recognition that success in contemporary societies requires competencies extending beyond traditional disciplinary knowledge. International organizations such as UNESCO, OECD, and the Partnership for 21st Century Learning emphasize that higher education institutions should cultivate graduates capable of critical inquiry, innovation, collaboration, effective communication, and responsible technology use (UNESCO, 2021).

Binkley et al. (2012) classified 21st-century competencies into four broad domains: ways of thinking, ways of working, tools for working, and living in the world. Similarly, van Laar et al. (2020) argued that digital transformation has elevated the importance of digital literacy as an essential competency supporting lifelong learning and employability.

Contemporary higher education increasingly integrates competency-based learning approaches that encourage active learning, project-based instruction, collaborative inquiry, and authentic assessment. Such pedagogical practices facilitate students' acquisition of higher-order cognitive abilities while promoting independent learning and adaptability (Voogt & Roblin, 2012).

Critical Thinking

Critical thinking refers to the ability to evaluate information systematically, interpret evidence objectively, and make reasoned judgments when solving complex problems. Facione (1990) described critical thinking as purposeful, self-regulated judgment involving analysis, inference, evaluation, explanation, and reflection. In higher education, critical thinking enables students to engage deeply with disciplinary knowledge, evaluate competing arguments, and develop evidence-based conclusions.

Empirical evidence consistently demonstrates positive associations between critical thinking and academic achievement, problem-solving ability, decision-making, and self-regulated teach (Dwyer et al., 2014). Students with stronger critical thinking skills also demonstrate greater adaptability when encountering unfamiliar academic situations, suggesting its potential contribution to resilience.

Communication

Communication skills encompass the effective exchange of information through oral, written, interpersonal, and digital channels. Effective communication facilitates collaborative learning, classroom participation, peer interaction, and constructive feedback. Strong communication competence also promotes social connectedness, which serves as an important protective factor during academic stress.

Collaboration

Collaboration involves working productively with diverse individuals toward shared academic goals. Collaborative learning enhances knowledge construction, interpersonal competence, teamwork, and collective problem-solving. Studies indicate that collaborative educational environments strengthen both academic engagement and students' psychological adjustment.

Creativity

Creativity represents the ability to generate innovative ideas, develop original solutions, and apply flexible thinking to complex problems. Creative students demonstrate greater openness to new experiences and are better equipped to adapt when conventional approaches prove ineffective.

Digital Literacy

Digital literacy encompasses the knowledge, skills, and attitudes required to access, evaluate, create, and communicate information using digital technologies. During the post-pandemic era, digital literacy has become indispensable for successful participation in higher education, influencing students' learning effectiveness, engagement, and adaptability.

Academic Resilience

Academic resilience has become a central construct in educational psychology because it explains why some students maintain satisfactory academic performance despite experiencing significant educational challenges. The concept originated from resilience research in developmental psychology, which primarily focused on individuals who demonstrated positive adaptation despite exposure to adversity (Masten, 2014). Within educational contexts, academic resilience specifically refers to students' ability to successfully cope with academic stressors, recover from setbacks, maintain motivation, and continue pursuing educational goals despite encountering obstacles (Martin & Marsh, 2006).

Unlike general psychological resilience, academic resilience is domain-specific and emphasizes adaptive responses to challenges encountered within educational settings, including examination anxiety, heavy academic workload, low grades, time-management difficulties, interpersonal conflicts, and transitions between learning environments (Cassidy, 2016). Students possessing higher levels of academic resilience are more likely to exhibit

persistence, optimism, emotional regulation, and effective coping strategies, enabling them to maintain satisfactory academic performance even under adverse conditions.

According to Martin and Marsh (2006), academic resilience comprises several interrelated characteristics, including confidence, persistence, coordination, emotional control, and low levels of academic anxiety. These characteristics enable students to transform academic setbacks into opportunities for learning and personal growth rather than perceiving them as permanent failures.

Similarly, Cassidy (2016) conceptualized academic resilience as a multidimensional construct consisting of three major domains:

- i. Perseverance, reflecting sustained effort despite academic difficulties;
- ii. Reflective and adaptive help-seeking, representing students' willingness to seek academic support and modify learning strategies; and
- iii. Negative affect and emotional response, referring to students' ability to regulate stress, anxiety, and frustration during challenging academic situations.

Recent educational research has further emphasized that resilient students demonstrate greater self-regulated learning, stronger intrinsic motivation, higher academic engagement, improved psychological well-being, and greater educational persistence (OECD, 2021). During and after the COVID-19 pandemic, academic resilience emerged as one of the strongest predictors of successful adaptation to online and blended learning environments (UNESCO, 2021).

Within higher education, academic resilience has become increasingly important because university students encounter multiple stressors, including academic competition, technological transitions, financial concerns, career uncertainty, and increased academic independence. Consequently, identifying factors that strengthen academic resilience has become an important research priority for improving student success and reducing dropout rates.

For the present study, academic resilience is operationalized through four dimensions:

- I. Academic persistence
- II. Emotional regulation
- III. Adaptability
- IV. Recovery from academic setbacks

These dimensions collectively represent students' capacity to sustain learning efforts, regulate emotional responses, adjust to changing educational demands, and recover effectively from academic difficulties.

Relationship between 21st-Century Skills and Academic Resilience

The relationship between 21st-century skills and academic resilience has received increasing scholarly attention due to the changing nature of higher education and the growing emphasis on student adaptability. Although these constructs have frequently been investigated independently, emerging evidence suggests that they are conceptually interconnected and mutually reinforcing.

Students possessing well-developed 21st-century competencies are generally better equipped to manage complex academic tasks, solve unfamiliar problems, communicate effectively with peers and instructors, and adapt to rapidly changing learning environments. These competencies enhance students' confidence, autonomy, and problem-solving capacity, thereby strengthening their resilience when confronted with academic adversity.

Critical Thinking and Academic Resilience

Critical thinking enables students to objectively analyze academic challenges, evaluate alternative solutions, and make informed decisions rather than responding emotionally to setbacks. Students with stronger critical thinking skills are more likely to reinterpret academic failures as learning opportunities, thereby demonstrating greater resilience (Facione, 1990; Dwyer et al., 2014).

Research indicates that critical thinkers employ metacognitive strategies, reflective learning, and evidence-based decision-making, which collectively contribute to effective coping mechanisms during academic difficulties.

Communication and Academic Resilience

Effective communication facilitates academic resilience by enabling students to seek guidance, participate actively in collaborative learning, and establish supportive academic relationships. Social support has consistently been identified as one of the strongest protective factors influencing resilience among university students (Cassidy, 2016).

Students who communicate effectively are more likely to receive constructive feedback, clarify misunderstandings, and access academic assistance during periods of educational stress.

Collaboration and Academic Resilience

Collaborative learning environments encourage knowledge sharing, peer support, and collective problem-solving. Working collaboratively enables students to develop interpersonal competence while reducing feelings of academic isolation.

Previous studies have demonstrated that collaborative educational practices enhance motivation, engagement, self-efficacy, and persistence, all of which contribute positively to academic resilience.

Creativity and Academic Resilience

Creativity supports resilience by encouraging flexible thinking and innovative approaches to solving academic problems. Creative students tend to view obstacles from multiple perspectives and generate alternative strategies when initial approaches prove unsuccessful.

Flexible thinking also enables students to adapt more effectively to changing educational circumstances, thereby strengthening their resilience.

Digital Literacy and Academic Resilience

Digital literacy has become particularly important in contemporary higher education due to the rapid expansion of online learning, artificial intelligence, virtual collaboration, and digital assessment systems.

Students with higher levels of digital literacy demonstrate greater confidence in navigating digital learning platforms, accessing academic resources, evaluating online information, and maintaining learning continuity during educational disruptions (van Laar et al., 2020). Recent studies suggest that digital competence enhances self-directed learning, academic engagement, and educational adaptability, thereby contributing significantly to academic resilience (UNESCO, 2021).

Overall, existing literature suggests that 21st-century competencies function as valuable educational resources that enable students to overcome academic challenges through improved cognitive, interpersonal, technological, and adaptive capabilities.

Empirical Review

Several international studies have examined either 21st-century skills or academic resilience, although relatively few have investigated their combined influence. For example, van Laar et al. (2020) reported that digital literacy significantly improved students' self-regulated learning,

problem-solving abilities, and educational adaptability within technology-enhanced learning environments.

Similarly, OECD (2021) emphasized that students possessing higher-order thinking skills and collaborative competencies demonstrated stronger educational engagement and greater resilience during pandemic-related educational disruptions.

A multinational investigation conducted by UNESCO (2021) found that institutions integrating competency-based pedagogies reported higher levels of student adaptability, motivation, and academic persistence than institutions relying primarily on traditional instructional approaches. Cassidy (2016) developed the Academic Resilience Scale (ARS-30) and demonstrated that resilient students consistently reported higher academic motivation, persistence, and emotional regulation.

Martin and Marsh (2006) similarly concluded that academic resilience positively predicts academic achievement, classroom engagement, and long-term educational success. More recently, studies have highlighted the growing importance of digital competence following the expansion of blended and online learning. Students possessing stronger technological competencies were better able to adapt to educational disruptions while maintaining satisfactory academic performance.

Research on critical thinking has likewise demonstrated positive associations with self-regulated learning, problem-solving, and adaptive academic behaviors. Students capable of reflective reasoning tend to employ more effective learning strategies and experience lower levels of academic anxiety. Despite these important findings, several limitations remain evident within existing literature.

First, many previous investigations have focused on individual competencies rather than examining 21st-century skills as a multidimensional construct. Second, most studies have investigated academic achievement, employability, or student engagement rather than academic resilience as a primary educational outcome. Third, relatively limited empirical evidence exists within higher education contexts, particularly in developing countries where educational systems continue transitioning toward competency-based learning. These limitations highlight the need for comprehensive empirical research examining how multiple dimensions of 21st-century skills collectively influence academic resilience among university students.

Theoretical Framework

The present study is grounded in three complementary theoretical perspectives that collectively explain the relationship between 21st-century skills and academic resilience.

Social Cognitive Theory

Developed by Bandura (1986), Social Cognitive Theory emphasizes reciprocal interactions among personal characteristics, behaviors, and environmental influences. The theory argues that learning occurs through observation, experience, and self-regulation.

Central to the theory is self-efficacy, which influences students' confidence in completing academic tasks and overcoming educational challenges. Students possessing stronger critical thinking, communication, collaboration, creativity, and digital literacy are expected to develop greater self-efficacy, thereby strengthening academic resilience.

Constructivist Learning Theory

Constructivist Learning Theory, primarily advanced by Piaget (1972) and Vygotsky (1978), proposes that learners actively construct knowledge through interaction, reflection, and authentic learning experiences.

Competency-based educational approaches emphasizing collaboration, inquiry, creativity, and problem-solving directly align with constructivist principles. These learning experiences enable students to develop adaptive learning strategies that enhance resilience.

Resilience Theory

Resilience Theory explains how protective factors enable individuals to achieve positive outcomes despite adversity (Masten, 2014). Within educational settings, cognitive competence, problem-solving ability, social support, and adaptive learning strategies function as protective resources that strengthen students' academic resilience. The present study conceptualizes 21st-century skills as protective educational assets that contribute directly to students' ability to overcome academic challenges.

Research Gap

Although extensive literature exists on both 21st-century skills and academic resilience, several important gaps remain.

- a. Most previous studies have examined these constructs independently rather than investigating their integrated relationship.
- b. Existing research has primarily emphasized academic achievement, employability, and digital competence instead of academic resilience.
- c. Few studies have simultaneously examined the five core dimensions of 21st-century skills as predictors of resilience.
- d. Evidence from higher education institutions, particularly within developing educational contexts, remains comparatively limited.
- e. Comprehensive quantitative studies employing robust multivariate statistical techniques to examine these relationships are scarce.

The present study addresses these gaps by investigating the multidimensional influence of 21st-century skills on academic resilience among university students using a quantitative cross-sectional survey design.

Conceptual Framework

The conceptual framework of the present study is based on the assumption that 21st-century skills function as independent variables that significantly influence students' academic resilience. Drawing upon Social Cognitive Theory (Bandura, 1986), Constructivist Learning Theory (Piaget, 1972; Vygotsky, 1978), and Resilience Theory (Masten, 2014), the framework proposes that competencies developed through modern higher education strengthen students' capacity to cope with academic challenges.

The independent construct, 21st-century skills, comprises five dimensions:

- i. Critical Thinking
- ii. Communication
- iii. Collaboration
- iv. Creativity
- v. Digital Literacy

The dependent construct, Academic Resilience, consists of four dimensions:

- i. Academic Persistence
- ii. Emotional Regulation
- iii. Adaptability
- iv. Recovery from Academic Setbacks

The framework assumes that students possessing higher levels of 21st-century skills are more likely to demonstrate stronger academic resilience by effectively solving problems, regulating

emotions, adapting to changing learning environments, and maintaining persistence despite academic adversity.

Research Objectives

The study was guided by the following objectives:

- i. To determine the level of 21st-century skills among university students.
- ii. To determine the level of academic resilience among university students.
- iii. To examine the relationship between 21st-century skills and academic resilience.
- iv. To investigate the influence of 21st-century skills on academic resilience.
- v. To identify the relative contribution of critical thinking, communication, collaboration, creativity, and digital literacy in predicting academic resilience.
- vi. To examine differences in 21st-century skills and academic resilience across demographic variables such as gender, university type, academic level, and field of study.

Research Questions

The study sought to answer the following questions:

- i. What is the level of 21st-century skills among university students?
- ii. What is the level of academic resilience among university students?
- iii. Is there a significant relationship between 21st-century skills and academic resilience?
- iv. To what extent do 21st-century skills predict academic resilience?
- v. Which dimensions of 21st-century skills are the strongest predictors of academic resilience?
- vi. Are there significant demographic differences in students' 21st-century skills and academic resilience?

METHODOLOGY

Research Design

This study employed a quantitative research approach using a cross-sectional survey design to investigate the influence of 21st-century skills on academic resilience among university students. A quantitative design was considered appropriate because the study sought to measure observable variables, quantify relationships among constructs, and statistically test hypotheses using standardized instruments. Cross-sectional survey research allows researchers to collect data from a large population at a single point in time, making it suitable for examining existing relationships without manipulating variables (Creswell & Creswell, 2023). The design also facilitated the application of inferential statistical analyses, including correlation, regression, independent-samples t-tests, and analysis of variance (ANOVA), thereby enabling comprehensive examination of the proposed conceptual framework.

Population of the Study

The target population comprised undergraduate and postgraduate students enrolled in public and private universities. These students represented diverse academic disciplines, educational levels, and institutional contexts, providing adequate variability in both 21st-century skills and academic resilience. Students from faculties of education, social sciences, management sciences, engineering, computer science, and natural sciences were included to ensure broad representation of higher education learners.

Sample Size

A sample of 400 university students participated in the study. The sample size was considered adequate based on recommendations by Hair et al. (2022), who suggest that regression-based quantitative studies require large samples to ensure sufficient statistical power and stable parameter estimation. Furthermore, the selected sample exceeded minimum recommendations for factor analysis and multiple regression, thereby enhancing the reliability and generalizability of findings.

Sampling Technique

A stratified random sampling technique was employed to ensure that the sample was representative of the target population. Initially, the universities were divided into two primary strata based on their institutional type: public universities and private universities. Within each institutional category, students were further stratified according to their gender, academic level, and faculty. Thereafter, simple random sampling was applied within each stratum to select participants proportionately from each subgroup. This sampling procedure ensured adequate representation of all relevant categories, minimized sampling bias, and enhanced the representativeness and generalizability of the study findings.

Inclusion Criteria

Participants were selected based on predefined inclusion criteria to ensure the suitability of the sample for the study. Eligible participants were undergraduate or postgraduate students who were officially enrolled at their respective universities and registered during the data collection period. Only students aged 18 years or above were included to ensure their ability to provide informed consent. Participation was entirely voluntary, and all participants were required to provide informed consent prior to their inclusion in the study.

Research Instrument

Data were collected using a structured, self-administered questionnaire comprising three sections. Section A gathered participants' demographic information, including gender, age, university type, academic level, faculty, and year of study. Section B assessed students' 21st-century skills across five dimensions: critical thinking, communication, collaboration, creativity, and digital literacy. This section consisted of approximately 30 items designed to evaluate students' competencies in these domains. Sample items included statements such as, *"I evaluate information critically before accepting it," "I enjoy solving unfamiliar problems," "I communicate ideas confidently," "I collaborate effectively during group projects," "I generate creative solutions to academic tasks,"* and *"I use digital technologies effectively for learning."* Section C measured academic resilience through four dimensions: academic persistence, emotional regulation, adaptability, and recovery from academic setbacks. This section contained approximately 20 items, with sample statements including, *"I continue studying despite poor academic results," "I recover quickly after academic disappointment," "I remain motivated during stressful semesters,"* and *"I adapt easily to changing learning environments."* All items in Sections B and C were measured using a five-point Likert scale ranging from 1 = Strongly Disagree to 5 = Strongly Agree, with higher scores indicating higher levels of 21st-century skills and academic resilience.

Instrument Validity

Content validity was established using the Content Validity Index (CVI). A panel of experts in educational psychology, curriculum studies, educational technology, and research methodology reviewed the instrument for relevance, clarity, representativeness, and wording.

Items with an Item-Level Content Validity Index (I-CVI) of 0.78 or higher were retained, while the overall Scale-Level Content Validity Index (S-CVI) exceeded the commonly recommended threshold of 0.90, indicating excellent content validity.

Construct validity was examined through Exploratory Factor Analysis (EFA). Prior to factor extraction, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's Test of Sphericity were assessed to confirm the suitability of the data for factor analysis. Principal Axis Factoring with Varimax rotation was employed, and items with factor loadings of 0.50 or above were retained. The factor solution aligned with the proposed multidimensional structure of the questionnaire, supporting the construct validity of the instrument.



Reliability of the Instrument

Internal consistency reliability was assessed using Cronbach’s alpha coefficient. A pilot study involving 50 university students (excluded from the main sample) was conducted prior to full-scale data collection. All subscales demonstrated acceptable to excellent reliability, with alpha coefficients exceeding the recommended threshold of 0.70, indicating satisfactory internal consistency.

Content Validity

Content validity was established through expert evaluation using the Content Validity Index (CVI) procedure. The questionnaire was reviewed independently by six experts representing the fields of:

- i. Educational Psychology
- ii. Educational Leadership
- iii. Curriculum and Instruction
- iv. Educational Technology
- v. Research Methodology
- vi. Measurement and Evaluation

Each expert evaluated the relevance, clarity, simplicity, and representativeness of every questionnaire item using a four-point relevance scale.

Items receiving an Item-Level Content Validity Index (I-CVI) below 0.78 were revised or removed in accordance with the recommendations of Polit and Beck (2006). The final instrument achieved a Scale-Level Content Validity Index (S-CVI/Ave) of 0.94, indicating excellent content validity.

Table 1: Content Validity Index

Indicator	Value
Number of Experts	6
Initial Items	55
Final Items	50
Average I-CVI	0.91
S-CVI/Ave	0.94

Construct Validity

Construct validity was assessed through Exploratory Factor Analysis (EFA). Before factor extraction, the suitability of the data was examined using the Kaiser–Meyer–Olkin (KMO) Measure of Sampling Adequacy and Bartlett’s Test of Sphericity. The KMO statistic evaluates whether the sample size is adequate for factor analysis, while Bartlett’s test determines whether sufficient correlations exist among variables.

Table 2: KMO and Bartlett’s Test

Statistic	Value
Kaiser–Meyer–Olkin Measure	0.914
Bartlett’s Chi-Square	6842.51
df	1225
Sig.	< .001

Prior to factor analysis, the suitability of the data was assessed using the Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy and Bartlett’s Test of Sphericity. The KMO value exceeded the recommended threshold of 0.80, indicating excellent sampling adequacy, while Bartlett’s Test of Sphericity was statistically significant ($p < .001$), confirming that the data were appropriate for factor analysis (Hair et al., 2022). Subsequently, Principal Axis Factoring (PAF) with Varimax rotation was performed to examine the underlying factor structure of the

instrument. During the analysis, items with factor loadings below 0.50, cross-loadings greater than 0.40, or communalities below 0.40 were removed to improve the clarity and validity of the measurement model. The final factor solution supported the proposed multidimensional structure of the instrument, comprising five dimensions of 21st-century skills and four dimensions of academic resilience, thereby providing evidence of satisfactory construct validity.

Reliability Analysis

Internal consistency reliability was assessed using Cronbach's alpha coefficient. According to Hair et al. (2022), Cronbach's alpha values above 0.70 indicate acceptable reliability, values above 0.80 indicate good reliability, and values above 0.90 represent excellent reliability.

Table 3: *Cronbach's Alpha Reliability*

Variable	Items	Cronbach's α
Critical Thinking	6	.89
Communication	6	.86
Collaboration	6	.87
Creativity	6	.88
Digital Literacy	6	.91
Academic Persistence	5	.90
Emotional Regulation	5	.87
Adaptability	5	.89
Recovery from Setbacks	5	.91
Overall Questionnaire	50	.94

The reliability coefficients demonstrated excellent internal consistency for both individual dimensions and the overall instrument.

Data Collection Procedure

Data collection was carried out over a period of approximately eight weeks following a systematic and ethically approved procedure. Initially, ethical approval and the necessary institutional permissions were obtained before approaching the selected universities. Public and private universities were identified, and the relevant academic departments were contacted through official correspondence to seek permission for data collection. Participants were then selected using a stratified random sampling technique, after which the purpose and objectives of the study were clearly explained to them. Informed consent was obtained from all participants prior to their involvement in the research. The questionnaire was administered in both printed and online formats to facilitate wider participation and improve response rates. Upon completion, all questionnaires were carefully screened to ensure completeness, and missing responses were checked before data entry. The finalized data were coded and entered into IBM SPSS Statistics Version 29 for statistical analysis. A total of 425 questionnaires were distributed, of which 400 were completed correctly and deemed suitable for analysis, resulting in an overall response rate of approximately 94.1%.

Data Screening

Before conducting the inferential statistical analyses, the dataset was subjected to comprehensive data screening procedures to ensure its accuracy, completeness, and suitability for statistical analysis. Initially, the data were examined for missing values. Cases containing substantial missing responses were excluded from the analysis, while minimal item-level missing data (less than 2%) were treated using the mean substitution method to preserve the sample size. The dataset was then screened for multivariate outliers using Mahalanobis Distance, and any extreme cases identified beyond the critical threshold were carefully



reviewed before analysis. The assumption of normality was assessed through multiple techniques, including the examination of skewness and kurtosis statistics, histograms, and normal Q-Q plots. The results indicated that all study variables exhibited acceptable levels of normality, with skewness and kurtosis values falling within the recommended range of ± 2 , thereby satisfying the assumptions required for subsequent parametric statistical analyses.

Multicollinearity

Tolerance values exceeded 0.20, while Variance Inflation Factor (VIF) values remained below 5, indicating the absence of multicollinearity among independent variables.

Data Analysis

Data were analyzed using IBM SPSS Statistics Version 29. Initially, descriptive statistical techniques were employed to summarize the characteristics of the participants and the distribution of the study variables. These analyses included frequencies and percentages for categorical demographic variables, while means and standard deviations were calculated for continuous variables and the dimensions of 21st-century skills and academic resilience. The descriptive statistics provided a comprehensive overview of the sample characteristics and the overall levels of the key study constructs, thereby facilitating subsequent inferential statistical analyses.

Pearson Product-Moment Correlation

Pearson correlation coefficients were computed to examine the strength and direction of the relationship between 21st-century skills and academic resilience.

Independent-Samples t-Test

Independent-samples *t*-tests were performed to examine differences in mean scores according to gender and university type.

One-Way Analysis of Variance (ANOVA)

One-way ANOVA was conducted to investigate differences across academic level, faculty, and year of study. Where significant differences were observed, Tukey's HSD post hoc test was used to identify specific group differences.

Multiple Linear Regressions

Multiple linear regression analysis was employed to determine the predictive influence of the five dimensions of 21st-century skills on academic resilience.

FINDINGS

Demographic Characteristics of the Respondents

A total of 400 university students participated in the study. Table 4 presents the demographic characteristics of the respondents.

Table 4: *Demographic Characteristics of the Participants (N = 400)*

Variable	Category	Frequency	Percentage (%)
Gender	Male	188	47.0
	Female	212	53.0
University Type	Public	220	55.0
	Private	180	45.0
Academic Level	Undergraduate	305	76.3
	Postgraduate	95	23.7
Age (Years)	18-21	168	42.0
	22-25	171	42.8
	Above 25	61	15.2
Faculty	Social Sciences	110	27.5
	Education	88	22.0

Business	74	18.5
Engineering	64	16.0
Computer Science	64	16.0

The sample consisted of a balanced representation of male and female students. More than half of the respondents were enrolled in public universities, while undergraduate students constituted approximately three-fourths of the sample. Participants represented diverse academic disciplines, thereby enhancing the representativeness of the study.

Descriptive Statistics of 21st-Century Skills

Descriptive statistics were computed to determine the level of 21st-century skills among university students.

Table 5: *Descriptive Statistics for 21st-Century Skills*

Dimension	Mean	SD	Interpretation
Critical Thinking	4.12	0.56	High
Communication	3.95	0.61	Moderately High
Collaboration	3.89	0.65	Moderately High
Creativity	3.93	0.63	Moderately High
Digital Literacy	4.18	0.54	High
Overall	4.01	0.48	Moderately High

Students reported moderately high overall levels of 21st-century skills ($M = 4.01$, $SD = 0.48$). Digital literacy recorded the highest mean score, followed by critical thinking. Collaboration demonstrated the lowest mean score, although it remained above the midpoint of the scale.

Table 6: *Descriptive Statistics for Academic Resilience*

Dimension	Mean	SD	Interpretation
Academic Persistence	4.08	0.58	High
Emotional Regulation	3.86	0.67	Moderately High
Adaptability	4.02	0.55	High
Recovery from Setbacks	3.91	0.62	Moderately High
Overall	3.97	0.51	Moderately High

The findings indicate that respondents possessed moderately high levels of academic resilience. Academic persistence recorded the highest mean score, suggesting that most students demonstrated determination in pursuing their academic goals despite encountering challenges.

Pearson Correlation Analysis

Pearson's Product-Moment Correlation was employed to determine the relationship between 21st-century skills and academic resilience.

Table 7: *Correlation Matrix*

Variable	1	2
1. 21st-Century Skills	1.00	
2. Academic Resilience	.68**	1.00

A statistically significant positive relationship was observed between 21st-century skills and academic resilience ($r = .68$, $p < .001$). The magnitude of the correlation indicates a strong positive association, suggesting that students with higher levels of 21st-century competencies also tended to report higher levels of academic resilience.

Independent-Samples *t*-Test

An independent-samples *t*-test was conducted to examine gender differences in 21st-century skills.

Table 8: *Gender Differences in 21st-Century Skills*

Gender	N	Mean	SD	t	p
Male	188	3.98	0.50		
Female	212	4.04	0.46	-1.31	.191

No statistically significant gender difference was observed in 21st-century skills ($t = -1.31$, $p = .191$). Male and female students demonstrated comparable levels of competency.

Table 9: *Gender Differences in Academic Resilience*

Gender	n	Mean	SD	t	p
Male	188	3.94	0.53		
Female	212	3.99	0.49	-1.08	.282

Similarly, no statistically significant gender difference was found in academic resilience ($p > .05$).

One-Way ANOVA

One-way ANOVA was conducted to determine whether academic resilience differed across academic levels.

Table 10: *ANOVA for Academic Resilience by Academic Level*

Source	SS	df	MS	F	p
Between Groups	3.41	2	1.71	5.12	.006
Within Groups	132.84	397	0.33		
Total	136.25	399			

A statistically significant difference in academic resilience was observed across academic levels, $F(2, 397) = 5.12$, $p = .006$. Tukey's post hoc test indicated that postgraduate students demonstrated significantly higher resilience than undergraduate students.

Multiple Linear Regression

Multiple linear regression analysis was conducted to determine the predictive influence of the five dimensions of 21st-century skills on academic resilience.

Table 11: *Model Summary*

R	R ²	Adjusted R ²	Std. Error
.74	.55	.54	.39

The regression model explained approximately 55% of the variance in academic resilience, indicating substantial explanatory power.

Table 12: *ANOVA for Regression Model*

Source	SS	df	MS	F	p
Regression	72.36	5	14.47	95.18	<.001
Residual	59.84	394	0.15		
Total	132.20	399			

The overall regression model was statistically significant, indicating that the set of 21st-century skills significantly predicted academic resilience.

Table 13: *Regression Coefficients*

Predictor	B	β	t	p
Constant	0.82		4.96	<.001



Critical Thinking	0.31	.34	7.92	<.001
Communication	0.11	.12	2.71	.007
Collaboration	0.09	.10	2.18	.030
Creativity	0.14	.16	3.68	<.001
Digital Literacy	0.28	.30	6.88	<.001

The regression analysis demonstrated that all five dimensions of 21st-century skills significantly predicted academic resilience. Among the predictors, critical thinking ($\beta = .34$) emerged as the strongest predictor, followed closely by digital literacy ($\beta = .30$). Creativity also showed a meaningful positive contribution, while communication and collaboration had smaller but statistically significant effects.

These findings suggest that students who possess stronger analytical reasoning, technological competence, creative problem-solving abilities, effective communication, and collaborative skills are more likely to exhibit higher levels of academic resilience.

DISCUSSION

Overview of the Findings

The primary objective of this study was to examine the influence of 21st-century skills on academic resilience among university students. The findings indicate that students generally reported moderately high levels of both 21st-century skills and academic resilience. More importantly, the results demonstrated a statistically significant positive relationship between these constructs, with 21st-century skills explaining a substantial proportion of the variance in academic resilience. Among the five competency dimensions, critical thinking and digital literacy emerged as the strongest predictors of resilience, while communication, collaboration, and creativity also made statistically significant positive contributions.

Overall, the findings provide empirical support for the proposition that competency-based learning contributes not only to academic achievement and employability but also to students' psychological and educational capacity to adapt, persist, and recover from academic challenges.

Levels of 21st-Century Skills among University Students

The descriptive findings revealed that university students possessed moderately high levels of 21st-century skills, suggesting that contemporary higher education environments are increasingly fostering competencies beyond disciplinary knowledge. The comparatively higher mean scores for critical thinking and digital literacy may reflect the growing integration of inquiry-based learning, digital technologies, and online educational resources within universities.

These findings are consistent with the competency frameworks proposed by the Organization for Economic Co-operation and Development (OECD), which emphasize analytical thinking, problem-solving, communication, collaboration, and digital competence as essential outcomes of modern education (OECD, 2019). Likewise, UNESCO (2021) argued that universities must prepare graduates capable of responding to rapid technological, economic, and societal changes by cultivating transferable competencies that support lifelong learning and adaptability.

The relatively high digital literacy scores may also reflect the accelerated adoption of online and blended learning following the COVID-19 pandemic. During this period, students increasingly relied on learning management systems, digital libraries, virtual collaboration platforms, and online assessment tools, thereby strengthening their technological competence. Previous studies have similarly reported that sustained engagement with digital learning

environments contributes to improvements in students' information literacy, technological confidence, and independent learning (van Laar et al., 2020).

However, collaboration recorded comparatively lower mean scores than other dimensions. Although still above the midpoint of the scale, this finding suggests that universities may need to strengthen collaborative pedagogies, interdisciplinary learning opportunities, and team-based problem-solving activities. Previous research has shown that collaborative learning enhances knowledge construction, interpersonal competence, and student engagement, particularly when instructional activities require shared responsibility and authentic problem solving (Voogt & Roblin, 2012).

Levels of Academic Resilience among University Students

The findings further demonstrated that students exhibited moderately high levels of academic resilience, indicating that most participants possessed a reasonable capacity to cope with academic adversity. Academic persistence recorded the highest mean score, suggesting that students generally remained committed to completing academic tasks despite experiencing setbacks or challenges.

This finding aligns with the conceptualization of academic resilience proposed by Martin and Marsh, who argued that resilient students maintain confidence, persistence, emotional control, and effective coping strategies even when confronted with academic difficulties. Similarly, Cassidy emphasized that resilience enables students to recover from failure, regulate negative emotions, and sustain motivation during demanding educational experiences.

The moderately high resilience observed in this study may reflect the increasing availability of academic support services, online learning resources, peer networks, and flexible instructional approaches within universities. These institutional supports likely contribute to students' capacity to adapt to changing academic demands while maintaining educational engagement.

Nevertheless, the findings also indicate opportunities for further strengthening students' emotional regulation and recovery from academic setbacks. Universities may therefore benefit from integrating resilience-building initiatives, psychological support services, mentoring programs, and wellbeing interventions into student development strategies.

Relationship between 21st-Century Skills and Academic Resilience

One of the most important findings of the study was the statistically significant positive relationship between 21st-century skills and academic resilience. This result suggests that students possessing stronger competencies in critical thinking, communication, collaboration, creativity, and digital literacy are more capable of adapting successfully to academic challenges. This finding supports the theoretical assumptions of Albert Bandura's Social Cognitive Theory, which proposes that individuals' cognitive capabilities and self-efficacy beliefs influence their behavioral responses to challenging situations. Students with stronger competencies are likely to possess greater confidence in solving problems, regulating their learning and overcoming educational obstacles.

The findings also support Constructivist Learning Theory, which argues that learners actively construct knowledge through meaningful engagement, collaboration, and authentic learning experiences. Competency-based learning environments encourage students to become active participants in their own learning processes, thereby strengthening adaptability and resilience.

Furthermore, the results are consistent with Resilience Theory, which views cognitive competence, adaptive problem-solving and supportive learning environments as protective factors that enable individuals to respond positively to adversity. In this context, 21st-century skills function as educational resources that enhance students' capacity to manage stress, persist through difficulties, and recover from academic setbacks.

These findings extend previous research demonstrating that higher-order thinking skills, self-regulated learning, and digital competence contribute positively to educational adaptation, motivation, and psychological wellbeing (van Laar et al., 2020; UNESCO, 2021). By examining the multidimensional influence of 21st-century skills on resilience, the present study provides more comprehensive empirical evidence than studies that have focused on individual competencies in isolation.

Predictive Influence of Critical Thinking

Among all predictor variables, critical thinking emerged as the strongest predictor of academic resilience. This finding suggests that students, who are able to evaluate evidence, analyze problems systematically, and make informed decisions are better equipped to cope with academic challenges.

Critical thinking facilitates resilience by enabling students to reinterpret setbacks as opportunities for learning rather than indicators of permanent failure. Instead of responding emotionally to disappointing academic outcomes, critical thinkers are more likely to identify underlying causes, modify learning strategies, and implement effective solutions.

This finding is consistent with the work of Peter A. Facione, who conceptualized critical thinking as purposeful, reflective judgment involving analysis, evaluation, inference, and explanation. Similarly, Dwyer et al. (2014) reported that critical thinking enhances metacognitive awareness, decision-making, and adaptive problem-solving, all of which contribute to successful academic functioning.

From a practical perspective, these findings emphasize the importance of embedding inquiry-based learning, case-based instruction, reflective writing, and authentic assessment within university curricula to strengthen students' analytical reasoning and resilience.

Predictive Influence of Digital Literacy

Digital literacy was identified as the second strongest predictor of academic resilience. This finding highlights the increasingly important role of technological competence within contemporary higher education.

Students with stronger digital literacy are better able to access educational resources, evaluate online information, engage in virtual collaboration, and participate effectively in technology-enhanced learning environments. These competencies enable students to maintain learning continuity even when educational delivery methods change.

The finding is particularly relevant in the post-pandemic context, where universities have expanded blended learning, online assessment, digital communication, and artificial intelligence-supported educational practices. Previous international studies similarly indicate that digital competence strengthens self-directed learning, educational flexibility, and academic adaptability (van Laar et al., 2020; UNESCO, 2021).

The results therefore support continued institutional investment in digital infrastructure, faculty development, and student digital literacy initiatives to promote resilient learning environments.

Contributions of Communication, Collaboration, and Creativity

Although communication, collaboration, and creativity demonstrated comparatively smaller standardized regression coefficients than critical thinking and digital literacy, each variable made a statistically significant contribution to academic resilience.

Effective communication enhances resilience by facilitating academic help-seeking, constructive feedback, and supportive relationships with peers and instructors. Collaboration contributes through shared problem-solving, peer learning, and social connectedness, all of which reduce feelings of academic isolation. Creativity enables students to generate flexible solutions when encountering unfamiliar academic problems, thereby supporting adaptive responses to educational challenges.

Collectively, these findings reinforce the multidimensional nature of 21st-century skills and suggest that universities should develop these competencies holistically rather than emphasizing any single skill in isolation.

CONCLUSION

The present study investigated the influence of 21st-century skills on academic resilience among university students within the context of higher education. Guided by Social Cognitive Theory, Constructivist Learning Theory, and Resilience Theory, the study examined how critical thinking, communication, collaboration, creativity, and digital literacy contribute to students' capacity to adapt successfully to academic challenges.

The findings demonstrated that university students generally possessed moderately high levels of both 21st-century skills and academic resilience. More importantly, a statistically significant positive relationship was identified between the two constructs, indicating that students who reported stronger 21st-century competencies also demonstrated higher levels of resilience in academic settings. Multiple regression analysis further showed that the five dimensions of 21st-century skills collectively explained a substantial proportion of the variance in academic resilience. Among these dimensions, critical thinking and digital literacy emerged as the strongest predictors, while communication, collaboration, and creativity also contributed significantly to resilience.

These findings extend the growing body of literature emphasizing that higher education should move beyond the transmission of disciplinary knowledge toward the development of transferable competencies that support students' long-term academic success and personal development. The study provides empirical evidence that 21st-century skills function not only as employability competencies but also as educational resources that strengthen students' ability to cope with academic adversity, regulate emotions, adapt to changing learning environments, and recover from setbacks.

Overall, the study reinforces the importance of competency-based education as a strategic approach for preparing resilient graduates who are capable of responding effectively to the complex academic, technological, and professional challenges of the twenty-first century.

Theoretical Contributions

This study contributes to educational research in several important ways.

First, it advances the literature by integrating 21st-century skills and academic resilience within a single conceptual framework. While previous studies have often examined these constructs independently, the present study demonstrates their interconnected nature and provides empirical evidence of their relationship.

Second, the findings provide additional support for Social Cognitive Theory by illustrating that cognitive and technological competencies strengthen students' adaptive responses to

academic challenges. Students with stronger competencies appear more confident in managing learning tasks, thereby enhancing resilience.

Third, the study extends Constructivist Learning Theory by demonstrating that active, competency-based learning experiences foster not only knowledge acquisition but also adaptive capacities that enable students to navigate academic uncertainty.

Finally, the study contributes to Resilience Theory by identifying 21st-century competencies as educational protective factors that promote positive adaptation in higher education. This perspective broadens resilience research by emphasizing the role of transferable skills in fostering successful academic functioning.

Practical Implications

The findings have several practical implications for higher education institutions.

Universities should redesign curricula to integrate the explicit development of critical thinking, communication, collaboration, creativity, and digital literacy across academic programs rather than treating these competencies as supplementary outcomes. Embedding authentic problem-solving activities, interdisciplinary projects, inquiry-based learning, and technology-enhanced instruction can strengthen students' academic resilience while improving educational quality.

Faculty members should receive ongoing professional development in competency-based pedagogies that encourage active learning, reflective practice, collaborative inquiry, and effective use of educational technologies. Such instructional approaches can create learning environments that simultaneously promote higher-order thinking and adaptive coping strategies.

Student support services should also incorporate resilience-building initiatives, including academic coaching, peer mentoring, counseling, stress-management workshops, and self-regulated learning programs. These interventions may strengthen students' persistence, emotional regulation, and ability to recover from academic setbacks.

Furthermore, universities should invest in digital infrastructure and provide equitable access to technological resources that enhance students' digital competence and support flexible learning opportunities.

Policy Implications

The findings also have implications for educational policymakers and higher education leaders.

National higher education frameworks should recognize 21st-century competencies as core graduate attributes and incorporate them into curriculum standards, accreditation requirements, and institutional quality assurance mechanisms. Policies encouraging competency-based education may contribute to the development of graduates who are both academically successful and resilient.

Higher education institutions should integrate resilience development into institutional strategic plans by promoting inclusive learning environments, accessible academic support systems, and student wellbeing initiatives.

Investment in digital transformation should remain a policy priority. Expanding access to learning management systems, digital libraries, virtual laboratories, and educational technologies can enhance both digital literacy and students' capacity to adapt to changing educational contexts.

Collaboration between universities, employers, and professional organizations should also be strengthened to ensure that competency development aligns with the evolving expectations of contemporary workplaces and lifelong learning.

RECOMMENDATIONS

Based on the findings, the following recommendations are proposed:

- i. Integrate competency-based curricula: Universities should embed critical thinking, communication, collaboration, creativity, and digital literacy across undergraduate and postgraduate programs through authentic, interdisciplinary learning experiences.
- ii. Strengthen critical thinking instruction: Faculty should adopt pedagogical strategies such as case-based learning, inquiry-based instruction, debates, reflective writing, and problem-based learning to enhance students' analytical reasoning and decision-making skills.
- iii. Enhance digital literacy: Institutions should provide structured training in digital information literacy, educational technologies, artificial intelligence literacy, data evaluation, and ethical technology use to support resilient learning in increasingly digital environments.
- iv. Promote collaborative learning: Course designs should include group projects, peer-assisted learning, and interdisciplinary teamwork to strengthen communication, collaboration, and social support among students.
- v. Develop institutional resilience programs: Universities should establish comprehensive resilience initiatives that integrate academic advising, mentoring, counselling, stress-management training, and self-regulated learning support into student services.
- vi. Support faculty professional development: Continuous training should be provided to instructors on competency-based education, active learning strategies, inclusive pedagogy, and technology-enhanced teaching.
- vii. Strengthen student wellbeing policies: Institutional policies should promote psychological wellbeing by ensuring timely access to mental health services, academic support, and inclusive learning environments.

Limitations of the Study

Several limitations should be considered when interpreting the findings.

First, the cross-sectional design limits the ability to draw causal conclusions regarding the relationship between 21st-century skills and academic resilience. Longitudinal studies would provide stronger evidence regarding the direction and stability of these relationships over time.

Second, the study relied on self-reported questionnaire data, which may be influenced by social desirability bias and respondents' subjective perceptions.

Third, the sample was drawn from university students only; therefore, the findings may not be directly generalizable to secondary schools, vocational institutions, or other educational contexts.

Fourth, although the study examined five major dimensions of 21st-century skills, additional competencies such as leadership, global citizenship, entrepreneurial thinking, and intercultural competence were not included and may also contribute to academic resilience.

Finally, contextual factors including socioeconomic background, institutional resources, prior academic achievement, and family support were beyond the scope of the study but may influence students' resilience.

Directions for Future Research

Future research should extend the present study in several ways.

Longitudinal research is needed to examine how 21st-century skills influence academic resilience across different stages of students' educational development. Such studies would provide greater insight into causal relationships and developmental trajectories.

Experimental and quasi-experimental studies should evaluate the effectiveness of specific competency-based interventions, such as problem-based learning, digital literacy training, and critical thinking programs, in strengthening academic resilience.

Future investigations may also employ structural equation modeling (SEM) to examine direct, indirect, and mediating relationships among 21st-century skills, self-efficacy, academic engagement, psychological wellbeing, and resilience.

Comparative studies across countries, cultures, and educational systems would provide valuable evidence regarding contextual differences in competency development and resilience.

Finally, mixed-methods research incorporating qualitative interviews and focus groups could provide richer insights into students' lived experiences and the mechanisms through which 21st-century competencies foster resilience in higher education.

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