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ORIGINAL RESEARCH ARTICLE

Critical Thinking as a Catalyst for Solving Emerging Workplace Challenges Among Administrative Employees: A Field Study in Lebanese Private Universities

اتاعماج اف نبيرادلا انيفظوما ل تئراط اتلاكشما اءجلا م ل ع ةردقلا ب اهتقلاعو يءقءا ريكفءا تارا
تءناديم ءسا : نازل ف ءصاخ

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GRAPHICAL ABSTRACT

INPUT	PROCESS	OUTCOME
107 Admin. Employees Beirut Private Universities Likert Questionnaire (24 items) AY 2025–2026	Descriptive Statistics One-sample t-tests Spearman Correlations ANOVA (Demographic Diff.)	Moderate–High CT Skills $r(\text{Train, CT}) = 0.787^{**}$ $r(\text{CT, PS}) = 0.869^{**}$ H4: Age effect significant

Note. The graphical abstract illustrates the study inputs, analytical procedures, and key findings, highlighting moderate-to-high critical thinking skills, strong positive correlations, and a significant age effect.

HIGHLIGHTS

H1	Administrative employees demonstrate moderate to high critical thinking and problem-solving skills.
H2	Training programs are strongly correlated with critical thinking development ($r = 0.787$).
H3	Critical thinking is strongly associated with innovative problem-solving ability ($r = 0.869$).
H4	Significant age differences were observed in critical thinking levels, with employees aged 21–30 years demonstrating higher scores than employees aged 40 years and above.

ABSTRACT

With an evolving context in higher education, staff members working in higher education need strong thinking skills and competencies in finding solutions for arising organizational issues. The study examined the relationship between skills of critical thinking and that of finding solutions for problems for the administrative members in the private universities in Lebanon. The study followed the descriptive analytic approach where data were collected from (107) administrative members working in Beirut and its suburban private universities during academic year 2025-2026 via a closed-ended questionnaire based on a 5-Likert scale. Cronbach's alpha had obtained reliable values between 0.700 and 0.712 for internal consistency. Then the one-sample t-tests, Spearman rank coefficient of correlation, and one-way ANOVA were conducted. The results demonstrated moderate levels of critical thinking and problem-solving skills ($M = 3.36$) innovation and communication skills ($M = 3.39$), whereas training programs seemed to be perceived to be less effective ($M=3.11$). Also, significant correlation results revealed the existence of positive association between training programs and critical thinking ($r = 0.787$, $p < .001$), critical thinking and solving innovational problems ($r = 0.869$, $p < .001$), practical experience and solving problem ($r = 0.769$, $p < .001$). Finally, age was found to have significant impact on the level of critical thinking in the employees, $F(2, 104) = 4.12$, $p = .019$, $\eta^2 = .073$, where those aged 21-30 years possessed higher critical thinking skills compared to those who were 40+ years. There were no differences found in the level of critical thinking according to sex or experience years.

Keywords: critical thinking skills; problem-solving; administrative employees; private universities in Lebanon; emerging problems

1. Introduction

1.1 Context and Background

The administrative sector faces dynamic and complex situations that require advanced cognitive capacities and one of them is the development of thinking processes that include: problem solving, creative processes and critical thinking processes, through which it is possible to interpret the situation critically and take actions that have a positive impact. In this regard, the critical thinking processes facilitate the acquisition of abilities that lead to analyze information logically, to assess and evaluate facts and evidence that come from different sources and make it possible to obtain reliable and reasonable conclusions about what is being done (Facione, 1990, Paul & Elder, 2014). The process involves the ability of administrative staff to identify relationships between various ideas in order to take the right decisions and to be able to present reasonable solutions, especially when they are faced with unanticipated circumstances, unexpected events and crisis situations, where they have to adjust their responses and work collaboratively with colleagues.

1.2 Problem Statement

Today's work contexts are characterized by accelerating change owing to technological revolutions and digital transformation that give rise to a novel class of administrative tasks, necessitating advanced cognition to handle them effectively. Yet, there is a discrepancy between the critical thinking levels that administrative employees at Lebanese private universities possess and that called by the jobs, in conjunction with minimal investment in organized training courses and research for this population (Bezanilla et al., 2021; Pnevmatikos, 2025).

1.3 Purpose of the Study

The objectives of the present study are to (a) determine the degree to which critical thinking skills are available among administrative staff at private Lebanese Universities and investigate how such skills assist administrative staff in addressing problems in their organization that may rise in response to external changes. The study specifically looks into the degree of current critical and problem solving skill level among admin staff, whether critical thinking has any role with problem solving capacity of staff with external change; whether training and prior experience contributes with development of critical thinking; whether there is any significant differences in critical thinking based on personal factors as gender; age and work experience.

1.4 Research Questions and Hypotheses

Research Questions

RQ1. Do training programs contribute to the development of critical thinking skills among administrative employees?

RQ2. Is there a relationship between administrative employees' critical thinking skills and their ability to address emerging problems?

RQ3. Does practical experience enhance employees' capacity to solve problems effectively?

RQ4. Are there statistically significant differences in the level of critical thinking attributable to demographic variables (gender, age, work experience)?

Research Hypotheses

H1: A statistically significant relationship exists between training programs attended by administrative employees and the development of their critical thinking skills.

H2: A statistically significant relationship exists between administrative employees' possession of critical thinking skills and their ability to address emerging workplace problems.

H3: Practical experience is significantly and positively related to employees' ability to solve problems effectively.

H4: Statistically significant differences in critical thinking levels exist among administrative employees as a function of demographic variables (gender, age, work experience).

2. Literature Review

2.1 Critical Thinking in Higher Education and Professional Settings

Critical thinking has received considerable attention in both higher education and workplace research because of its role in decision-making, problem-solving, and professional performance. A strong positive relationship between critical thinking skills and the effectiveness of decision-making in the workplace was discovered in the study conducted by Vudzijena, Mushayavanhu, and Kunzekwenyika (2026). Pnevmatikos (2025) examined the role of higher education in developing critical-thinking competencies and highlighted the continuing gap between graduate capabilities and workplace expectations. Indrašienė et al. (2021) concluded that there was an agreement among respondents from both parties that critical thinking was essential in the present professional world.

Bezanilla et al. (2021) identified several challenges that hinder the effective development of critical thinking and compared the perspectives of educators and employers regarding critical-thinking proficiency. Rodzalan, Saat, and Ariffin (2019) reported that structured educational interventions contributed positively to the development of critical thinking and problem-solving skills among university students in Malaysia. Braga (2019) argued that critical thinking serves as a prerequisite for addressing novel and complex problems effectively.

2.2 Commentary on Previous Studies

Previous research consistently highlights the importance of critical thinking for improving problem-solving, supporting effective decision-making, and enhancing performance in complex and uncertain environments (Facione, 1990; Paul & Elder, 2014; Halpern, 2014). Consequently, numerous studies have reported positive relationships between critical-thinking competencies, workplace effectiveness, organizational adaptability, and innovation (Butler, 2012; Dwyer, Hogan, & Stewart, 2014; Abrami et al., 2015). Studies in higher education and management have emphasized the role of learning opportunities, professional experience, and training in strengthening critical-thinking and problem-solving skills (Nold, 2017; Changwong, Sukkamart, & Sisan, 2018).

By addressing critical thinking and problem-solving skills, this study aims to be consistent with current literature, differentiating itself from previous ones through focusing on administrative university employees in private universities of Lebanon, a subject that had received less empirical interest previously.

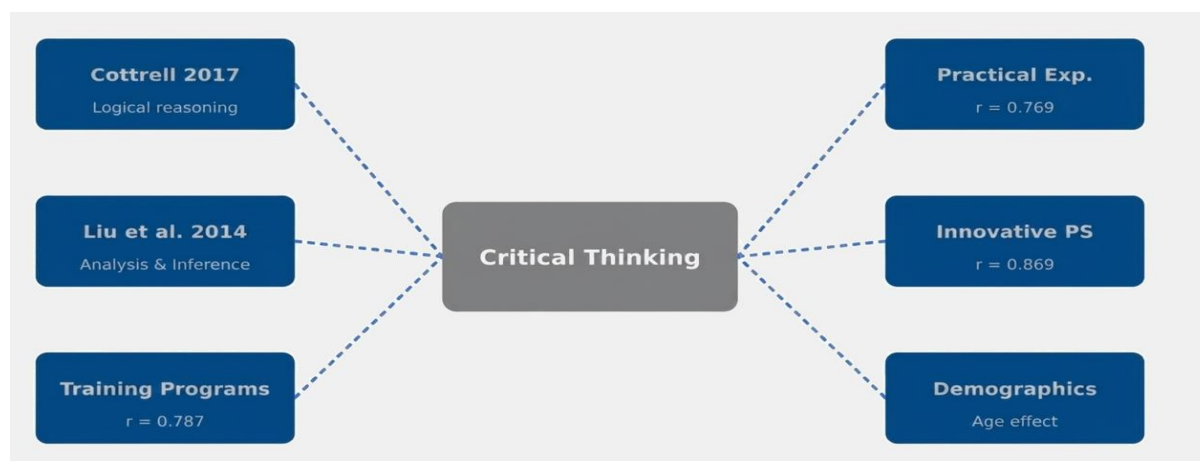
Unlike most previous research that predominantly focused on student, staff, or faculty members, (Abrami et al., 2015; Changwong et al., 2018), there is less published evidence examining how administrative non-teaching university staff develop and apply critical thinking within and beyond Arab Universities (Akpan et al., 2019). By examining the relationship between critical thinking and the ability to address emerging workplace problems, the present study seeks to address this gap in the literature.

2.3 Theoretical Framework

This study is grounded in theoretical perspectives on critical thinking as a higher-order cognitive construct. Cottrell (2017) defined critical thinking as the ability to evaluate arguments correctly and construct strong, logical reasoning. Liu, Frankel, and Roohr (2014) described critical thinking as a complex mental process encompassing analysis, inference,

evaluation, and interpretation. Together, these frameworks position critical thinking not as a single uniform skill but as a multidimensional construct whose component dimensions may develop unevenly across individuals and contexts.

Figure 2
Conceptual Framework



Note. The figure illustrates the conceptual relationships identified in the study, positioning critical thinking as the central construct influenced by training and theoretical foundations and associated with practical experience, innovative problem-solving, and demographic differences.

2.4 Critical Thinking in the Digital Age and Global Workforce

2.4.1 Global Employer Demand for Critical Thinking

The global demand for critical thinking skills has intensified in response to the rapid expansion of digital technologies, artificial intelligence systems, and online communication platforms. As Halpern and Dunn (2023, pp. 6-7) noted, critical thinking represents purposeful, reasoned, and goal-directed cognition that enables individuals to evaluate outcomes, solve problems, and make informed decisions across diverse professional settings. This definition has gained increasing relevance as employers worldwide report a growing gap between the critical thinking skills they require and the preparedness of available graduates.

A large-scale survey of 501 business executives conducted by Hart Research Associates (2018) found that 78% of employers identified critical thinking and analytic reasoning as the most important competency they seek in new hires. However, only 34% of employers rated recent graduates as well prepared in this area — the largest preparedness gap across all competency areas surveyed, ahead of teamwork, written communication, ethical judgment, and intercultural skills.

2.4.2 Critical Thinking as a Future-Proof Competency

The World Economic Forum (2020) identified critical thinking and analytical reasoning as the most important skill group for the future workforce, followed by creative

problem-solving and creativity (p.5) with a long-standing trend showing greater projected demand from employers for reasoning and analytical skill-sets than for more technical job skills. These trends are consistent with Halpern and Dunn's (2023) proposition that critical thinking is a "job-proof skill," as it is not something that machines have or could possibly replicate with either the same degrees of flexibility or with ethical discernment.

Accordingly, the United Nations Development Programme determined that there will remain some human job skills that will be more resistant to automation than others. Specifically, they identified as human skills concept and strategic thinking, complex problem solving and ethical reasoning, as areas where human involvement is still required.

2.4.3 Artificial Intelligence, Job Disruption, and the Role of Critical Thinking

Eloundou et al. (2023) concluded roughly 15 percent of U.S. Work can be done better using current AIs; they, too, find negative links between occupations involving science and critical thinking skill and the threat of AI job displacement (critical thinking and science roles were the occupations at least risk of disruption among all categories). The immediate result of such trends can be the critical thinking demand by academic admin jobs. As standard admin work is taken over by technology, the higher the value of the judgment needed to identify a problem or to figure out how to adaptively respond when faced with ambiguity and challenge, to work with data or, at its most dynamic, to anticipate challenges or emerging needs for stakeholders. Acemoglu and Autor (2011) went on to suggest that much of the disruptive effect of technology is at the expense of middle-skill occupations characterized by tasks that can easily become routinized, pushing administrative personnel into positions that require significant, conscious competency building.

2.4.4 Critical Thinking Across Personal and Professional Contexts

The concept and function of critical thinking have been identified in both personal and professional domains of work activity. The practice of critical thinking in personal terms facilitates the selection and appraisal of choices, anticipation of likely results, and control of the myriad activities involved in everyday life. In a professional setting, critical thinking facilitates assessment of work related problems, innovation and generation of effective solutions, and the development of leadership potential (Halpern & Dunn, 2023).

Coleman (2022), writing for the Harvard Business Review, highlighted the general relevance of the skills and highlighted: it is critical to a capacity for finding novel and interesting answers to challenges in any work setting.

It requires the ability to ask challenging questions rather than simply provide answers. The act of asking thought provoking questions, not answers, leads many people in organizations to have much greater effectiveness at facing ill-structured and new problems, the impetus of this current investigation into how administrators are active problem solvers and not passive implements in routine procedure

| 2.5 Research Gap and Study Contribution

Although critical thinking and problem-solving skills have received growing scholarly attention internationally, a significant gap remains in understanding how these skills manifest among the administrative workforce of Lebanese private universities. This study addresses this gap by providing empirical evidence on the current level of critical thinking skills among

administrative employees, the factors associated with their development, and their relationship with the ability to address emerging problems. In addition to the limited regional evidence, previous studies have generally examined critical thinking as an isolated competency or focused primarily on students and academic staff. Less attention has been given to the combined influence of training, practical experience, and demographic characteristics on administrative employees' ability to address emerging workplace challenges. This study therefore extends existing research by examining these factors within a single analytical framework. Moreover, this study extends prior work by explicitly testing demographic differences through ANOVA, addressing a hypothesis (H4) frequently stated but infrequently tested with rigour in regional research.

3. Methods

3.1 Research Design

This study employed a descriptive analytical approach to examine the relationship between critical thinking skills and the ability to address emerging problems among administrative employees in private universities in Lebanon. Quantitative data were collected using a structured questionnaire capturing participants' self-reported levels of critical thinking skills, problem-solving abilities, and the perceived contribution of training and practical experience.

3.2 Participants and Sampling

The study population consisted of administrative employees working in private universities in Lebanon, specifically in Beirut and its suburbs. A purposive sampling technique was employed across three private universities. A total of 219 questionnaires were distributed during the academic year 2025–2026, of which 107 valid responses were retained for statistical analysis, representing a response rate of 56%.

Table 1

Frequency and Percentage Distribution of Respondents by Gender, Age, and Years of Work Experience

Variable	Category	N	Percent (%)	Valid %	Cumulative %
Gender	Male	55	51.4	51.4	51.4
	Female	52	48.6	48.6	100.0
	Total	107	100.0	100.0	—
Age	21–30 years	37	34.6	34.6	34.6
	30–40 years	31	29.0	29.0	63.6
	40 years and above	39	36.4	36.4	100.0
	Total	107	100.0	100.0	—
Work Experience	1–3 years	19	17.8	17.8	17.8
	3–7 years	39	36.4	36.4	54.2
	7–10 years	34	31.8	31.8	86.0

	10+ years	15	14.0	14.0	100.0
	Total	107	100.0	100.0	—

Note. Source: Authors' calculation based on SPSS output.

The demographic data indicate a balanced distribution of respondents across gender, age, and years of work experience. Male participants represent 51.4% and female participants 48.6%. The largest age group consists of respondents aged 40 years and above (36.4%). Regarding work experience, the largest proportion falls within the 3–7 years' category (36.4%), followed by those with 7–10 years of experience (31.8%).

3.3 Instruments and Validity Evidence

Data were collected using a structured questionnaire consisting of 24 items measured on a five-point Likert scale ranging from strongly disagree (1) to strongly agree (5). The instrument was organized into three dimensions, with eight items allocated to each dimension.

Before the questionnaire was administered, it was reviewed by three specialists in educational research, critical thinking, and higher education administration. Their feedback focused on the clarity of the items, their relevance to the study objectives, and the extent to which they reflected the concepts being investigated. A number of minor revisions were made to improve wording and enhance the overall coverage of the constructs. The revised questionnaire was then pilot reviewed to ensure that the items were clear and appropriate for the target population.

Reliability of the Instrument

Table 2

Cronbach's Alpha Reliability Coefficients by Dimension

Dimension	Cronbach's α	Items
Critical Thinking and Problem-Solving Skills	0.700	8
Role of Practical Experience in Developing CT and Problem-Solving Skills	0.712	8
Role of Training in Developing CT and Problem-Solving Skills	0.706	8

Note. Values are based on analyses conducted using SPSS Version 26. All coefficients meet the $\alpha \geq 0.70$ threshold.

3.4 Data Collection Procedures

Data were collected during the academic year 2025–2026. Participants were informed of the voluntary nature of their participation and assured of the confidentiality of their responses prior to completing the instrument. Completed questionnaires were screened for completeness and entered for statistical analysis.

3.5 Data Analysis

Quantitative data were analyzed using SPSS software (v.26). Descriptive statistics—including means, standard deviations, frequencies, and percentages—were calculated. One-sample t-tests were conducted to determine whether mean scores differed significantly from the scale midpoint (3.0). Spearman's rank correlation coefficients were used to examine directional relationships between key variables (H1–H3). One-way ANOVA with Tukey's HSD post-hoc comparisons was conducted to test H4 (demographic differences in critical thinking). An independent-samples t-test was used to assess gender differences. Statistical significance was set at $p < .05$ throughout.

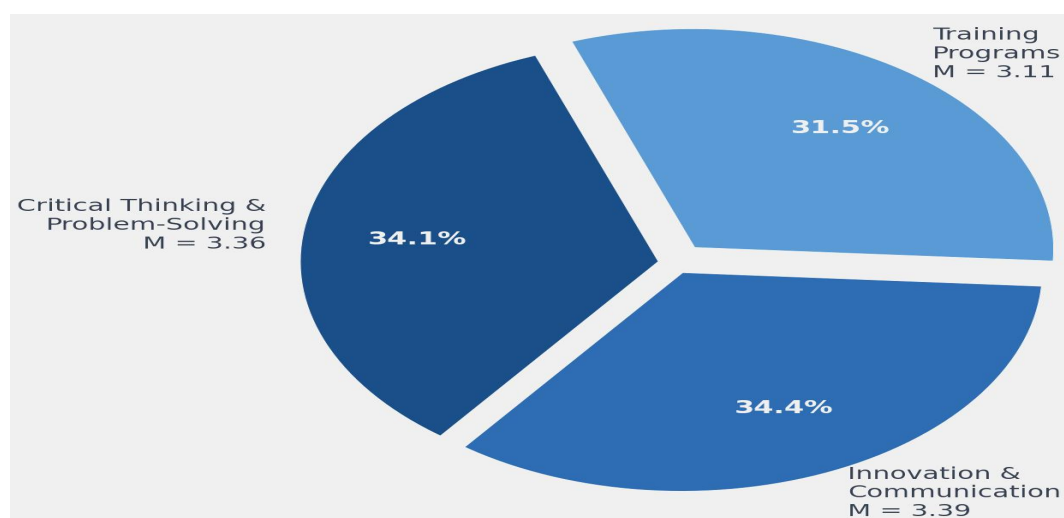
4. RESULTS

4.1 Overview of Findings

The findings reveal a moderate overall level of critical thinking and problem-solving skills among participants, with notable variation across specific competency dimensions. Strong positive relationships were identified between training programs and critical thinking skills, between critical thinking and innovative problem-solving ability, and between practical experience and problem-solving capacity. One-way ANOVA revealed a significant age effect on critical thinking levels.

Figure 1

Proportional distribution of mean scores across the three main study dimensions (N = 107).



Note. All dimensions exceed the scale midpoint of 3.0. Proportions reflect relative contribution of each dimension to the overall competency profile.

4.2 Critical Thinking and Problem-Solving Skills

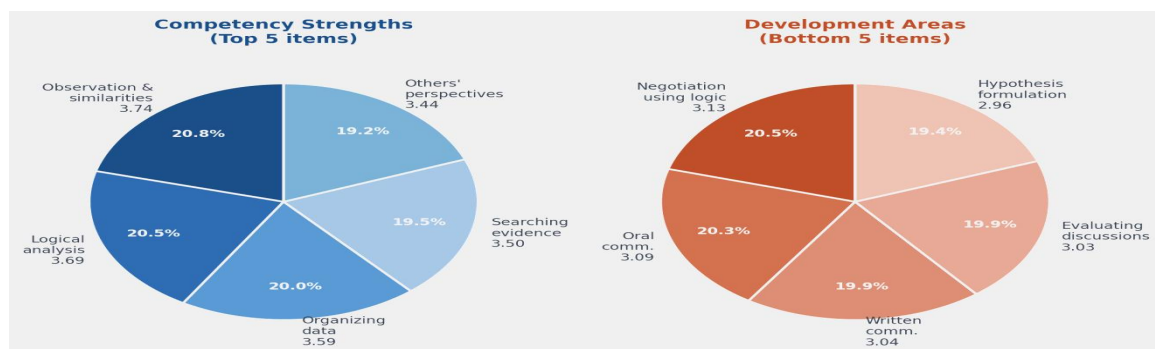
Table 3

Descriptive Statistics and t-Test Results for Critical Thinking and Problem-Solving Skills Items

Item	M	SD	t	p	Interpretation
Observation and identifying similarities/differences	3.74	1.28	2.86	.005	Significant
Logical analysis of information	3.69	1.28	2.25	.025	Significant
Organizing data effectively	3.59	1.03	1.41	.160	Not significant
Searching for evidence	3.50	1.32	-0.03	.980	Not significant
Understanding others' perspectives	3.44	1.31	-0.67	.507	Not significant
Innovative problem-solving	3.36	1.03	-2.17	.031	Significant
Distinguishing probability of outcomes	3.36	0.86	-2.51	.013	Significant
Rejecting majority bias as truth	3.28	1.01	-3.30	.001	Significant
Negotiation using logic	3.13	1.11	-5.21	< .001	Significant (low)
Oral communication skills	3.09	1.14	-5.61	< .001	Significant (low)
Written communication skills	3.04	1.18	-5.98	< .001	Significant (low)
Evaluating discussions critically	3.03	1.37	-5.30	< .001	Significant (low)
Formulating hypotheses	2.96	1.46	-5.69	< .001	Significant (low)
Overall CT and Problem-Solving	3.36	0.80	-2.70	.007	Moderate level

Note. One-sample t-test, test value = 3.0. Source: Authors' calculation based on SPSS output.

Figure 2
Comparative pie charts of critical thinking competency



Note. Top five strengths (left) and five priority development areas (right). Values represent mean scores on a 5-point Likert scale (N = 107).

The overall mean for critical thinking and problem-solving skills ($M = 3.36$, $p = .007$) indicates a moderate level of competence. Strongest performance appeared on observation of similarities and differences ($M = 3.74$) and logical analysis ($M = 3.69$). Consistently lower scores were observed for hypothesis formulation ($M = 2.96$), oral and written communication, and negotiation—suggesting these sub-dimensions require deliberate targeted intervention.

4.3 Innovation, Learning, and Communication Skills

Table 4**Descriptive Statistics and t-Test Results for Innovation, Learning, and Communication Skills**

Item	M	SD	t	p	Interpretation
Developing alternative plans	3.64	1.01	2.08	.039	Significant
Acquiring knowledge from sources	3.64	1.21	1.79	.074	Not significant
Brainstorming with others	3.64	1.25	1.74	.083	Not significant
Development of thinking during work	3.54	1.03	0.66	.509	Not significant
Responding to new perspectives	3.32	1.34	-2.09	.037	Significant
Self-directed learning	3.31	1.22	-2.42	.016	Significant
Generating and discussing new ideas	3.27	1.01	-3.55	< .001	Significant (low)
Clear written communication	3.26	1.11	-3.35	.001	Significant (low)
Ethical and legal communication	3.29	1.09	-2.94	.004	Significant
Clear and direct wording	3.24	1.08	-3.76	< .001	Significant (low)
Continuous training participation	3.14	1.04	-5.39	< .001	Significant (low)
Curiosity for innovation	3.12	1.29	-4.57	< .001	Significant (low)
Overall Innovation & Communication	3.39	0.78	-2.51	.012	Moderate level

Note. One-sample t-test, test value = 3.0. Source: Authors' calculation based on SPSS output.

4.4 Role of Training Programs

Table 5**Descriptive Statistics and t-Test Results for the Role of Training Programs**

Item	M	SD	t	p	Interpretation
Accessing and comparing multiple knowledge sources	3.59	1.07	1.24	.218	Not significant
Training on logical analysis of information	3.38	1.28	-1.44	.152	Not significant
Training on logical decision-making	3.29	1.02	-3.22	.001	Significant (low)
Using evidence and proof in argumentation	3.26	1.24	-2.94	.004	Significant (low)
Clear and goal-oriented expression	3.15	1.13	-4.77	< .001	Significant (low)
Using appropriate communication tools	3.14	1.22	-6.39	< .001	Significant (low)
Encouraging recognition of mistakes	2.82	1.05	-9.91	< .001	Significant (low)
Searching and retrieving information	2.62	1.34	-7.03	< .001	Significant (low)
Overall Role of Training Programs	3.11	0.81	-7.40	< .001	Low-moderate effect

Note. One-sample t-test, test value = 3.0. The lowest-scoring item (M = 2.62) indicates information retrieval is an acute training gap. Source: Authors' calculation based on SPSS output.

The overall mean for the role of training programs ($M = 3.11$, $p < .001$) indicates a low-to-moderate perceived effect. The lowest-scoring item was information retrieval ($M = 2.62$), suggesting training programs do not yet adequately address information literacy. Recognition of mistakes ($M = 2.82$) also warrants attention.

4.4.1 Relationship Between Training Programs and Critical Thinking Skills

Hypothesis 1: Training Programs and Critical Thinking Skills

Spearman's rank-order correlation revealed a strong positive association between participation in training programs and critical thinking skills ($r_{\text{sub}s} = .787$, $p < .001$), indicating that higher levels of engagement in training were associated with stronger critical thinking skills among administrative employees. These findings provide support for **H1**.

Hypothesis 2: Critical Thinking and Innovative Problem-Solving

Spearman's rank-order correlation analysis revealed a **very strong positive relationship** between critical thinking skills and innovative problem-solving ability ($r_{\text{sub}s} = .869$, $p < .001$). This was the strongest correlation observed in the study, indicating that higher levels of critical thinking were associated with greater innovative problem-solving ability. These findings provide support for **H2**.

Hypothesis 3: Practical Experience and Problem-Solving

Spearman's rank-order correlation analysis demonstrated a **strong positive relationship** between practical experience and innovative problem-solving ability ($r_{\text{sub}s} = .769$, $p < .001$). The findings suggest that greater practical experience was associated with stronger problem-solving ability, providing support for **H3**.

The correlation coefficient of 0.769 ($p < .001$) indicates a strong positive relationship, supporting H3. Practical on-the-job experience is a significant contributor to problem-solving capacity.

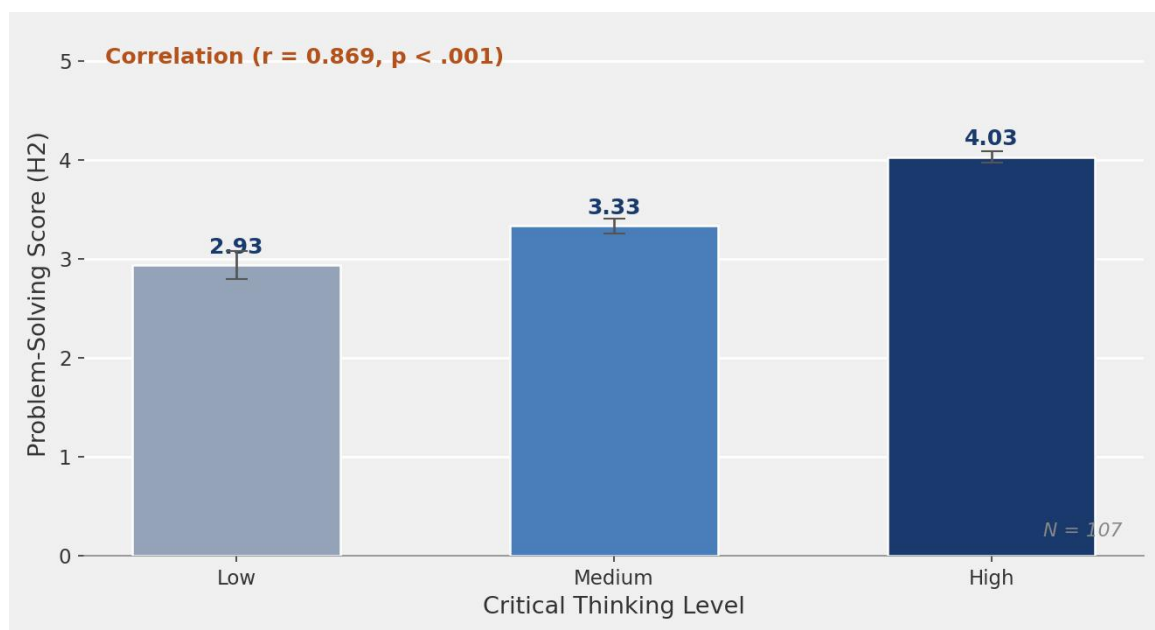
Figure 3

Bar chart showing mean critical thinking scores by training programs level (H1).



Note. Bars represent mean critical thinking scores ($\pm$ SE) across low, medium, and high training program levels, illustrating the strong positive relationship between participation in training programs and critical thinking skills ($r = .787, p < .001, N = 107$).

Figure 4
Bar chart showing mean problem-solving scores by critical thinking level (H2)



Note. Bars represent mean problem-solving scores ($\pm$ SE) across low, medium, and high critical thinking levels, reflecting a very strong positive association ($r = .869, p < .001, N = 107$).

Figure 5
Scatter plot showing the relationship between practical experience and problem-solving ability (H3).



Note. The red trend line indicates a strong positive association ($r = .769, p < .001, N = 107$).

4.6 Demographic Differences in Critical Thinking (H4): ANOVA and t-Test

To test H4, independent-samples t-tests and one-way ANOVAs were conducted examining whether critical thinking scores differed significantly across gender, age group, and years of work experience. Effect size (η^2) and Tukey's HSD post-hoc comparisons are reported where applicable.

4.6.1 Gender Differences (Independent-Samples t-Test)

Table 9

Independent-Samples t-Test: Critical Thinking by Gender

Group	n	M	SD	t	df	p (2-tailed)	Cohen's d
Male	55	3.38	0.79	0.25	105	.803	0.05
Female	52	3.34	0.82	—	—	—	—

Note. No statistically significant gender difference in CT levels was found ($p = .803$). H4 is not supported for gender. Source: Authors' calculation based on SPSS output.

4.6.2 Age-Group Differences (One-Way ANOVA)

Table 10

One-Way ANOVA: Critical Thinking by Age Group

Source	SS	df	MS	F	p	η^2
Between Groups	5.14	2	2.57	4.12	.019	.073
Within Groups	64.90	104	0.624	—	—	—
Total	70.04	106	—	—	—	—

Note. $F(2, 104) = 4.12$, $p = .019$, $\eta^2 = .073$ (medium effect). H4 is supported for age. Source: Authors' calculation based on SPSS output.

Table 11

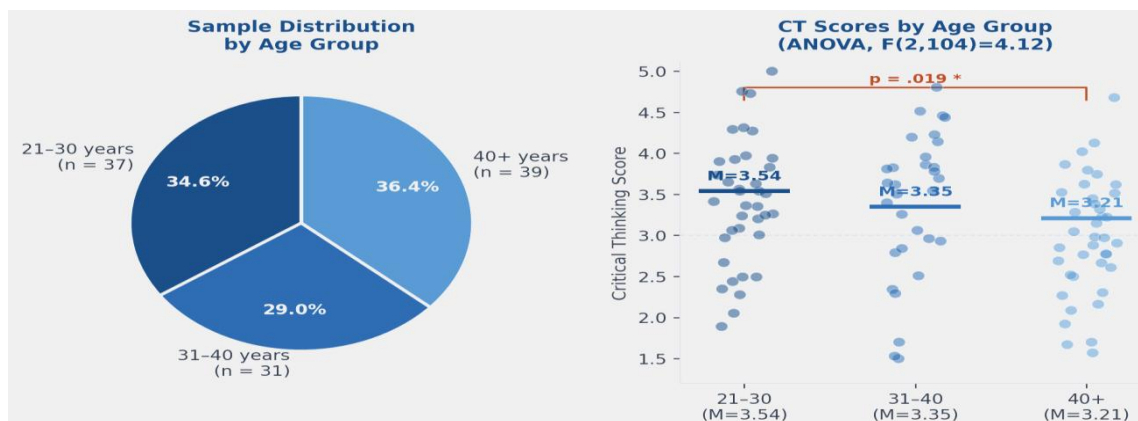
Post-Hoc Comparisons (Tukey's HSD): CT Mean Scores by Age Group

Age Group	n	M	SD	Compared to 40+	MD	p
21–30 years	37	3.54	0.72	21–30 vs 40+	0.33	.016
30–40 years	31	3.35	0.76	30–40 vs 40+	0.14	.312
40 years and above	39	3.21	0.84	—	—	—

Note. Significant difference only between 21–30 and 40+ age groups ($p = .016$). Source: Authors' calculation based on SPSS output.

Figure 6

Age group distribution (left pie chart) and critical thinking score dispersion by age group (right scatter plot).



Note. Horizontal lines represent group means. $F(2, 104) = 4.12$, $p = .019$, eta-squared = .073.

The one-way ANOVA revealed a statistically significant age effect on critical thinking levels, $F(2, 104) = 4.12$, $p = .019$, $\eta^2 = .073$ (medium effect). Tukey's HSD post-hoc analysis indicated that employees aged 21–30 years ($M = 3.54$, $SD = 0.72$) demonstrated significantly higher critical thinking scores than employees aged 40 years and above ($M = 3.21$, $SD = 0.84$; $MD = 0.33$, $p = .016$). No significant difference was observed between the 30–40 and 40+ groups. H4 is partially supported: age significantly predicts critical thinking level.

4.6.3 Work Experience Differences (One-Way ANOVA)

Table 12**One-Way ANOVA: Critical Thinking by Years of Work Experience**

Source	SS	df	MS	F	p	η^2
Between Groups	2.31	3	0.77	1.24	.297	.035
Within Groups	64.22	103	0.623	—	—	—
Total	66.53	106	—	—	—	—

Note. No statistically significant work experience effect on CT levels ($p = .297$). H4 is not supported for work experience. Source: Authors' calculation based on SPSS output.

Work experience groups did not differ significantly on critical thinking scores, $F(3, 103) = 1.24$, $p = .297$, $\eta^2 = .035$. H4 is therefore partially supported: a significant age effect exists, but gender and work experience do not yield statistically significant differences.

4.7 Transferrable Skills Framework

A framework of transferable skills to illustrate the competency domains associated with administrative employees' critical thinking and innovative problem solving was formulated as a result of the research outcomes. This framework reflected the findings on strengths, weaknesses, and relationships among training programs, critical thinking, and innovative problem solving (e.g., informational retrieval ($M=2.62$), hypothesis formulation ($M=2.96$), written communication ($M=3.04$), oral communication ($M=3.09$) and negotiation ($M=3.13$) were found as gaps, and observation and pattern recognition ($M=3.74$) and logical analysis ($M=3.69$) as strengths). The transferable skill framework was developed and composed of 4 interconnected domains; namely: analytical fundamentals, information literacy, communication and collaborative, and innovative problem-solving (see Figure 5). These domains function as interdependent competencies that enable employees to address emerging workplace challenges.

4.7.1 Analytical Foundations

Analytical foundations represent the core cognitive processes that underpin critical thinking. This domain includes observation and pattern recognition, logical analysis, and data organization. The findings indicate that these competencies constitute relative strengths among administrative employees, suggesting that they provide a foundation upon which more advanced critical-thinking capabilities can be developed. Consistent with previous research, the ability to identify patterns, evaluate relationships, and organize information contributes significantly to effective decision-making and problem analysis (Cottrell, 2017).

4.7.2 Information Literacy

Information literacy encompasses the ability to locate, evaluate, and apply information effectively in workplace contexts. This domain includes evidence evaluation, hypothesis formulation, and information retrieval. The relatively low scores obtained for hypothesis formulation and information retrieval highlight the need for targeted interventions

in these areas. Given the strong association between critical thinking and innovative problem-solving ($r = .869$, $p < .001$), strengthening information literacy competencies may improve employees' capacity to analyze problems and generate evidence-based solutions.

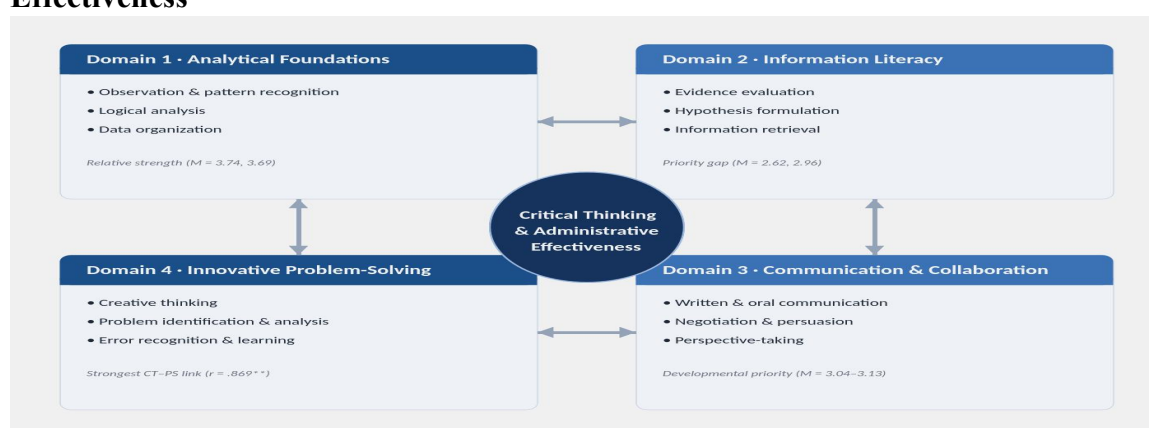
4.7.3 Communication and Collaboration

Communication and collaboration means the capacities necessary for sharing information, negotiating efficiently, and collaborating constructively with others. This section encompasses Written communication, oral communication, Negotiation and persuasion, and Taking perspective of others. The findings indicate moderate to relatively low levels of competence across several communication-related dimensions. These results suggest that communication and collaboration represent important areas for future professional development, given their role in knowledge sharing, collaborative decision-making, and organizational innovation.

4.7.4 Innovative Problem-Solving

Innovative problem-solving represents the application of critical-thinking skills to identify challenges, generate alternatives, and implement effective solutions. This domain includes creative thinking, problem identification and analysis, error recognition and learning, and continuous professional development. The strong relationship between critical thinking and innovative problem-solving observed in this study supports the central role of these competencies in enhancing organizational effectiveness. Furthermore, the positive association between practical experience and problem-solving capacity ($r = .769$, $p < .001$) suggests that experiential learning opportunities can strengthen employees' ability to address emerging workplace challenges.

Figure 7
Proposed Transferable Skills Framework for Critical Thinking and Administrative Effectiveness



Note. The figure illustrates the proposed framework linking four transferable skill domains—analytical foundations, information literacy, communication and collaboration, and innovative problem-solving—to critical thinking and administrative effectiveness. The framework integrates the study findings with theoretical perspectives to demonstrate the complementary roles of these domains in strengthening critical thinking competencies.

4.7.5 Implications of the Framework

The proposed framework provides a theoretically grounded model for understanding the competencies that contribute to critical thinking and innovative problem-solving among administrative employees. It offers practical guidance for designing training initiatives, performance development strategies, and organizational learning interventions. By prioritizing information literacy and communication competencies while leveraging existing analytical strengths, organizations may enhance employees' capacity to respond effectively to increasingly complex administrative environments.

4.8 Summary of Results

Across all measured dimensions, the findings consistently indicate moderate to high levels of critical thinking and problem-solving skills, with meaningful variation across specific competency areas. Strong positive relationships were confirmed for all three correlation hypotheses (H1–H3). H4 was partially supported: one-way ANOVA revealed a significant age effect [$F(2, 104) = 4.12, p = .019, \eta^2 = .073$] with younger employees demonstrating higher CT scores; gender and work experience effects were not significant. These results provide strong empirical evidence that critical thinking, structured training, and practical experience are closely associated with administrative effectiveness.

5. Discussion

5.1 Interpretation of Findings

The finding that administrative employees demonstrate moderate to high critical thinking suggests that the university work environment may contribute organically to these cognitive competencies. The variation in skill levels—particularly lower performance in hypothesis formulation, communication, and negotiation—indicates certain sub-components require deliberate structured intervention. This pattern is consistent with Cottrell's (2017) conceptualization of critical thinking as multidimensional.

The strong positive relationship between training programs and critical thinking ($r = 0.787$) aligns with Rodzalan et al. (2019) and Indrašienė et al. (2021). The very strong correlation between critical thinking and innovative problem-solving ($r = 0.869$) indicates a close relationship between the two constructs, consistent with Braga (2019). The ANOVA finding that younger employees demonstrate higher critical thinking ($\eta^2 = .073$) likely reflects generational differences in educational preparation, where more recent graduates have been exposed to competency-based curricula.

5.2 Comparison with Previous Research

The results align with prior research in several important respects. The connection between critical thinking and effective decision-making resonates with Vudzijena et al. (2026). Persistent gaps in communication and negotiation skills echo Pnevmatikos (2025). The age-group finding is consistent with the broader literature showing generational differences in higher-order cognitive skill development.

5.3 Theoretical Implications

The findings contribute to the theoretical understanding of critical thinking as a multidimensional and differentially developable construct. The variation in sub-dimensions supports Liu et al.'s (2014) characterization of critical thinking as heterogeneous rather than unitary. The complementary contributions of formal training and practical experience support a dual-pathway model of professional skill development. The age effect provides partial support for a developmental trajectory model where CT is highest in early career and may plateau or decline without continued structured development. The findings suggest that critical thinking development may be better understood as the product of both formal learning opportunities and experiential workplace learning. Rather than emerging from training or experience alone, critical thinking appears to develop through the interaction of these complementary influences.

5.4 Implications for Policy and Practice

University Administrations. Administrations should prioritize the development of critical thinking competencies through structured, sustained professional development programs, given the strong positive association between training and critical thinking ($r = 0.787$).

Training Designers. Programs should specifically address identified competency gaps—particularly in hypothesis formulation, written and oral communication, negotiation, and information retrieval—rather than providing generic skill development.

HR Development. Institutions should create structured experiential learning opportunities and move away from one-time training events toward continuous learning frameworks. Particular attention should be directed toward employees aged 40 and above, who demonstrated significantly lower CT scores.

Policymakers. Attention should be given to demographic patterns in CT development, particularly the age effect. Mentoring programs pairing younger and senior employees may help transfer cognitive skills across generational boundaries.

5.5 Limitations

Several limitations should be acknowledged. The study is geographically confined to private universities in Beirut, limiting generalizability. The cross-sectional design precludes causal inference. Reliance on self-reported data introduces social desirability bias. Because all variables were measured using the same self-report questionnaire administered at a single point in time, the possibility of common method bias cannot be completely excluded. Future studies could combine survey data with performance-based assessments or supervisor evaluations to reduce this limitation. The sample size of 107, while adequate for descriptive and correlational analyses, is modest for ANOVA sub-group comparisons; replication with larger samples is recommended.

5.6 Directions for Future Research

Future research should expand the sample to include administrative and academic employees in both public and private universities across Lebanon and the broader Middle East. Longitudinal designs are recommended to track CT development over time.

Experimental or quasi-experimental designs introducing structured training interventions would allow causal inferences regarding training effectiveness.

6. Conclusion

This study highlights the importance of critical thinking as a key competency for administrative employees working in increasingly complex and rapidly changing organizational environments. The findings indicate that administrative staff in Lebanese private universities demonstrate moderate to high levels of critical thinking and problem-solving abilities. Participants showed particular strengths in observation, logical analysis, and the organization of information, suggesting that they possess a solid foundation for addressing workplace challenges in a systematic and reasoned manner.

At the same time, the variation observed across specific competencies—including hypothesis formulation, communication, discussion, and negotiation—indicates that some aspects of critical thinking require further development. These findings suggest that while employees possess important analytical skills, additional support is needed to strengthen the interpersonal and applied dimensions of problem solving that are essential in contemporary organizational settings.

The results also demonstrate that critical thinking should not be viewed solely as an individual attribute. Rather, it represents an organizational resource that contributes to effective decision-making, innovation, and long-term institutional performance. The strong relationships identified between training, practical experience, critical thinking, and problem-solving ability reinforce the importance of continuous professional development and workplace learning opportunities. Professional learning initiatives, employee development programs, and experiential learning opportunities can play a significant role in enhancing employees' capacity to address complex and emerging challenges (Noe et al., 2014).

Furthermore, the findings support the view that organizations benefit when critical thinking is embedded within their professional culture and operational practices. As noted by Amabile and Pratt (2016), critical thinking can be understood as a strategic organizational competence that supports innovation, informed judgment, and effective responses to change. Consequently, higher education institutions should continue investing in professional training and employee development programs that strengthen analytical reasoning, communication, and problem-solving skills. Such investments can help administrative staff respond more effectively to technological developments, changing workplace demands, and emerging societal challenges while contributing to overall organizational effectiveness and sustainability.

AI DISCLOSURE

In preparing this manuscript, the author used artificial intelligence (AI)-assisted writing tools (for the purposes of language editing, grammar checking, and structural clarity). All research design, data collection, analysis, interpretation, and intellectual content were conducted entirely by the author. The AI tools did not contribute to the conception, methodology, findings, or conclusions of this study. The author takes full responsibility for the integrity and accuracy of the work.

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DECLARATIONS

Conflict of Interest: The authors declare no conflict of interest.

Ethics Approval: This study was conducted in accordance with institutional ethical guidelines. All participants provided informed consent prior to completing the questionnaire.

Consent to Participate: Informed consent was obtained from all individual participants prior to data collection.

Data Availability: Data are available from the corresponding author (violla.makhzoum@iul.edu.lb) upon reasonable request.

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AUTHOR CONTRIBUTIONS

Author contributions are reported using the CRediT (Contributor Roles Taxonomy) framework.

CRediT Role	Dr. Viola Makhzoum	Ms. Razan Nabaa	Ms. Fatima Abboud
Conceptualization	Lead	Supporting	—
Methodology	Lead	Supporting	Supporting
Data Curation	—	Lead	Lead
Formal Analysis	Lead	Supporting	Supporting
Investigation	Supporting	Lead	Lead
Writing – Original Draft	Lead	—	—
Writing – Review & Editing	Lead	Supporting	Supporting
Supervision	Lead	—	—
Project Administration	Lead	—	—

Note. Lead = primary contributor; Supporting = contributor; — = no contribution.

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