

Critical Thinking and Its Relationship to Mindfulness Among Secondary School Students : A Field Study at Mohamed Ben Shanab Secondary School, Médéa Province

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Abstract: Through this study, we aim to reveal the relationship between critical thinking and Mindfulness among secondary education students majoring in natural and life sciences, and we adopted the descriptive and analytical method, and it was applied to a sample of (112) female students at Mohammed Ben Shanab Secondary School, Medea State, Algeria. selected by a simple random method. We relied on the critical thinking scale prepared by Farouk Abdel Salam and Mamdouh Mohammed Suleiman, which was modified by the researcher Abdul Latif Qanoua in 2019, and the Mindfulness scale prepared by Baer and colleagues (2004), and statistical methods were used: Arithmetic mean .-Pearson correlation coefficient. -Spearman's coefficient.-Cronbach's alpha coefficient. -Kolmogorov-Smirnov test. Shapiro-Wilk test. The results showed that there is a statistically significant correlation between critical thinking and Mindfulness among secondary education students:

- The level of critical thinking is average among secondary education students; and the level of Mindfulness is average for secondary education students.

Keywords: Critical Thinking; Mindfulness.

ملخص

تهدف هذه الدراسة الى التعرف على مستوى التفكير الناقد لدى طلبة التعليم الثانوي (تخصص علوم الطبيعة والحياة)، وكذا التعرف على طبيعة العلاقة بين التفكير الناقد واليقظة العقلية لديهم.

اجريت الدراسة على عينة قوامها (112) طالبة بثانوية محمد بن شنب ولاية المدية، الجزائر. تم اختيارهم بالطريقة العشوائية البسيطة، واعتمدنا في أدوات الدراسة على مقياس التفكير الناقد من إعداد فاروق عبد السلام، وممدوح محمد سليمان والذي قام بتعديله الباحث عبد اللطيف قنوعة سنة

(2019)، ومقياس اليقظة العقلية من إعداد باير وزملاؤه (2004) استخدمنا في هذه الدراسة المنهج الوصفي، وأسفرت النتائج الدراسة ان مستوى التفكير الناقد متوسط لدى طلبة التعليم الثانوي شعبة علوم الطبيعة والحياة، وان مستوى اليقظة العقلية مرتفع لديهم، ووجود علاقة ارتباطية دالة إحصائياً بين التفكير الناقد واليقظة العقلية لدى طلبة التعليم الثانوي.

مفاهيم الدراسة:

التفكير الناقد، اليقظة العقلية.

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1 - Introduction

In contemporary society, cognitive processes are given considerable attention in developed countries due to their importance in both construction and progress, especially as we live in an era characterized by rapid transformations, with developments in science and technology spreading across various fields of knowledge. To maintain the momentum of this progress, it is essential to unleash the scientific and intellectual creative capacities within society.

In the modern world, cognitive processes are under intense scrutiny in developed countries because of their vital role in shaping and advancing knowledge. This is particularly true in an age defined by swift changes, where innovations in science and technology permeate diverse domains of intellectual inquiry. To sustain this trajectory of progress, it is crucial to activate the inherent scientific and intellectual creativity in individuals and communities.

The emphasis on cognitive processes has emerged as an undeniable necessity in both developed and developing nations in the current era. This necessity stems from the importance of various forms of thinking in advancing modern societies, as thinking is the primary tool individuals possess to confront life's challenges and future obstacles collectively. Intellectuals in any society represent the real reservoir of wealth and the driving force behind advancement and innovation through the numerous developments humanity experiences across disciplines (Majid Sawsan, 2008, p. 19).

Mohammed (2021) defines critical thinking as a reflective and inferential process that relies on a set of strategies and cognitive operations, such as distinguishing assumptions, interpreting, evaluating arguments, deduction, and inference. This type of thinking aims to analyze opinions and beliefs, examine evidence and claims used as a basis for decision-making, problem-solving, or judgment.

Many studies and research projects have confirmed the possibility of teaching thinking in its various forms, including critical thinking, which has garnered special interest in educational and instructional contexts, as well as in society at large due to its profound significance on both individual and collective levels. Critical thinking enables

individuals to find innovative solutions to the problems they face and helps them adapt to their environments, enhancing their sense of self-worth within their communities. At the societal level, when individuals possess critical thinking skills, this contributes to societal advancement, productivity, and development, as well as the ability to overcome crises and lead groups. (Mohammed Al-Titi, 2007, p. 38)

Undoubtedly, there is a strong relationship between education and critical thinking, as education can either contribute to its development and reinforcement or hinder its growth and spread. Every individual is born with a certain amount of intellectual energy, but it is influenced by various factors that cause it to fluctuate. The surrounding environment plays a key role in either encouraging or suppressing critical thinking, along with the developmental characteristics of the learner's personality. It is worth noting that intellectual abilities appear early in childhood and can be observed from the initial stages of growth. (Abu Jadu, Nofal Mohammed, 2015, p. 10)

Given the complexity of the future awaiting students, it has become essential to equip them with thinking skills to enable effective competition, especially as success and excellence in the modern era depend on their ability to think well and creatively. Therefore, educational scholars stress the importance of teaching students these skills, emphasizing that education should be capable of preparing the thinkers and leaders society needs, which requires imparting sufficient thinking skills (Nadia Sorour, 1998, p. 90).

Since secondary school students are in adolescence—a stage marked by unique cognitive developmental characteristics—this period witnesses a cognitive leap that allows learners to interpret events and phenomena in more complex ways, along with increasing intelligence and mental capacities. These include skills in handling numbers and equations, as well as verbal and linguistic abilities.

This stage also features abstract thinking, as learners become capable of understanding abstract meanings and distinguishing them from their sensory manifestations. Attention span and duration also improve, enabling students to solve complex problems more easily, with increased focus, and a greater ability to generalize and grasp overarching ideas and long-range concepts. (Qatami, 2000, pp. 40–43).

Despite scholars' emphasis on the importance of developing critical thinking and enhancing mindfulness in learners, many challenges hinder the application of these concepts. Therefore, it is necessary to shift from traditional rote-based learning methods to interactive approaches that stimulate the learner's thinking and develop their abilities and skills, making them active participants in the learning process instead of passive recipients. Studies indicate that this approach significantly enhances creative thinking and increases learners' innovative abilities. (Mohammed Hassan, 2011, p. 54)

Mindfulness is a relatively recent concept in psychology, contributing to an individual's ability to adapt to situations that require full awareness and intense focus on the present moment (Keye & Pidgeon, 2013, p.1).

The concept of mindfulness has begun to expand and spread to include various fields under terms such as strategic mindfulness, technological mindfulness, scientific

mindfulness, and social mindfulness. Mindfulness is a vital process that derives its importance from being one of the fundamental requirements for many mental operations, such as memory, perception, and learning. A person may struggle with memory, leading to errors in behavior or thinking. Individuals with active memory tend to exhibit high levels of mindfulness, as they can use available tools to improve their understanding and acceptance of new information from multiple sources. They are typically unwilling to confine themselves to a single method for solving problems (Langer, 1989, p. 166).

Critical thinking is closely linked to mindfulness, as each enhances an individual's ability to effectively handle complex situations. Critical thinking involves a systematic evaluation of information, which is essential for making informed decisions. This analytical approach requires mindfulness, defined as the ability to remain aware of and responsive to the environment, facilitating quick information processing, adaptability, and problem-solving. Furthermore, mindfulness supports critical thinking by allowing individuals to focus and engage deeply with current situations, thereby improving decision-making. The interaction between these two concepts is vital, as increased mindfulness boosts critical thinking, contributing to improved problem-solving skills and overall cognitive performance. Therefore, fostering both critical thinking and mindfulness is essential for effective learning and decision-making in various contexts (Vincent-Lancrin, S. 2024, p.125).

As a result, interest in mindfulness has grown in the academic field, where it is seen as a form of reflection that helps students regulate their thoughts and behaviors. It is also one of the best ways to manage stress, as it helps individuals avoid feeling out of control. Moreover, it increases focus and prevents erratic and rapid switching between thoughts, thus avoiding distraction. In a study by Heba Mohammed Ibrahim Saad (2021), which aimed to examine the effectiveness of a mindfulness training program in reducing cognitive load among secondary school girls, the study confirmed that mindfulness enhances students' creative abilities and distances them from negative thoughts, helping them focus on the present moment.

Acting without awareness and mindfulness often leads students to miss important information that broadens their intellectual horizons and enables them to handle the situations they face. This results in a lack of flexible cognitive processing, making them unreceptive to new experiences. The senses receive many stimuli, and it is important to pay attention to these stimuli as they enter the mind. But it is even more important to avoid being preoccupied with secondary and intrusive aspects of these stimuli. This is what mindfulness achieves—it makes the individual aware of their thoughts and feelings. A study by Ghada Abdel-Hamid (2021) indicated the effectiveness of a training program in improving mindfulness, which significantly impacted the level of metacognitive thinking.

While critical thinking and mindfulness are key goals pursued by many societies, there are very few foreign studies on the relationship between these two concepts. Arabic studies on the subject are even rarer, to the best of the researcher's knowledge. This justifies the present study, which attempts to explore the relationship between critical thinking and mindfulness among secondary school students in the natural and life sciences stream.

1. Is there a statistically significant correlation between critical thinking and mindfulness among second-year secondary school students in the natural and life sciences stream?
2. What is the level of critical thinking among second-year secondary school students in this Stream ?
3. What is the level of mindfulness among second-year secondary school students in this stream ?

2.1 Research Hypotheses:

1. There is a statistically significant correlation between critical thinking and mindfulness among second-year secondary school students in the natural and life sciences stream.
2. The level of critical thinking is high among these students.
3. The level of mindfulness is high among these students

3.1 Research Objectives :

- To determine whether there is a statistically significant correlation between critical thinking and mindfulness among second-year secondary school students in the natural and life sciences stream.
- To assess the level of critical thinking among these students.
- To assess the level of mindfulness among these students

4.1 Importance of the Study :

- This study may contribute to revealing an important aspect of education—understanding the levels of critical thinking and mindfulness among secondary school students and exploring the relationship between them.
- Given the scarcity of Algerian research on the subject, this study adds to theoretical knowledge and can inform the improvement of creative teaching. It also recommends promoting effective teaching practices among secondary school educators

5.1 Definition of Key Concepts :

Critical Thinking:

According to Mohamed El-Sharafi (2005), critical thinking is “the ability of an individual to carefully examine the situations they encounter, distinguish between them, interpret, evaluate, and draw conclusions from them, while maintaining objectivity and neutrality.”

Operational Definition:

In this research, critical thinking is operationally defined as the total score obtained by a student on the Critical Thinking Skills Scale developed by Farouk Abdel-Salam and Mamdouh Mohamed Suleiman, and later adapted by Abdel-Latif Qanoua (2019), which includes the following skills: identifying assumptions, interpretation, evaluation of arguments, deduction, and inference.

Mindfulness

Mindfulness is defined as the awareness that emerges through intentionally paying attention to the present moment nonjudgmentally as the experience unfolds. Bahiri and others (2014) define it as a multi-dimensional concept consisting of observation, description, acting with awareness, and non-judgmental acceptance.

Operational**Definition:**

Mindfulness is operationally defined as the total score obtained by a student on the Mindfulness Scale developed by Baer et al. (2004), which includes the following dimensions : observation, description, acting with awareness, and nonjudgmental acceptance.

6.1 Previous Studies:**Study by Nasira and Abdelrahman (2022):**

This study aimed to highlight the relationship between critical thinking and linguistic intelligence among preschool children, given the importance of fostering both during early childhood. A descriptive methodology was used. The research sample consisted of 80 children (31 males and 49 females) from preparatory classes in four schools in El-Khemisti Municipality, Tissemsilt, Algeria. The study used a scale designed to assess both critical thinking and linguistic intelligence. The research concluded with recommendations, including prioritizing early childhood development through creative programs and activities to enhance critical thinking and multiples intelligences.

Study by Al-Deeb (2023) :

This study aimed to examine the relationship between critical thinking styles and problem-solving ability among secondary school students. Using a descriptive correlational method, a sample of 500 students from Al-Dhiaa and Al-Amal Schools in Zawiya was randomly selected. The researcher employed critical thinking and problem-solving scales. Statistical tools used included frequencies, percentages, Pearson's correlation coefficient, and t-tests. Key findings included:

- A significant correlation between critical thinking styles and problem-solving ability among secondary school students.
- No gender differences in critical thinking ability.

Recommendations included understanding critical thinking styles and raising

awareness among secondary students about the importance of developing critical thinking and avoiding extremism in opinion, as well as reconsidering evaluation methods by incorporating problem-solving into exams.

Studies Related to Mindfulness :

Study by Bouksara and Foutia (2022):

This study aimed to investigate the relationship between analytical thinking and mindfulness among first-year university students in the Faculty of Social Sciences using a descriptive-analytical approach. A simple random sample of 100 students was used. The instruments included an analytical thinking scale developed by Hamza Noura Karim (2019) and a mindfulness scale developed by Ahlam Mahdi Abdullah (2013). Statistical methods included mean, standard deviation, hypothetical mean, and t-tests. The results indicated a statistically significant correlation between analytical thinking and mindfulness. The level of mindfulness among students was found to be moderate. The study also found statistically significant differences in both analytical thinking and mindfulness attributable to...

To conduct the pilot study, we made a field visit to “Mohamed Ben Cheneb” High School, where the study sample consisted of 40 male and female students. This was done during the last week of September 2024 to ensure the validity of the study tools before applying them in the main study.

2.2 – Research Method :

We adopted the **descriptive analytical method** in conducting this study because it is suitable for the nature of the research. The study focuses on identifying and describing a current situation and clarifying its aspects. The descriptive method is based on describing the reality and what exists, and then interpreting it. According to Al-Obaidi (2003, p. 919), the descriptive method does not stop at data collection and classification, but rather extends to understanding, interpretation, comparison, measurement, and then precise analysis, which leads the researcher to identify relationships and derive conclusions relevant to the research problem.

3.2 – Study Population :

We set the spatial and temporal boundaries for the target population. The study population consisted of second-year students majoring in Natural and Life Sciences, totaling **471 female students** at “Mohamed Ben Cheneb” High School in the municipality of Médéa, the site of the study, for the academic year 2024/2025.

4.2 – Study Sample :

A. Type and Location of the Sample :

The sample consisted of **112 female students** from the second year of secondary school, majoring in Natural and Life Sciences at “Mohamed Ben Cheneb” High School in Médéa Province. The sample was selected using the **simple random sampling**

method (lottery method). Each student was assigned a name, and names were drawn randomly until the desired number was reached. The researchers then applied the study tools—the **Critical Thinking Scale and the Mindfulness Scale**—by distributing and collecting the completed questionnaires from the students.

5.2 – Study Tools :

5.2.1 – Critical Thinking Scale:

We used the **Critical Thinking Scale** developed by Farouk Abdelsalam and Mamdouh Mohamed Suleiman, and modified by the researcher **Qanoua Abdel Latif (2019)**. It is based on the **Watson-Glaser Critical Thinking Appraisal**.

The scale consists of five groups of questions :

- **Assumption Recognition** : 7 items (1–7). Each question presents a statement followed by three proposed assumptions to be judged as “Valid” or “Invalid.”
- **Interpretation** : 6 items (8–13). Each includes a statement followed by three possible assumptions to be judged as “Valid” or “Invalid.”
- **Argument Evaluation** : 6 items (14–19). Each statement is followed by three arguments rated as “Strong” or “Weak.”
- **Deduction**: 7 items (20–26). Each item has three assumptions rated as “Correct” or “Incorrect.”
- **Conclusion Drawing**: 5 items (27–31). Each statement is followed by five conclusions rated as “Definitely True,” “Probably True,” “Insufficient Data,” “Probably False,” or “Definitely False.”

Scoring Method :

The total and subscale scores are calculated as follows:

Each correct answer receives 1 point ; incorrect answers receive 0. For the first four groups, scores range from 0–3 per item. For the fifth group, scores range from 0–5 per item. Summing the scores from all five sections gives the total score for the scale. Scoring details are provided in Appendix (01).

Reliability and Validity of the Critical Thinking Scale:

A. Reliability – Internal Consistency (Cronbach’s Alpha):

Reliability was calculated using Cronbach's Alpha, which estimates average inter-item variance within each subscale and the overall scale. The reliability coefficient was **0.71**, indicating high consistency, with values exceeding 0.50 across items.

B. Validity – Internal Consistency:

Pearson correlation coefficients were calculated between each subscale and the overall scale. The results are shown in the table below:

Table 07 – Correlation Matrix : Critical Thinking Scale Subscales and Total Score

Subscale	Total Score
Conclusion Drawing	0.532**
Deduction	0.485**
Argument Evaluation	0.576**
Interpretation	0.607**
Assumption Recognition	0.510**

(**) Correlation is statistically significant at $\alpha = 0.01$

All Pearson correlation coefficients were statistically significant at $\alpha = 0.01$, indicating strong alignment between each subscale and the overall scale. Therefore, the scale demonstrates good validity.

5.2.2 – Mindfulness Scale (KIMS – Kentucky Inventory of Mindfulness Skills):

The **Kentucky Inventory of Mindfulness Skills (KIMS)** is a **self-report** measure consisting of **39 items**, used to assess mindfulness skills. It helps professionals and specialists evaluate strengths, weaknesses, and development areas in mindfulness.

Developed by **Baer et al. (2004)**, the initial version was administered to a sample of 215 psychology students at the University of Kentucky, aged 18–22. The final 39 items are divided into four dimensions :

Dimension	Items
Observation	1, 5, 9, 13, 17, 21, 25, 29, 30, 33, 37, 39
Description	2, 6, 10, 14, 18, 22, 26, 34
Acting with Awareness	3, 7, 11, 15, 19, 23, 27, 31, 35, 38
Nonjudgmental Acceptance	4, 8, 12, 16, 20, 24, 28, 32, 36

Scoring**Method**

:

Responses are scored on a **5-point Likert scale**:

- 1 = Very Rarely
- 2 = Rarely

- 3 = Sometimes
- 4 = Often
- 5 = Very Often

Reverse scoring applies to negative items :
3, 4, 8, 11, 12, 14, 16, 18, 20, 22, 24, 26, 27, 31, 32, 35, 36

Reliability and Validity of the Mindfulness Scale:

A. Reliability – Internal Consistency (Cronbach’s Alpha):

Calculated using Cronbach’s Alpha, the reliability coefficient was **0.88**, indicating excellent reliability and strong internal consistency, with inter-item correlations exceeding 0.50.

B. Validity – Internal Consistency:

Validity was assessed by calculating the correlation between each item and its subscale, and between each subscale and the total score.

Table 13 – Correlation Matrix : Mindfulness Subscales and Total Score

Subscale	Total Score
Observation	0.861**
Acting with Awareness	0.887**
Description	0.818**
Nonjudgmental Acceptance	0.889**

(**) Correlation is statistically significant at $\alpha = 0.01$

The correlations show strong and significant relationships between subscales and the overall mindfulness score, confirming the scale’s validity.

Through the above table and by looking at the Pearson correlation coefficient values, we notice that all of them are statistically significant at the significance level α ($\alpha = 0.01$). The Pearson correlation coefficient between the total score of the first axis (Observation) and the total score of the entire scale was (0.86). Regarding the correlation between the total score of the second axis (Description) and the total score of the entire scale, it was (0.81). For the correlation between the total score of the third axis (Conscious Behavior) and the total scale score, it was (0.88). For the correlation between the total score of the fourth axis (Acceptance without Judgment) and the total scale score, it was (0.88). Generally, it can be said that this scale is valid because all its axes are consistent with each other and with the entire scale.

6.2 Statistical methods used in the study:

- Arithmetic Mean
- Pearson Correlation Coefficient
- Spearman Correlation Coefficient
- Cronbach's Alpha
- Chi-Square Test
- Kolmogorov-Smirnov Test
- Shapiro-Wilk Test

Presentation, Interpretation, and Discussion of Study Results

First : Checking the Normality Condition

Before starting to test the hypotheses using various appropriate statistical methods, it was necessary first to check the normality condition of the distribution for the variable under current study. The following table clarifies this:

Table 14 : Testing the Normality Condition for the Study Variables

Variable	Kolmogorov-Smirnov	df	Sig.	Shapiro-Wilk	df	Sig.	Decision
Critical Thinking	0.133	112	0.000	0.952	112	0.001	Significant
Mindfulness	0.118	112	0.001	0.949	112	0.000	Significant

Based on the data in the above table and according to the values of the Kolmogorov-Smirnov and Shapiro-Wilk tests for the scores of the sample individuals on both variables (Critical Thinking and Mindfulness), these were statistically significant at the alpha level (0.05). Therefore, it can be said that both variables do not follow a normal distribution, meaning all statistical methods used in the analysis will be non-parametric.

Presentation and Interpretation of Results Based on the First Hypothesis:

The first hypothesis stated: "There is a statistically significant correlation between critical thinking and mindfulness among second-year secondary school students, Natural Sciences branch."

To test this hypothesis, the Spearman correlation coefficient was used after confirming linearity. The statistical processing led to the following result:

Table 15 : Correlation between Critical Thinking and Mindfulness

Table 15: Correlation between Critical Thinking and Mindfulness

Variable	Spearman's rho	Decision	
Critical Thinking	Correlation	0.862**	Statistically significant at $\alpha = 0.01$
	Significance	0.000	
	Sample size	112	

From the above table, the Spearman correlation coefficient between the critical thinking scores and mindfulness scores of the sample individuals was 0.86, which is a strong positive value. This means the relationship between the critical thinking and mindfulness scores is direct : as one increases, so does the other. This correlation was statistically significant at $\alpha = 0.01$, so the null hypothesis (denying the existence of the relationship) was rejected. Thus, the result supports the first hypothesis asserting a statistically significant correlation between critical thinking and mindfulness among second-year secondary school students in Natural Sciences, with 99% confidence and a 1% probability of error.

The current study's results align with previous studies showing a strong correlation between critical thinking and mindfulness, such as Sherif Abdulrahman Al-Saud (2023), which found a strong relationship between the two. It also agrees with studies by Ding, L. (2024), Su, M. R., & Shum, K. K. (2019), and Škobalj, E. (2018), which indicated a strong relationship, whether directly or indirectly, where mindfulness enhances critical thinking skills.

The researchers interpret this result according to the study's theoretical framework, stating that the relationship between critical thinking and mindfulness is integrative. Critical thinking can be considered an essential part of mindfulness, as mindfulness enhances the ability to focus more deeply on thoughts and feelings, enabling more effective application of critical thinking. When mindful, one can objectively analyze situations and decisions without being influenced by stress or biases.

The relationship between critical thinking and mindfulness is multifaceted; mindfulness acts as an important mediator that enhances critical thinking skills. Research shows mindfulness not only fosters a favorable environment for critical thinking but also affects the various cognitive processes essential for effective reasoning and analysis. In educational contexts, mindfulness contributes to student well-being, supporting their critical thinking abilities (Ding, L. 2024). Mindfulness serves as a foundation for critical thinking by enhancing deep observation, self-reflection, and understanding of phenomena. Both practices intertwine, strengthening conscious awareness and logical thinking, which are essential for developing critical thinking capacities and skills (Škobalj, E. 2018).

In conclusion, critical thinking and mindfulness have a shared and integrated relationship.

Presentation, Interpretation, and Discussion of the Second Hypothesis:

The second hypothesis stated:

"The level of critical thinking among second-year secondary school students in Natural Sciences is high."

To answer this, the Chi-square goodness-of-fit test was used. The result is shown below:

Table 16 : Chi-Square Test for Levels of Critical Thinking among Sample Individuals

Level	Observed Frequency	%	Expected Frequency	Difference	Chi-Square	d f	Sig.	Decision
Low	1	1%	37.3	-36.3	189.661	2	0.000	Sig 0.01
Medium	106	95%	37.3	68.7				
High	5	4%	37.3	-32.3				
Total	112	100%	//	//				

From the above table, among the 112 individuals in the sample, their levels varied : 106 individuals (95%) scored at the medium level, 5 individuals (4%) at a high level, and only 1 individual (1%) at a low level. The Chi-square test value was 189.66 with 2 degrees of freedom, which is statistically significant at $\alpha = 0.01$, indicating significant differences between the three levels, favoring the medium level.

Therefore, it can be concluded that the critical thinking level is medium according to the sample responses. This result contradicts the second hypothesis that assumed the critical thinking level would be high. The confidence in this result is 99% with a 1% chance of error.

This finding aligns with Hawwa Fattoum (2021), who explained that the study was conducted at Djelfa University where teaching methods rely heavily on lectures and rote learning, leaving students passive without opportunities for analysis or inference. This reflects the absence of a formal system to develop critical thinking skills, unlike advanced countries.

It also agrees with Farouk (2016), who attributed the finding to teachers using competency-based approaches focusing on learner thinking rather than rote memorization, unlike traditional systems that emphasize memorization and retrieval without considering individual differences or emotional and behavioral aspects.

However, the results differ from those of Mohamed Khmad (2021) and Naima Jari (2021), which reported low critical thinking levels, blaming school curricula for not encouraging critical thinking and teachers' lack of training to develop these skills in students. Factors such as distraction, lack of focus, reliance on memorization, and experience deficiency were cited.

The researchers attribute the medium levels of critical thinking among secondary students to various factors, including educational practices, curricula, teaching methods, and assessment strategies that collectively shape students' critical thinking abilities, resulting in a moderate level of competence.

Traditional curricula, tests, and assessments do not encourage creativity or critical thinking, focusing instead on memorization and retrieval. To build an advanced society, emphasis must be placed on cultivating creative thinking among youth, revising curricula, adopting modern teaching methods, and new evaluation approaches aligned with cognitive development and critical thinking.

Parental educational background also affects students' critical thinking abilities, acting as a motivator to unlock their potential.

Presentation, Interpretation, and Discussion of the Third Hypothesis :

The third hypothesis stated:

"The level of mindfulness among second-year secondary school students in Natural Sciences is high."

To test this, the Chi-square goodness-of-fit test was again used, with results shown below:

Table 17 : Chi-Square Test for Levels of Mindfulness among Sample Individuals

Level	Observed Frequency	%	Expected Frequency	Difference	Chi-Square	d f	Sig.	Decision
Low	37	33%	37.3	-0.3	75.33920.000Sig 0.01			
Medium	75	67%	37.3	37.7				
High	0	0%	37.3	-37.3				
Total	112	100%	//	//				

From the above, among 112 individuals, 75 (67%) were at a medium level of mindfulness, 37 (33%) at a low level, and none at a high level. The Chi-square value was 75.33 with 2 degrees of freedom, statistically significant at $\alpha = 0.01$, indicating significant differences between levels, favoring the medium level.

Thus, it can be said that the mindfulness level is medium among the sample, contradicting the third hypothesis expecting a high level. Confidence in this result is 99% with a 1% chance of error.

The current results agree with Ibrahim Saad (2022) and Zainab Zaid Al-Khair (2022), who explained the findings by the nature of old curricula and teaching methods, where students are mere recipients of information without deep engagement, compounded by school disruptions, COVID-19 impacts, digital platform disturbances, and dormitory instability.

However, these results differ from Bouksara and Foutia (2022), who found high mindfulness levels attributed to students' focus, attention to their life moment-to-moment, and ability to understand and deal with events and situations.

Similarly, the findings differ from Amiar and Barakat (2022), who explained high mindfulness in terms of Langer's theory, where high school students do not follow automatic thinking patterns ; their responses and behaviors to situations are non-automatic, indicating awareness and understanding of their surroundings.

Often, secondary students achieve medium scores in mindfulness due to various factors: lack of sleep affecting cognitive functions such as attention and concentration, mental fatigue from academic pressure, overuse of social media, extracurricular activities, and chronic stress associated with high academic expectations, all contributing to reduced mindfulness.

The cognitive load of complex subjects confuses students, leading to moderate mindfulness levels. Some students struggle to maintain attention, which lowers mindfulness levels. Addressing hyperactivity, attention deficits, and sleep deprivation is necessary to improve mindfulness

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