

A Comparative Study of Creative Thinking levels Among University Students

Saada Salim¹ ; Chetioui Abdelmalek²

^{1,2}Laboratory of Research and Studies in the Science and Techniques of Physical and Sports
Activities, University of Biskra,

¹salim.saada@univ-biskra.dz ; ² a.chetioui@univ-biskra.dz

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Abstract

This study aims to examine the differences in the level of creative thinking among students of the Institute of Sciences and Techniques of Physical Activities and Sports based on their academic level, and to compare the level of creative thinking between the students of the institute and those of other faculties. The researchers used a descriptive approach, with a sample size of 1639 students selected through stratified random sampling. The Torrance Test of Creative Thinking was adopted to measure creative thinking skills. The results showed that there were no statistically significant differences in the level of creative thinking among students based on their academic level, nor were there statistically significant differences in the level of creative thinking between students of the institute and those of other faculties

Corresponding author:

Saada Salim

e-mail:

salim.saada@univ-biskra.dz

1. Introduction

Thinking is considered one of the cognitive processes that has received widespread attention from researchers and educators, making it one of the most studied topics in cognitive psychology. As a result, philosophical, intellectual, and educational schools have focused on developing thinking to enable individuals to overcome problems and challenges in various life aspects (Atallah, Abbas, 2017). It is a comprehensive process through which individuals process the information and data they receive. Among the skills used, creative thinking has been a focal point for educational decision-makers as they look towards educational reform. It is rare to find a modern educational curriculum that does not address it. Creative thinking involves breaking away from conventional thinking and using familiar data in an innovative way. (Abdi, 2024)

Creativity is an effective tool that creative individuals use to bring their ideas to life both theoretically and practically. This highlights the value of creative thinking as it serves as a reliable channel for discoveries and a clear path to success and excellence. It is a means to achieve our goals efficiently and quickly. Therefore, we strongly need creative thinking in our universities to nurture talents, raise performance levels, and improve quality of life. (Seghir, 2012, p. 185)

Researchers in the field of creative thinking have proposed various definitions, reflecting the theoretical perspectives each researcher relies on when dealing with this complex psychological phenomenon (Bourzama, 2012). Some believe that creative thinking is a cognitive process that involves a series of distinct stages and subsequent operations until an individual produces something new. Others see creative thinking as a reflection of personal traits—traits that are not present in others. (Bar, Fedel, 2021, p. 85)

Furthermore, researchers in the field of creativity have classified creative thinking skills in various ways. Considering the different definitions, Guilford categorized creative thinking skills into three groups based on their appearance: the first category is cognitive ability, the second is productive ability, and the third is evaluative ability. Thus, creative thinking is considered a necessary educational goal and a requirement sought by educators who aim to develop it in learners in the era of increasing scientific and technological advancement (Chouia, and others, 2009). People with creative thinking skills can think independently and make decisions based on personal analysis and evaluation of the available information.

The study conducted by Fakher et al. (2022) aimed to examine the levels of critical and creative thinking and the relationship between them among university students in the West Bank, along with their relationship to certain variables (gender, type of college, GPA, and academic year). For this purpose, the researchers adopted a correlational descriptive method with a sample of 414 students. The California Critical Thinking Skills Test and the Cognitive Processes Scale of Creativity were used. The results indicated that the level of critical thinking was low, while the level of creative thinking was moderate. Additionally, there were statistically significant differences in the level of creative thinking based on the academic discipline, with humanities disciplines showing better scores. There were also statistically significant differences in critical thinking based on GPA and academic level, favoring students with higher GPAs and those in advanced years. Furthermore, male students outperformed female students in critical thinking.

A study conducted by Boulssan and Kettifi (2021) to examine whether there are statistically significant differences in creative thinking skills among university students, specifically in the areas of intellectual fluency, spontaneous flexibility, and creative originality, in two different educational systems: the traditional system and the LMD system. For this purpose, the researchers used a comparative descriptive method with a purposive sample of Master's students in Urban Planning. The creative thinking test was employed. The results revealed no statistically significant differences in creative thinking skills between Master's students in the traditional system and their counterparts in the LMD system.

In Attawa and Quidri (2020) study, which aimed to assess the level of creative thinking and its three components (originality, flexibility, and fluency) among students at the Institute of Fine Arts in the town of Kifri, and its relationship to certain variables (gender, academic year). For this purpose, the researchers employed a descriptive method with a sample of 50 students. The Torrance Test of Creative Thinking (1979) was used. The results revealed that the level of creative thinking among the sample was low. Additionally, no statistically significant differences were found based on gender and academic level.

It is important to note that developing creative thinking is not an easy task in educational institutions. Despite the importance of developing students'

skills and inspiring them to deeply analyze and evaluate ideas and information, it is essential to provide an educational environment that encourages creativity and creative thinking, in addition to employing innovative teaching methods that foster creativity. All these factors together led us to conduct this study to highlight the level of creative thinking skills among students at Mohammed Khider University of Biskra. Based on this, we posed the following questions :

1. Are there differences in the level of creative thinking among students at the Institute of Sciences and Techniques of Physical Activities and Sports according to their academic level?
2. Are there differences in the level of creative thinking between students of the institute and those of other faculties?

2. Method and Materials

2.1. Participants

The purpose of selecting the sample is to obtain information from the original research population. A sample is, therefore, a model that includes a part or portion of the original population, representing it with common characteristics. This model allows the researcher to avoid studying all units of the population, especially when it is difficult or impossible to study all those units. (Al-Dulaimi & Saleh, 2014, p. 74)

The sample was selected using stratified sampling according to Robert Mason's formula, with a total of 1,639 students from the first, second, and third-year undergraduate students at the Institute of Sciences and Techniques of Physical Activities and Sports, as well as third-year students from Biskra University across all faculties for the academic year 2023-2024, which include:

- Institute of Sciences and Techniques of Physical Activities and Sports
- Faculty of Exact Sciences and Natural Life Sciences
- Faculty of Economic, Commercial, and Management Sciences
- Faculty of Science and Technology
- Faculty of Law and Political Science
- Faculty of Humanities and Social Sciences
- Faculty of Literature and Languages

Table 1: Shows the study sample according to academic level.

Academic Level	Study Sample
First Year	93
Second Year	36
Third Year	50
Total	179

Table 2: Shows the study sample according to academic specialization

Academic Specialization	Study Sample
Institute of Sciences and Techniques of Physical Activities and Sports	50
Faculty of Exact Sciences and Natural Life Sciences	267
Faculty of Economic, Commercial, and Management Sciences	260
Faculty of Science and Technology	242
Faculty of Law and Political Science	275
Faculty of Humanities and Social Sciences	282
Faculty of Literature and Languages	263
Total	1639

Source: Prepared by the researchers based on SPSS outputs.

2.2. Materials

In this study, we used the Torrance Test of Creative Thinking (Verbal Form A) to measure the level of creative thinking skills among students. The test consists of seven activities that assess three creative thinking skills:

- **Fluency:** Represented by the number of possible answers to a given situation within a fixed time.
- **Flexibility:** Represented by the number of different answers to a given situation within a fixed time.
- **Originality:** Represented by the number of new and unique answers to a given situation within a fixed time. (Ghadban, 2011, p. 116)

These skills form the core elements of creative thinking. Each of these seven activities requires seven minutes to answer, in addition to the time needed for instructions and guidelines. The seven activities included in the Torrance Test of Creative Thinking Verbal Form A are as follows:

- **Activity 1: Asking Questions** – The test-taker asks questions about a particular incident.
- **Activity 2: Guessing Causes** – The test-taker guesses the possible causes that led to the incident.
- **Activity 3: Guessing Results** – The test-taker predicts the potential outcomes of the incident.

- **Activity 4: Improving Production** – The test-taker offers suggestions for improving or developing something.
- **Activity 5: Uncommon Uses** – The test-taker lists alternative, uncommon uses for something.
- **Activity 6: Uncommon Questions** – The test-taker generates uncommon questions related to something.
- **Activity 7: Assume That** – The test-taker makes multiple predictions based on a hypothetical and non-real situation.

Torrance recommended removing the sixth sub-test, as ongoing research indicated that it does not contribute to the predictive validity of the total score of the test. (Ghadban, 2011, pp. 110-111)

2.2.1. Test Scoring Procedures:

To score the Torrance Test of Creative Thinking Verbal Form A, the researchers performed the following:

- Scoring the forms and calculating the scores for each activity of the Torrance Test of Creative Thinking Verbal Form A on the corresponding scoring sheet.
- The test-taker receives the total score of the Torrance Verbal Form A based on the total scores achieved in the fluency, flexibility, and originality dimensions. The responses for the activities in Verbal Form A are scored for each creative thinking skill as follows:
- **Fluency:** This is measured by the ability to provide the greatest number of appropriate answers within a given time. A score is assigned for each correct response from the largest possible number of appropriate responses within the designated time. Random responses that lack logical or scientific reasoning are excluded, and only those fitting the requirements of the real-world environment are considered valid.
- **Flexibility:** This is measured by the ability to diversify appropriate answers. A score is given for each group of responses based on the number of different areas they cover. If the responses are varied and belong to diverse fields, a higher score is awarded.
- **Originality:** This is measured by the ability to provide uncommon answers within the group the individual belongs to. The highest scores are given for the rarest responses and the least repeated ones. After converting all responses to percentages, they are compared according to Torrance's estimates for originality.

2.2.2. Psychometric Properties of the Study Tool:

Validity: The internal consistency validity of the study tool was confirmed by applying the test and calculating Pearson's correlation coefficients between the score of each dimension and the total score of the test. The results are as follows:

Table 3: Shows the internal consistency validity of the Creative Thinking Test.

Dimension	Pearson Correlation Coefficient	Significance Level	Significance
Fluency	0.877	0.000	Significant
Flexibility	0.831	0.000	Significant
Originality	0.588	0.001	Significant
Total	1		

Source: Prepared by the researchers based on SPSS outputs.

It is clear from the table above that all the correlation coefficients between the dimensions and the total score of the scale are statistically significant at the 0.01 level. The correlation coefficients ranged between 0.588 and 0.877, which confirms the validity of the internal consistency of the dimensions and the total score of the Creative Thinking Scale.

Reliability: The test-retest method was used, where the researchers applied the test twice with a two-week interval to a sample of 30 students. The correlation coefficients between the students' performances in the two applications were calculated. The reliability coefficients using the test-retest method are shown in the following table:

Table 4: Shows the reliability of the Creative Thinking Test using the test-retest method.

Variable	Number of Items	Reliability Coefficient
Creative Thinking	18	0.746

Source: Prepared by the researchers based on SPSS outputs.

From Table 4, it is evident that the reliability coefficient of the scale is 0.746, which represents a good level, indicating that the Creative Thinking Scale has a good degree of consistency. However, there may be room for improvement to further increase its reliability.

2.3. Design and Procedure

2.3.1. Study Method:

The method is defined as the art of organizing a series of ideas correctly, either to uncover an unknown truth or to prove a truth that others do not know. (Boudoud, 2010, p. 12)

Given the subject of our current study, which focuses on the level of creative thinking among students at Mohammed Khider University of Biskra, we adopted the descriptive method. This is considered a precise scientific study used to describe phenomena as they are in reality. It involves forms of analysis and scientific interpretation to achieve objective results.

2.3.2. Limitations of the Study:

The limitations of our study are confined to the following areas:

- **Human Limits:** The study was conducted on a sample of students from Mohammed Khider University of Biskra.
- **Geographical Limits:** The study was conducted at Mohammed Khider University of Biskra, covering all its faculties and institutes.
- **Temporal Limits:** The study was conducted during the second semester of the academic year 2023/2024.

2.4. Statistical Analysis

The Statistical Package for the Social Sciences (SPSS, 27) was used to analyze the data statistically. The data were analyzed using the following statistical methods:

1. Pearson's correlation coefficients and Spearman-Brown for calculating the reliability of the Creative Thinking Test.
2. Mean scores and standard deviations.
3. Kolmogorov-Smirnov and Shapiro-Wilk tests.
4. Kruskal-Wallis test.
5. Mann-Whitney test.

3. Results

Verification of Normal Distribution:

This step is carried out to understand the nature of the data distribution in order to determine the appropriate statistical method for hypothesis testing.

Table 5: Shows the nature of data distribution.

Creative Thinking Test	Kolmogorov-Smirnov Test			Shapiro-Wilk Test		
	Test Value	Degrees of Freedom	Significance Value	Test Value	Degrees of Freedom	Significance Value
	0.112	1818	0.001	0.969	1818	0.000

Source: Prepared by the researchers based on SPSS outputs.

Since the study sample size is larger than 50, we will rely on the Kolmogorov-Smirnov test value. The statistical significance level is less than 0.05, which indicates that the study data do not follow a normal distribution. Therefore, for hypothesis testing on the differences between students at the Institute of Sciences and Techniques of Physical Activities and Sports and students from other disciplines, we will use the non-parametric Mann-Whitney U test for two independent samples and the non-parametric Kruskal-Wallis test when testing for differences based on academic level.

Presentation of Results for the First Hypothesis:

The first hypothesis states: "There are no statistically significant differences in the level of creative thinking among students of the Institute of Sciences and Techniques of Physical Activities and Sports based on their academic level."

Table 6: Shows the differences in the level of creative thinking among students of the Institute of Sciences and Techniques of Physical Activities and Sports based on academic level.

Academic Level	Number of Individuals	Mean Ranks	Test Value	Sig
First Year	93	83.46	4.084	0.130
Second Year	36	90.81		
Third Year	50	101.59		

Source: Prepared by the researchers based on SPSS outputs.

The results in Table 6 indicate that there are no statistically significant differences in the level of creative thinking among students of the Institute of Sciences and Techniques of Physical Activities and Sports based on

academic level. The test results show that the significance value (Sig) was 0.130, which is greater than 0.05. This means that there are no statistically significant differences between first-year, second-year, and third-year students at the Institute in terms of their creative thinking levels.

Looking at the mean ranks, we observe that the mean rank for third-year students was 101.59, followed by second-year students with a mean rank of 90.81, and finally first-year students with a mean rank of 83.46. Despite these differences in the ranks of individuals within the groups, the test value ($H = 4.084$) was not statistically significant (since $Sig = 0.130$), which means that the differences between the groups are not meaningful and do not indicate a true difference in creative thinking levels based on academic level.

Presentation of Results for the Second Hypothesis:

The second hypothesis states: "There are no statistically significant differences in the level of creative thinking between students of the Institute of Sciences and Techniques of Physical Activities and Sports and students from other disciplines."

Table 7: Shows the differences in the level of creative thinking between students of the Institute of Sciences and Techniques of Physical Activities and Sports and students from other faculties.

Academic Discipline	Number of Individuals	Mean Ranks	Test Value	Sig
Institute of Sciences and Techniques of Physical Activities and Sports	50	824.83	0.333	0.999
Faculty of Exact Sciences and Natural Life Sciences	267	829.42		
Faculty of Economic, Commercial, and Management Sciences	260	812.89		
Faculty of Science and Technology	242	826.94		
Faculty of Law and Political Science	275	813.59		
Faculty of Humanities and Social Sciences	282	822.76		
Faculty of Literature and Languages	263	813.90		

Source: Prepared by the researchers based on SPSS outputs.

The results in Table 7 indicate that there are no statistically significant differences in the level of creative thinking between students of the Institute of Sciences and Techniques of Physical Activities and Sports and students from other faculties. The test results show that the significance value (Sig) was 0.999, which is very high and indicates that the variations between the

mean ranks for different disciplines are merely random differences and not significant.

Looking at the mean ranks, we see that the Faculty of Exact Sciences and Natural Life Sciences recorded the highest mean (829.42), followed by the Faculty of Science and Technology (826.94). The lowest mean was recorded in the Faculty of Economic, Commercial, and Management Sciences (812.89). However, this slight variation in the mean ranks does not reflect a true difference, which is supported by the non-significant test value.

4. Discussion

The results related to the first hypothesis showed that there were no significant differences in the level of creative thinking among students at the Institute of Sciences and Techniques of Physical Activities and Sports based on their academic level. When examining the mean ranks, we observe that the mean rank for third-year undergraduate students was 101.59, followed by second-year students with a mean rank of 90.81, and finally first-year students with a mean rank of 83.46. Despite these differences in the ranks within the groups, the test value ($H = 4.084$) was not statistically significant (since $Sig = 0.130$), which means that the differences between the groups are not meaningful and do not indicate a true difference in the level of creative thinking based on academic level.

A possible explanation for this result could be related to several factors. First, creative thinking may be a trait that is largely independent of traditional academic level, relying more on personal qualities of the students, such as the ability to think outside the box, exposure to situations that stimulate creativity, and personal learning styles. Second, the educational environment at the Institute of Sciences and Techniques of Physical Activities and Sports may not focus as heavily on developing creative thinking skills compared to other disciplines, which may place more emphasis on theoretical and applied methods. The difference between academic years at the Institute may not be directly related to creative thinking skills, as students at all academic levels may be exposed to the same activities and educational approaches, which do not clearly differentiate them in this aspect.

This study's findings align with studies that found no differences in the level of creative thinking based on academic level, while differing from studies that found differences in creative thinking according to academic level. These results are consistent with those of several related studies, such

as Boulssan and Kettifi (2021) and Attawa and Quidri (2020), which concluded that there are no differences in the level of creative thinking based on academic level. However, these results diverge from the study by Qais (2022) and Fakher et al. (2022), which concluded that there are differences in the level of creative thinking based on academic level.

Regarding the results related to the second hypothesis, the findings showed that there were no significant differences in the level of creative thinking between students at the Institute of Sciences and Techniques of Physical Activities and Sports and students from other disciplines. Looking at the mean ranks, it appears that the Faculty of Exact Sciences and Natural Life Sciences recorded the highest mean (829.42), followed by the Faculty of Science and Technology (826.94), while the lowest mean was observed in the Faculty of Economic, Commercial, and Management Sciences (812.89). However, this slight variation in the means does not reflect a true difference, which is supported by the non-significant test value.

A possible explanation for this result is that this type of thinking is not influenced by the academic curriculum or the educational environment provided by each discipline. Creative thinking, by nature, is influenced by deeper factors more closely related to the personal traits of individuals, such as cognitive flexibility, curiosity, openness to new ideas, and the ability to solve problems in unconventional ways. These traits are not necessarily a direct result of academic education but are affected by other factors such as family environment, life experiences, and social interactions outside the scope of studies.

On the other hand, the absence of differences may reflect the impact of the prevalent teaching approach in universities, which may be similar across most disciplines. If academic programs focus on theoretical and traditional aspects without allowing enough room for the development of creativity skills, students, regardless of their disciplines, may exhibit similar levels of creative thinking. Often, university curricula rely on traditional teaching methods such as memorization and recall, which limit students' ability to think in innovative ways. As a result, these curricula do not provide an educational environment conducive to creativity development, leading to similar levels of creative thinking across different disciplines. These findings differ from those indicated by several related studies, such as Saadallah and Charef (2024) and Fakher et al. (2022), which concluded that there are differences in the level of creative thinking among students based on their academic disciplines.

5. Conclusion

Based on the study's objectives, which aimed to explore the differences in creative thinking levels among students of the Institute of Sciences and Techniques of Physical Activities and Sports according to their academic level and to determine whether there are differences in creative thinking between students of the Institute and those from other disciplines, the current study found no significant differences in creative thinking levels among the students of the Institute based on academic level.

Additionally, the study found no significant differences in the level of creative thinking between students of the Institute and those from other disciplines. In light of these results, the researchers offer the following recommendations:

1. The need to train students within programs based on scientific methodologies to enhance creative thinking and its associated skills.
2. The need for faculty members to use diverse teaching methods, assessment techniques, and educational tools that encourage and stimulate creative thinking among students.
3. The need to establish clear mechanisms to motivate and encourage creative students.
4. Conducting comparative studies to assess the level of creative thinking in other educational environments.

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