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Mental Alertness among Students of the Chemistry Department at the College of Education for Pure Sciences - Ibn Al-Haytham

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Abstract

The current research aims to identify the level of mental alertness among students of the Department of Chemistry in the Faculty of Education for Pure Sciences – Ibn Al-Haytham during the academic year (2022-2023). To achieve this goal, a descriptive approach was followed. The research community was identified as all chemistry students across the four grades (first, second, third, and fourth). A sample from each grade was selected for the current research. A tool was prepared to measure mental alertness within the research sample. The researcher adopted the scale by Baer, Smith, Kristemoyer, & Tany (2006), which was developed by Al-Buhairi et al. (2014), ensuring its validity, reliability, and psychometric characteristics, making it ready for application. When the tool was applied in the second semester of the mentioned year, data were statistically analyzed using some statistical methods (SPSS23). It was generally found that students exhibited an average level of mental alertness and its dimensions, but observation showed that the level of mental alertness among students increased, which is a positive indicator. Additionally, fourth-grade students showed a higher level of mental alertness that increased with grade level. Based on these results, some conclusions were drawn, such as that mental alertness among the students of the Faculty of Pure Sciences, specifically in the Department of Chemistry, was at an average level. Recommendations were made, including measures to help students with low mental alertness improve. Proposals were also developed for incorporating mental alertness into teaching in the Department of Chemistry.

Keywords: - Mental alertness, students, chemistry department.

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Introduction

1-1: The Research Problem

The research problem focuses on examining mental alertness, an educational concept that significantly influences students by affecting their interactions with various learning situations during the educational stage. This, in turn, impacts their efficiency. This research aims to explore mental alertness among undergraduate students at the College of Education for Pure Sciences - Ibn Al-Haytham, recognizing the burdens and responsibilities they bear toward their community. University students are particularly susceptible to stress, depression, and anxiety due to the conflicts and crises they encounter. Concurrently, they are in a sensitive phase of establishing their identities, influenced by perceptions and feelings of those around them, especially concerning their personal characteristics and interests that emerge during their university years.

University students may also face numerous problems of varying degrees, potentially threatening their social and psychological development. Such issues can inhibit their ability to perform new roles, leading to feelings of unhappiness, dissatisfaction, and sadness.Research into mental alertness among university students is beneficial as it aids them in overcoming challenges and enhances other aspects of their personalities.

Thus, the research problem can be summarized by the following question: "What is the extent of mental alertness among students of the Department of Chemistry at the Faculty of Education for Pure Sciences - Ibn Al-Haytham?"

1-2: The Importance of Research

Numerous studies have shown that mental alertness is linked to many positive traits, such as psychological well-being, stability, self-regulation, coping with pressures, and resilience (Khairi, 2017; Bajaj & Pande, 2015). Therefore, studying mental alertness among university students can be beneficial, as it helps them overcome challenges and enhance various aspects of their personalities. Higher education plays a crucial role in shaping the mentality of nations, representing the pinnacle of educational achievement. It prepares trained, qualified human resources with excellent educational, cognitive, practical, professional, and cultural competencies. Universities not only fulfill a scientific role but also a social one through sustaining intergenerational communication, promoting real interactions with social values, and disseminating knowledge.

To ensure universities maintain their vital role in global change, it is essential to balance the quality of their inputs and outputs. Learners are seen as national assets and key to societal development, necessitating a focus on personality development and positive behavioral change. University students are pivotal in constructing the university's future as they are future leaders. Hence, universities emphasize the quality and cognitive preparation of learners, specializing them in fields crucial to societal needs. Ideally, students should be self-aware, enabling them to adapt, make sound decisions, and acquire new skills. This self-awareness is fostered when learners are mentally alert, allowing them to critically analyze situations, draw on prior experiences, prioritize essential matters, and discover new insights. Mental alertness facilitates cognitive meditation, keeping students engaged in the present moment both physically and mentally, as defined by Langer (1997).

Mindfulness, as described by Langer (2000), involves discerning new aspects within the familiar and is a goal for universities—to produce vigilant learners who are reality-oriented, environmentally aware, and responsive to new developments. Mental alertness supports consciousness, with research indicating that it can be cultivated through training to yield various beneficial outcomes (Brown & Ryan, 2003). In academic settings, mental alertness enhances student achievement by fostering focus, planning, and active engagement, eventually aiding effective thinking (Langer, 1989). It improves decision-making and coping strategies, boosting self-confidence and self-awareness, while enabling learners to challenge outdated beliefs and embrace environments rich with stimuli for productive learning (Perkins & Richhart, 2000).

1-3: The Objectives of the Research

The research aims to:

Measure mental alertness among students of the Department of Chemistry, Faculty of Education for Pure Sciences - Ibn Al-Haytham.

Assess mental alertness across different undergraduate grades.

1-4: Research Limits

Spatial Boundaries: Faculty of Education for Pure Sciences - Ibn Al-Haytham, Department of Chemistry.

Time Limits: The second semester of the academic year 2022-2023.

Cognitive Boundaries: Mental alertness.

1-5: Defined Terms

Mindfulness Defined By:

Marlette & Kristeller (1999): "Awareness of the total dimension of experiences present here with attention to immediate experience and acceptance without judgment, whether unpleasant or pleasant, accepting all personal experiences such as thoughts, feelings, and events in the present moment."

Langer (2002): "A flexible state of mind characterized by openness to the new, reflecting a process of active innovation."

Brown & Ryan (2003): "The state in which the individual is conscious and attentive to what is happening around them in the present time and possesses a conscious interest in the current reality."

Ahmed (2016): "Attention in a specific way towards a goal in the present moment, entailing open and receptive awareness of the present moment and heightened consciousness resulting from deliberate focus."

Mark & Danny (2011): "A trait encompassing both mind and body, enabling individuals to alter their thinking and manage painful experiences through activities like meditation and deep breathing, encouraging adaptation in challenging situations."

The researcher adopts Ahmed's definition (2016) as the theoretical definition for this study.

Procedural Definition: The degree of mental alertness is measured by the responses of students from the Department of Chemistry at the Faculty of Education for Pure Sciences - Ibn Al-Haytham using the scale prepared by the researcher.

Chapter Two

2-1: Theoretical Framework: Theories of Mental Awakening

2-1-1: Theories of Mental Awakening

1. **Langer Theory:** Langer views mental alertness as the ability to form new conclusions, receive new information, be open to different perspectives, manage context, and verify outcomes. Her theory suggests that abilities are often constrained by the unconscious acceptance of premature cognitive constructs. Studies by Langer and Beck (1979) demonstrated that it is possible to enhance both short-term and long-term memory by altering the informational context. Langer's work emphasizes that mental alertness extends beyond mere vigilance, involving a comprehensive approach to facing life (Issa, 2018).

2. **Self-Design Theory (Special and Differential Treatment):** This theory posits that mental alertness aids memory through self-driven actions satisfying psychological needs based on authenticity. Individuals who are mentally alert tend to have better memory retention compared to those engaged in distracting activities, as awareness amplifies responsiveness to symbols fulfilling basic needs. The theory is popular for promoting personality development in social contexts and focuses on self-determined behaviors, allowing individuals to act with heightened awareness independently (Abd & Bediwi, 2018).

2-1-2: Components of Mental Alertness

1. **Acceptance and Awareness:** Acceptance allows individuals to effectively handle various situations, promoting endurance in daily life challenges. Awareness involves recording stimuli, engaging physical senses, mental activities, and direct contact with reality.

2. **Resilience with Awareness and Attention:** This is essential for mental alertness, reflecting the ability to adapt mental states in response to changing circumstances, thus fostering creative responses (Al-Marri, 2019).

3. **Consciousness and Attention Continuity:** An inherent ability that stabilizes awareness, helping eliminate misconceptions and negative thoughts (Al-Sindi, 2010).

Additional components mentioned by Salahat and Zghoul (2017) include description, lack of judgment, conscious work, and non-reactivity.

2-1-3: Characteristics of Mentally Alert Individuals

Mentally alert individuals are characterized by:

1. **Openness:** Viewing experiences afresh and considering all possibilities.
2. **Non-Judgmental Attitude:** Observing the present without classification.
3. **Confidence:** Trusting in themselves, their peers, and their intuitions.
4. **Acceptance:** Understanding and reacting adaptively to the present.
5. **Empathy:** Interpreting emotions and behaviors of others currently.
6. **Kindness:** Being affectionately tolerant and loving (Mutlaq, 2019).

2-1-4: Elements of Mental Alertness

1. **Clear Awareness:** Engages with physical stimuli, sensory movement, and mental activities in direct engagement with the environment.
2. **Attention and Flexible Awareness:** Ability to modify mental states with changing attitudes, promoting innovative thinking.
3. **Consciousness Continuum for Stability and Attention:** Features unfamiliar to many, essential for robust cognitive function (Al-Tutu, 2018).

2-1-5: Dimensions of Mental Alertness

According to Langer (1989), mental alertness consists of:

1. **Mindful Discrimination:** Innovating thoughts and producing new continuous creative ideas.
2. **Openness to the New:** Awareness and interaction with new stimuli while assessing the consequences safely (Al-Ma'mouri, Salam, 2018).
3. **Awareness of Different Points of View:** Evaluating situations from multiple perspectives for comprehensive understanding (Al-Shalawi, 2018).

Germer (2005) adds three dimensions: awareness, current experience, and acceptance. Pierre et al. (2006) further describe four dimensions: engagement with internal experiences, conscious awareness, descriptive capability, and non-judgment during evaluation (Norrie, 2007).

5-1-2: Advantages of Mental Alertness

Mental alertness advantages include:

1. **Environmental Sensitivity:** Heightened awareness of surroundings.
2. **Openness to Information:** Increased receptiveness to new data.
3. **Creation of New Categories:** Flexible thinking patterns.
4. **Enhanced Problem-Solving:** Increased capacity for addressing challenges (Aziz et al., 2017).

2-1-6: Benefits of Mental Alertness

1. **External Engagement:** Proactivity in dealing with the external world.
2. **Enhanced Learning:** Improved acquisition of experiences and skills.

3. **Perspective Awareness:** Cultivation of diverse opinions aiding problem resolution (Al-Zamili, 2018).

4. **Purpose Discovery:** Heightened sense of life's meaning.

5. **Stress Reduction:** Lower anxiety and enhanced memory and attention (Al-Hashem, 2017).

6. **Information Openness:** Increased openness to new insights (Younis, 2017).

2-2: Previous Studies Dealing with Mental Alertness

studies	Spring Study (2018)	Salahat and Zaghloul Study (2018)	Al-Ma 'mouri and Abdul (2018)	Nagwani Study (2019)	Shaheen and Ryan (2020)	THE PRESENT RESEARCH
Place of carrying out the study:	at the university	at the university	at the university	at the university	at the university	at the university
The study population	University students	University students	University students	University students	University students	University students
The Study Sample	420	720	600	600	251	610
Validity of the study tool:	Mental Alertness	The Five Faces of Mindfulness Test	Mental alertness test prepared by (Langer, 1992)	Kentucky Mental Alertness Test	Mental Alertness	The Five Faces of Mindfulness Test
Study Findings	There is an average level of mental alertness attributed to the variable of the academic level between the second and fourth year students in favor of the second year students, while no statistically significant differences in the level of mental alertness were	It showed that the level of mental alertness among university students was average on the tool as a whole and in the dimensions except after monitoring was high	University students have a high level of mental alertness and there is no statistically significant difference in mental alertness according to gender and specialization	It showed that the level of mental alertness is average among post-basic university students, as well as the absence of a statistically significant difference for gender, grade, age, and level of achievement	The level of mental alertness was high, as well as the lack of a statistically significant difference in mental alertness and academic specialization	It was found that the average level of mental alertness and its dimensions and after observation is high and the reason for this result is due to the impact of cultural and social variables of the study sample

	revealed due to the variables of academic specialization and academic achievement					

2-2-1: Aspects of Benefiting from Previous Studies:

The researcher reports the following aspects learned from previous studies:

1. Defining the terms used in the research and formulating the procedural definitions.
2. Aiding in preparing the theoretical framework.
3. Choosing the appropriate methodology for the research.
4. Selecting suitable statistical methods to analyze research data.
5. Utilizing sources for later reference.
6. Preparing the mental alertness test.

Chapter Three

Research Methodology

The descriptive approach was used to achieve the two goals of the current research.

3-1: Research Population

The research population consisted of students from the College of Education for Pure Sciences – Ibn Al-Haytham – Department of Chemistry during the second semester of the 2022-2023 academic year, totaling 610 students. Table 1 shows the distribution of the Chemistry Department students across the four university grades.

Table 1Distribution of the Research Population Across University Grades

Class.	Students Number	Percentage %
The first	140	9 -- 22
Second	160	2/ 26
third	125	20%
Fourth	185	3.30
Total	610	99.4%

3-2: The Research Sample

A sample consisting of 20% of the students from the Department of Chemistry at the Faculty of Education for Pure Sciences – Ibn Al-Haytham (the research population) was randomly selected for the research. According to Ahmed and Al-Malkawi (1992), the minimum sample size for descriptive studies should be 20% of a relatively small population consisting of a few hundred individuals (Ahmed and Al-Malkawi, 1992: pp. 167-168). Consequently, the research sample comprised 120 male and female students from the Department of Chemistry. One group was selected from each division of one grade of the department, and 30 male and female students were identified from each grade for inclusion. These students were

randomly selected to serve as participants in the current research. Table 2 illustrates the mechanism for selecting the research sample from the population.

Table (2)Distribution of students of the research sample to their classrooms

Class.	Students Number	% serviced 90%
The first	30	25%
Second	30	25%
third	30	25%
Fourth	30	25%
Total	120	100 %

3-3: Research Tool - Steps to Prepare the Five-Factor Test for Mental Alertness:

3-3-1: Determining the Goal of the Test: The test aims to measure the level of a specific trait using the five-factor test for mental alertness among students of the Department of Chemistry at the College of Education for Pure Sciences – Ibn Al-Haytham.

3-3-2: Reviewing Previous Studies: The researcher reviewed previous studies addressing mental alertness at the university level, which assisted in adopting test items aligned with the target age and university stage.

3-3-3: Test Development: After reviewing prior studies on mental alertness tests and consulting experts in teaching methods and psychology, the researcher adopted the five-factor mental alertness test prepared by Baer, Smith, Hopkins, Kristemoyer, & Tany (2006), and Arabized by Al-Buhairi et al. (2014). The test developers compiled phrases from five mental alertness tests conducted between 2001 and 2005. The initial version consisted of 102 items; exploratory and confirmatory factor analysis reduced this to 39 items categorized into five mental alertness factors:

1. **Observation:** Eight (8) items measuring observation, attention, and experiences.
2. **Description:** Eight (8) items measuring the description and expression of internal experiences.
3. **Acting Consciously:** Eight (8) items measuring awareness of actions at a given time.
4. **Non-judgment of Internal Experience:** Eight (8) items measuring impartiality towards thoughts and feelings.
5. **Lack of Interaction with Internal Experiences:** Seven (7) items measuring the capacity to allow thoughts and feelings to come and go without distraction.

3-3-4: Test Directions:

- Answer Instructions: The researcher provided instructions on the nature of the test and answer guidelines, emphasizing the importance of reading items carefully to provide appropriate responses.
- Test Scoring and Correction: Responses to test items were assigned one of five ratings (fully applicable, highly applicable, moderately applicable, slightly applicable, not applicable) corresponding to scores (5, 4, 3, 2, 1) respectively, with reverse scoring for negative items.

5-3-3: Validity of the Test: The test was validated as follows:

- Face Validity: The tool was constructed in line with standard tool-building steps and its items were checked for alignment with the behavior being tested. After presenting the test to a panel of experts in teaching methods, measurement, evaluation, and psychology, some items were revised. The expert consensus on the test items was 80%, indicating that the test preserved all 39 items, with some modifications made according to majority feedback.

3-3-6: Exploratory Sample:

1. **First Exploratory Sample:** The researcher administered the mental alertness test to a sample of 30 students from the Faculty of Education for Pure Sciences - Ibn Al-Haytham, Department of Chemistry, outside the main research sample. Student feedback and inquiries about test items were recorded, along with the time taken to complete the test. The average time required for the test was 35 minutes.

2. **Second Exploratory Sample:** The test was administered to a second exploratory sample of 200 students, distinct from the first exploratory sample and the main research sample.

3-3-7: Statistical Analysis of the Mental Alertness Test Items (Psychometric Characteristics): After the researcher administered the test, student responses were scored, ranked, and analyzed. The top 27% and bottom 27% of scores were examined to determine the psychometric properties of the test items.

3-3-8: Correlation Coefficients: The correlation coefficients between the five factors ranged from 0.34 to 0.10, while item correlations with their respective dimensions ranged from 0.356 to 0.665, all statistically significant. Correlations between the five dimensions and the total test score ranged from 0.706 to 0.452, also statistically significant.

3-3-9: Validity of the Structural Elements: Construct validity, reflecting how well a test measures a hypothetical concept, was evidenced by internal consistency indices ranging from 0.472 to 0.868, all acceptable against benchmark values, as shown in Table 3.

Table (3) The construct validity of the mental alertness test clauses

Item	Number	Degree of Freedom	Tabular Value	Correlation value	Statistical significance at (0.05)
1	200	198	139	809	Function
2				640	
3				766	
4				616	
5				705	
6				645	
7				775	
8				826	
9				804	
10				821	
11				774	
12				869	
13				612	
14				615	
15				750	
16				708	
17				786	

18				474	
19				689	
20				731	
21				477	
22				760	
23				786	
24				735	
25				534	
26				495	
27				771	
28				793	
29				713	
30				682	
31				479	
32				761	
33				787	
34				545	
35				498	
36				696	
37				739	
38				760	
39				767	

3-3-10: The Discriminatory Power of the Mental Alertness Test Items:

The discriminatory power of the items in the mental alertness test was calculated for all items, showing a range between 3.671 and 17.150. The item discrimination coefficient was determined using the equation for the discriminatory power of the items, indicating that all test items have an acceptable level of discrimination.

3-3-11: Statistical Methods:

The SPSS 23 program was used to perform the statistical analyses. Below is a summary of the key statistical methods used in this research:

1. Cooper's Equation: Used to calculate the percentage agreement among experts to ensure the face validity of the mental alertness test items.

2. Cronbach's Alpha: Applied to calculate the reliability coefficient of the mental alertness test.

3. Pearson Correlation Coefficient: Employed to assess the validity indices for constructing the mental alertness test items.

4. Spearman Correlation Coefficient: Used to adjust the mental alertness correlation coefficient, calculated using the split-half method.

Chapter Four

Results And Discussion

4-1: Presentation of Results:

The results serve as the link between theoretical and practical data. The practical application of the research tool has generated a range of results that require analysis and interpretation. This is essential for determining whether to accept or reject the proposed hypothesis by explaining the phenomenon at the heart of this research: mental alertness and its relationship with university students.

Question 1: What is the level of mental alertness among students of the Department of Chemistry at the Faculty of Education for Pure Sciences, Ibn Al-Haytham?

To address this question, arithmetic means and standard deviations were calculated, as shown in Table 4.

Table (4) Arithmetic means and standard deviations of mental alertness

C	DIMENSION	mean	Standard deviation	Assessment
1	Note	A/55/31	93±4	High
2	to	58.25	5/35	Medium
3	Act consciously in the present	70,24	124-09-4	Medium
4	Not judging with in-house expertise	28:21	5/49	Medium
5	Lack of interaction with in-house experiences	A/65/21	67.3	Medium
Total score		124	40:11	Medium

It is clear from Table 4 that the students demonstrated an average level of mental alertness overall; however, the level of mental alertness related to observation was notably high, which is a positive indicator.

Question 2: Is there a difference in the degree of mental alertness among the research sample (students of the Department of Chemistry) attributable to academic grade in the undergraduate stage (first, second, third, fourth)?

Table 5 presents the arithmetic means and standard deviations of mental

C	Stage	mean	Standard deviation	Level
1	The first	20	124-09-4	Medium
2	Second	9 -- 22	93±4	Medium
3	third	2/ 26	5/35	High
4	Fourth	3.30	5/49	High

It is clear from Table 5 that the fourth-grade students exhibited a high level of mental alertness, while the first-grade students demonstrated a low level of mental alertness.

Results Interpretation:

Overall, students at the Faculty of Education for Pure Sciences, Ibn Al-Haytham, Department of Chemistry, displayed an average level of mental alertness and its dimensions. This result may be attributed to cultural and social factors specific to university students, as these factors can enhance their awareness of mental alertness. Park, Paar, and Cross (2013) emphasize that mental alertness is an unstable dynamic state and a trait that varies among individuals and is subject to practice. This variability reflects students' unique ability to engage with university learning experiences, which differ from prior educational stages they've completed. At this level, students establish broader social and academic relationships compared to those in previous phases, and the significance of this academic stage to their future prompts greater self-awareness regarding their emotions and identities. This maturation leads them to seek a balance and compatibility with their evolving selves. The results of the second question in the current research suggest that, as students progress through university, their mental alertness grows, indicating a direct proportional relationship between mental alertness and academic level. This pattern may also be linked to the developmental stage of university students, characterized as late adolescence, where individuals strive to define their identity and lifestyle. Erikson refers to this as a stage of identity and lifestyle crisis characterized by numerous variables (Salahat & Al-Zaghloul, 2019).

Chapter Five : Conclusions, Recommendations, and Proposals

Based on the research results obtained, several conclusions, recommendations, and proposals have been derived to address the issues raised and to deepen and expand upon the current research variable.

5.5.1 Conclusions:

1. Mental alertness among students of the Faculty of Education for Pure Sciences, Ibn Al-Haytham, Department of Chemistry, is at an intermediate level.

2. The higher the engagement of the Faculty of Education for Pure Sciences, Ibn Al-Haytham, Department of Chemistry students in classroom activities, the greater their level of mental alertness.

3. Mental alertness in the first and second grades of the Faculty of Education for Pure Sciences, Ibn Al-Haytham, Department of Chemistry, is at an intermediate level.

4. Mental alertness in the third and fourth grades of the Faculty of Education for Pure Sciences, Ibn Al-Haytham, Department of Chemistry, is at a high level.

5.2 Recommendations:

1. Assist students with low mental alertness in improving their levels.

2. Encourage students to practice mental alertness in their personal and academic lives.

3. Provide opportunities for students to enhance their personality traits in general, and specifically focus on developing mental alertness through scientific meetings and training related to this trait.

4. Create a supportive social and psychological environment through educational programs and courses aimed at enhancing mental alertness.

5. Emphasize the family's role in helping their children achieve mental alertness.

5.3 Proposals:

1. Investigate mental alertness in larger samples.

2. Apply the mental alertness test to academic stages outside of university.

3. Employ the mental alertness test in other disciplines, such as life sciences, physics, mathematics, and computer science.

4. Implement the mental alertness test in the teaching of the Chemistry Department.

5. Explore the relationship between mental alertness and other personality traits such as motivation, intelligence, and thinking.

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