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The Level of Scientific Values Acquisition and Their Components Among University Students

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ABSTRACT
The present study aimed to identify the level of acquisition of scientific values and their components (cognitive, affective, and skill-based) among students at the Higher Normal School of Technological Education of Skikda, Algeria, during the 2025–2026 academic year. It also sought to determine whether there were statistically significant differences in the level of acquisition of these values and their components according to the variables of gender (male, female), specialization (Middle School Teacher, Secondary School Teacher), and academic level (first year, final year).
To achieve the objectives of the study, the descriptive method was adopted. A Scientific Values Scale was developed by the researcher, with its construction focusing on the three components of scientific values. The scale consisted of 36 items. Four dimensions were derived from each component as follows:

Cognitive Component: dissemination of knowledge, application of knowledge, self-development, and the importance of and interest in science.

Affective Component: carefulness in judgment, research ethics, appreciation of science, and academic integrity.

Skill-Based Component: scientific courage, planning, self-criticism, and acceptance of criticism.

The scale was administered to a convenience sample of **80 university students**.
After analyzing the data using means, standard deviations, and the independent samples *t*-test through the **Statistical Package for the Social Sciences (SPSS)**, the study concluded that the overall level of scientific values among the students was high. Furthermore, no statistically significant differences were found in the level of acquisition of scientific values and their components, except for the affective component, which showed differences attributable to the gender variable (male, female). The findings also revealed statistically significant differences in the level of scientific values and their cognitive, affective, and skill-based components according to the variables of specialization (Middle School Teacher, Secondary School Teacher) and academic level (first year, final year). These values were acquired and developed throughout the students' training at the Higher School, owing to the efforts of the teaching staff as well as the students' own commitment, sense of responsibility toward their future

profession, and awareness of the importance of preserving scientific values in light of rapid scientific and technological advancement.

Accordingly, the study recommends:

- Investigating the scientific values embedded in the curricula and educational courses studied by student teachers.
- Examining the comprehensiveness and integration of the training provided to students and its role in developing scientific values.
- Exploring methods for developing scientific values among students at the three pre-university educational levels.
- Assessing the competence of university instructors, as they are primarily responsible for instilling scientific values in their students.
- Investigating the importance of scientific training programs in fostering a love of knowledge and science and promoting the acquisition of scientific values.

Keywords: Level, Acquisition, Scientific Values, University Students, Higher School for Teachers of Technological Education, Skikda.

INTRODUCTION

The Third Technological Revolution, one of the defining characteristics of the twenty-first century, differs fundamentally in its resources, inputs, processes, and outcomes from the First Industrial Revolution, which relied on steam power, coal, mechanization, and entrepreneurial capital. It also differs from the Second Industrial Revolution, which was based on electricity, petroleum, nuclear energy, modern management techniques, joint-stock companies, and economic conglomerates. The current revolution is driven by advanced scientific knowledge and the optimal use of the continuous flow of information. It is therefore founded on human intellect, microelectronics, satellite technology, computers, and the generation, organization, storage, retrieval, and instantaneous transmission of information. Human intelligence constitutes the primary pillar of this revolution, representing an inexhaustible and renewable resource. Consequently, all nations are capable of participating in, adapting to, and excelling in this revolution, provided they prepare their citizens through sound educational and pedagogical systems. (Abu Jawdeh, 2011: 1)

In the contemporary era, learners need to develop solid cognitive foundations within a value-based framework that governs scientific applications and the use of technology. The challenge of modern science has become closely linked to individuals' awareness of the value of science and the significance of its applications, thereby increasing the need to promote scientific literacy among learners in all matters related to civilization and societal development.

Science also requires the use of various technological means to disseminate knowledge to individuals and communities. This process should take place within the cultural context of society to ensure that scientific knowledge is both accepted and beneficial. In other words, scientists must possess a set of ethical standards that regulate and guide their scientific and technological activities across different disciplines and fields of life. These ethical standards are referred to as **scientific values**, and the concept

of scientific values emerges from the reciprocal and inseparable relationship between science and values. (Khazali, 2009: 115–116)

The contemporary world is witnessing rapid developments and transformations across numerous fields, generating profound intellectual changes that have significantly influenced both individuals and societies. Since scientific knowledge has become a fundamental requirement for human societies, these transformations have reshaped individuals' intellectual perspectives and behavioral patterns. This change has been particularly evident in the realm of values, which play a crucial role in enabling individuals to adapt to the demands of the modern era. Consequently, the close relationship between values and science has given rise to the concept of **scientific values**.

Scientific values constitute one dimension within the broader system of values and are generally viewed as comprising three interrelated components: the **cognitive component**, which provides individuals with knowledge about the nature of scientific values; the **affective component**, which shapes their attitudes and dispositions; and the **behavioral (skill-based) component**, which is reflected in their actions and practices. Individuals acquire these scientific values from their religious, cultural, and social backgrounds, develop a sense of acceptance toward them, and integrate them into the formation of their personalities. These values enable individuals to confront various phenomena with wisdom and competence and exert a direct influence on their behavior. (Abu Jawdeh, 2011: 3)

Against this background, increasing attention has been devoted to the study of scientific values. This interest has motivated the present study, which seeks to investigate the **level of acquisition of scientific values and their components among university students**, who represent the cornerstone of future societal development.

1. Research Problem and Research Questions

Nations have consistently devoted considerable attention to their values and to the methods that facilitate their transmission to all members of society, as values constitute a well-defined framework that shapes individuals' personalities and guides their behavior. They also represent a standard by which human conduct in both public and private life is evaluated, enabling individuals to cope more effectively with various challenges and crises.

Values are regarded as one of the fundamental pillars of modern education and among the most essential foundations of contemporary life, contributing significantly to scientific and technological progress. They also constitute a core principle emphasized by the three monotheistic religions. (Badawi & Al-Mukaimi, 2009)

Accordingly, the issue of values in general, and scientific values in particular, has become one of the major concerns of contemporary thought. Scientific values represent an essential educational requirement for developing the human capital capable of meeting society's aspirations for sustainable development. They serve as a scientific reference framework that enables learners to respond consciously to scientific innovation and its applications and to understand the relationship between science and the modern technological revolution.

Since one of the principal missions of the Higher Schools for Teachers in Algeria is to provide student teachers with professional and pedagogical preparation, and given that these students constitute an important segment of society as the teachers of tomorrow, it is essential to equip them with a set of

values, including scientific values, that will enable them to address the challenges arising from scientific and technological developments across various fields. This consideration motivated the present study, entitled **"The Level of Scientific Values Acquisition and Their Components Among University Students,"** which seeks to answer the following research questions:

Main Research Question

What is the level of acquisition of scientific values and their components (cognitive, affective, and skill-based) among university students?

Research Sub-Questions

- Are there statistically significant differences at the significance level (α = 0.05) in the level of acquisition of scientific values and their components among students attributable to the **specialization** variable (Mathematics, Natural Sciences)?
- Are there statistically significant differences at the significance level (α = 0.05) in the level of acquisition of scientific values and their components among students attributable to the **teaching track** variable (Middle School Teacher, Secondary School Teacher)?
- Are there statistically significant differences at the significance level (α = 0.05) in the level of acquisition of scientific values and their components among students attributable to the **academic level** variable (first year, final year)?

2. Research Hypotheses

2.1. General Hypothesis

The level of acquisition of scientific values and their components (cognitive, affective, and skill-based) among university students is high.

2.2. Specific Hypotheses

Hypothesis One: There are no statistically significant differences at the significance level (α = 0.05) in the level of acquisition of scientific values and their components among students attributable to the **specialization** variable (Mathematics, Natural Sciences).

Hypothesis Two: There are no statistically significant differences at the significance level (α = 0.05) in the level of acquisition of scientific values and their components among students attributable to the **teaching track** variable (Middle School Teacher, Secondary School Teacher).

Hypothesis Three: There are no statistically significant differences at the significance level (α = 0.05) in the level of acquisition of scientific values and their components among students attributable to the **academic level** variable (first year, final year).

3. Research Objectives

- To determine the level of acquisition of scientific values among university students according to their three components (cognitive, affective, and skill-based).
- To examine whether there are statistically significant differences at the significance level (α = 0.05) in the level of acquisition of scientific values and their components among students attributable to the **specialization** variable (Mathematics, Natural Sciences).
- To determine whether there are statistically significant differences at the significance level (α = 0.05) in the level of acquisition of scientific values and their components among students attributable to the **teaching track** variable (Middle School Teacher, Secondary School Teacher).

- To investigate whether there are statistically significant differences at the significance level ($\alpha = 0.05$) in the level of acquisition of scientific values and their components among students attributable to the **academic level** variable (first year, final year).

4. Significance of the Study

The general significance of this study lies in the fact that emphasizing scientific values can establish them as a fundamental frame of reference that guides individuals in various situations they encounter, particularly in light of rapid technological developments, while protecting them from the influence of negative values that compete with positive ones. Furthermore, promoting scientific values may contribute to advancing scientific research by fostering an academic environment in which individuals appreciate the importance of science, scientists, and scientific culture.

The specific significance of the study stems from the importance of university students' acquisition of scientific values, as these values serve to guide their scientific behavior and strengthen the skills associated with scientific inquiry and professional practice.

5. Operational Definitions of the Study

Level: The degree to which university students have acquired scientific values and their components, as represented by the scores obtained on the **Scientific Values Scale** used as the research instrument.

Acquisition: The set of cognitive, affective, and skill-based aspects that the student teacher has internalized during the training process at the Higher Normal School of Technological Education of Skikda.

Scientific Values: The body of values acquired by the student teacher, who is expected to enter the teaching profession immediately after graduation. These values comprise three components—the cognitive, affective, and skill-based components—which will assist the graduate in the effective performance of the teaching profession.

University Students: Students enrolled in the first year or the final year at the Higher School for Teachers of Technological Education, preparing to become **Middle School Teachers** or **Secondary School Teachers** in the specializations of **Mathematics** or **Natural Sciences**.

Higher Normal School of Technological Education of Skikda (ENSET Skikda): A public higher education institution under the supervision of the Algerian Ministry of Higher Education and Scientific Research. Established in **2009**, it is located in the city of Skikda (Bousta Brothers District, Azzaba). The institution is responsible for preparing **Middle School Teachers** through a **four-year** program and **Secondary School Teachers** through a **five-year** program in the disciplines of **Technology, Natural Sciences, Physics, Mathematics, and Computer Science**. Upon successful completion of their studies, students are awarded a degree corresponding to their teaching track, which qualifies them to enter the teaching profession immediately after graduation.

6. Theoretical Framework of the Study

6.1. Concept of Scientific Values

Scientific values are defined as "implicit normative judgments formed by individuals through their interaction with situations and experiences of a scientific nature. These judgments are reflected in individuals' responses to the scientific issues and problems they encounter and interact with, and are manifested in their interests, attitudes, and behaviors toward them." (Al-Mouji, 2016: 491)

Abu Jawdeh also defines scientific values as "a three-dimensional construct consisting of cognitive, affective, and skill-based components that develops among students through school curricula responsible for shaping the ethics of science." (Abu Jawdeh, 2011: 26)
They are further described as "a set of principles developed by individuals through various scientific situations, enabling them to interact with contemporary developments and the continuous flow of knowledge through scientific approaches." (Al-Qahtani, 2017: 190)
Koodlad also argues that, as an initial step in every learning activity, it is essential to identify values, defining them as "beliefs about whether something is good or bad, desirable or undesirable." (Al-Darij, 2004: 242)

6.2. Components of Scientific Values

Individuals gradually acquire values through the process of socialization and its institutions, which determine their standards and functions, since life within society requires rules that regulate human needs. Parsons (PARSONS) maintained that values consist of three fundamental components:

- **The Cognitive (Intellectual) Component:** This component encompasses information, theoretical knowledge, and objectives. Through it, values can be learned. It is directly related to the value being acquired and includes identifying and exploring possible alternatives, considering the consequences of each alternative, and making a free choice.
- **The Affective (Psychological–Evaluative) Component:** This component includes free choice and the feeling of satisfaction associated with selecting a particular value. Through it, individuals develop a preference for specific values.
- **The Behavioral (Moral–Guiding) Component:** This component includes publicly affirming one's commitment to a value, translating the value into actual practice, and developing a coherent value system. (Al-Khatib et al., 2003: 160–161)

6.3. Importance of Acquiring Scientific Values

- Familiarizing students with the system of scientific values enables them to adopt it as a frame of reference when dealing with various situations and future challenges, without being influenced by negative values that compete with positive ones.
- The possession of scientific values enables students to evaluate the practices of faculty members both inside and outside the classroom.
- Scientific values constitute one of the pillars of quality education within society and contribute to the production of useful knowledge and to raising awareness of appropriate methods for managing and applying such knowledge.
- They promote scientific research across various disciplines, thereby creating an academic environment in which science flourishes and individuals appreciate the importance of science, scientists, and scientific culture.
- They enrich students' science-related skills, including analytical ability, the proper handling of scientific facts when studying scientific theories, linking theory with the environment, applying research findings, and fostering a sense of participation in scientific issues and environmental challenges.

- Certain scientific values contribute to the study of the philosophy of science at both local and international levels, including comprehensiveness, experimental accuracy, intellectual fertility, testability, scientific flexibility, scientific reasoning, the search for causes, and scientific consistency. (Abu Jawdeh, 2011: 28)

6.4. Methods for Developing Scientific Values

According to Assaf (2019: 31), these methods may be summarized under two main approaches:

Promoting Scientific Literacy Programs and Extracurricular Activities

Specialists in the social sciences and humanities face the challenging task of fostering interaction and integration between technology, science, and culture. Educational institutions bear the responsibility of narrowing the gap between these domains by integrating elements of the humanities into science, engineering, and technology education, while simultaneously enhancing scientific literacy in pre-university general education. This highlights the importance of enabling students to understand science and technology through well-designed scientific literacy programs.

Supporting Science Clubs and School Laboratories

Extracurricular activities play a significant role in providing educational experiences that complement classroom instruction, allowing cognitive learning to acquire both scientific and practical significance. Consequently, science clubs, laboratories, and science exhibitions make substantial contributions to developing an informed understanding of the nature of science and contemporary technology. Science clubs, in particular, strongly reinforce curriculum content and other school activities by offering students additional scientific situations and experimental experiences characterized by intellectual stimulation and enjoyment.

7. Review of Previous Studies and Commentary

7.1. Review of Previous Studies

The following section presents a selection of previous studies in chronological order, from the most recent to the earliest.

- **Boughda and Bouaziz (2020),** "Scientific Values Acquired by Prospective Graduating Students of the Department of Natural Sciences: A Field Study at the Higher Normal School of Technological Education of Skikda." This study aimed to identify the level of acquisition of scientific values and their components (cognitive, affective, and skill-based) among students during the 2019–2020 academic year, and to determine whether differences existed according to the variables of gender (male, female) and teaching track (Middle School Teacher, Secondary School Teacher). The descriptive method was adopted, and the Scientific Values Scale was administered to a survey sample of **135 university students**. After analyzing the data using **SPSS**, the study concluded that students exhibited a **high level of scientific values acquisition**, with no statistically significant differences attributable to either gender or teaching track.
- **Assaf (2019),** "A Proposed Vision for Activating the Role of Basic Education Teachers in Developing Scientific Values Among Their Students." The researcher adopted the descriptive-analytical approach. The study concluded that scientific values comprise multiple dimensions derived from the relationship between science and the educational process. It also found that the most important requirements for developing scientific values among basic education students

include promoting scientific literacy programs, extracurricular activities, scientific laboratories, and school libraries, while emphasizing that teachers' technological preparation constitutes the foundation of their ability to develop scientific values among their students.

- **Assaf and Al-Hadidi (2017),** "The Degree to Which Secondary School Teachers in the Governorates of Gaza Embody Scientific Values Associated with the Knowledge Society." The researchers employed the descriptive method using a questionnaire consisting of **51 items** distributed across **four domains**, which was administered to a sample of **90 secondary school principals**. The principal findings indicated that school principals rated the degree to which secondary school teachers embodied scientific values associated with the knowledge society at **69.63%**, representing a high level approaching the moderate range. The domain of **values related to the importance of and interest in science** ranked first, followed by **values related to the dissemination of knowledge**, **values related to self-development**, and finally **values related to the application of knowledge**.
- **Al-Shayyab (2014),** "The Degree of Practice of Scientific Values Among Students of the Faculty of Science in Yanbu, Taibah University, from Their Own Perspectives." The researcher used an instrument consisting of **38 behavioral indicators**, administered to a stratified random sample of **238 male and female students**. The findings revealed that students' level of practicing scientific values reached **70%**, representing a moderate level. No statistically significant differences were found according to academic level among preparatory-year, first-year, and second-year students, whereas significant differences were observed among third-year students. Likewise, no statistically significant differences were found according to gender (male, female).
- **Abu Jawdeh (2011),** "Scientific Values Embedded in Basic Education Science Textbooks and the Extent to Which Tenth-Grade Students Possess Them." The study adopted the descriptive method and employed two instruments: a **content analysis framework** and a **Scientific Values Scale** consisting of **24 questionnaire items**. The study population comprised all tenth-grade students in the North Hebron Governorate. A cluster random sample of **262 male students** and **263 female students** was selected. The findings indicated that scientific values were incorporated into science textbooks in an unplanned manner, without adequate balance, comprehensiveness, or sequencing. Female students outperformed male students in their possession of scientific values. Furthermore, the level of scientific values increased with higher achievement in science and with the father's educational level, whereas neither the mother's educational level nor the place of residence had a significant effect.
- **Khazali (2009),** "The System of Scientific Values Embedded in Science Textbooks for the Early Basic Education Grades in Jordan." This study aimed to propose a list of scientific values that should be incorporated into science textbooks for the early basic education grades in Jordan. The researcher developed an instrument for analyzing scientific values using the developmental approach and employed the descriptive method to analyze three science textbooks. The principal findings resulted in the proposal of **eight scientific values**: curiosity, academic integrity, acceptance of criticism, carefulness in judgment, ethics of science, scientific thinking, appreciation of science, and respect for scientists.

7.2. Commentary on Previous Studies

- **With regard to the objectives:** All of the reviewed studies shared the common objective of investigating **scientific values**. However, the studies conducted by **Abu Jawdeh (2011)** and **Khazali (2009)** focused specifically on identifying the scientific values that should be incorporated into school curricula and science textbooks.
- **With regard to the methodology:** Most of the reviewed studies adopted the **descriptive-analytical approach**, with the exception of **Khazali (2009)**, which employed the **developmental approach** in addition to the descriptive-analytical method.
- **With regard to the research instruments: Boughda and Bouaziz (2020)** employed a **Scientific Values Scale**. **Assaf and Al-Hadidi (2017), Al-Shayyab (2014), and Abu Jawdeh (2011)** relied on **content analysis** and a **Scientific Values Scale**. **Assaf (2019)** presented a **proposed conceptual framework**, whereas **Khazali (2009)** used a **content analysis instrument**.
- **With regard to the study samples: Assaf (2019)** conducted his study on **basic education teachers**, whereas **Assaf and Al-Hadidi (2017)** investigated **secondary school principals**. The studies of **Boughda and Bouaziz (2020)** and **Al-Shayyab (2014)** focused on **university students**, while **Abu Jawdeh (2011)** examined **tenth-grade students**.
- **Scientific values** have attracted considerable attention from researchers at both the **Arab** and **international** levels. Nevertheless, the researcher observed that this topic has received **relatively limited attention within the local context**, thereby highlighting the need for further research in this field.

8. Methodological Procedures

8.1. Scope of the Study

Human Scope: Students enrolled at the Higher Normal School of Technological Education of Skikda, Algeria.

Geographical Scope: The Higher Normal School of Technological Education of Skikda, Algeria.

Temporal Scope: The field study was conducted during the **2025–2026 academic year**.

8.2. Research Method

Since each research phenomenon or problem possesses characteristics that distinguish it from other phenomena, every scientific study in psychology requires a research method that is appropriate to the nature of its subject. As the present study aimed to determine the level of acquisition of scientific values and their components (cognitive, affective, and skill-based) among university students, the **descriptive method** was considered the most appropriate approach for this type of research.

8.3. Study Sample and Its Characteristics

The study employed a **non-probability sampling** technique, specifically **convenience sampling**, which is defined as **"the selection of a sample from the research population according to the researcher's accessibility and convenience."** (Angers, 2004: 311)

The rationale for adopting this sampling technique was that all participants shared the common characteristic of being enrolled at the Higher School for Teachers. The sample therefore represented university students undergoing teacher education. Their stage of higher education, their identity as future teachers, and the profession for which they were being prepared—namely, **Middle School Teachers** or **Secondary School Teachers**—all necessitate the acquisition of scientific values, as these values guide their scientific behavior, strengthen their science-related skills, and enhance their capacity to receive, internalize, and learn new knowledge, particularly within the field of education.

		Mathematics	Natural Sciences	Total	Percentage (%)
First Year	Middle School Teacher	10	10	20	%25
	Secondary School Teacher	10	10	20	%25
Final Year	Middle School Teacher	10	10	20	%25
	Secondary School Teacher	10	10	20	%25
Total		40	40	80	%100
Total Number of Participants					

The total study sample consisted of **80 participants**, distributed according to the variables presented in the following table.

Table 1. Distribution of the Study Sample According to the Study Variables (Specialization, Teaching Track, and Academic Level)

From the table presenting the study sample, it is evident that the participants were **intentionally and equally selected** based on the availability of specific characteristics and attributes considered essential for the purposes of this study.

8.5. Research Instrument

A **Scientific Values Scale**, developed by the researcher, was used as the data collection instrument.

Description of the Scale

The construction of the scale focused on the **three components of scientific values** (cognitive, affective, and skill-based). The instrument consisted of **36 items**. Based on each component, four dimensions were identified as follows:

Cognitive Component:

- Dissemination of Knowledge
- Application of Knowledge
- Self-Development
- Importance of Science and Interest in It

Affective Component:

- Carefulness in Judgment
- Ethics of Scientific Research
- Appreciation of Science

- Academic Integrity

Skill-Based Component:

- Scientific Courage
- Planning
- Self-Criticism
- Acceptance of Criticism

Following the identification of these dimensions, both **positively** and **negatively worded** indicators were developed for each dimension. The negatively worded items were **(3, 6, 7, 15, 18, 19, 24, 26, 29, 33, and 35)**, whereas the positively worded items were **(1, 2, 4, 5, 8, 9, 10, 11, 12, 13, 14, 16, 17, 20, 21, 22, 23, 25, 27, 28, 30, 31, 32, and 34).**

A **five-point Likert scale** was adopted for the responses, with the following levels of agreement:

- Very High
- High
- Moderate
- Low
- Very Low

The response categories were assigned the following scores: **(1, 2, 3, 4, and 5).**

Validity and Reliability of the Research Instrument

Content Validity

The content validity of the scale was established by submitting it to **four expert reviewers** specializing in **Educational Psychology** and **Educational Assessment** from universities both within and outside Algeria. An agreement coefficient of **0.80** was adopted as the criterion for accepting each item. Based on the reviewers' evaluations, the final version of the scale consisted of **36 items**.

Internal Consistency Validity

The internal consistency validity of the scale was examined by administering it to a **pilot sample of 30 male and female students**. **Pearson's correlation coefficient** was calculated between the score of each component and the total score of the Scientific Values Scale. The following table presents the results.

Table 2. Pearson Correlation Coefficients Between Each Component and the Total Score of the Scientific Values Scale

Components	Pearson Correlation Coefficient	Significance Value
Cognitive Component	0.831	0.000
Affective Component	0.885	0.000
Skill-Based Component	0.709	0.000

Source: Prepared by the researcher based on **SPSS** output.

The table shows that all components are correlated with the total score of the scale, confirming that the questionnaire demonstrates a high degree of internal consistency.

Reliability of the Research Instrument

The reliability of the questionnaire was established by the researcher using Cronbach's Alpha. The scale was administered to a pilot sample of 30 male and female students, and the internal consistency coefficient was calculated for the items of each component of the scale. The obtained reliability coefficients are presented in the following table.

Table 3. Cronbach's Alpha Coefficients for Each Component of the Scale

Components	Number of Items	Cronbach's Alpha Coefficient
Cognitive Component	12	0.723
Affective Component	12	0.731
Skill-Based Component	12	0.723
Total	36	0.826

Source: Prepared by the researcher based on **SPSS** output.

The table shows that the overall reliability coefficient of the scale is 0.826, indicating that the questionnaire possesses a high level of reliability, thus supporting its suitability for application.

Scoring of the Scale

The highest possible score that a respondent can obtain is 180 (36 × 5), while the lowest possible score is 36 (36 × 1). Accordingly, the scale is interpreted as follows:

- **[36–72]:** Low level of scientific values.
- **[73–145]:** Moderate level of scientific values.
- **[146–180]:** High level of scientific values.

For the components of the scale, the scoring is interpreted as follows:

- **[12–24]:** Low level.
- **[25–48]:** Moderate level.
- **[49–60]:** High level.

For the dimensions, the scoring is interpreted as follows:

- **[3–6]:** Low level.
- **[7–12]:** Moderate level.
- **[13–15]:** High level.

8.6. Data Analysis Procedures

Quantitative Analysis

The quantitative analysis was conducted using the Statistical Package for the Social Sciences (SPSS), Version 25, in addition to descriptive statistics, including the mean and standard deviation, as well as the independent-samples t-test (T-test).

Qualitative Analysis

The qualitative analysis was based on the information presented in the theoretical framework and the review of previous studies.

9. Presentation and Discussion of the Study Results

9.1. Presentation and Discussion of the Results in Light of the Study Hypotheses

9.1.1. Presentation and Discussion of the Results in Light of the General Hypothesis

Hypothesis:

The level of scientific values acquisition and their components (cognitive, affective, and skill-based) is high among university students at the Higher Normal School of Technological Education of Skikda.

Table 4. Means and Standard Deviations of the Scientific Values Scale, Its Components, and Its Dimensions Among University Students

Statistical Indicators / Scale: Components and Dimensions		Mean	Median	Mode	Standard Deviation	Minimum	Maximum	Total
Scientific Values		148.59	149.00	155	9.494	125	172	11887
Cognitive Component		50.89	51.00	51	4.053	42	60	4071
Cognitive Component	**Knowledge Dissemination**	12.31	12.00	12	1.383	8	15	985
	Application of Knowledge	13.08	13.00	14	1.499	9	15	1046
	Self-Development	13.05	13.00	13	1.457	8	15	1044
	Importance of Science and Interest in It	12.45	12.50	12	1.841	7	15	996
Affective Component		50.61	50.00	49	4.102	39	60	4049
Affective Component	**Carefulness in Judgment**	12.84	13.00	13	1.563	9	15	1027
	Appreciation of Science	13.08	13.00	14	1.516	9	15	1046
	Academic Integrity	12.99	13.00	14	1.680	8	15	1039
	Ethics of Scientific Research	11.71	12.00	12	1.982	7	15	937
Skill-Based Component		47.09	47.00	46	4.459	34	59	3767
Skill-Based Component	**Planning**	12.48	12.50	15	1.882	7	15	998
	Self-Criticism	11.20	11.00	10	1.649	7	15	896
	Scientific Courage	11.49	11.00	13	1.743	7	15	919
	Acceptance of Criticism	11.93	12.00	12	2.061	7	15	954

Source: Prepared by the researcher based on SPSS output.

The table above showed a high level of scientific values. The mean score of the study sample on the Scientific Values Scale was (148.59), with a standard deviation of (9.494). The minimum score was (125), whereas the maximum score was (172).

The results related to the components and dimensions of scientific values were as follows:

Cognitive Component:

The results related to the cognitive component among the study sample showed that the mean score for this component was (50.89), with a standard deviation of (4.053). This component achieved the highest score compared with the other components. The minimum score was (42), while the maximum score was (60). Its dimensions were as follows:

1. **Knowledge Dissemination:** The mean score for this dimension was (12.31), with a standard deviation of (1.383). The minimum score was (8), whereas the maximum score was (15).
2. **Application of Knowledge:** The mean score of the sample participants in this dimension was (13.08), with a standard deviation of (1.499). The minimum score was (9), whereas the maximum score was (15).
3. **Self-Development:** The mean score of the sample participants in this dimension was (13.05), with a standard deviation of (1.457). The minimum score was (8), whereas the maximum score was (15).
4. **Importance of Science and Interest in It:** The mean score of the sample participants in this dimension was (12.45), with a standard deviation of (1.841). The minimum score was (7), whereas the maximum score was (15).

Affective Component:

The statistical results related to the affective component among the study sample indicated that the mean score for this component was (50.61), with a standard deviation of (4.102). The minimum score was (39), whereas the maximum score was (60). Its dimensions were as follows:

1. **Carefulness in Judgment:** The mean score for this dimension was (12.84), with a standard deviation of (1.563). The minimum score was (9), whereas the maximum score was (15).
2. **Appreciation of Science:** The mean score of the sample participants in this dimension was (13.08), with a standard deviation of (1.516). The minimum score was (9), whereas the maximum score was (15).
3. **Academic Integrity:** The mean score of the sample participants in this dimension was (12.99), with a standard deviation of (1.680). The minimum score was (8), whereas the maximum score was (15).
4. **Ethics of Scientific Research:** The mean score of the sample participants in this dimension was (11.71), with a standard deviation of (1.982). The minimum score was (7), whereas the maximum score was (15).

Skill-Based Component:

The statistical results related to the skill-based component among the study sample showed that the mean score for this component was (47.09), with a standard deviation of (4.459). The minimum score was (34), whereas the maximum score was (59). Its dimensions were as follows:

1. **Planning:** The mean score for this dimension was (12.48), with a standard deviation of (1.882). The minimum score was (7), whereas the maximum score was (15).
2. **Self-Criticism:** The mean score of the sample participants in this dimension was (11.20), with a standard deviation of (1.649). The minimum score was (7), whereas the maximum score was (15).
3. **Scientific Courage:** The mean score of the sample participants in this dimension was (11.49), with a standard deviation of (1.743). The minimum score was (7), whereas the maximum score was (15).
4. **Acceptance of Criticism:** The mean score of the sample participants in this dimension was (11.93), with a standard deviation of (2.061). The minimum score was (7), whereas the maximum score was (15).

"The statistical results indicate a high level of scientific values; therefore, the general hypothesis is confirmed."

Regarding the components of scientific values, the results indicated:

A high level in the cognitive and affective components, and a moderate level in the skill-based component.

Regarding the dimensions, the results indicated:

A high level in each of the following: application of knowledge, self-development, and appreciation of science. A moderate level was found in each of the following: knowledge dissemination, importance of science and interest in it, carefulness in judgment, academic integrity, ethics of scientific research, planning, self-criticism, scientific courage, and acceptance of criticism.

The finding that students possess a high level of scientific values and their cognitive and affective components may be explained by the efforts made by the school's teachers and administrative staff to provide students with high-quality training that enables them to perform their future professional duties effectively and, consequently, contribute to the development of a generation characterized by high scientific values. As for the skill-based component, its level was moderate. This may be explained by the fact that students do not yet possess extensive professional or practical experience, as they are still at the beginning of their careers.

Students' awareness of these scientific values will help them adopt them as a frame of reference in the various situations they encounter, whether social or professional, and in addressing future technological developments and contemporary challenges without being influenced by negative values that compete with positive ones. In addition, scientific values contribute to enriching students' science-related skills, such as the ability to analyze, the availability of a theoretical background that assists in interpreting societal problems, dealing with scientific facts when studying scientific theories, linking them to the environment, applying results, and developing a sense of participation in issues related to science and environmental problems. This contributes to advancing scientific research and creating a scientific environment in which the sciences flourish and individuals appreciate the status of science, scientists, and scientific culture. (Abu Jawdeh, 2011: 28)

The results were consistent with the study of Boughda and Bouaziz (2020), which showed a high level of scientific values acquisition among students. They were also consistent with the study of Assaf and

Al-Hadidi (2017), which revealed that the overall assessment by school principals of the degree to which secondary school teachers in the governorates of Gaza demonstrated scientific values associated with the knowledge society was (69.63%), representing a high degree.

The results differed from those of Al-Shayyab's study (2014), which showed a moderate degree of scientific values practice among students of the Faculty of Science at Yanbu, Taibah University, Saudi Arabia, unlike the present study, whose results revealed a high level of scientific values among students.

9.1.2 Presentation and Discussion of the Results in Light of the First Sub-Hypothesis

Hypothesis:

There are no statistically significant differences at the significance level ($\alpha = 0.05$) in the level of scientific values acquisition and their components among students attributable to the specialization variable (Mathematics, Natural Sciences).

Table 5. Means and Standard Deviations of the Scientific Values Scale, Its Components, and Its Dimensions According to the Specialization Variable

Scale, Components, and Dimensions		Specialization	Mean	Standard Deviation
Scientific Values		**Mathematics**	148.03	9.225
		Natural Sciences	149.15	9.841
Cognitive Component		**Mathematics**	51.18	4.284
		Natural Sciences	50.60	3.842
Cognitive Component	**Knowledge Dissemination**	**Mathematics**	12.65	1.252
		Natural Sciences	11.98	1.441
	Application of Knowledge	**Mathematics**	13.03	1.368
		Natural Sciences	13.13	1.636
	Self-Development	**Mathematics**	12.98	1.593
		Natural Sciences	13.13	1.324
	Importance of Science and Interest in It	**Mathematics**	12.53	1.935
		Natural Sciences	12.38	1.764
Affective Component		**Mathematics**	50.30	4.020
		Natural Sciences	50.93	4.209
Affective Component	**Carefulness in Judgment**	**Mathematics**	12.75	1.463
		Natural Sciences	12.93	1.670
	Appreciation of Science	**Mathematics**	13.10	1.482
		Natural Sciences	13.05	1.568
	Academic Integrity	**Mathematics**	12.90	1.630
		Natural Sciences	13.08	1.745
	Ethics of Scientific Research	**Mathematics**	11.55	2.050
		Natural Sciences	11.88	1.924

Skill-Based Component		**Mathematics**	46.55	3.266
		Natural Sciences	47.63	5.386
Skill-Based Component	**Planning**	**Mathematics**	12.43	1.893
		Natural Sciences	12.53	1.894
	Self-Criticism	**Mathematics**	11.25	1.428
		Natural Sciences	11.15	1.861
	Scientific Courage	**Mathematics**	11.48	1.536
		Natural Sciences	11.50	1.948
	Acceptance of Criticism	**Mathematics**	11.40	1.932
		Natural Sciences	12.45	2.075

Source: Prepared by the researcher based on SPSS output.

It can be observed from the table that the mean score of scientific values among students majoring in **Mathematics** is **(148.03**), with a standard deviation of **(9.225),** whereas the mean score of scientific values among students majoring in **Natural Sciences** is **(149.15),** with a standard deviation of **(9.841),** indicating that the level of scientific values is high in both specializations. The mean scores for the cognitive and affective components were similar, indicating a high level. As for the skill-based component, the mean scores were also similar, but they indicated a moderate level.

To determine whether there are statistically significant differences at the significance level ($\alpha = 0.05$) in the level of scientific values, their components, and their dimensions attributable to the specialization variable (Mathematics, Natural Sciences), the results of the t-test presented in the following table are examined.

Table 06: t-test Values and Significance Levels for the Scientific Values Scale, Its Components, and Its Dimensions According to the Specialization Variable

Scale, Components, and Dimensions		t-value	Degrees of Freedom (df)	Significance Level (Sig.)
Scientific Values		-0.527	78	0.599
Cognitive Component		0.632	78	0.529
Cognitive Component	**Knowledge Dissemination**	2.237	78	0.028
	Application of Knowledge	-0.297	78	0.768
	Self-Development	-0.458	78	0.648
	Importance of Science and Interest in It	0.362	78	0.718
Affective Component		-0.679	78	0.499
Affective Component	**Carefulness in Judgment**	-0.498	78	0.620
	Appreciation of Science	0.147	78	0.884

	Academic Integrity	-0.464	78	0.644
	Ethics of Scientific Research	-0.731	78	0.467
Skill-Based Component		-1.079	78	0.284
Skill-Based Component	**Planning**	-0.236	78	0.814
	Self-Criticism	0.270	78	0.788
	Scientific Courage	-0.064	78	0.949
	Acceptance of Criticism	-2.342	78	0.022

Source: Prepared by the researcher based on SPSS output.

Based on Table 06, it can be concluded that there are no statistically significant differences in the level of scientific values attributable to the specialization variable. Therefore, the first sub-hypothesis is confirmed, as the significance level was (0.599), which is greater than the significance level (0.05). This indicates that there are no statistically significant differences in the overall mean score of the Scientific Values Scale.

With regard to the components of the scale, the statistical results indicated the following:

There were no statistically significant differences at the significance level (α = 0.05) in any of the scale components (cognitive, affective, and skill-based). The significance levels were as follows: cognitive component (0.529), affective component (0.499), and skill-based component (0.284). All these values are greater than the significance level (0.05), indicating that there are no statistically significant differences across all components.

Regarding the dimensions of scientific values, the significance levels were as follows:

The dimensions of Knowledge Application (0.768), Self-Development (0.648), Importance of Science and Interest in It (0.718), Carefulness in Judgment (0.620), Appreciation of Science (0.884), Academic Integrity (0.644), Ethics of Scientific Research (0.467), Planning (0.814), Self-Criticism (0.788), and Scientific Courage (0.949) all yielded significance levels greater than (0.05), indicating the absence of statistically significant differences. However, the dimensions of Knowledge Dissemination (0.028) and Acceptance of Criticism (0.022) yielded significance levels lower than (0.05), indicating the presence of statistically significant differences. These differences favored Mathematics students in the Knowledge Dissemination dimension and Natural Sciences students in the Acceptance of Criticism dimension.

These findings may be explained by the fact that the students possess similar abilities and skills regardless of their specialization. In addition, they study at the same institution, where they are exposed to similar regulations and socio-cultural environments. They also acquire similar attitudes, values, ways of thinking, and standards for judging various issues, which ultimately leads them to develop similar scientific values.

9-1-3 Presentation and Discussion of the Results in Light of the Second Sub-Hypothesis

Hypothesis Statement: There are no statistically significant differences at the significance level (α = 0.05) in the level of acquisition of scientific values and their components among students attributable to the program variable (**Middle School Teacher**, **Secondary School Teacher**).

Table 07: Means and Standard Deviations of the Scientific Values Scale, Its Components, and Its Dimensions According to the Program Variable

Scale, Components, and Dimensions		University Level	Mean	Standard Deviation
Scientific Values		**Secondary School Teacher**	145.28	8.452
		Middle School Teacher	151.90	9.416
Cognitive Component		**Secondary School Teacher**	49.53	3.955
		Middle School Teacher	52.25	3.719
Cognitive Component	**Knowledge Dissemination**	**Secondary School Teacher**	12.18	1.357
		Middle School Teacher	12.45	1.413
	Application of Knowledge	**Secondary School Teacher**	12.63	1.427
		Middle School Teacher	13.53	1.450
	Self-Development	**Secondary School Teacher**	12.68	1.421
		Middle School Teacher	13.43	1.412
	Importance of Science and Interest in It	**Secondary School Teacher**	12.05	1.753
		Middle School Teacher	12.85	1.861
Affective Component		**Secondary School Teacher**	50.08	3.619
		Middle School Teacher	51.15	4.515
Affective Component	**Carefulness in Judgment**	**Secondary School Teacher**	12.60	1.374
		Middle School Teacher	13.08	1.716
	Appreciation of Science	**Secondary School Teacher**	12.70	1.454

		Middle School Teacher	13.45	1.501
	Academic Integrity	**Secondary School Teacher**	13.00	1.485
		Middle School Teacher	12.98	1.874
	Ethics of Scientific Research	**Secondary School Teacher**	11.78	1.761
		Middle School Teacher	11.65	2.202
Skill-Based Component		**Secondary School Teacher**	45.68	4.190
		Middle School Teacher	48.50	4.315
Skill-Based Component	**Planning**	**Secondary School Teacher**	12.40	1.878
		Middle School Teacher	12.55	1.907
	Self-Criticism	**Secondary School Teacher**	10.80	1.436
		Middle School Teacher	11.60	1.776
	Scientific Courage	**Secondary School Teacher**	10.90	1.533
		Middle School Teacher	12.08	1.760
	Acceptance of Criticism	**Secondary School Teacher**	11.58	1.907
		Middle School Teacher	12.28	2.172

Source: Prepared by the researcher based on SPSS output.

It can be observed from the table that the **mean score of scientific values** among students in the **Secondary School Teacher** program is **(145.28)**, with a **standard deviation** of **(8.452)**, whereas the mean score among students in the **Middle School Teacher** program is **(151.90)**, with a standard deviation of **(9.416)**. This indicates that the level of **scientific values** is **moderate** among students in the **Secondary School Teacher** program and **high** among students in the **Middle School Teacher** program.

The **mean scores** for the **cognitive** and **affective components** were similar across both programs, indicating a **high level**. As for the **skill-based component**, the mean scores were also similar across both programs, but they indicated a **moderate level**.

To determine whether there are **statistically significant differences** at the **significance level (α = 0.05)** in the level of **scientific values**, their **components**, and their **dimensions** attributable to the **program variable** (**Secondary School Teacher**, **Middle School Teacher**), the results of the **t-test** presented in the following table are examined.

Table 08. t-test Values and Significance Levels for the Scientific Values Scale, Its Components, and Its Dimensions According to the Program Variable

Scale, Components, and Dimensions		T-value	Degrees of Freedom (df)	Significance Level (Sig.)
Scientific Values		-3.312	78	0.001
Cognitive Component		-3.175	78	0.002
Cognitive Component	**Knowledge Dissemination**	-0.888	78	0.377
	Application of Knowledge	-2.798	78	0.006
	Self-Development	-2.368	78	0.020
	Importance of Science and Interest in It	-1.979	78	0.051
Affective Component		-1.175	78	0.244
Affective Component	**Carefulness in Judgment**	-1.367	78	0.176
	Appreciation of Science	-2.270	78	0.026
	Academic Integrity	0.066	78	0.947
	Ethics of Scientific Research	0.280	78	0.780
Skill-Based Component		-2.971	78	0.004
Skill-Based Component	**Planning**	-0.354	78	0.724
	Self-Criticism	-2.223	78	0.029
	Scientific Courage	-3.185	78	0.002
	Acceptance of Criticism	-1.532	78	0.130

Source: Prepared by the researcher based on SPSS output.

Based on **Table 08**, it can be concluded that there are **statistically significant differences** in the level of **scientific values** attributable to the **program variable**. Therefore, the **second sub-hypothesis is not confirmed**, as the **significance level** is **(0.001)**, which is lower than **(0.05)**. This indicates the presence of **statistically significant differences** in the overall mean score of the **Scientific Values Scale**, with the difference favoring students in the **Middle School Teacher** program.

With regard to the **components of the scale**, the statistical results indicated the following:

There were **statistically significant differences** at the **significance level (α = 0.05)** in both the **cognitive** and **skill-based components**. The significance levels were **(0.002)** for the **cognitive component** and **(0.004)** for the **skill-based component**. Since both values are lower than **(0.05)**, they

indicate **statistically significant differences**, favoring students in the **Middle School Teacher** program.

However, there were **no statistically significant differences** in the **affective component**, as the significance level was **(0.244)**, which is greater than **(0.05)**.

Regarding the **dimensions of scientific values**, the significance levels were as follows:

The dimensions of **Knowledge Dissemination (0.377)**, **Importance of Science and Interest in It (0.051)**, **Carefulness in Judgment (0.176)**, **Academic Integrity (0.947)**, **Ethics of Scientific Research (0.780)**, **Planning (0.724)**, and **Acceptance of Criticism (0.130)** all yielded significance levels greater than **(0.05)**, indicating **no statistically significant differences**.

In contrast, the dimensions of **Knowledge Application (0.006)**, **Self-Development (0.020)**, **Appreciation of Science (0.026)**, **Self-Criticism (0.029)**, and **Scientific Courage (0.002)** yielded significance levels lower than **(0.05)**, indicating the presence of **statistically significant differences**, with these differences favoring students in the **Middle School Teacher** program.

These statistical findings, which indicate differences in the level of **scientific values acquisition** and their **components** according to the **program variable**, leading to the rejection of the **null hypothesis**, may be explained by the fact that the two programs follow **different training curricula** in terms of both the subjects taught and the content of the courses. In addition, these differences may be attributed to variations in the **duration of training**, which could be an important factor contributing to this disparity.

The findings of the present study differ from those reported by **Boughda and Bouaziz (2020)** in their study entitled **"Scientific Values Acquired by Graduating Students of the Department of Natural Sciences,"** which concluded that there were **no statistically significant differences** among Natural Sciences students attributable to the **program variable** (**Middle School Teacher**, **Secondary School Teacher**).

9-1-4 Presentation and Discussion of the Results in Light of the Third Sub-Hypothesis

Hypothesis Statement: There are no statistically significant differences at the significance level ($\alpha = 0.05$) in the level of scientific values acquisition and their components among students attributable to the university level variable (First Year, Final Year).

Table 09. Means and Standard Deviations of the Scientific Values Scale, Its Components, and Its Dimensions According to the University Level Variable

Scale, Components, and Dimensions		University Level	Mean	Standard Deviation
Scientific Values		**First Year**	144.70	8.795
		Final Year	152.48	8.617
Cognitive Component		**First Year**	49.70	3.653
		Final Year	52.08	4.129
Cognitive Component	**Knowledge Dissemination**	**First Year**	12.30	1.067
		Final Year	12.33	1.655
	Application of Knowledge	**First Year**	12.75	1.548
		Final Year	13.40	1.392

	Self-Development	**First Year**	12.60	1.429
		Final Year	13.50	1.359
	Importance of Science and Interest in It	**First Year**	12.05	1.947
		Final Year	12.85	1.657
Affective Component		**First Year**	49.40	3.967
		Final Year	51.83	3.915
Affective Component	**Carefulness in Judgment**	**First Year**	12.60	1.446
		Final Year	13.08	1.655
	Appreciation of Science	**First Year**	12.70	1.588
		Final Year	13.45	1.358
	Academic Integrity	**First Year**	12.78	1.747
		Final Year	13.20	1.604
	Ethics of Scientific Research	**First Year**	11.33	1.966
		Final Year	12.10	1.945
Skill-Based Component		**First Year**	45.60	3.999
		Final Year	48.58	4.443
Skill-Based Component	**Planning**	**First Year**	12.08	1.979
		Final Year	12.88	1.713
	Self-Criticism	**First Year**	10.48	1.432
		Final Year	11.93	1.542
	Scientific Courage	**First Year**	11.45	1.679
		Final Year	11.53	1.826
	Acceptance of Criticism	**First Year**	11.60	2.216
		Final Year	12.25	1.864

Source: Prepared by the researcher based on SPSS output.

It can be observed from the table that the **mean score of scientific values** among **First Year** students is **(144.70)**, with a **standard deviation** of **(8.795)**, whereas the mean score among **Final Year** students is **(152.48)**, with a standard deviation of **(8.617)**. This indicates that the level of **scientific values** is **moderate** among **First Year** students and **high** among **Final Year** students.

The **mean scores** for the **cognitive** and **affective components** were similar across both **university levels**, indicating a **high level**. As for the **skill-based component**, the mean scores were also similar across both levels, but they indicated a **moderate level**.

To determine whether there are **statistically significant differences** at the **significance level (α = 0.05)** in the level of **scientific values**, their **components**, and their **dimensions** attributable to the **university level variable** (**First Year**, **Final Year**), the results of the **t-test** presented in the following table are examined.

Table 10. t-test Values and Significance Levels for the Scientific Values Scale, Its Components, and Its Dimensions According to the University Level Variable

Scale, Components, and Dimensions		t-value	Degrees of Freedom (df)	Significance Level (Sig.)
Scientific Values		-3.994	78	0.000
Cognitive Component		-2.725	78	0.008
Cognitive Component	**Knowledge Dissemination**	-0.080	78	0.936
	Application of Knowledge	-1.974	78	0.052
	Self-Development	-2.887	78	0.005
	Importance of Science and Interest in It	-1.979	78	0.051
Affective Component		-2.752	78	0.007
Affective Component	**Carefulness in Judgment**	-1.367	78	0.176
	Appreciation of Science	-2.270	78	0.026
	Academic Integrity	-1.133	78	0.261
	Ethics of Scientific Research	-1.772	78	0.080
Skill-Based Component		-3.148	78	0.002
Skill-Based Compone	**Planning**	-1.933	78	0.057
	Self-Criticism	-4.357	78	0.000
	Scientific Courage	-0.191	78	0.849
	Acceptance of Criticism	-1.419	78	0.160

Source: Prepared by the researcher based on SPSS output.

Based on the **above table**, it can be concluded that there are **statistically significant differences** in the level of **scientific values** attributable to the **university level variable**. Therefore, the **third sub-hypothesis is not confirmed**, as the **significance level** is **(0.000)**, which is lower than **(0.05)**. This indicates the presence of **statistically significant differences** in the overall mean score of the **Scientific Values Scale**, with the difference favoring **Final Year** students.

With regard to the **components of the scale**, the statistical results indicated the following:

There were **statistically significant differences** at the **significance level (α = 0.05)** in all the scale components (**cognitive, affective, and skill-based**). The significance levels were **(0.008)** for the **cognitive component**, **(0.007)** for the **affective component**, and **(0.002)** for the **skill-based component**. Since all these values are lower than **(0.05)**, they indicate **statistically significant differences** across all components, with the differences favoring **Final Year** students.

Regarding the **dimensions of scientific values**, the significance levels were as follows:

The dimensions of **Knowledge Dissemination (0.936)**, **Knowledge Application (0.052)**, **Importance of Science and Interest in It (0.051)**, **Carefulness in Judgment (0.176)**, **Academic Integrity (0.261)**, **Ethics of Scientific Research (0.080)**, **Planning (0.057)**, **Scientific Courage**

(0.849), and **Acceptance of Criticism (0.160)** yielded significance levels greater than **(0.05)**, indicating **no statistically significant differences**.

In contrast, the dimensions of **Self-Development (0.005)**, **Appreciation of Science (0.026)**, and **Self-Criticism (0.000)** yielded significance levels lower than **(0.05)**, indicating **statistically significant differences**, with these differences favoring **Final Year** students.

These statistical findings, which indicate differences in the level of **scientific values acquisition** and their **components** according to the **university level variable**, favoring **Final Year** students and leading to the rejection of the **third sub-hypothesis**, may be explained by the fact that **Final Year** students have developed a more advanced **scientific mindset** and **scientific methodology** than students in the earlier years, particularly those in the **First Year**. This is due to their exposure to more specialized and in-depth courses, many of which emphasize **scientific knowledge**, **scientific facts**, the **philosophy of science**, and the **ethics of the teaching profession** (School Legislation course). This has had a positive impact on their way of thinking, their understanding of **scientific values**, and their application of these values. In contrast, **First Year** students study more general courses that serve as an introduction to their specialization, which may explain their lower level of **scientific values**.

Accordingly, the more the **university student** progresses through the years of study, the more they acquire **scientific knowledge** and **scientific methodology**, both theoretically and practically, and this is reflected in their behavior and practices, particularly within the **academic university environment**.

The findings of the **present study** were **partially consistent** with those of **Al-Shiyab (2014)** in the study entitled **"The Degree of Scientific Values Practice Among Students of the Faculty of Science at Yanbu, Taibah University, Saudi Arabia, from Their Perspective."** That study found **no statistically significant differences** attributable to the **academic level variable** among **Preparatory Year**, **First Year**, and **Second Year** students in the degree to which they practiced **scientific values**, while **statistically significant differences** were found for **Third Year** students.

Conclusion and Recommendations

The findings of the present study indicate that the level of scientific values among students is high. Furthermore, there were no differences in the level of scientific values acquisition and their components, except for the affective component, attributable to the specialization variable (Mathematics, Natural Sciences). The results also revealed differences in the level of scientific values and their components (cognitive, affective, and skill-based) attributable to the program variable (Middle School Teacher, Secondary School Teacher) and the university level variable (first year, final year). These values were acquired and developed by students throughout their period of study at the school through the efforts of the teaching staff, as well as through the students' own diligence and sense of responsibility toward the profession they will assume upon graduation. They are also aware of the importance of preserving these scientific values, particularly in light of rapid scientific and technological advancements.

Accordingly, the present study recommends the following:

- Examining the scientific values embedded in the curricula and educational courses studied by student teachers.
- Investigating the comprehensiveness and integration of the training provided to students and its role in developing scientific values.

- Examining methods for developing scientific values among students at the three pre-university educational levels.
- Investigating the competence of university faculty members, as they are responsible for instilling scientific values in their students.
- Examining the importance of scientific training courses in fostering a spirit of love for knowledge and science and in promoting the acquisition of scientific values.

References

1. Abu Jawdeh, Janan. (2011). Scientific Values Included in Science Textbooks for the Basic Education Stage and the Extent to Which Tenth Grade Students Possess Them. Unpublished Master's Thesis. Palestine: Al-Quds University.
2. Angers, Maurice. (2004). Scientific Research Methodology in the Humanities (Practical Exercises). Translated by Bouzid Sahraoui et al. Algeria: Dar El Kasbah.
3. Badawi, Bilal Abdel Aziz, & Al-Mukaimi, Hussein Zayed. (2009). Moral Values Among Scout Activity Participants in the Arab Republic of Egypt and Kuwait: A Comparative Study. Journal of Physical Education and Sports, Faculty of Physical Education, Menoufia University, Issue 16, pp. 155–169.
4. Boughda, Amani, & Bouaziz, Rania. (2020). Scientific Values Acquired by Graduating Students of the Department of Natural Sciences. Unpublished Bachelor's Dissertation. Algeria: Higher School for Teachers of Technological Education.
5. Khazali, Qasim. (2009). The System of Scientific Values Included in Science Textbooks for the First Stage of Basic Education in Jordan. Jordan Journal of Educational Sciences, Yarmouk University, Vol. 5, No. 2, pp. 115–135.
6. Al-Khatib, Yassin, et al. (2003). Child Socialization. Amman: International Scientific Publishing House.
7. Al-Drij, Mohammed. (2004). Purposeful Teaching. United Arab Emirates: University Book House.
8. Al-Shayyab, Moeen. (2014). The Degree of Scientific Values Practice Among Students of the Faculty of Science at Yanbu, Taibah University, Saudi Arabia, from Their Perspective. An-Najah University Journal for Research (Humanities), Vol. 3, No. 28, pp. 548–570.
9. Assaf, Mahmoud Abdel Majid. (2019). A Proposed Vision for Activating the Role of Basic Education Teachers in Developing Scientific Values Among Their Students. Imtiaz Journal of Educational and Pedagogical Sciences, Higher School for Teachers of Technological Education, Vol. 1, No. 1, pp. 16–39.
10. Assaf, Mahmoud Abdel Majid, & Al-Hadidi, Imad Amin. (2017). The Degree to Which Secondary School Teachers Represent Scientific Values Associated with the Knowledge Society in the Governorates of Gaza. Palestine University Journal for Studies and Research, Vol. 2, No. 7, pp. 30–62.
11. Al-Qahtani, Ibtisam Mohammed Hadi. (2017). Scientific Values Included in the Third-Year Secondary School Physics Textbook in the Kingdom of Saudi Arabia. Journal of Educational and Psychological Sciences, National Research Center, Gaza, Palestine, Vol. 1, No. 4, pp. 186–207.

12. Al-Mouji, Amani. (2016). Evaluation of Primary School Science Curricula in Light of a Proposed Framework of Scientific Values in Egypt. Arab Studies in Education and Psychology, Vol. 75, No. 75, pp. 471–513.