

Academic Laboratory Skills and their relationship to the achievement of practical organic chemistry among students of the Faculty of Education for Pure Science

Ibn Al-Haytham

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Abstract: The current research is to identify:

1- The level of laboratory academic skills possessed by students of the Faculty of Education for Pure Sciences, Ibn Al-Haytham.

2-Achieving practical organic chemistry among students of the Faculty of Education Ibn Al-Haytham for pure sciences.

3-The correlation between laboratory academic skills and the achievement of practical organic chemistry among students of the Faculty of Education Ibn Al-Haytham for Pure Sciences.

4- The statistically significant differences in the correlation between laboratory academic skills and the achievement of practical organic chemistry according to the gender variable (males) (females), and to achieve the objectives of the research, the researcher adopted a descriptive and correlational research approach and the research community was determined and his sample was chosen (students of the third stage/Faculty of Education/Ibn Al-Haytham /University of Baghdad) for the academic year (2021-2022), and his sample consisted of (214) male and female students, and it consisted of (101) female students and(113) male students .

In the research, the following tools were used:

1- Laboratory Academic Skills Scale: This included a scale on nine skills:

(Report writing skill, lecture follow-up skill, self-learning skill, effective study skill, time management skill, return skill, reading skill, thinking skill and scientific research skill), and its discriminatory strength, and its psychometric properties were verified, and the scale in its final form consisted of (45) paragraphs, Appendix (1).

2- The achievement test for the eight experiments of the practical organic chemistry of the third stage, where the test consisted of (40) paragraphs ,including (31) objective

paragraphs of a multiple choice type with four alternatives , and(9) paragraphs of article, and the psychometric properties of the paragraphs were calculated, and after verification, the test was applied in its final form e Appendix(2).

The research results showed:

1-The statistically significant laboratory academic skills that students at the university level must possess have reached (9)skills .

2- There are statistically significant differences at the level of significance(0.05) in the level of students' possession of laboratory academic skills.

3- The existence of a correlation between students' possession of laboratory academic skills and their academic achievement.

4- Differences in the correlation between laboratory academic skills and academic achievement according to the gender variable (male ,female) are all statistically significant, as the calculated Z_{score} was less than the tabular Z_{score} (1.960) at the level of significance (0.05) and with a degree of freedom (182), that is, there are no differences between them.

Chapter 1/The problem of research: Because of the great importance of chemistry, the interest in teaching chemistry and its teaching methods has become one of the basic priorities of the objectives of education in all scientific countries and all Arab countries, including Iraq, because of its great impact on scientific progress and the prosperity and progress of the country. If education can provide students with the basic concepts of chemistry and its laboratory skills among teachers and students, it will create a conscious academic generation that contributes effectively to progress and development (Al-Haidari, 4:2012)

The acquisition of laboratory academic skills and the development of mental processes are among the most important goals and objectives of teaching science, and the belief that the acquisition of these skills may help to increase and raise the level of educational and knowledge achievement of students and the development of their mental processes. (Educational Sciences, Volume2016:43)

Therefore, there is an urgent need for students to have the information, knowledge and laboratory academic skills necessary for the success of laboratory work and to help students to perform their future duties and tasks with all ability, and this is confirmed by previous studies, research and literature (Alham Al-Hakimi 2003) (Ahmed A for Hanif 2006), (, Saunders 1998).

Therefore, the lack of use of the laboratory by the students of the Department of Chemistry , and the reluctance to conduct experiments is not always due to the lack or lack of materials and laboratory equipment, but may be due to their low level of

proficiency in the laboratory academic skills necessary to carry out the activities and experiments, which leads to the question of the laboratory academic skills that students possess in this advanced university stage, which enables them to implement the practical aspect in the laboratory with high skills in the final stage in which students are supposed to be prepared for that.

The importance of research: Our current society (the society of the twenty-first century) faces many transformations and challenges, including the accelerating transformations in various areas of life, the challenges of rapid changes, the information and knowledge revolution and the employment of communication and information technology, so the traditional and traditional means, methods and tools are no longer able to keep pace with these rapid changes, transformations and challenges and cannot contribute to the development of development in its multiple forms effectively, all of which led to the rethinking and review of thinking, construction and organization, and the increasing need for creative initiatives to reform curricula in education, as the only way to prepare scientific energies and the basic construction of society content and structure. All this requires preparing the learner to participate in active learning to build and use knowledge and to achieve scientific and technological culture according to the needs and interests of the learner in the present and the future on the one hand and the social and personal context on the other hand.

Research Objectives/The current study aims to identify:

- 1- The level of laboratory academic skills possessed by students of the Faculty of Education for Pure Sciences, Ibn Al-Haytham.
2. Achievement of practical organic chemistry by students of the Faculty of Education Ibn Al-Haytham Pure Science.
- 3-The correlation between laboratory academic skills and the achievement of practical organic chemistry among students of the Faculty of Education Ibn Al-Haytham for Pure Sciences.
- 4- The statistically significant differences in the correlation between laboratory academic skills and the achievement of practical organic chemistry according to the gender variable (males, females).

search limits

1. Spatial boundaries: Students of the Department of Chemistry, third stage, Faculty of Education, Ibn Al-Haytham Pure Science, University of Baghdad.

2- Scientific limits: Practical organic chemistry experiments (preparation of estalide, preparation of para-nitrostenlide, preparation of para-

nitroaniline, preparation of para-iodoaniline, preparation of cyclohexanone phenylhydrazone, preparation of beta-hydroxyl-alpha-naphthaldehyde (Raimer Tiemann)).

3. **Time limits:** academic year (2021-2022)

Define terminology

First : The skill was defined by each of the following:

(Tawfiq Meri and Muhammad Al-Hilah, 2002) As a complex pattern of purposeful activity, its performance requires management, processing, and coordination of previously learned information and training (Tawfiq Meri and Muhammad Al-Hilah, 2002: p. 215) and Zaytoun defined it, 2008: The acquired ability that enables the learner to accomplish the work entrusted to him. (Zeytoun, 2008)

Second: Academic skills/ defined by (Kuwaiti, 2011) are the set of educational skills e Basic cognitive e Associated Materials e. (Kuwaiti, 2011)

Third: Laboratory skills/ defined (Manufacturer, 56 :2006): - It is a set of applied practices for science teachers in the laboratory in terms of implementing the planned scientific experiments. (Manufacturer, 56:2006)

Fourth: Laboratory Academic Skills

The researcher has defined it because she did not find a definition of it is a set of scientific and cognitive skills that the learner needs to work in the laboratory accurately and proficiently to achieve the objectives of teaching science

* (Abujado, 425:2009) defined it as the result of what the student learned after a certain period of time and can be measured by the degree that the student gets in the achievement test, and the student's access to knowledge that translates into grades.

(Abu Jadoo, 425:2009)

Chapter 3/Theoretical Framework: Skills in the Light of Constructivist Theory

Constructivism theory:

Constructivism as a concept emerged in the past and played an important role in the natural sciences, but the attention to it as a method of application in all sciences did not crystallize except in our modern era, and one of the modern fields invaded by the Constructivism theory is the field of education, as it emerged in a new dress represented in practical application and teaching strategies aimed at building knowledge in (Al-Dulaimi, 18 :2014)

The importance of laboratories in the teaching of chemistry

Evolution in the educational process takes many forms, including innovation in the use of teaching methods and methods and diversification in practical activities aimed at acquiring skills and learning. This means adopting modern methods and strategies in teaching and learning. (REZBLET, 2016)

(Al-Hazmi, 2010) finds that through the laboratory, the teacher and the learner are able to conduct practical or verbal activities, or both, and the science lesson requirements are available to conduct experiments to achieve their teaching objectives. A lab may be called a custom-made table, which can be moved between classrooms

(Al-Hazmi,2010: 40)

Why should students learn laboratory academic skills?

All students seek to succeed and progress in their studies, whether they are students in the early stages of education or students in the secondary and university levels, all of them share their firm and strong desire to succeed, but many of them linger and stumble in achieving their goals. Some achieve their goals by chance and luck. These skills include:

- 1- Effective Study Skill,2- Time Management Skill,3- Review Skill,4- Report Writing Skill,5- Reading Skill,
- 6- The skill of scientific research,7- The skill of following up lectures,8- The skill of self-learning,9- The skill of thinking.

The relationship of the laboratory to the development of the academic skills of the students and their attitudes towards the learning of chemistry

Laboratory teaching is one of the basic aspects of teaching chemistry and teaching science in all other university disciplines, and the laboratory work coincides with the theoretical aspect, as the faculty members at universities are keen to develop the skills of laboratory work for their students because it is a major goal of the laboratory activity and an important part of the study programs. Those concerned emphasize the effective role of a laboratory in teaching chemistry and the positive aspects it achieves in the student's personality, such as developing their scientific tendencies, improving their abilities to solve problems, their love for scientific exploration, developing their creative thinking, and developing their scientific thinking and scientific skills. (Malcolm and Abdallah, 155:1994)

Second: Academic achievement is one of the most complex educational concepts, because many different processes and factors participate in it (personal, social, school,

and economic), and it is one of the most important areas that provide the opportunity to reveal students' abilities and develop students' talents and aspirations.

(Hamdan, 1996: 65)

Chapter Three/Research Procedures: This chapter includes the research methodology and procedures in terms of identifying the research community and the sample, verifying the psychometric characteristics of the measures and tests adopted in the research, namely (the laboratory academic skills scale), (the practical organic chemistry achievement test), and identifying the statistical means used in the current research.

First: Research Methodology: Research Methodology

In order to achieve the objectives of the research, the researcher adopted (descriptive and associative approach) in identifying the correlation between laboratory academic skills and the achievement of practical organic chemistry among students of the Faculty of Education Ibn Al-Haytham. This approach depends on the description of the phenomenon, and how to determine the relationships between its elements or between them and another phenomenon for the purpose of analysis, evaluation and interpretation to reach generalizations. (Abbas, 74:2009)

Second: Research Community: Research Community

The research community consists of all students of chemistry in the third phase of the morning and evening studies, Faculty of Education, Ibn Al-Haytham Pure Science, University of Baghdad, for the academic year (2021-2022). After providing the researcher with the task facilitation book, it was found that the number of students reached (214) by (113) students and (101) students distributed over four divisions according to the statistics of the Department of Chemistry at the Faculty of Education for Pure Science/Ibn Al-Haytham for the academic year (2021-2022).

Third: The research sample: The research sample

In order for the sample to be representative of the original community, the researcher took a sample of (184) male and female students from the Faculty of Education, Ibn Al-Haytham for Pure Sciences, the Department of Chemistry, the third stage, morning and evening, and in a simple random way, with a percentage of (86%) of the research community, and by gender, with (122) students for morning study and (62) students for evening study.

Fourth: Research tools

In order to reach the objectives of the current research, it was necessary to provide two tools that have statistical and psychometric characteristics, and in a clarification of each tool:

First: Laboratory Academic Skills Scale

1. Defining the objective of the scale

The measure aims to measure the level of laboratory academic skills among students of the Faculty of Education for Pure Sciences, stage 3, Department of Chemistry in the practical organic chemistry for the academic year (2001-2002).

2- examining previous studies:

After reviewing many previous studies and research related to the subject of the research and its objectives, and because of the lack of an appropriate tool to measure the laboratory academic skills of the students of the Department of Chemistry, the researcher resorted to building a scale of these skills based on the literature and previous studies, including the study of Laayoune (2001), the study of Al-Nouhi (2001), and the study of Al-Faleh (2005), and I have benefited from these studies in determining laboratory academic skills, and the researcher identified (9) key skills after taking the opinion of arbitrators and those with experience in this field to determine the skills and these skills include(writing reports, scientific research, reading, time management, effective study, self-learning, review, thinking, following up lectures).

The researcher built the paragraphs of the laboratory academic skills scale of the students of the Faculty of Education as follows:

3. Formulation of paragraphs and their alternatives:

After identifying the skills of the scale , the researcher formulated a set of paragraphs that represent the laboratory academic skills, as (6) paragraphs were drafted for each skill initially to reach the total number of paragraphs of the scale (54) paragraphs. Five alternatives were placed in front of each paragraph respectively and Table (1) shows this.

Table (1) Alternatives to responding to the paragraphs of the Laboratory Academic Skills Scale and their weights

Response Alternatives	I agree with her very, very much.	I agree with her quite a bit.	I agree with her with a grade of *medium	I agree with her relatively little.	I agree with her very little.
Paragraph Weight	5	4	3	2	1

The respondent chooses only one of the five alternatives in each paragraph of the scale . The overall score for each respondent was calculated by adding up the scores for the metric paragraphs.

4. Validity of the laboratory academic skills scale (validity of paragraphs).

In order to identify the validity of the paragraphs of the laboratory academic skills scale, the researcher presented the scale in its initial form of (54) paragraphs to 20 arbitrators

who specialize in methods of teaching chemistry, measurement and evaluation, teaching chemistry laboratories and specialists in the field of chemistry to express their opinions and observations about the validity of the instructions and the validity of the paragraphs of the scale and the suitability of the paragraphs to measure laboratory academic skills. In light of what the arbitrators decided, some paragraphs were amended and others were deleted, and 80% or higher of the arbitrators' opinions were adopted as a cut-off point for accepting the paragraph or not, and in light of that, (10) paragraphs were deleted from the scale that were not approved, so that the scale becomes the final(applied) version of the statistical analysis sample consists of (45) paragraphs,

5- The first exploratory experiment: The first exploratory experiment was applied for the purpose of identifying the suitability of alternatives, identifying the clarity of paragraphs and instructions, and calculating the response time.

6- The second exploratory sample: Statistical analysis of the paragraphs of the laboratory academic skills scale:

In order to carry out the statistical analysis of the paragraphs of the scale , the laboratory academic skills scale, which consists of (45) paragraphs, was applied to the sample of statistical analysis of (184) male and female students. The sample size of statistical analysis is appropriate to analyze the paragraphs of the laboratory academic skills scale. The laboratory academic skills scale was applied on Monday, 17/1/2022. The scale was applied to students after providing the researcher with a book to facilitate the task. For the purpose of statistical analysis, the researcher carried out the following:

a. Discriminatory power of paragraphs:

For the purpose of finding the discriminatory strength of the scale paragraphs, the T-test was used for two independent samples. The calculated T-value was considered an indicator to distinguish the paragraph by comparing it with the tabular T-value, which is equal to (1,980) at the significance level (0.05) and the degree of freedom (98). It was found that all the calculated T-values for all the paragraphs are greater than the tabular T-value, which is statistically significant, i.e. distinctive.

Constructs Validity Indicators

B- The relationship of the degree of paragraph to the total degree of the scale

This method depends on finding the correlation between the degree of each paragraph of the scale and the total degree of (184) forms, which are the same forms that were subjected to statistical analysis, and the statistical processing showed that all the paragraphs of the scale are statistically significant at the level of significance(0.05) and degree of freedom(182), and all the values of the coefficients related to the total degree of the scale were greater than the tabular value of(0.139).

C- The correlation of the degree of paragraph with the degree of skill to which it belongs

In order to calculate the correlation coefficient between the degree of paragraph and the degree of skill to which it belongs, the correlation coefficient (Pearson) was used to find the values of the correlation coefficient and the statistical processing showed that all paragraphs are statistically significant, as the values of the correlation coefficients calculated were greater than the table value (0.139) at the significance level (0.05) and degree of freedom (182).

D- The relationship of the degree of each skill with the laboratory academic skills scale

The degree correlation of each skill was extracted with the total degree of the laboratory academic skill scale, and it was found that all correlation coefficients are statistically significant, as the Pearson correlation coefficient was used, as all the values of the correlation coefficients were greater than the table value (0.139) at the significance level (0.05) and with a degree of freedom (182),

E- Internal correlations between skill scores with each other to measure the skills of the laboratory academy:

The internal correlation matrix was extracted between the scores of each skill and the other skills, and it was found that all correlation coefficients are statistically significant, the Pearson correlation coefficient was used, as all the values of the correlation coefficients were greater than the table value (0.139) at the significance level (0.05) and with a degree of freedom (182),

*** The stability of the scale (Scales Reliability):** For the purpose of calculating the stability of the laboratory academic skills scale, the scores of the stability sample were analyzed by analyzing the scores of the statistical analysis sample of (184) forms, and the stability was calculated in two ways:

a. Cronbach's Alpha equation:

To ensure the stability of the scale, the Alpha-Cronbach equation (Cronbach Alpha) was used, and it was found that the stability coefficient using this equation is equal to (0.81). This means that the stability coefficient is good, as the stability coefficient is good if its value is not less than (0.67). (Al-Nabhan, 2004:284)

B - Half Split Method: (Half Split) And because the number of paragraphs of the laboratory academic skills scale (45) items is an odd number, the researcher adopted the Rolon method for half splitting, where this method is considered to calculate the stability between the two half of the test in the event that the number of test paragraphs or the scale is individually, i.e. the inequality of the number of paragraphs between the two half of the test (Al-Dulaimi, 2019), he found that the coefficient of stability using this method is equal to (0.84) .

7. The measure in its final form

After verifying the validity and stability of the scale and calculating the discriminatory strength of its paragraphs, the measure in its final form consisted of (45) paragraphs ready to measure the laboratory academic skills of students. APPENDIX 1

II. Achievement test in practical organic chemistry

The researcher built an achievement test for the purposes of the current research to be able to determine the achievement level of students of the Faculty of Education for Pure Sciences in the practical organic chemistry, and the following is a detailed explanation of these steps:

1. The objective of the test is defined as:

The goal of the application of the achievement test is to measure the academic achievement of the students of the research sample in the practical organic chemistry at the six cognitive levels (recall, understanding, application, analysis, composition and evaluation).

2. Determination of content (scientific material):

The content of the eight experiments of the practical organic chemistry for the academic year (2021-2022), which was determined by the researcher within the limits of her research, which includes (preparation of acetaldehyde, preparation of para-nitrobenzylidene, preparation of para-nitroaniline, preparation of para-iodination, preparation of cyclohexanone phenylhydrazone, Reimer-Titman reaction, condensation of Canizaro and preparation of pentachol-Pitacholone) was determined in terms of the time taken to conduct the experiment and the topics she dealt with.

3. Formulation of behavioral purposes

Behavioral goals must be formulated clearly and specifically to describe the expected performance of the student, i.e., to show the change required in the student's behavior after the completion of the educational situation. (Kojak, 2001: 172)

The researcher formulated a number of behavioral goals based on the established practical organic chemistry and its content, and the number of goals reached (143) as in Table (2), and the goals consist of six levels of the cognitive domain according to Bloom's classification (recall, comprehension, application, analysis, composition, evaluation).

Table (2) Distribution of behavioral purposes between the levels of the knowledge field and the content of experiences

Total	Calendar	Installation	The Analysis	The Application	The Understanding	Remembering	Behavioral objects The Experiences	No.
20	1	1	4	3	9	2	Preparation of steroids	1

20	2	3	1	1	11	2	Preparing Parra-Nitro Steinlide	2
15	1	3	1	1	7	2	Para-nitroaniline preparation	3
23	2	2	1	1	14	3	Preparing Para-Iudo Aniline	4
14	1	3	2	1	5	2	Preparation of Cyclohexanonephenylhydrazine	5
19	2	4	3	1	8	1	Preparation of beta-hydroxy-alpha-naphthaldehyde (Raimertiemann)	6
15	1	3	2	1	6	2	Kanizaro condensation	7
17	1	4	1	1	8	2	Pentacol - BN Acolone	8
143	11	23	15	10	68	16	Total	

4 - Validity of the table of specifications for behavioral purposes (content validity)

In order to verify the validity of the content for behavioral purposes, the researcher presented the table of specifications for behavioral purposes to a group of arbitrators specialized in methods of teaching chemistry, educational psychology, measurement and evaluation, to indicate their views and observations on the validity of behavioral purposes for the content of practical experiments. The researcher relied on the percentage of agreement between the arbitrators to accept the behavioral purpose or not. Thus, all behavioral purposes obtained an agreement rate of 80% or more, which the researcher promised as a criterion for accepting the behavioral purpose.

5-Preparation of the test map for the achievement test paragraphs (specifications table)

After completing the definition of the content and the formulation of behavioral purposes, the researcher identified (40) paragraphs for the achievement test. The researcher used the opinions of a number of professors and teachers of practical organic chemistry laboratories and the opinions of experts and specialists after they were informed of the behavioral purposes of the content of the eight experiments of the practical organic chemistry of the third phase, where it was agreed to limit the number of paragraphs for the test (40) paragraphs. It was distributed to the experiments within the research limits of the scientific material and the behavioral purposes that will be measured. The researcher extracted the weights or concentration ratios for each of the content and behavioral purposes and the number of paragraphs at each level as shown in the following table:

(Table 3)The test map of a sample of behavioral goals to represent them in the achievement test

100%	Calendar 8%	INSTALLATION 16	Analysis 10%	Application 7%	Understanding 48%	Remembering 11%
3		1	0	0	2	0
7	1	1	1	1	3	1
6	0	1	1	0	3	1
6	0	1	1	0	3	1
3	0	1	0	0	2	0
8	1	1	1	1	3	1
3	0	1	0	0	2	0
3	0	1	0	0	2	0
40	2	8	4	2	20	4

6 - Formulate the paragraphs of the achievement test:

The researcher prepared the paragraphs of the intermediate test. The test paragraphs, consisting of (40) paragraphs in its initial form, which includes (31) objective paragraphs of the type of multiple choice (4 alternatives) and (9) paragraphs of an article based on the purposes of TB and Kia, the researcher placed in front of each objective paragraph four alternatives, one of the paragraphs is correct and the rest is wrong. The wrong alternatives are characterized by homogeneity between them, so the percentage of resort to guesswork is reduced, and the achievement test was presented to the arbitrators specialized in the field of chemistry and methods of teaching chemistry and a number of teachers, and amendments were made to some paragraphs, and then the test was corrected after consultation with the supervising doctor, specialists and experts in this field as a model to answer every question on which I rely in correcting the test.

7- Validity of achievement test paragraphs (apparent validity) :

The apparent validity of the achievement test paragraphs with behavioral purposes (in their initial form) was verified after it was presented to a group of arbitrators, and specialists in the field of teaching methods of chemistry and educational psychology, measurement and evaluation, and chemistry, in order to indicate and know their views and observations on the validity of the test paragraphs in measuring what was set for him. The researcher relied on Cooper's equation to calculate the percentage of agreement between the agreeing and disagreeing arbitrators, and that the test paragraphs

are valid as they obtained an acceptance rate of (80%) and more. With this procedure, all the paragraphs of the achievement test have an agreement rate of 80% or more.

8- Reconnaissance Experience//A - The first reconnaissance experience:

In order to reveal the clarity of the test items, the clarity of the instructions, their wording, and the time taken to answer, the test was applied to a first exploratory sample of students other than the research sample consisting of (30) male and female students of the Faculty of Education for Pure Sciences Ibn Al-Haytham Morning Study. The researcher clarified the instructions to students and informed students a week before the test date. It was found that the test instructions and its paragraphs were clear, and the estimated time for answering the test items was calculated. The time allocated for answering the test items was (75) minutes. The first survey sample also revealed the lack of students' inquiries about the test items, which indicates the clarity of the test items and instructions.

B- The second exploratory experiment:

After the researcher confirmed the clarity of the test instructions and the clarity of its paragraphs and the time it took to answer the test application to extract the statistical and psychometric characteristics, a simple random sample was chosen consisting of (86) students and (98) students for the morning studies and in cooperation with the professors of the subject, and she informed the students of the date of the test a week before its application, and the researcher herself supervised the application.

A- Paragraph difficulty coefficient: The difficulty coefficient for the objective paragraphs was calculated to range between (0.36-0.64), and a good and acceptable difficulty coefficient. Accordingly, the difficulty of the test paragraphs for the objective questions is appropriate, and the difficulty of the article questions was calculated by adopting its own difficulty coefficient, and it was found that its value is (0.40-0.55). Thus, the test paragraphs are acceptable and good and the difficulty coefficient is appropriate because they fall within the specified range.

B- Paragraph discrimination coefficient: The discrimination coefficient for each of the objective test paragraphs was calculated based on the equation of the discrimination coefficient for the objective paragraphs, and it was found that it ranged between (0.44-0.76). The discrimination coefficient for the article paragraphs was also calculated by adopting its own discrimination coefficient equation, and it was found that its value is (0.30-0.48), and thus the achievement test paragraphs are distinctive.

C- The effectiveness of the wrong alternatives: After calculating them, it became clear that the wrong alternatives have all their values negative, it has been shown that the wrong alternatives have attracted more students from the lower group compared to the students from the upper group, so they have been kept unchanged

9 - The psychometric properties of the achievement test//the stability of the achievement test:

For the purpose of calculating the stability of the achievement test, which consists of (40) paragraphs, the stability sample scores were analyzed by analyzing the scores of

the statistical analysis sample of (184) forms, and the stability was calculated in two ways:

1- Alpha-Cronbach technique:

Because the achievement test consists of objective and temporary paragraphs, the best way to extract stability is the equation of Alpha-Cronbachs-Alpa, and the stability coefficient reached (0.83), which is a good stability coefficient, as the test is characterized by stability if its value is (0.67) or more. (Al-Nabhan, 2004: 240)

2-Method of liquidation:

The researcher calculated a correlation coefficient (Pearson) between the two half of the test, and the stability coefficient in this way reached (0.78), which represents half of the correlation, and after correcting it with the Spearman-Brown formula, it reached (0.88), which is a good stability coefficient.(Auda,226:2002)

12- The achievement test in its final form:

The achievement test shall be in its final form of (40) test items of two types, the first of which shall be of the objective test type. Multiple choice of four alternatives has reached the number of (31) paragraphs, and it has given a score of (1) for the correct answer, and a score of (0) for the wrong or abandoned answer, and(9) paragraphs of an article, taking the scores of (0-3). Therefore, the highest score on the achievement test is (58) marks, and the lowest score is (0).

Chapter Four

Presentation and interpretation of results

First: Presentation, interpretation and discussion of the results/This chapter includes a presentation of the results of the research reached, interpretation and analysis, and then a statement of conclusions, recommendations and proposals as follows:

The first objective: To identify the level of laboratory academic skills possessed by students of the Faculty of Education for Pure Sciences Ibn Al-Haytham .

In order to verify the current research objective, the laboratory academic skills scale was applied to the research sample of (184) students. The results showed that their average score on the scale was(140.554) degrees and with a standard deviation of (16.564) degrees , and when weighing the significance of the difference between the arithmetic average and the hypothetical average of the scale, which was (135) degrees , and using the T-test of one sample, it was found that the difference was statistically significant and in favor of the arithmetic average, as the calculated T-value of (4.549) was higher than the tabular value of (1.960), with a degree of freedom (182) and a significance level of (0.05), and Table (4)shows this.

Table (4)

One Sample T-Test for Laboratory Academic Skills Scale Scores

Variable	Sample	Sample arithmetic mean	deviation normative	Hypothetical average scale	T value		Significance level	Difference Significance
					Calculated	tabular		
Laboratory Academic Skills	184	140.554	16.564	135	4.549	1.960	0.05	Function

The second goal: Achieving practical organic chemistry among students of the Faculty of Education Ibn Al-Haytham for Pure Sciences.

In order to verify the current research objective, the achievement test was applied in the practical organic chemistry to the research sample of (184) students. The results showed that the arithmetic mean (130.635) degrees and a standard deviation of (4.978) degrees, and when weighing the significance of the difference between the arithmetic mean and the hypothetical mean of the test, which reached (29) degrees, and using the T-test of one sample, it was found that the difference is statistically significant and in favor of the arithmetic mean of the sample, as the calculated T-value of (4.457) was higher than the tabular value of (1.960), with a degree of freedom (182) and a level of significance (0.05), and Table (5) shows this.

Table (5) Results of the T-test of one sample of achievement test scores in practical organic chemistry

Sample	Sample arithmetic mean	deviation normative	Hypothetical average of the test	T value		Significance level	Difference Significance
				Calculated	tabular		
184	30.635	4.978	29	4.457	1.960	0.05	Function

Table (23) shows that there is a statistically significant difference between the arithmetic mean of the sample and the hypothetical average of the achievement test, where the calculated T-value was greater than the tabular T-value.

Third Objective: - The correlation between the skills of the laboratory academy and the achievement of practical organic chemistry among students of the Faculty of Education Ibn Al-Haytham Pure Science

To identify the type and nature of the relationship between laboratory academic skills and achievement, the Pearson correlation coefficient was calculated on the students' scores in the practical organic chemistry achievement test, and their scores in the laboratory academic skills scale, so the results were as shown in Table (6).

Table (6): Pearson correlation coefficient results for laboratory and test academic skill scale scores Achievement of practical organic chemistry

Skills	The value of the correlation coefficient calculated between the achievement test of the practical organic chemistry	Tabular Value	Significance level	Difference Significance
report writing	0.212***	0.139	0.05	Function
Academic research	0.446	0.139	0.05	Function
Reading	0.235	0.139	0.05	Function
Time management	0.506	0.139	0.05	Function
Active Study	0.296	0.139	0.05	Function
Self-learning	0.482	0.139	0.05	Function
Audit	0.228	0.139	0.05	Function
Thinking	0.282	0.139	0.05	Function
Follow the lectures	0.214	0.139	0.05	Function
Laboratory Academic Skills	0.341	0.139	0.05	Function

It is clear from Table (6) that the correlation between laboratory academic skills and academic achievement in practical organic chemistry is statistically significant and has a positive directional relationship, that is, the more students possess laboratory academic skills, the more they achieve their academic achievement. The students' acquisition of laboratory academic skills and their possession of them bring them closer to the scientific material for laboratory experiments, where they have a desire towards the scientific material and interact more and thus increase their academic achievement, but it is still less than the level of ambition.....It is an expected relationship because the

university books, the teaching methods used, the strategies used and the means of evaluation used are still within the traditional framework that focuses on conservation and indoctrination and does not help the development of basic science processes, thinking, self-learning and other laboratory academic skills, as well as the lack of educational activities such as laboratory courses, scientific travels, competitions, chemistry exhibitions, membership laboratories and others that help students acquire important laboratory academic skills, which in turn contribute to raising the correlation of variables.

Fourth Objective: The statistically significant differences in the correlation between laboratory academic skills and the achievement of practical organic chemistry according to the gender variable(males ,females).

To identify differences in the correlation between the skills of the laboratory academy and the achievement of the practical organic chemistry according to the gender variable, the Pearson correlation coefficient was calculated and its values were converted into Fischer's standard values and extraction of the meta-value. The results were as shown in Table (7).

Table (7)Results of the hypothetical values of the differences in the relationship between the skills of the laboratory academy and the testAchievement of practical organic chemistry

Skills	The value of the correlation coefficient, the achievement test for practical organic chemistry		Standard crust value		Calculated Zero Value	Difference Significance Function
	Males	Females	Males	Females		
report writing	0.243***	0.230	0.250	0.234	0.108	Not significant
Academic research	0.410	0.310	0.436	0.321	0.777	Not significant
Reading	0.480	0.324	0.523	0.337	1.256	Not significant
Time management	- 0.532***	0.388	0.590	0.406	1.243	Not significant
Active Study	0.487	0.276	0.530	0.282	1.675	Not significant
Self-learning	0.643	0.480	0.767	0.523	1.648	Not significant
Audit	0.410	0.288	0.436	0.293	0.966	Not significant

Thinking	-0.365	x0.330	0.383	0.343	0.270	Not significant
Follow the lectures	0.410	0.265	0.436	0.271	1.114	Not significant
Laboratory Academic Skills	0.280	0.255	0.288	0.261	0.182	Not significant

It is clear from Table (7) that the differences in the correlation between the skills of the laboratory academy and the academic achievement in the practical organic chemistry according to gender (males, females) are all not statistically significant, as their calculated values were less than the tabular values (1.960) at the level of significance (0.05) and with a degree of freedom (182).

The researcher sees a compatibility between laboratory academic skills with the general goal of education from teaching science, i.e. making students the focus of the educational process.

Conclusion

In light of the results of the current research, we can come to the following conclusions:

- 1-The statistically significant laboratory academic skills that students at the university level must possess have reached (9) skills .
- 2-There are statistically significant differences at the level of significance (0.05) in the level of students' possession of laboratory academic skills.
- 3- The existence of a correlation between students' possession of laboratory academic skills and their academic achievement.
- 4- The differences in the correlation between laboratory academic skills and academic achievement according to the gender variable (male ,female) are all statistically different, as the calculated Z_{score} was less than the tabular Z_{score} (1.960) at the significance level (0.05) and with a degree of freedom (182), that is, there are no differences between them.

As an example, the European Community and its member States, and

In light of the findings of the current study, and in light of the methodology and limits of the study, the researcher presents a set of recommendations that can contribute to the practical application of the results of the study in the field of laboratory performance. The following is a presentation of these recommendations:

- 1-Using modern strategies and teaching methods in laboratory teaching that help students acquire laboratory academic skills.

2- Utilizing the laboratory skills scale in the current research and including it for all experiments in their laboratory curricula and preparing it as a tool to measure the laboratory performance of students.

IV. Proposals

The researcher proposes to conduct the following studies:

1-Conducting more studies on the use of the laboratory and providing students with laboratory academic skills for a larger sample and comparing them with laboratory work skills.

2-Conducting a study similar to the current study to show its relationship in the development of the trend towards organic chemistry.

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Appendix No. (1) Laboratory Academic Skills Scale

Applies to me with a degree					Skill	No.
Very few.	Relatively few.	Average	You're proportional big.	Endless.		
					I choose a clear and understandable title that expresses the main idea of the report	1
					Take into account aspects and ethics of scientific research when writing reports (scientific secretariat)	2
					I follow a logical organization when organizing information and take into account the sequence of ideas regularly and accurately	3
					I present the chemical content of a clear and smooth adult, free from ambiguity and mistakes	4
					Sponsor writing resources scientifically and correctly	5
					I rely on myself to search for information	6
					I acquire information from reliable and modern sources that are most useful for writing the report	7
					I apply the knowledge and information available in solving my problems to get new information	8

					Use more senses to solve problems in the lab	9
					I follow the method of systematic scientific investigation in searching for information from different sources and accurately	10
					I put questions and keywords while reading	11
					I prefer to read in SQ3R and mean (survey,ask,read,study,review)	12

Achievement Test Appendix No.(2)

Quiz Items	No.
<p>Why is aniline effective?</p> <p>A-Because of the presence of the group (NH₂) pulling induction and the motive resonance and since the resonance is stronger So the electronic dual of the nitrogen atom goes into resonance with the ring.</p> <p>B - Because of the presence of the group (NH₂) pulling induction and the motive resonance and since the resonance So the electron dual of the nitrogen atom doesn't go into resonance with the ring.</p> <p>C - Because of the presence of the group (NH₂) pulling induction and the motive resonance and since the resonance So the electron dual atom of nitrogen doesn't go into resonance with the ring.</p> <p>D- Because of the presence of the group (NH₂)inductor and puller resonance and since resonance Weaker so the electronic duplex of the nitrogen atom goes into resonance with the ring</p>	1
<p>Why not aniline directly?</p> <p>A-Because the direct nitrate of the aniline we get the compound 6,4,2-trinitroaniline Not para-nitro-aniline.</p> <p>B -Because the direct nitrate of aniline we get the compound 3,4,6 trichloroaniline Not para-nitro-aniline.</p> <p>C -Because the direct nitrate of the aniline we get the acetylide dBecause the direct nitrate of aniline is 6.4.5 tribromoaniline, not nitroaniline.</p>	2
<p>The type of reaction in the acetylide preparation experiment is:</p> <p>a-acetyl , b-oxidation, c-halogenation, d-nitrification</p>	3
<p>Ice acetic acid is:</p> <p>A-is three molecules of acetic acid acquired a water molecule</p> <p>B-It is concentrated acetic acid without any drop of water</p> <p>C-It is two molecules of acetic acid acquired a water molecule</p> <p>D-It's three molecules of acetic acid that have lost two molecules of water.</p>	4

<p>Tools used to prepare para-nitroaniline should be dry because:</p> <p>A-Because in the presence of water and acids, a hydrolysis of the stenoid occurs and to aniline.</p> <p>B-Because in the presence of water and acids, there is dilution of the reaction and prod astilide</p> <p>C -Because in the presence of water, there is disturbance of the solution</p> <p>D-Because in the presence of water, a gelatinous deposit is formed</p>	5
<p>The reason for cooling the reaction vessel during the addition of concentrated acids w preparing para-nitrostenlide is:</p> <p>a. To increase the kinetic energy of the spike, the NO_2 group is directed towards the Or site.</p> <p>B.To reduce the kinetic energy of the reaction, a group (NO_2) is directed towards the s para.</p> <p>c. To increase the kinetic energy of the reaction, the NO_2 group is directed to the para s</p> <p>d. To increase the kinetic energy of the reaction, the NO_2 group is directed towards the site.</p>	6