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Abstract:

Poor linguistic competence among deaf and hard-of-hearing students is one of the most significant challenges facing the educational process, given the link between language and the development of thinking, learning, and communication. Poor language acquisition and comprehension negatively affect academic achievement, particularly in reading and writing skills, and are linked to factors such as early hearing loss, delayed educational intervention, and the absence of teaching strategies tailored to the specific needs of this group. To address this problem, this study aimed to examine the impact of metacognitive strategies on the development of Arabic linguistic competence in a group of D/HH students. To this end, a descriptive and quasi-experimental approach was adopted with a sample of 40 students from "Lalla Asmae Foundation for the D/HH" who were trained in the 5E's Learning Cycle and Self-Questioning. Data were then collected using psychological measures and pre- and post-tests of linguistic competence, which were analyzed using specific statistical methods (SPSS). The results showed a significant improvement in the linguistic competence of D/HH students in terms of comprehension, writing, and sign language, as well as an increase in linguistic and metacognitive awareness in the experimental group compared to the control group. The importance of the research lies in its presentation of a practical educational model that enhances metacognitive awareness in the classroom for D/HH students, thereby supporting the trend toward self-learning and their linguistic integration within the educational institution and society.

Keywords: Metacognitive strategies, Linguistic competence, Deaf and hard of hearing, 5E-Learning cycle, Self-Questioning.

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الملخّص:

يعتبر ضعف الكفاية اللغوية لدى المتعلمين الصم وضعاف السمع أحد أهم التحديات التي تواجه العملية التعليمية، وذلك نظرًا للصلة الوطيدة بين اللغة، تطور التفكير، التعلم، والتواصل. كما يؤثر ضعف اكتساب اللغة وفهمها سلبًا على التحصيل الدراسي خاصة ما يتعلق منه بمهارات القراءة والكتابة، وذلك لارتباطه بعوامل رئيسة كفقدان السمع في مرحلة مبكرة، وتأخر التدخل التعليمي، وغياب استراتيجيات التدريس المصممة خصيصًا لتلبية الاحتياجات الخاصة لهذه الفئة.

ولمعالجة هذه المشكلة، فقد هدفت هذه الدراسة إلى البحث في أثر استراتيجيات ما وراء المعرفة على تطور الكفاية اللغوية العربية لدى مجموعة من المتعلمين الصم وضعاف السمع. ولهذه الغاية، تم اعتماد المنهجين؛ الوصفي وشبه التجريبي مع عينة من (٤٠) طالبًا وطالبةً من "مؤسسة للا أسماء للصم وضعاف السمع" بالرباط، الذين تم تدريبهم على استراتيجيتي؛ "دورة التعلم الخماسية " و"التساؤل الذاتي". ثم جمعت البيانات باستخدام مقاييس نفسية واختبارات الكفاية اللغوية القبلية والبعدية، وتحليلها باستخدام طرق إحصائية محددة (SPSS). وقد أظهرت النتائج تحسنًا ملحوظًا في الكفاية اللغوية للمتعلمين الصم وضعاف السمع من حيث الفهم والكتابة ولغة الإشارة، بالإضافة إلى زيادة الوعي ما وراء معرفي في المجموعة التجريبية مقارنة بالمجموعة الضابطة.

إن أهمية هذا البحث تكمن في تقديمه نموذجًا تعليميًا عمليًا يعزز الوعي ما وراء معرفي في الفصل الدراسي للمتعلمين الصم وضعاف السمع، مما يدعم اتجاههم نحو التعلم الذاتي، واندماجهم اللغوي داخل المؤسسة التعليمية والمجتمع.

الكلمات المفتاحية: استراتيجيات ما وراء المعرفة، الكفاية اللغوية، الصم وضعاف السمع، دورة التعلم الخماسية، التساؤل الذاتي.

Introduction:

The modern educational curriculum is based on a set of elements derived from philosophical, social, psychological, and cognitive foundations related to students and communities. These elements are employed in learning situations that aim to contribute to the integrated development of the student's personality in its mental, emotional, and physical aspects. This is consistent with the student's present and future and helps them adapt to the changes and demands of their era using a variety of appropriate educational methods (Hamadneh & Obeidat, 2012).

More precisely, it is an approach that organizes educational processes so that students can control their mental processes and develop their thinking skills, thereby gaining a deeper understanding of themselves and their surroundings. This is because purposeful thinking and self-directed learning are developed when effective teaching and thinking strategies are discussed in the classroom, and

learners who practice thinking according to strategies that promote this thinking know how to learn and control the learning process (Welson & Wing, 2009).

On this basis, if thinking is of paramount importance in education and life and our goal is to reach the highest levels of comprehension, we must be well aware of the means and the path to achieve it, which is thinking, especially in view of the changes imposed by developments in various aspects of contemporary life (Attiya, 2014).

The modern curriculum has imposed new roles on schools, transforming them into places for teaching thinking rather than ideas, and making students contributors and producers in the learning process rather than passive recipients or consumers of knowledge. This is because, as a mental skill, thinking, when taught or applied implicitly in an educational context, requires a different approach to the knowledge presented, with the focus exclusively on what learners can do rather than what they know. In this case, the teacher's role in presenting and sharing information with students is no longer required, as was the case in traditional teaching methods. Instead, the teacher becomes a guide for learning and helps students develop their skills, as information is now readily available online, eliminating the traditional role of the teacher as the sole source of knowledge. Students must now be equipped with thinking skills that enable them to deal effectively with the available information (Matthews & Lally, 2010).

Thinking skills can be developed by guiding students to reflect on their thinking, or what is known as metacognition, which helps them monitor their thinking and direct it towards finding the best solutions and ruling out inappropriate ones. There has been an increase in social demand for thinking skills at all levels, especially metacognitive skills, and teaching these skills has become a focus of attention for educators due to the following reasons:

A. The cognitive view of intelligence, which suggests that intelligence is modifiable.

B. The constructivist approach to education, which emphasizes student activity and the use of their knowledge construction by finding and coordinating relationships in their cognitive experience.

C. The information processing perspective, which deals with the acquisition, expansion, and organization of information (Al-Najdi, Saudi & Rashid, 2005).

From this perspective, a close look at the educational systems in developed and underdeveloped countries reveals that the former is concerned with teaching its children ways and methods of thinking. The systems in other societies, on the other hand, focus on teaching children the products of thinking... As a result, children in the former societies learn the products of knowledge. Children in other societies, on the other hand, live in a culture of memory and have no role other than that of consumers of knowledge without producing it (Qawasmeh & Abu Ghazaleh, 2013).

Helping children develop their abilities to extrapolate and self-monitor keeps them from naively accepting their acquired knowledge. Skills beyond knowledge, such as planning, predicting, scrutinizing, and evaluating, are often mastered by students who struggle academically. The difference between our ideas/knowledge and the process of thinking is that thinking is an unlimited, continuous, and non-incidental activity about knowledge that dies as soon as it is known. Knowledge is a given that can be reviewed and modified. To address these challenges, we help students understand and decode the world and produce their own authentic answers. Therefore, the basis of metacognitive is thinking about ideas (Thenmozhi, 2019).

Schools today need more than ever learning and teaching strategies that provide teachers and students with broad, diverse, and advanced educational horizons to help them enrich their experiences and knowledge, develop their various mental skills, and train them to think and reason so that they can effectively deal with any type of information or changes that the future may bring (Qawasmeh & Abu Ghazaleh, 2013).

Since language is an integral part of the thinking process, the two are interrelated and cannot be separated, especially in comprehension and understanding. Language is important for forming vocabulary and then sentences, and thinking is the primary driver of the process of producing, organizing, and arranging language in response to the situations an individual encounters. Therefore, there is no language without thinking, and no thinking without linguistic information and ideas. This interdependence is considered a prerequisite for social adaptation (Mohammed & Issa, 2011, pp. 222-223).

Therefore, developing learners' language skills was one of the fundamental objectives that educational institutions and language teachers should pursue using modern teaching methods and educational strategies that help students reflect on

their learning and build their knowledge themselves, strategies that are consistent with the students' environment and constantly evolving reality (Jahjouh, 2012), (Attiya, 2014).

In an effort to implement these modern strategies and benefit from them in classroom practice, this study measured the impact of modern teaching methods and metacognitive strategies, specifically the "5E learning cycle" and "self-questioning" on the development of language competence among deaf and hard-of-hearing students in secondary school in the subject of Arabic language.

Research problem:

Educational action is considered an activity that is, in its entirety, based on the application of the educational curriculum from which it originates, which is the procedural method by which the curriculum's goals and objectives are achieved. If all the references on which the educational curriculum in our country is based, including the “National Charter for Education and Training," the "Framework Document for Educational Tests and Guidelines,” and the "Strategic Vision for Reform 2015-2030,” all aim to reform the education and training system in our country and emphasize the need to move beyond traditional teaching methods by reducing reliance on rote learning and memorization, investing in the development of self-directed learning, and encouraging positive interaction among learners... In addition to continuous renewal and development, this will enable the orientation of educational practice toward developing students' competencies and skills and mastering a methodology of thinking... to improve the quality of education and training... (Higher Council for Education and Training, 2015) However, the reality of education is fraught with numerous obstacles that prevent the achievement of these goals and objectives, as revealed by students' modest results—despite their teaching and accumulated experience in the field—which are not satisfactory. This raises questions about the reasons behind these setbacks and prompts a search for alternatives that would renew pedagogical methods, help overcome academic problems, and enhance learning.

This is the basis for the idea and problem statement of this research, which aims to examine the impact of metacognitive strategies on the development of Arabic language proficiency among deaf and hard-of-hearing students, focusing on the “5E learning cycle” and “self-questioning.”

Research questions:

The current study attempted to answer the following questions:
1- What is the effect of using the "5E learning cycle" and "self-questioning" strategies on the development of language competence in Arabic for deaf and hard-of-hearing secondary school students compared to the usual teaching method?
2- Are there statistically significant differences in the use of the "5E learning cycle" and "self-questioning" strategies among learners related to gender?

Research hypotheses:

Based on the research questions, the study hypotheses were formulated as follows:
- There is a statistically significant difference at the significance level (0.05 α) between the mean scores of the experimental and control groups in the post-test of linguistic competence.
- There is a statistically significant difference at the level (0.05 α) between the average scores of learners (male/female) from the experimental group in the post-test of linguistic competence.
- There is a statistically significant difference at the level of (0.05 α) between males and females in the research sample in some linguistic areas (vocabulary/reading/writing/sign comprehension).
- There is a statistically significant difference at the level of (0.05 α) between the 5E learning cycle strategy and self-questioning and the development of language skills among students from the experimental group in the post-test.

Research objectives:

This research aims to achieve the following objectives:
1- Identify a sample of students with learning difficulties and examine the nature and patterns of these difficulties.
2- To identify the impact of teaching using the "five-cycle learning" and "self-questioning" strategies on the development of linguistic proficiency in Arabic among a sample of deaf and hard-of-hearing students.
3- Clarifying the effect of gender (male/female) on the development of linguistic competence in Arabic among deaf and hard-of-hearing secondary school students.

Significance of the research:

The significance of this research is highlighted in the following points:

1- It presents two measurement tools, namely:
   a. "Michael Best" Scale for identifying students with learning difficulties.
   b. Language Competence Test for measuring learning, developed in accordance with Arabic language teaching standards as stipulated in educational references, programs, and guidelines for Arabic language teaching in secondary education.
2- Introducing a modern teaching method that improves learning and raises its quality among learners.
3- Adopting a language proficiency test to determine students' level in Arabic and diagnose their achievements in order to identify their weaknesses and help them.
4- Raising awareness of the importance of promoting thinking by adopting modern teaching methods, "metacognition," that equip students with the mechanisms of thinking in learning, awareness of them, and adopting them as an approach and behavior for dealing with information on a broader scale.

I - Study Concepts:

1- Metacognitive Strategies:

A strategy is an organized plan using method, techniques, and means to achieve a specific goal (Zayer & Dakhel, 2015). These awareness processes and strategies for controlling them through regulation and guidance are known as metacognitive strategies (Mohammed & Issa, 2011, p. 154).

Phakiti (2008) states that metacognitive strategies are conscious processes that organize cognitive and other processes, including planning, monitoring, and evaluation (Zhang, 2018).

Procedurally, metacognitive strategies refer to a practical, conscious behavioral approach that relies on didactic methods and procedural steps to achieve a specific goal in the teaching-learning process, enabling students to think about educational content independently or with the teacher's help and guidance to reach understanding.

2- Linguistic competence:

Chomsky defines competence as the speaker's knowledge of their language, and ability as the actual use or verbal achievement of that language in specific

situations. According to this definition, ability is a direct reflection of competence, and knowledge of language _Chomsky asserts_ implicitly involves the ability to understand an unlimited number of sentences (Chomsky, 1965, pp. 4-15).

This definition is consistent with that of psycholinguistics, which defines competence as the totality of the speaker's linguistic knowledge, enabling them to understand and produce an infinite number of sentences (Al-Dareeg, 2000). Ali Musa, on the other hand, believes that linguistic competence is the minimum level of linguistic knowledge, attitudes, values, and skills that enables a high school student to interact positively with the components of their mother tongue and communicate effectively with life and living beings (Badran, 2008).

Procedurally, linguistic competence refers to the totality of linguistic knowledge, information, and skills that students have accumulated during their learning process, regardless of their levels, which enable them to achieve specific goals.

3- The 5E's Learning Cycle:

This is a metacognitive teaching strategy developed by educational scientist Bybee, based primarily on constructivist theory. It consists of five stages: Engagement, Exploration, Explanation, Elaboration, and Evaluation (Al-Najdi, Saudi, and Rashid, 2005).

This strategy aims to develop a plan for science learning that aligns with contemporary theories of how individuals learn.

The 5E learning cycle strategy is a teaching plan based on five constructive stages through which educational content is conveyed. It can help students build their learning, achieve the highest degree of understanding and comprehension, and reach the goals of the educational process.

4- Self-Questioning:

Qatami (2013) defined it as the method by which the teacher communicates with the student by asking questions about what the student knows about a topic and what the student expects to learn from the new text (Qatami, 2013, p. 619).

There are three stages: pre-learning, learning, and post-learning. It also helps students focus and identify their prior knowledge (Al-Shomari, 2020). The importance of using the self-questioning strategy in teaching is due to the following:

- It allows students to be in positive situations by discussing what they are studying, which makes it clearer.

- It processes information through questions that motivate students to consider their previous experiences, which increases the likelihood of storing information in long-term memory and makes it easy to use in the future.

- Students become more sensitive to the important parts of the lesson content and monitor their understanding of these parts, which increases their understanding of what is being presented (Hamida, 2009, p. 26).

Procedurally, the self-questioning strategy refers to a teaching plan that asks meaningful questions at certain stages of the lesson, with questions being vertical (teacher/student) or horizontal (student/self) to focus, stimulate prior knowledge, and guide the student toward inquiry and learning construction.

5- Deaf and hard of hearing:

The terms “deaf” and “hard of hearing” intuitively refer to a group of people who suffer from varying degrees of hearing loss, but the medical meaning of these terms has evolved to include cultural identity and unique communication mechanisms. Understanding these differences is essential for effective communication, education, and support (Heckendorf, 2009).

1- Deaf: A person who has lost their sense of hearing for genetic, congenital, or acquired reasons, either at birth or later in life, which prevents them from pursuing their studies and learning life experiences with their normal peers in the usual ways (Suleiman, 2005, p. 72).

2- Hard of hearing: People with hearing loss or residual hearing. However, their hearing functions to some degree, and they can learn speech and language, with or without hearing aids (Al-Quraiti, 2005, p. 300; Haddaba, 2014).

Deaf and hard-of-hearing people are defined procedurally as a group of students whose hearing abilities range from complete deafness to hearing impairment, adolescents pursuing secondary and preparatory studies at the La Asmae Institution for the Deaf and Hard of Hearing in Rabat, who formed the experimental and control samples for the study.

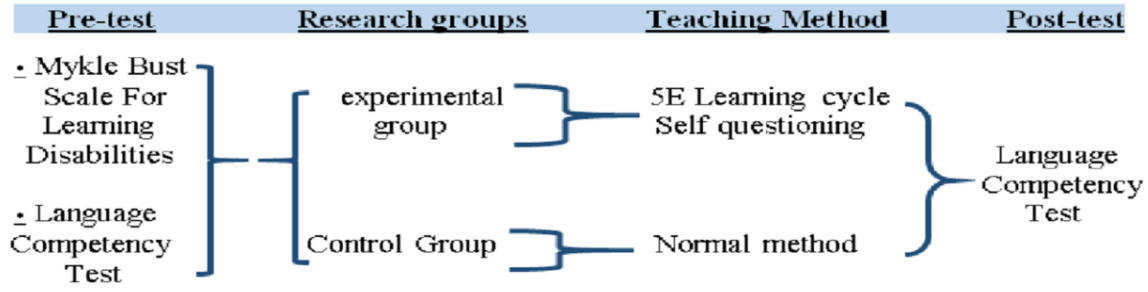
II- Research procedures:

1- Research methodology:

A- Descriptive analytical approach: This involves identifying the phenomenon to be researched, describing studies related to the research variables, materials, and tools, and identifying and clarifying existing problems and shortcomings when analyzing educational content.

B- Quasi-experimental approach: This is used when researching the main effect of the 5E learning cycle strategy and self-questioning on the development of linguistic competence, by dividing the research sample into an experimental group to determine the effect of teaching them with modern strategies on the development of linguistic competence, and a control group that was taught using the traditional method. The following figure illustrates this:

Figure (1): Research methodology



2- Scope of the study:

a. **Time frame:** From March to the end of May 2023.

b. **Human scope:** A sample of 40 students (male and female) representing the third year of secondary school and the first year of professional baccalaureate.

c. **Spatial scope:** Lalla Asmae Foundation for the Deaf and Hard of Hearing in Rabat, Morocco.

3- Research sample:

The study sample consisted of secondary school students in the third year of secondary school and the first year of professional baccalaureate specializing in IT maintenance who are studying at the Lalla Asmae Institute for the Deaf and Hard of Hearing in Rabat, representing the two experimental groups (20 students) and the two control groups (20 students), bringing the total number of research subjects to 40 students, distributed by gender as follows:

Table (1): Characteristics of the study population according to gender

Gendre	Number	Percentage
Males	24	60%
Females	16	40%
All	40	100%

4- Research variables:

A. Independent variable: represented by the "5E's learning Cycle" and "self-questioning" strategies.

B. Dependent variable: This is the linguistic competency that the study seeks to develop in third-year preparatory school and first-year professional baccalaureate students (deaf or hard of hearing) in the Arabic language.

C. Extraneous variables: These are variables that may affect the dependent variable at the same time as the independent variable, which may influence the research results. These variables were controlled for: gender, learner achievement, individual differences represented by learners' average pre- and post-test scores, excellence and failure, and educational content.

III- Research tools:

1- Myklebust Scale for identifying learners with learning difficulties:

This scale aims to distinguish between normal students and those with learning difficulties. It is used to identify the critical points for both groups after presenting and correcting the test items (Debono, 2017).

This scale consists of three major axes, divided into four headings, comprising 24 items, each with five statements. The examiner answers these questions through observation and with the teacher's help. Parents can also perform the same process. The items include the following:

Table (2): Shows the components of the Michael Best test for diagnosing learning difficulties

	Titles	Paragraphs	Paragraph points	Test points
Verbal test	Auditory comprehension and recall	4	20	Verbal test
	Spoken language	5	25	
	General knowledge test	4	19	
Nonverbal test	Motor coordination	3	15	Nonverbal test
Personal and social test	---	8	48	
Final average				---

2- Linguistic Competence Test:

Research into metacognitive strategies required the preparation of a test to measure the linguistic competence of the students in the study sample, with a view to developing their skills through the application of the "5E's Learning cycle" and "self-questioning" strategies. The preparation of this test went through several stages, as follows:

A. Determining the purpose of the test: The test aims to measure the level of students' linguistic competence (in the experimental and control groups) in Arabic in the pre-test, to develop it through metacognitive strategies, and to measure its development in the post-test.

B. Sources for preparing the test: The test content was drawn from the following sources: "Al-Kitab Al-Abyad" issued by the Moroccan educational curriculum review committees for primary, secondary, and high schools (2002), educational guidelines and programs for teaching Arabic in secondary and high schools (Ministry of National Education, November 2007), the reference frameworks for Arabic language teaching in lower and secondary education (Ministry of National Education, August 2009), and the academic curricula for lower and secondary education.

C. Stages of test development: The linguistic competence test went through the following stages: Reviewing the contents of "Al-Kitab Al-Abyad", educational guidelines, and programs for teaching Arabic in secondary education; listing the educational competencies specific to the research sample level (third secondary and first year professional baccalaureate); and identifying the basic competencies targeted in the test (communicative, methodological, and cultural competencies), then sorting the elements that make up the three basic competencies to formulate appropriate test questions, in addition to identifying the linguistic areas to be measured (vocabulary/ reading/ writing/ sign comprehension), and then formulating the test questions. On this basis, the test was constructed and appeared in its final form below:

Table (3): Specifications for the linguistic competence test

		linguistic competences			
		Communication competence	Methodological competence	Cultural competence	Number of questions
Linguistic fields	vocabulary	5	5	5	15
	Reading	5	5	5	15
	Writing	5	5	5	15
	Sign language comprehension	5	5	5	15
	Number of questions	20	20	20	60

2-1- Test validity:

A test is considered valid if it successfully measures the behavioral objectives of the material for which it was developed (Daoud, Hanna & Abdul Rahman, 1990). The validity of the test was confirmed, and it was ensured that it actually measures what it was designed to measure by adopting apparent validity. It was presented to a group of experts and educational specialists in the Arabic language and its teaching methods to express their opinions and observations on whether the test measures the objective for which it was designed, the suitability of the test questions and materials for the research sample, the extent to which the test elements corresponded to the targeted competencies, and the clarity of the wording of the test items.

The results of the reviewers' opinions were then compiled, and their percentages extracted[1]. Questions with a percentage of 80% or higher were retained, and those with lower percentages were modified to align with the competencies they were designed to target, with some deleted. The test was then ready for application with a total of 60 questions.

2-2- Stability:

The test stability rate was calculated in two ways:

A- Spearman-Brown split-half method:

[1] - Percentage of agreement among arbitrators on Linguistic Competence Test question.

Table (4): Stability of the study tool using the half-segmentation method

Test	Number of questions	Study sample	Correlation value Before modification	Correlation value after adjustment
Linguistic competence	60	20	0,86	0,92

The table shows that the correlation value for the linguistic competency test before adjustment was 0.86, but after adjustment using Spearman-Brown's equation, it increased to 0.92, a high value. Therefore, the test achieved a reliable stability rate and can be applied.

B- Alpha Cronbach method:

Table (5): Reliability of the study tool using the alpha Cronbach method

Test	Number of questions	Study sample	Correlation value
Linguistic competence	60	20	0,80

The table shows that the correlation value for the linguistic competence test according to Cronbach's alpha method reached 0.80, which is a good percentage. This shows that the test has a reliable degree of stability when applied.

2-3- Determining the test time:

In order to determine the duration of the linguistic competence test, it was trialed on a sample group of students. The time taken by the students to answer the test questions was calculated by dividing the total time (the time of the first student to finish and the time of the last student to finish) by 2.

$$\text{test time} = \frac{\text{(time of the 1st student) + (time of the last student)}}{2}$$

Thus, the duration of the linguistic competence test, after calculating the time taken to read and explain the instructions and write personal details, is 180 minutes, taking into account the principle of adapting the exam for deaf and hard-

of-hearing students and the conditions under which they take the exam, including time considerations, as stipulated in educational documents (Al-Alami, 2015).

3- Preparation of teacher and student guides for the "5E Learning Cycle" and "Self-Questioning" strategies:

The two guides were prepared after reviewing the references and studies that had previously addressed these two strategies in theory and research, and included the following:

Table (6): Teacher and student's guide

Teacher's Guide	Student Guide
Introduction to the guide: Includes the following: - Introduction to the "5E Learning Cycle" and "Self-Questioning" strategies. - Presentation of the importance of these two strategies in developing students thinking skills, raising their awareness of thinking processes, and helping them control and monitor these processes and organize their reading and comprehension skills. - Objectives of the guide.	
Illustrative examples of the application of the five-step learning cycle and self-questioning strategies on three components excerpted from: 1- The student's book "My Guide to Arabic" "Morchidi fi al-lugha al-arabia" for the third year of secondary education. 2- The student's book "Complete Arabic Language" "Al-Kamil fi al-Lugha al-Arabia" for the first year of high school.	- Procedural steps for teaching according to the 5E Learning Cycle strategy and Self-Questioning. - Targeted competencies in selected lessons to be taught in the guide according to the 5E Learning Cycle and Self-Questioning strategies. - Practical examples of the didactic construction stages of lessons according to the 5E Learning Cycle and Self-Questioning strategies.

IV- Procedures for applying and testing the research tools:

1- Research sample:

The research sample consisted of third-year secondary school students and first-year professional baccalaureate students at the Lalla Asmae Foundation for Deaf and Hard of Hearing in Rabat, with 20 students in the experimental group and 20 in the control group. Therefore, the total number of participants was 40. The scheduling of Arabic language classes helped to conduct the research experiment under appropriate conditions that respected the principle of equal opportunity and the stability of extraneous variables

2- Application of the research tool:

2-1- Pre-test:

The research tool was pre-tested after completing the inventory and applying the learning difficulties measurement (Michael Best Scale), and the test was found to be valid and reliable. The results were as follows:

Table (7): The results of the pre-test of the linguistic competence test for the third year of secondary education and the first baccalaureate-professional year in the linguistic competence test

	Level	Group	Average mean	Standard deviation	T Value	Sig.	Statistical significance
Linguistic competence test	3rd year of secondary school	experimental	30.1	8.332	0.246	0.809	Statistically non-significant
		Control	29.2	8.038			
	1st year professional baccalaureate	experimental	31.2	5.006	0.727	0.355	Statistically non-significant
		Control	30.03	6.272			

Table (7) shows that the values “t” and “Sig.” are not statistically significant at the level (0.05α), indicating that there is no statistically significant difference between the experimental and control groups in linguistic competence.

2-2- Application of the research experiment:

The actual research experiment began after the preliminary assessment and application. Teaching was conducted according to the “5E Learning Cycle” and “Self-Questioning” strategies. Data extraction from the post-test results of the two groups enabled the acceptance or rejection of research hypotheses. The process was as follows:

The actual application of the research experiment began on 22 March 2021 and continued until 30 May, during which the experimental group was taught according to the 5E Learning Cycle and then the Self-Questioning strategy, with gradual presentation. These strategies were then applied to different lesson models, and it was ensured that they were well understood and represented by the students. In contrast, the control group was studied using the standard method.

2-3- Post-test:

After the completion of the research pilot phase, which lasted approximately nine weeks, the experimental and control groups underwent a post-test to measure linguistic competence on Monday, 31 May 2021. The test was then corrected, and the data were extracted and statistically processed.

2-4- Statistical methods used in the study:

To extract the research results, answer its questions, and test its hypotheses, the SPSS statistical program was used to determine the validity and reliability of the research tools. Some statistical treatments appropriate to the research hypotheses were also applied, namely the arithmetic mean, standard deviation, correlation coefficient, and t-test.

V- Results: presentation and interpretation:

This section presents the overall results of the study for discussion and interpretation in accordance with the research hypotheses, which are as follows:

1- Hypothesis 1: "There is a statistically significant difference at the significance level (0.05 α) between the mean scores of the experimental and control groups in the post-test of linguistic competence."

To test the hypothesis, the arithmetic mean of the experimental and control groups for the pre- and post-tests, their mean scores, the "T" value, and the significance value (Sig.) were calculated, as shown in the following table:

Table (8): The relationship between the average scores of the experimental group

	Group	Average mean		Average score obtained	T Value	Sig.	Statistical significance
		Pre	Post				
3rd year of secondary school	experimental	30.1	38.9	8.80	2.239	0.038	Statistically significant
	Control	29.2	32.4	3.20			
1st year professional baccalaureate	experimental	31.2	34.9	3.70	2.131	0.001	Statistically significant
	Control	30.03	31.6	1.30			

The data in Table 08 show statistically significant differences at the (α = 0.05) level between the mean scores of the experimental and control groups in the post-test of linguistic competence, favoring the experimental group (Sig.).

For the third preparatory level, the significance value was (0.038), which is less than the level of (0.05α), indicating that it is statistically significant. The same result was observed for the first-year professional baccalaureate level, with a significant value of 0.001.

Looking at the average scores of the experimental and control groups and their pre- and post-test scores, there is a difference and variation in the level of language competence development between the group that studied using metacognitive strategies and the group that studied using the traditional method. This noticeable development can be explained by the sum of developmental changes (physiological/mental/psychological...) that accompany the stages of maturity of the educational group (experimental/control) and the progress of their general learning levels, although the achievement rate shows, nevertheless, a significant difference in favor of the two experimental groups with an average of (8.8) points and (3.7) points for the third preparatory and first year professional baccalaureate levels, unlike the control groups, with a difference of (3.20) points and (1.30) points. This confirmed the validity of the first hypothesis, which stated that there was a statistically significant difference at the significance level (0.05α) between the average scores of the experimental and control groups in the post-test of linguistic competence.

2- Second hypothesis: "There is a statistically significant difference at the (0.05α) level between the average scores of learners (male/female) from the experimental group in the post-test of linguistic competence.

To test the hypothesis, the pre-test and post-test mean scores, the average scores of the experimental group obtained in the pre-test and post-test, and the average scores of the experimental group obtained according to gender, the "T" value, and the significance value (Sig.) were calculated, as shown in the following table:

Table (9): The relationship between the average scores obtained by the experimental groups in the post-test of linguistic competence according to gender

	Group	Avg. mean		Avg. Scr. obt.	Avg .Score by gender		"T" Value	Sig.	Statistical significance
		Pre	Post		M.	F.			
3rd year of secondary school	experimental	30.1	38.9	8.80	7.62	13.50	-1.038	0.992	Statistically non-significant
1st year professional baccalaureate	experimental	31.2	34	3.70	3.83	3.50	0.142	0.891	Statistically non-significant

Table (9) shows that there is no statistically significant difference at the (0.05α) level between the average scores of students (male/female) from the experimental group in the post-test of linguistic competence.

In the third year of secondary school, the average score for male students was 7.62, while the average score for female students was 13.50, indicating no significant difference between the average scores of male and female students. The same result is even more evident in the first year of the professional baccalaureate, which showed a significant and nearly equal convergence between the average scores of male students (3.83) and female students (3.50). The significance value (Sig.) confirmed the above results and proved that they were not statistically significant, as it reached (0.992), which is a value exceeding the level (0.05α) for the third year of secondary school. A value of (0.891) was also recorded, which in turn exceeded the level of α 0.05 for the first year of professional baccalaureate.

This result can be explained by stating that learning is a human characteristic unrelated to gender and that the physiological structure of the human mind is the same regardless of gender. Furthermore, cognitive and academic achievement can reveal differences in learning attributable to other variables, such as psychological, social, or pathological factors, without overlooking the multiple intelligences of male and female students, which may also make a difference.

It should also be noted that the age group (adolescence) that male and female students are going through is significant, as it is considered a transitional stage from childhood to adulthood, accompanied by a desire for change and rejection of fixed and routine ideas, and an appetite for everything new/different, in addition to defiance, self-confidence, and a sense of inner satisfaction. The higher post-test averages for both experimental groups, across both genders, indicate that these strategies have opened up a space for students to recognize and control their own abilities and have facilitated their learning processes without submissive supervision, instead guiding them towards educational paths and constructive learning determined by the students themselves.

In light of these data, we confirm that the second hypothesis, which states that there is a statistically significant difference at the level of (0.05α) between the average scores of the students (male/female) from the experimental group in the post-test of linguistic competence, is incorrect.

3- Third hypothesis: "There is a statistically significant difference at the level of (α 0.05) between the sexes in the research sample in some areas of language (vocabulary/reading/writing/comprehension)."

To test the hypothesis, the pre- and post-test average scores, the mean scores of the experimental group in the pre- and post-tests, the mean scores of the experimental group according to gender, the t-value, and the significance value (Sig.) were calculated, as shown in the following table:

Table (10): The relationship between the mean scores obtained by both genders in the experimental group in the post-test for linguistic competence and some language fields

	Group	Linguistic field	Avg. mean		Avg. Scr. obt.	Avg .Score by gender		"T" Value	Sig.	Statistical significance
			Pre	Post		M.	F.			
3rd year of secondary school	experimental	vocabulary	7.20	9.70	2.50	2.78	1.00	0.712	0.497	Statistically non-significant
		Reading	7.30	9.50	2.20	2 .50	1.00	0.461	0.775	Statistically non-significant
		Writing	7.40	9.70	2.30	2.25	2.50	-0.141	0.891	Statistically non-significant
		Sign language comprehension	8.20	10.00	1.80	1.62	2.50	-0.972	0.360	Statistically non-significant
1st year professional baccalaureate	experimental	vocabulary	8.00	8.60	0.60	0.66	0.50	0.193	0.852	Statistically non-significant
		Reading	6.60	8.00	1.60	1.66	1.00	1.079	0.312	Statistically non-significant
		Writing	7.00	7.60	0.66	0.66	0.50	0.181	0.861	Statistically non-significant
		Sign language comprehension	9.60	10.70	1.40	0.83	1.50	-0.785	0.455	Statistically non-significant

The results of the statistical analysis of the third hypothesis shown in Table (10) indicate that there is no statistically significant difference at the level of (0.05α) between the sexes in the sample research in some language fields (vocabulary/reading/writing/sign comprehension). as the significance values (Sig.) all recorded rates exceeding the significance level (0.05α) in the four language fields for both experimental groups.

Concerning the data presented for the third-year secondary school, we see that the significance value (Sig.) for vocabulary was (0.497) reading (0.775) writing (0.891) and sign language comprehension (0.360) These values are not statistically significant because they are higher than the significance level (0.05α) even though the average scores by gender fluctuated in favor of males (2.78) and (2.50) at times and in favor of females (2.50) twice in a row at other times.

As for the first year of professional baccalaureate, the significance value (Sig.) for vocabulary was 0.852, for reading 0.312, for writing 0.861, and for sign comprehension 0.455; these values are also not statistically significant because they are higher than the significance level (0.05α). Furthermore, the average scores by gender are almost identical, with a difference of 0.16 in favor of males on one occasion and 0.33 in favor of females on another.

These results can be interpreted as meaning that the lack of significant differences between the sexes in certain language fields is mainly due to the fact that learning is not affected by gender or by differences in the fields or content of learning. If some differences do emerge from time to time, they may be related to the student's personality and motivation. Thus, we reject the third hypothesis, which states that there is a statistically significant difference at the level of (0.05α) between the genders in the experimental group of the research sample in some language fields (vocabulary/reading/writing/sign language comprehension).

4- Fourth hypothesis: "There is a statistically significant difference at the level of (0.05α) between the 5E Learning Cycle strategy and Self-Questioning and the development of language skills among students in the experimental group in the post-test."

To test the hypothesis, the average score for the linguistic fields, the average post-test score, the t-value, and the significance value (Sig.) were calculated, as shown in the following table:

Table (11): The relationship between the average scores obtained by both genders in the experimental group in the post-test of linguistic competence and some language fields

	Group	Linguistic field	Avg. score for linguistic fields		Avg. post-test score	"T" Value	Sig.	Statistical significance
			Teaching by the normal way	Teaching with metacog-nitive strategies				
3rd year of secondary school	experimental	vocabulary	7.20	9.70	38.9	7.573	0.001	Statistically significant
		Reading	7.30	9.50		7.681	0.001	Statistically significant
		Writing	7.40	9.70		7.585	0.001	Statistically significant
		Sign language compreh-ension	8.20	10.00		7.544	0.001	Statistically significant
1st year professional baccalaureate	experimental	vocabulary	8.00	8.60	34.9	25.55	0.001	Statistically significant
		Reading	6.60	8.00		25.66	0.001	Statistically significant
		Writing	7.00	7.60		26.53	0.001	Statistically significant
		Sign language compreh-ension	9.60	10.70		23.80	0.001	Statistically significant

Table (11) above shows the relationship between the average scores obtained by both genders from the experimental group in the post-test of linguistic competence and some language fields that showed statistically significant differences at both levels of the sample research.

The results of the third secondary year showed a remarkable improvement in language fields between the regular teaching method and the teaching method based on the 5E Learning cycle and Self-Questioning. They scored (7.2/9.7) in vocabulary, (7.3/9.5) in reading, (7.4/9.7) in writing, and (8.2/10) in sign language comprehension, with an average score of 38.9 in the post-test and a significance value (Sig.) of (0.001) in the four language fields, which is less than the significance level (0.05 α), explaining the statistically significant difference between the 5E Learning Cycle strategy and Self-Questioning and the development of language skills among students in the experimental group in the post-test.

The same result is shown in the table data for the first year of professional baccalaureate, which recorded between the regular teaching method and the teaching method according to metacognitive strategy: 5E Learning cycle and Self-Questioning, respectively, rates of (8/8.6) in vocabulary, (6.6/8) in reading, (7/7.6)

in writing, and (9.6/10.7) in sign language comprehension, with an average score of (34.9) in the post-test and a significance value (Sig.) of (0.001) in all linguistic fields.

The progress in language skills of third-year secondary school students and first-year professional baccalaureate students, as shown in Table 9, favored the experimental group that studied using metacognitive strategies. The 5E Learning Cycle and Self-Questioning cycle is attributed to the effectiveness of teaching with metacognitive strategies, which helped students learn effectively by paying special attention to developing their thinking abilities and skills, helping them build their learning and achieve the highest levels of understanding and comprehension (which explains the high scores of students in the four language fields in the post-test). Thus, students can examine their understanding and become aware of what they are learning and how they are learning.

Although the two strategies differ, they agree on the principle of gradual knowledge building, a natural process that is most beneficial when guided by students themselves. They do not provide ready-made knowledge or direct answers, but rather keys to knowledge formation, opening paths to the search for solutions and new ideas, whether at the level of observation, exploration, clarification, and detailed thinking, or at the level of reflection, discussion, and monitoring of understanding.

Based on the above, the fourth hypothesis is confirmed, which states that there is a statistically significant difference at the (0.05α) level between the 5E Learning strategy and Self-Questioning and the development of language skills among students in the experimental group in the post-test.

Conclusion:

To renew the educational curriculum and address contemporary challenges, the Ministry of National Education has raised the bar for quality by focusing on educational issues and developing a pedagogical model. Educational research and studies have called for a change in the educational model, revealing the weaknesses of the educational process. In contrast, they have sought to keep pace with recent developments in curricula and teaching methods that focus on quality rather than quantity in learning.

Through this article, I have attempted to contribute, from my position, by employing some modern teaching strategies in the education of a sample of deaf and hard-of-hearing students, whose experience has revealed many shortcomings in their learning, with the aim of extracting positive outcomes that can improve the quality of learning, students' skills, and their academic abilities.

The results of this research revealed the following:

1. The effectiveness of teaching using metacognitive strategies, particularly the "5E Learning cycle" and "self-questioning," in developing language competence and increasing the achievement level of deaf and hard-of-hearing students.
2. Academic achievement based on teaching using the "5E Learning cycle" and "self-questioning" strategies was not affected by gender, as the development of linguistic competence was evident in the averages of both genders.
3. Teaching with the "5E Learning cycle" and "self-questioning" strategies changed the nature and quality of the school environment and developed psychological skills (self-esteem), personality (ability to discuss), and mental abilities (control of mental processes), which are not strongly evident in normal teaching methods.
4. The suitability of the "5E Learning cycle" strategy and "self-questioning" strategies to the age group that constitutes the sample research (adolescents) and their contribution to their self-awareness and control of their abilities, enabling them to learn without supervision that subjects them to control, but rather guides them toward new educational paths and constructive learning that is determined by the students themselves.
5. Teaching with the "5E Learning cycle" and "self-questioning" strategies not only developed the linguistic competence of deaf and hard-of-hearing students but also gave them a methodology for thinking and the ability to organize.

Based on these results, the following recommendations can be made:

1. Adopting the "5E Learning cycle" and "self-questioning" strategies in teaching Arabic language components in both types of secondary education.

2. Researching metacognitive strategies and measuring their impact on teaching various Arabic language components and other subjects.
3. Encourage those responsible for education (teachers/principals/educational supervisors) to innovate by investing in metacognitive strategies in the teaching and learning process through training courses and motivating innovative and creative teachers.
4. Consider incorporating metacognitive strategies into the curriculum to cover all educational subjects.
5. Conduct similar research to cover different levels and subjects.

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