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Constructing and Developing a Scale for Assessing Language Teachers' Performance in Integrating Reflective Thinking Skills within Primary Reading Learning Environments

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ABSTRACT

The study employed a multi-phase design to construct and validate a scale for assessing language teachers' performance in integrating reflective thinking within primary reading environments. The research began with a literature review to identify relevant dimensions and indicators for reflective thinking in reading instruction. In the first phase, a pilot test with 200 teachers was conducted to evaluate the scale's validity and reliability through both qualitative and quantitative feedback, leading to refinements in the scale. The second phase involved a larger study with 800 teachers, using Rasch model analysis and confirmatory factor analysis (CFA) to validate the scale's structure. Rasch analysis ensured internal consistency, while CFA confirmed alignment with theoretical constructs. The findings showed strong psychometric properties, with high internal reliability and validity, indicating that the scale accurately measures teachers' ability to integrate reflective thinking in reading instruction. The validated scale provides a reliable tool for evaluating teachers' performance, helping identify professional development needs. This tool enables schools to support teachers in enhancing their practices, ultimately improving student outcomes in reading comprehension and critical thinking. The scale fosters a supportive learning

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environment, contributing to better educational outcomes and preparing students for future challenges.
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1. Introduction

Having reading skills is crucial, for acquiring knowledge as it enables people to grasp information and gain a comprehension of written materials. This not boosts skills but also allows students to think critically by enabling students to assess and link ideas together effectively, and fostering creativity[1, 2]. Additionally reading plays a role in improving communication skills by assisting individuals, in articulating their ideas and participating in meaningful conversations that can positively impact their social connections[3]. In this era of technology and information overload we live in nowadays. It is crucial to be able to understand and think critically about the things we read[1, 2, 4].

The significance of reading extends beyond academic success. Personal development is enhanced by education as it shapes identity and passes down beliefs and values to generations[3, 5, 6]. As we equip students, for the environment they face today and in the future the cultivation of reading and critical thinking skills is of importance. Critical thinking involves analyzing and solving problems thoughtfully which's essential for advancement, and guiding students through intricate scenarios[2, 7, 8]. Therefore, fostering reflective thinking skills in educational settings is essential for cultivating independent, critical thinkers capable of facing future challenges with confidence and creativity[9–11].

Studies have indicated a link, between reflective thinking and reading comprehension skills among students. Engaging in reflective reading allows students to delve deeper into the content by analyzing and interpreting material while also reflecting on it. Practicing activities like writing essays or drawing and participating in group discussions can foster creativity. Assist students in refining their thoughts and ideas[12–14]. Despite these benefits, however, integrating reflective thinking into reading environments remains a challenge in educational practice.

A notable void, in previous studies is the insufficiency of evaluation methods for gauging the extent to which language educators incorporate reflective thinking in their instructional methods. The dearth of dependable assessment tools poses a challenge, in assessing the efficiency of integrating reflective thinking into classroom settings. This lack of evaluation resources impedes the capacity to assess and enhance teaching practices and techniques ultimately constraining advancements in standards and improvement of educational quality[15–18].

In order to fill this void, in research literature on language teaching practices in primary school reading settings this study suggests constructing a scale to evaluate how well teachers incorporate reflective thinking into their instruction. The aim of this scale is to offer an unbiased way to gather information about teaching methods with the intention of enhancing approaches and boosting student learning achievements.

The suggested scale is designed to provide a tool, for assessing how educators integrate reflective thinking into their teaching methods. This tool aims not to assist teachers in improving their practices and techniques only but to facilitate the design of tailored training initiatives that can enhance educators' capacity to promote critical thinking among students. Through this endeavor the research seeks to play a role in nurturing a cohort of learners equipped with critical thinking and creative and innovative problem-solving skills.

High school students benefit greatly from having Reflective thinking skills as they improve problem solving and decision-making capabilities[19]. Yet some students struggle to utilize these skills because of the absence of strategies that encourage reflective thinking practices; this limitation impairs their capacity to interact with academic material in a thoughtful and constructive way. Moreover, educators frequently encounter challenges in evaluating their methods. It is a challenge to improve the learning experience when there are no valid and reliable assessment tools to pinpoint the strengths and weaknesses of teaching methods.

Given these obstacles faced by educators in reading instruction settings comes the fundamental query. What are the essential characteristics required to develop a scale that assesses language teachers' practices in reading learning environments? The objective of this inquiry is to pinpoint the components for formulating a tool that can elevate teaching

methodologies and boost students' capacity for reflective thinking while enhancing the overall educational standards. Tackling this matter holds significance in equipping educators with the resources to nurture critical thinking and reflective learning within academic environments.

2. Literature Review

Reading learning environments are a primary means of developing reflective thinking among students, as it enables them to reconsider, analyze, and examine ideas and texts from multiple perspectives [20, 21]. This process allows them to uncover relationships between elements of a concept and identify existing gaps. Furthermore, reading fosters the development of self-directed learners, a key objective of modern education. Enhancing reflective reading skills is one of the foremost goals of education, as it aids students in monitoring and evaluating their methods of text analysis and making informed decisions based on available information. This type of reading promotes deep learning, leaving a lasting impact on learners' minds [22].

Reflective thinking is a fundamental dimension in developing critical and creative thinking, reflecting the ability to analyze, interpret, and derive conclusions from past experiences, thus facilitating the handling of complex challenges. Reflective thinking skills encompass several key aspects, each playing a vital role in the thinking process [2, 4, 23].

Firstly, visual perception is a foundational skill that assists individuals in visualizing and understanding various aspects of a problem by organizing information in a way that reveals connections. This can be exemplified by using graphs and diagrams to clarify relationships. Secondly, the ability to identify fallacies pertains to recognizing errors in reasoning, such as pinpointing incorrect relationships or flawed steps in problem-solving, which necessitates analyzing relationships between ideas [7, 19, 24, 25].

Thirdly, reaching conclusions requires the ability to draw logical inferences through inductive or deductive reasoning, helping individuals understand the implications of proposed decisions or solutions. Fourthly, providing compelling explanations involves presenting logical meanings for results or relationships, supported by clear evidence. Lastly, proposing solutions necessitates outlining logical steps to address the presented problem, based on thorough analysis and innovation [7, 10, 16, 26, 27].

The cognitive processes involved in reflective thinking encompass several critical components. Focusing attention on a specific goal requires directing attention toward the defined problem. Understanding relationships entails grasping how the components of the issue influence one another, facilitating the analysis process. Additionally, testing and recalling past experiences enhances the ability to make informed decisions by retrieving previous experiences. Distinguishing relationships among components of an experience contributes to understanding the mutual effects of different elements [7, 19, 28] .

Moreover, forming new mental patterns encourages innovation and the development of new ideas, while evaluating solutions serves as a practical application to test and assess the effectiveness of solutions through data collection and result analysis. Psychologists emphasize the need to link thinking with reading quality [7], viewing them as manifestations of a single cognitive process. The growth of both is intertwined with one another and influenced by the experiences individuals encounter throughout their lives. When expression is vivid, it must evoke feelings, memories, and emotions; advanced reading that lacks meaning derived from personal experiences is essentially lifeless for students, regardless of its rhetorical value [1, 12, 29].

Thus, the relationship between reflective thinking and reading is reciprocal. For an individual to read, they must comprehend and analyze the elements of a situation, recall prior knowledge about it, and organize it. Through this process, they arrive at conclusions and solutions, which are inherently stages of reflective thinking. Consequently, fostering reflective thinking practices among students in reading learning environments necessitates considering several important foundations, as noted by AlAli et al. [1].

Among these foundations, presenting information in the form of clear problems is essential. When educational content is framed as issues requiring resolution, students are more motivated to engage with the material and explore innovative solutions. This approach empowers students to recognize challenges and how to address them, thereby enhancing their critical thinking. Furthermore, involving students in active thinking is a significant step in developing their skills. They should be given the opportunity to devise plans for confronting situations and challenges they may encounter in

their studies. This participation not only enhances their intellectual capacities but also fosters a sense of responsibility toward their learning, motivating them to develop effective strategies for dealing with challenges [7, 23, 27].

Furthermore, teachers should guide learners through the observation process. Enhancing their ability to observe helps students analyze their environment thoughtfully, understand events in the world around them, and stimulates critical thinking. Moreover, posing thought-provoking questions is fundamental to promoting reflective thinking. Questions should be directed toward stimulating deeper contemplation of various issues and situations. These inquiries activate students' thinking and assist them in honing their critical thinking skills, as they encourage exploration of ideas in greater depth.

Based on the above, educationalists [10, 13, 15, 18] underline that students should be provided with diverse reading materials, including dialogues, discussions, and conclusions, while emphasizing the significance of reading environments. Offering rich and inspiring reading environments enhances students' reflective thinking, enabling them to analyze information and derive conclusions through critical reading. Focusing on these foundations will allow educators to develop a learning environment that supports reflective thinking, ultimately preparing students to tackle complex challenges in their academic and professional lives.

Reflective thinking practices are fundamental factors contributing to enhancing the quality of reading learning. Researchers [1, 2, 10, 19] have highlighted methods that can help students engage critically with texts and boost their understanding and memory retention.

- Reflective thinking plays a role, in helping students delve deeper into texts by prompting them to ask questions and analyze the content critically. By engaging in reflection on what they read students develop skills to derive meanings and establish connections, between ideas ultimately enrichening their reading journey.
- Teaching students how to draw conclusions from texts and use them in situations is an aspect of encouraging critical thinking skills in education is part of reflective thinking practices. It goes beyond reading. Helps improve their academic abilities across various areas of learning.
- Engaging and maintaining students' motivation and interest, in reading can be achieved through Reflective thinking practices that empower them to ponder over texts and ask questions actively. This approach sparks enthusiasm for reading and discovery, among students which in turn contributes to enhanced achievements.
- Creating a conducive learning setting involves incorporating Reflective thinking techniques that foster open dialogue and active participation, among students to help them express their thoughts clearly and improve their language abilities through discussions and idea exchanges during the learning process.
- Critical thinking is nurtured through Reflective thinking which helps students enhance their ability to evaluate information, in texts and differentiate between opinions and facts. The development of this skill boosts their critical reading skills and enhances comprehension and retention quality.
- When students think about how they approach reading tasks and understand their learning preferences better they can improve their reading techniques to suit their requirements and make them more effective.

Engaging in Reflective thinking is key, to enhancing reading comprehension skills and boosting student motivation through understanding and inference development in a supportive learning environment that encourages dialogue and critical thinking discussions. This approach also helps students become more self-aware and ultimately leads to outcomes [7, 9].

Research conducted by Habók & Magyar [7] has emphasized the importance of Reflective thinking in boosting success. As a result of these findings it is crucial for teachers and educators to focus on constructing settings that encourage thinking skills in students. The present research aims to develop a measure for assessing reflective thinking, emphasizing efforts to enhance learning and prepare learners to effectively tackle life's challenges.

Based on the current studies were conducted in western countries by Papadakis et al. and Papadakis & Kalogiannakis [30, 31] it can be said that the effective use of technology in reading learning environments contributes to enhancing reflective thinking. For example, language teachers can utilize computer simulations and cloud-based smart technologies in education, which enhances students' reflective thinking. In-

tegrating these technological tools in learning environments enables learners to deeply analyze educational scenarios and critically evaluate outcomes. These technologies also help create personalized learning environments that encourage students to think independently and reflectively, increasing their ability to make informed educational decisions based on accurate data and information. These technologies, particularly in open learning environments that rely on big data and machine learning, are considered effective tools for developing students' reflective thinking skills, thereby improving the quality of education and preparing them to face modern educational challenges.

Contemporary studies, including the well-known study by Papadakis [32], emphasize the importance of using technology applications in children's learning environments to support and develop Computational Thinking (CT) and coding skills as tools to stimulate critical and reflective thinking during reading instruction. These applications provide opportunities for children to interact with texts in innovative ways, where simple programming can be used to design educational activities that enhance the ability to analyze and interpret texts more deeply. Moreover, previous studies [33, 34] confirm that teachers can employ these technological applications in reading environments to encourage children to think independently by solving reading-related problems, such as word arrangement or story-building using basic programming techniques. Through these activities, children can develop reflective thinking skills as they assess and critically reflect on their solutions. Additionally, these applications can help improve children's interaction with educational materials and encourage them to think about ways to improve reading strategies and use technological tools to deepen their understanding of texts.

Despite the importance of enhancing digital tools to improve children's reflective thinking in reading learning environments, educationalists [35] have warned about the potential addiction of children to digital technology tools, particularly through understanding the relationship between digital addiction and academic achievement. Therefore, it is crucial to comprehend how digital addiction affects students' ability to engage in reflective thinking during reading instruction. This requires enabling language teachers to design learning environments that balance technology use with those that promote reflective thinking, by providing digital learning tools that enhance critical thinking skills while determining appropriate time limits for their use to mitigate the impact of digital addiction. Additionally, understanding the personal and familial factors contributing to digital addiction can guide teachers in offering psychological and social support to students, thereby enhancing their reflective thinking abilities. Through these strategies, educational activities can be designed to encourage students to think deeply about the impact of digital addiction on their learning, ultimately improving reading learning environments and effectively supporting reflective thinking.

In light of the above, the current study aims to construct and develop a scale to assess reflective thinking, a vital step in this context. Building a reliable scale can contribute to a deeper understanding of the relationship between reflective thinking and academic achievement, providing practical tools for teachers and educators to evaluate the effectiveness of their teaching methods. Moreover, having a scale available allows researchers to analyze data, with precision helpful in spotting trends and methods that encourage reflective thinking in schools. Hence this research not evaluates the situation but also plays a role, in crafting successful educational approaches that improve academic results and nurture students' critical thinking skills.

The importance of reflective thinking in improving academic achievement is evident from previous studies. Therefore, teachers and educators must focus on developing learning environments that enhance students' thinking skills. The current study, through its goal of constructing a scale for assessing reflective thinking, reflects a continuous necessity and commitment to improving education and preparing students to better confront life's challenges.

In light of the presented theoretical literature, it is evident that reflective thinking is a fundamental component in enhancing the learning process, particularly in reading contexts. By taking time to reflective thinking about their studies students can enhance their skills in analyzing and comprehending the connections, among ideas and concepts effectively. Improving reflective thinking does not help in developing critical and creative thinking but also plays a positive role in boosting academic success. Moreover, the incorporation of tools, like programming and technological applications can greatly enhance reflective thinking as long as they are used in a balanced and deliberate manner, this lead-

ing to a positive impact, on both critical and creative thinking development. Ultimately, developing a reliable scale to assess reflective thinking is a crucial step toward improving learning environments and supporting critical thinking in students, leading to better academic outcomes.

3. Methods

3.1. Research Model and Procedure

This research employed the quantitative descriptive survey method—one of the structured scientific approaches, to explaining and understanding a particular phenomenon or issue, through gathering and analyzing standardized data sets. Because quantitative research involves an audience base it enables precise outcomes to be obtained. The scale of assessing Language Teachers' Performance in Integrating Reflective Thinking Skills within Primary Reading Learning Environments was developed, and it consists of five dimensions:

- ➢ Visual Perception Skills.
- ➢ Identifying Fallacies Skills.
- ➢ Drawing Conclusions Skills.
- ➢ Providing Convincing Explanations Skills,
- ➢ Proposing Solutions Skills.

The research received approval from King Faisal University in Saudi Arabia to proceed. The scale's purpose was tested on a preliminary sample before being applied to the main sample. Subsequent steps included conducting analyses and interpreting the results.

3.2. Participants and Sampling

The goal of this research was to apply the Scale for Assessing Language Teachers' Performance in Integrating Reflective Thinking Skills within Primary Reading Learning Environments to a cohort of teachers in Saudi Arabia and the United Arab Emirates. This study, conducted during the 2024/2025 academic year, focused on teachers at the primary education level. A total of 800 teachers were randomly selected from various schools for research purposes. The research team collaborated with the Education Administration and colleagues, who assisted in distributing and overseeing the questionnaire process, ensuring that ethical standards were adhered to with a clear ethics statement attached to the research.

To improve clarity on how participants are chosen we have set out criteria, for participant inclusion.

- **Teaching background requirement:** Applicants needed to possess a minimum of two years of teaching experience, with elementary school students, in Saudi Arabia or the United Arab Emirates.
- **Subject area:** Only teachers of primary reading and language subjects were included to ensure the assessment's relevance to the research focus.
- **School type:** Teachers were selected from both public and private schools to ensure a diverse representation of teaching environments.
- **Geographical location:** Participants were selected from areas, in Saudi Arabia and the United Arab Emirates to consider the variations, in teaching methods and educational settings across regions.
- **Willingness to participate:** Teachers who chose to take part in the study and adhered to the ethical guidelines were included.

  The selection criteria guaranteed that the sample encompassed a variety of teaching backgrounds and settings to cover a spectrum of experiences. This approach stayed true to the study objectives by emphasizing reading instruction. Data collection involved teachers distributing the instruments to all participants, further ensuring that the study's methodology was consistently applied across all participants.

3.3. Scale Construction

Upon examining writings and past research materials in the field the investigators discovered a set of skills used to assess language teachers' performance in integrating reflective thinking skills within primary reading learning environments. We used these skills to pinpoint five aspects and after examining them we determined a list of items that encompass the essential skills needed for fostering creative teaching practices that involve integrating reflective thinking skills within reading learning environments in the primary stage; the diagram presented in **Figure 1** illustrates the steps involved in constructing and developing the scale.

Figure 1 details the steps involved in constructing and developing the scale of assessing Language Teachers' Performance in Integrating reflective thinking Skills within Pri-

mary Reading Learning Environments was depicted in **Figure 1**. The aim of the scale to assess language Teachers' Performance was explained first. Then the aspects of the scale were established by examining books, internet sources, expert insights and literature reviews. The assessment included five aspects to measure skills. Visual Perception Skills (VPS), Identifying Fallacies Skills (IFS), Drawing Conclusions Skills (DCS), Providing Convincing Explanations Skills (CES), and Proposing Solutions Skills (PSS).

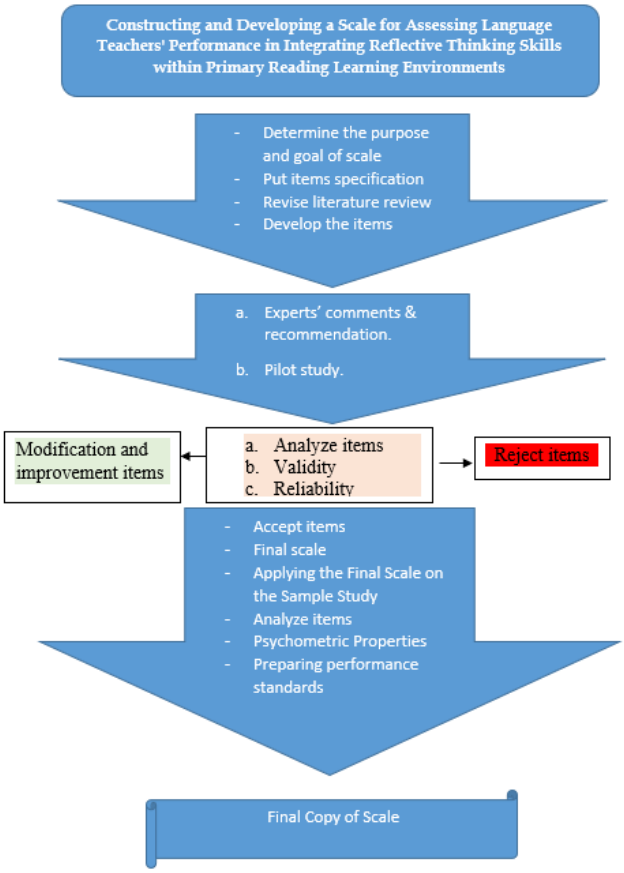

Figure 1. Scale construction procedures.

Following that process was the constructing and developing of scale items using insights, from research findings and the expertise of the researchers along with input, from faculty members to shape them. The scale encompassed 35 items categorized into dimensions. A five point Likert rating scale was established for each item ranging from completely achieved, highly achieved, moderately achieved, slightly achieved, and not at all achieved.

The scale validity was confirmed through a review, by eleven university experts who assessed the scale items and suggested revisions to address any unclear wording well, as grammatical errors; additionally, 3 items that were deemed inappropriate or duplicated by at least 30% of the experts were removed. To enhance validity and reliability further testing was conducted with 200 teachers who provided feedback that was used to refine the version of the scale. The Rasch model analysis was chosen due to its effectiveness in assessing the validity of construct ensuring objectivity, in educational measurement well [15, 36].

Understanding the analysis results of Rasch model measurement involves considering factors, like firstly, infit and misfit as aspects to interpret effectively. Infit refers to the degree of fit for an item or a person in this context. Essentially representing a transformation of residuals that depict the disparity, between predicted and observed values. Typically speaking and based as a rule of thumb that many experts follow in this field of study is that mean-square values (MNSQ) falling within the range of 0.4 to 1.5 are deemed appropriate, for test purposes; similarly for the statistic (referred to as Zstd) values between −2 and 2 are also suitable for analysis purposes. In the first aspect under consideration during our analysis pinpointed two specific items that were left out as they exhibited MNSQ values greater than 1.5 both in terms of infit and outfit; likewise the Zstd value was also, beyond the acceptable range as detailed in **Appendix A** [15].

Secondly, Analyzing the polarity of items (known as Point Measure Correlation PTMEA) or checking the consistency of items can help determine if they align with the constructs being measured in a study or survey. If there is a sign associated with an item indicator value it is advisable to review the data to identify opportunities, for enhancement or removal as this might suggest discrepancies, in how some items or individuals are responding compared to the overarching construct. This process also aids in identifying and establishing construct validity at a stage. If the number falls within the range of 0.2 and 1 then the findings, in **Appendix A** are considered suitable.

One crucial aspect to consider is the dimensionality of an instrument when evaluating if it measures a direction and a sole dimension effectively in the Rasch model analysis process to validate the content and construct of the instrument as required by a criterion of more, than 40% for dimensionality and keeping the unexplained variance in the first contrast, below 15%. This approach involves focusing on one trait or dimension at a time to ensure accuracy and validity. In order

to have an specific focus, in one area when analyzing the data set the majority of the variability should be accounted for by at least 40% with less than 15% of the unexplained variance present in the first contrast [13, 36]. The findings from the dimensionality analysis align well, with the Rasch model framework as indicated in **Appendix B**.

3.4. Data Analysis

In order to address the research question and confirm the construct validity under investigation various measures were examined such as Macdonalds Omega and Composite Reliability, for convergent and discriminant validity assessment purposes respectively. Furthermore, Rasch model analysis was carried out utilizing Winsteps software version 3.68. 2 Which allowed for estimation of individual ability levels as difficulty and discrimination coefficients, for items. The model was also utilized to calculate a coefficient indicating the precision of estimating the capabilities of each person (Awdeh, 2023). Furthermore, factor validity was assessed through exploratory factor analysis (EFA) and confirmatory factor analysis (CFI) utilizing software like SPSS and Amos. Confirmatory factor analysis (CFI) a form of structural equation modeling (SEM) aims to identify patterns, within data (SEM). Confirmatory Factor Analysis (CFA) proves valuable, in exploring connections between hidden variables in a manner. This method serves as a tool in formulating measuring instruments and evaluating the credibility of constructs while categorizing method influences. Throughout the stages of an scale creation process the application of CFA helps validate the structure of the test tool. Moreover, it plays a role in confirming the core dimensions and factor loadings of the instrument making it an essential analytical resource, in aspects of psychometric assessment [13, 15, 36].

4. Results of the Study

The study aimed at constructing and developing a scale to assess Language Teachers' Performance in Integrating Reflective Thinking Skills within Primary Reading Learning Environments and to validate its aspects. Developing this scale involves following specific procedures, and the construct validity of the scale was confirmed through various approaches.

Key indicators and coefficients demonstrate whether the scale is valid. Macdonald's Omega and composite reliability (CR) are commonly used to assess the scale's reliability. According to the findings presented in **Table 1**, both Macdonald's Omega and CR fall within the range of 0.832–0.964 and 0.845–0.956, respectively, which align with the suggested values (>70%), signifying a level of consistency for the scale's measurements.

Table 1. Indicators and coefficients of construct validity.

Aspects	Items	Loading Factor	Macdonalds Omega	CR	AVE	$\sqrt{AVE}$
Visual Perception Skills (VPS)	10	0.42–0.80	0.832	0.845	0.543	0.737
Identifying Fallacies Skills (IFS)	5	0.49–0.78	0.964	0.956	0.625	0.791
Drawing Conclusions Skills (DCS)	5	0.59–0.66	0.933	0.939	0.715	0.846
Providing Convincing Explanations Skills (CES)	5	0.65–0.82	0.842	0.839	0.560	0.748
Proposing Solutions Skills (PSS)	5	0.54–0.81	0.953	0.947	0.639	0.799

Furthermore, the Average Variance Extracted (AVE) values range from 54% to 72%, which is greater than 50%, indicating a level of variance explained by the constructs being measured. In terms of validity coefficients (the root of the AVE or convergent validity), it is important that these coefficients exceed the intercorrelations between the latent variables or factors. Comparing the last column with the minimum loading factor value and observing that it significantly surpasses it indicates the reliability and validity of the scale [15, 36].

4.1. Construct Validity in the Context of the Rasch Model

To ensure the validity and reliability of the final assessing Language Teachers' Performance in Integrating reflective thinking Skills within Primary Reading Learning Environments scale the following steps were taken;

The scale accuracy was assessed by looking at the MNSQ values for the fit and the findings indicated that the scale demonstrated a level of accuracy and validity. The validity ratings of the scale based on MNSQ values are, within ranges typically ranging from 0.4 To 1.5 Aligning with item polarity analysis as, per PTMEA values falling between 0.2 and 1. The Zstd value, in **Table 2**, below falls within the range of −2 to 2 for a standardized fit statistic assessment.

Table 2. Item fit analysis for the scale (final).

Items	Measure	Model S.E	MNSQ		MNSQ		Pt-Measure	
			Infit	ZSTD	Outfit	ZSTD	CORR	EXP
VPS7	0.65	0.07	1.26	1.7	1.81	1.6	0.57	0.65
VPS2	0.22	0.06	1.06	−1.2	1.31	1.9	0.57	0.63
VPS9	0.36	0.06	1.24	−0.3	0.86	−1.4	0.58	0.59
DCS3	0.50	0.06	1.08	−0.7	0.97	−0.9	0.58	0.61
IFS4	0.38	0.06	1.21	0.7	0.82	−0.8	0.60	0.67
VPS1	0.60	0.06	1.43	−1.6	1.34	−0.7	0.60	0.67
PSS2	0.35	0.07	1.06	−0.8	1.09	−0.9	0.60	0.62
CES5	0.79	0.06	0.95	0.3	1.17	0.4	0.61	0.64
IFS1	0.17	0.07	0.97	0.6	0.89	−1.6	0.61	0.67
VPS3	0.22	0.06	1.36	0.8	1.14	−1.3	0.61	0.65
PSS4	0.24	0.07	0.90	0.6	1.06	−1.1	0.63	0.65
DCS5	0.34	0.06	1.05	−0.5	0.84	1.3	0.63	0.63
CES1	0.27	0.07	1.00	−0.6	1.36	−0.4	0.63	0.65
VPS8	0.15	0.07	0.88	1.1	0.72	1.6	0.64	0.72
IFS3	0.13	0.06	0.94	1.2	0.70	1.2	0.64	0.69
IFS5	0.04	0.06	0.88	0.7	0.87	1.1	0.65	0.66
PSS5	0.10	0.06	0.92	1.1	1.46	0.3	0.65	0.68
CES3	0.08	0.06	1.16	0.2	1.03	0.9	0.65	0.66
DES1	0.26	0.06	0.81	0.3	1.25	0.7	0.65	0.64
VPS4	0.34	0.07	0.86	0.0	0.93	1.0	0.65	0.68
PSS1	0.27	0.06	0.91	0.6	0.79	1.7	0.66	0.64
CES2	0.15	0.07	0.98	0.6	0.83	0.4	0.66	0.66
PSS3	0.09	0.06	0.93	0.2	0.98	−1.1	0.66	0.68
IFS2	0.35	0.07	1.04	0.2	1.48	0.6	0.66	0.69
DCS2	0.35	0.06	1.11	0.5	0.90	−1.3	0.66	0.67
VPS10	0.26	0.07	1.05	0.4	1.00	0.7	0.67	0.68
DCS4	0.18	0.06	0.98	0.3	0.85	−0.5	0.67	0.66
VPS6	0.62	0.07	0.97	0.9	1.06	0.6	0.67	0.69
VPS5	0.57	0.07	0.97	1.2	0.83	1.5	0.67	0.64
CES4	0.26	0.06	0.92	0.2	0.86	1.2	0.67	0.67

It also works well with calibration measurement analysis and the outcomes align, with the dimensionality analysis since than 40% of the raw variance is accounted for by the measures and the unexplained variance in the first contrast is, under 15%. Thusly noted in **Table 3** are the dimensionality data results are appropriate based upon the Rasch model.

The scale reliability was assessed through person reliability – measuring how consistent individuals were, in responding to the assessing Language Teachers' Performance in Integrating reflective thinking Skills within Primary Reading Learning Environments scale as depicted in **Table 4**. The item reliability of the scale was also computed to show how reliable each item on the scale is. The study findings indicated that the items, on the scale demonstrate a level of reliability as displayed in **Table 4**.

4.2. Factor Analysis Method to Verify of Construct Validity

To validate the scale validity and reliability during the research process we performed exploratory factor analysis EFA as confirmatory factor analysis CFA with the help of

Table 3. Item dimensionality of the scale.

		Empirical		Modeled
Total raw variance in observations	94.3	100%		100%
Raw variance explained by measures	46.6	47.3%		46.3%
Raw variance explained by persons	26.4	24.3%		26.7%
Raw Variance explained by items	24.1	24.6%		21.6%
Raw unexplained variance (total)	50.3	52.6%	100%	52.3%
Unexplained variance in 1st contrast	4.4	4.4%	8.7%	
Unexplained variance in 2nd contrast	4.0	4.8%	9.1	
Unexplained variance in 3rd contrast	3.4	3.7%	7.5%	
Unexplained variance in 4th contrast	3.1	3.3%	7.1%	

Table 4. Person and item separation and reliability for the scale.

	Score	Count	Measure	Error	Infit		Outfit	
					MNSQ	ZSTD	MNSQ	ZSTD
Mean	167.7	800.0	1.16	0.21	1.06	−0.5	1.08	−0.4
S.D	34.6	0.0	1.38	0.14	0.68	2.6	0.75	3.5
Real rmse	0.25							
Adj.sd	1.36							
Separation	4.83							
Person reliability	0.91							
Mean	1743.7	30.0	0.07	0.17	1.00	0.3	1.08	0.2
S.D	81.5	0.0	0.01	0.02	0.18	2.2	0.45	2.3
Real rmse	0.09							
Adj.sd	0.32							
Separation	5.12							
Item reliability	0.95							

statistical software, like SPSS and Amos.

4.3. Exploratory Factor Analysis EFA

An analysis was conducted to explore the factors by utilizing principal components analysis, on the responses within the scale of 30 items. An oblique rotation was then applied using the Promax method to the extracted factors, with eigenvalues exceeding one. The outcomes of this exploratory factor analysis utilizing the Promax method are presented in **Table 5**.

Table 5 displays five factors that have an eigenvalue, than 1 and explain 99.778 Percent of the variance. The first-dimension eigenvalue is 4.440 With a explanatory variance ratio of 88.801. The analysis identified five factors that align with the assumptions underlying the items. These factors surpass a latent root value of 1. Account, for 99.778 Percent of the overall samples' variance.

To construct and develop the scale effectively it was vital to understand the loading values of each item across its dimensions during the exploratory factor analysis process as depicted in **Figure 2**. It was critical that no item, with loading factors, below 0.40 be included[13, 36]. The data illustrates that all items have loading factors exceeding 0.40 within their dimensions. Therefore, the scale progresses through five dimensions; the first dimension has ten items; the second dimension has five items; the third dimension has five items; the fourth dimension has five items; and the fifth dimension has five items.

4.4. Confirmatory Factor Analysis (CFA)

In order to confirm the factorial construct validity of the scale used in the study sample effectively and accurately comprehend its elements and relationships, across dimensions; a final version of the scale, with 30 items organized into five dimensions was utilized for a confirmatory factor analysis as illustrated in **Figure 2**.

In **Figure 2** the extent of loading, for each item within its dimension is illustrated, indicating a level of loading for

Table 5. The results of the exploratory factor analysis using Promax method.

Component	Initial Eigenvalues		
	Total	% of Variance	Cumulative %
Visual Perception Skills (VPS)	4.440	88.801	88.801
Identifying Fallacies Skills (IFS)	0.271	5.414	94.215
Drawing Conclusions Skills (DCS)	0.146	2.922	97.137
Providing Convincing Explanations Skills (CES)	0.130	2.602	99.740
Proposing Solutions Skills (PSS)	0.013	0.260	99.778

each item in its dimension was observed as per the results obtained. Additionally the findings revealed a correlation among the dimensions of the scale with the correlation coefficient analysis confirming a strong and positive relationship, between all five dimensions of the scale. This shows how reliable the model is, in assessing the connections among the items, on the scale.

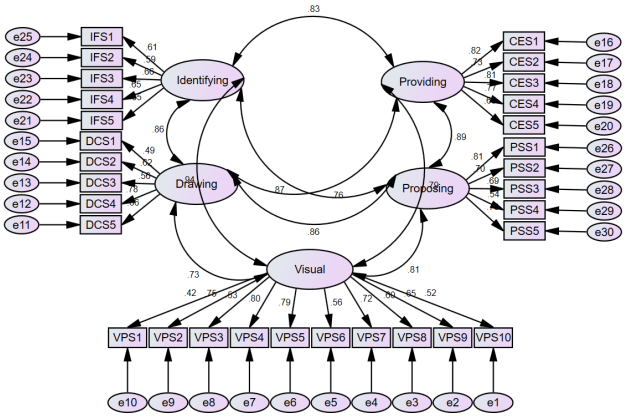

Figure 2. The outcomes of CFA of the model used to examine how the scale items relate to their dimensions.

5. Discussion

This research aims at constructing and developing a scale to assess the language teachers' performance in incorporating reflective thinking skills within reading instruction environments at the primary level. Five key aspects have been identified for this assessment: ***visual perception skills, identification of fallacies, inference skills, presentation of persuasive explanations***, *and* ***problem-solving skills***. Assessing these skills is essential, as it aligns with the need for effective teaching strategies that prepare students to navigate the complexities of learning in a rapidly changing world.

The development of the assessment scale followed numerous essential steps. Initially, the scale's purpose and its five dimensions were defined. Subsequently, 11 university experts were invited to review and modify the scale items, which helped in removing unnecessary elements. This process resulted in testing the scale on an exploratory sample to verify its validity and reliability. This rigorous development process was critical to ensure that the scale captures the essential aspects of integrating reflective thinking.

The findings indicated that the psychometric properties of the scale support the evaluation of language teachers' performance in integrating reflective thinking skills. The construct validity of the scale was established through concurrent validity and discriminant validity measures, revealing coherence and consistency among the scale items. Furthermore, the scale demonstrated reliability, as evidenced by McDonald's Omega coefficients and composite reliability. Analyzing the aggregated data using the Rasch model confirmed the scale's validity, as no negative values were found for the PTMEA indicator. Additionally, items with PTMEA values exceeding 0.20 demonstrated unidimensionality and assessment metrics, both important indicators of construct validity.

During the study phase, some items were removed due to non-conformity, assessed based on Mean Square (MSNQ) and standard values. Reliability was also evaluated using the Rasch model through personal separation reliability, indicating the scale's ability to distinguish individuals with varying levels of thinking skills. This suggests that the reliability of the scale items reflects the difficulty level of each item, allowing respondents to answer based on their abilities. Results from the Confirmatory Factor Analysis (CFA) also showed concordance between the fit indices and the primary components of the assessment tool, reflecting the effectiveness of the model in evaluating how language teachers integrate thinking skills within reading environments.

The strength of the scale's performance stems from the participating teachers, who demonstrated awareness and interest in the scale's items. Additionally, the items were

carefully formulated to align with student behaviors in online learning environments, enhancing the scale's relevance and applicability.

It is noteworthy that this study fills a substantial gap in the current literature, as no previous studies have comprehensively investigated the integration of reflective thinking skills within primary reading education environments. While many studies have developed assessment tools for teacher performance, they often focused narrowly on specific dimensions, leading to the omission of the full spectrum of data needed to achieve our research goals. This gap underscores the significance of our findings and emphasizes the need for further exploration in this area.

In light of the findings of this study and based on the assertions of Al-Hassan et al.[17] and Al-Ali et al.[1], developing a comprehensive assessment tool like the one presented in this study is vital for enhancing effective teaching practices. Both Al-Hassan et al. and Al-Ali et al. stress the significance of integrating reflective thinking skills into primary education, emphasizing that such integration equips students with the ability to face complex learning challenges and solve problems. This research supports these viewpoints by showing how reflective thinking can enhance students' cognitive capabilities. This is especially evident, in tasks that involve problem solving and critical thinking.

Furthermore, this research underscores the significance of teacher training a topic supported by scholars[2, 10, 17, 21, 25, 28, 29]. These studies confirm that training programs for teachers that incorporate reflective thinking methods can greatly improve their teaching approaches and ultimately enrich students' educational journeys. When looking at it differently from studies like those by Al-Hassan et al.[8] and Al-Ali et al.[1], which concentrate on the advantages of reflective thinking, our research offers real world proof backing up how well this integration works in educational settings instead of just being a theory based discussion only. This points to the idea that schools should embrace these methods to encourage students critical and creative thinking skills and connect the theoretical aspects with practical application, in learning situations.

Additionally, ongoing support for teachers in using tools like the developed scale can enhance teaching performance and make the learning process more dynamic and interactive. This recommendation aligns with the conclusions of research by Al-Hassan et al.[17], who argue that continuous training and the provision of supportive tools are essential for fostering an adaptive teaching environment. Our findings provide further validation to this claim, emphasizing that sustained teacher support and professional development are key to successful implementation.

More importantly, the results contribute to providing an effective assessment tool that can be used to evaluate language teachers' performance in integrating reflective thinking skills. This tool is valuable, for teachers. Also contributes to advancing research and development, in this area. The findings of this study highlight how important it is to create education systems that meet students' needs in this century. Based on our stance, on this issue and in line with the findings of research[1, 12, 29–31, 33, 34] we endorse the idea of a transformation that emphasizes the significance of critical thinking and problem solving abilities, as crucial facets for students to thrive in today's society.

6. Conclusions

This study successfully developed a comprehensive scale for assessing language teachers' performance in incorporating reflective thinking skills within primary reading learning environments. The scale, informed by an extensive review of current literature, includes key dimensions that ensure its relevance to contemporary educational needs. Initial validation through pilot testing with 200 teachers, followed by a larger validation study involving 800 teachers, confirmed the scale's validity and reliability. Extensive statistical evaluations were conducted using methods, like the Rasch model and confirmatory factor analysis to support the durability of the scale confidently. The results highlight the scale effectiveness as an asset, for assessing and improving teaching methods that focus on developing critical thinking and reflective skills in students.

7. Limitations

While the study's positive results are encouraging to see it is important to note that there are limitations that might affect how broadly its conclusions can be applied. While the sample size of 800 teachers is quite large it might not fully represent all the environments out there which could impact how relevant the findings are and application, in var-

ious situations. Additionally, the data were collected from teachers in specific regions, limiting the ability to generalize the findings to other geographic areas or educational systems. The reliance on self-reported data from teachers also poses a risk of self-bias, particularly when they evaluate their own performance in applying reflective thinking, which may influence the accuracy and reliability of the results.

8. Future Research Directions

To address the limitations of the study, future research should aim to diversify samples by including teachers from varied geographic and cultural backgrounds, which would enhance the accuracy and generalizability of the findings. Additionally, longitudinal studies are recommended to evaluate the long-term impact of reflective thinking practices on both teachers' professional development and students' academic achievements. Examining external factors, such as institutional support and teachers' experience, is also essential to understand how the educational environment influences the effectiveness of reflective thinking strategies.

Furthermore, testing the study's scale within diverse cultural and educational settings is a key step to improving the reliability and applicability of the findings. There should also be a focus on understanding how reflective thinking impacts students' academic outcomes, especially in language education. This could involve developing more objective assessment tools to minimize the effects of self-bias when teachers assess their reflective practices.

By following these guidelines, for research exploration and analysis in education settings and policy making arenas alike will provide an understanding of the significance of reflective thinking in the field of education establishments to formulate effective teaching strategies based on empirical evidence that improve educational standards, in various learning environments.

Author Contributions

R.M.A. and A.A.A.-B. conceptualized the focus of the manuscript, proposed the aims, prepared the draft, and wrote all sections. They also collected, analyzed, and interpreted the data. R.M.A. and A.A.A.-B. were the primary contributors to writing the manuscript. All authors reviewed and approved the final version of the manuscript.

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Institutional Review Board Statement

The research involving human participants was reviewed and approved by the Deanship of Scientific Research at King Faisal University. All participants provided their written informed consent prior to taking part in the study.

Informed Consent Statement

Informed consent was obtained from all individual participants included in the study.

Date Availability Statement

The authors will make the raw data supporting the conclusions of this article available upon request, without anyundue restrictions.

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Conflict of Interest

The authors declare that there is no conflict of interest.

Appendix A

Table A1. Number of items omitted in the Scale based on experts.

Dimensions	Number of Items in the Initial Copy	Number of Items Omitted	Number of Modified Items
Visual Perception Skills (VPS)	13	2	**10**
Identifying Fallacies Skills (IFS)	5	0	5
Drawing Conclusions Skills (DCS)	5	0	**5**
Providing Convincing Explanations Skills (CES)	7	1	**5**
Proposing Solutions Skills (PSS)	5	5	5
Total	35	10	30

Appendix B

Table A2. Item fit analysis for the scale (initial).

Infit		Outfit		Pt-Measure		Exact OBS%	Match EXP%	Items
MNSQ	ZSTD	MNSQ	ZSTD	CORR	EXP			
1.47	2.1	2.50	2.9	0.43	0.54	41.5	56.1	VPS3
1.39	1.8	2.46	2.3	0.55	0.46	52.8	48.1	CES4
1.33	1.6	1.27	1.0	0.55	0.60	50.9	48.3	VPS7
1.14	0.8	1.03	0.2	0.57	0.59	49.1	52.6	VPS2
1.25	1.2	1.17	0.7	0.58	0.61	49.1	47.9	VPS9
1.26	1.3	1.22	0.1	0.59	0.63	60.4	50.9	DCS3
1.50	2.2	1.31	0.6	0.60	0.64	54.7	49.3	IFS4
0.93	0.3	0.76	1.4	0.60	0.58	54.7	46.8	VPS1
0.98	0.0	0.95	0.1	0.61	0.61	56.6	55.0	PSS2
0.91	0.4	0.82	0.8	0.63	0.61	56.6	49.2	CES5
1.29	1.4	1.31	0.5	0.63	0.67	45.3	46.7	IFS1
1.06	0.4	1.00	0.3	0.63	0.64	66.0	52.9	VPS11
0.97	0.1	1.17	0.3	0.64	0.65	52.8	48.0	PSS4
0.95	0.2	0.87	0.8	0.64	0.63	64.2	50.1	DCS5
1.08	0.5	1.04	0.3	0.64	0.66	64.2	52.2	CES1
1.08	0.4	1.06	1.1	0.65	0.62	39.6	53.5	VPS8
0.89	0.5	0.81	1.3	0.65	0.61	62.3	55.3	IFS3
1.11	0.6	1.06	0.4	0.65	0.65	62.3	45.0	IFS5
0.80	1.1	0.72	1.8	0.65	0.70	54.7	50.5	PSS5
0.78	1.2	0.70	0.2	0.66	0.67	45.3	51.5	CES3
0.99	0.0	0.87	1.1	0.66	0.68	60.4	44.9	DES1
1.21	1.1	1.46	0.3	0.66	0.66	45.3	49.2	VPS4
1.03	0.2	1.03	0.9	0.66	0.64	66.0	46.7	PSS1
1.05	0.3	1.25	0.7	0.66	0.64	52.8	52.9	CES2
0.98	0.0	0.93	0.0	0.67	0.66	64.2	48.0	PSS3
0.88	0.6	0.79	2.0	0.67	0.64	64.2	50.1	IFS2
0.89	0.6	0.83	0.4	0.67	0.64	39.6	52.2	DCS2
0.94	0.2	0.98	0.1	0.67	0.66	62.3	53.5	VPS10
1.02	0.2	1.48	0.6	0.67	0.68	62.3	55.3	DCS4
0.89	0.5	0.90	0.3	0.67	0.66	54.7	45.0	VPS6
1.06	0.4	1.00	0.7	0.67	0.68	45.3	50.5	VPS5
0.92	0.3	0.85	0.5	0.68	0.66	45.3	51.5	CES6

Appendix C

Table A3. Item dimensionality of self-efficacy scale.

	Empirical		Modeled
Total raw variance in observations	96.3	100%	100%
Raw variance explained by measures	47.6	49.3%	48.3%
Raw variance explained by persons	25.4	22.3%	24.7%
Raw Variance explained by items	23.1	21.6%	20.6%
Raw unexplained variance (total)	51.3	51.6%	100% 51.3%
Unexplained variance in 1st contrast	5.4	5.4%	8.6%
Unexplained variance in 2nd contrast	5.0	5.8%	8.1%
Unexplained variance in 3rd contrast	3.7	4.7%	6.5%
Unexplained variance in 4th contrast	3.5	4.3%	6.1%

Appendix D

Table A4. Person and item separation and reliability for the scale.

	Score	Count	Measure	Error	Infit		Outfit	
					MNSQ	ZSTD	MNSQ	ZSTD
Mean	194.3	50.0	1.66	0.46	1.07	−0.6	1.08	−0.5
S.D	39.7	0.0	2.28	0.15	0.71	3.6	0.74	3.5
Real rmse	0.26							
Adj.sd	2.18							
Separation	3.31							
Person reliability	0.91							
Mean	233.2	60.0	0.00	0.18	1.00	0.0	1.08	0.1
S.D	10.5	0.0	0.36	0.01	0.22	1.1	0.56	1.6
Real rmse	0.19							
Adj.sd	0.31							
Separation	2.69							
Item reliability	0.84							

References

[1] AlAli, R., Al-Hassan, O., Al-Barakat, A., et al., 2024. Good practices in using instructional images to enhance young children's linguistic skills from the viewpoint of language education experts. International Journal of Learning, Teaching and Educational Research. 23(9), 179–197. DOI: https://doi.org/10.26803/ijlter.23.9.10

[2] Al-Rashidi, A., Aberash, A., 2024. Reflective thinking and self-evaluation in language learning: Mirroring the impacts on Saudi Arabian EFL students' growth mindfulness, resilience, and academic well-being. Asian Journal of Second and Foreign Language Education. 9, 44. DOI: https://doi.org/10.1186/s40862-024-00265-1

[3] Burns, A., Edwards, E., Ellis, N.J., 2022. Sustaining action research: A practical guide for institutional engagement. Routledge.

[4] Cabaroglu, N., 2014. Professional development through action research: Impact on self-efficacy. System. 44, 79–88. DOI: https://doi.org/10.1016/j.system.2014.03.003

[5] Cirocki, A., Indrarathne, B., Calderón, V.E.A., 2024. Effectiveness of professional development training on reflective practice and action research: A case study from Ecuador. Reflective Practice. 25(5), 676–694. DOI: https://doi.org/10.1080/14623943.2024.2384124

[6] Cirocki, A., Wyatt, M., Gao, X., 2024. Reflective practice in TESOL: An introduction. In: Cirocki, A., Wyatt, M., Gao, X. (eds.). Developing reflective TESOL practitioners through teacher education: Insights from Asia. Springer. pp. 1–30.

[7] Habók, A., Magyar, A., 2018. The effect of language learning strategies on proficiency, attitudes and school achievement. Frontiers in Psychology. 8(2358), 1–8.

DOI: https://doi.org/10.3389/fpsyg.2017.02358

[8] Habók, A., Magyar, A., 2019. The effects of EFL reading comprehension and certain learning-related factors on EFL learners' reading strategy use. Cogent Education. 6(1), 1616522. DOI: https://doi.org/10.1080/2331186X.2019.1616522

[9] Farrell, T.S.C., Kennedy, B., 2019. A reflective practice framework for TESOL teachers: One teacher's reflective journey. Reflective Practice. 20(1), 1–12.

[10] Setiawan, J., Sudrajat, A., Aman, A., et al., 2021. Development of higher order thinking skill assessment instruments in learning Indonesian history. International Journal of Evaluation and Research in Education. 10(2), 545–552. DOI: https://doi.org/10.11591/ijere.v10i2.20796

[11] Irshid, M., Khasawneh, A., Al-Barakat, A., 2023. The effect of conceptual understanding principles-based training program on enhancement of pedagogical knowledge of mathematics teachers. Eurasia Journal of Mathematics, Science and Technology Education. 19(6), em2277. DOI: https://doi.org/10.29333/ejmste/13215

[12] Khasawneh, A., Al-Barakat, A., Almahmoud, S., 2022. The effect of error analysis-based learning on proportional reasoning ability of seventh-grade students. Frontiers in Education. 7, 899288. DOI: https://doi.org/10.3389/feduc.2022.899288

[13] AlAli, R., Aboud, Y., 2024. Sustainability assessment of higher education institutions: Faculty members perspective in Saudi universities. Geo Journal of Tourism and Geosites. 52(1), 133–149. DOI: https://doi.org/10.30892/gtg.52113-1190

[14] Hanks, J., 2017. Exploratory practice in language teaching: Puzzling about principles and practices. Palgrave Macmillan.

[15] Alali, R., Al-Barakat, A., 2022. Using structural equation modeling to assess a model for measuring creative teaching perceptions and practices in higher education. Education Sciences. 12(10), 690. DOI: https://doi.org/10.3390/educsci12100690

[16] Al-Barakat, A., AlAli, R., Al-Hassan, M., et al., 2022. Supervisory performance of cooperative teachers in improving the professional preparation of student teachers. International Journal of Learning, Teaching and Educational Research. 21(8), 425–445. DOI: https://doi.org/10.26803/ijlter.21.8.24

[17] Al-Hassan, O., Al-Barakat, A., Al-Hassan, Y., 2012. Pre-service teachers' reflections during field experience. Journal of Education for Teaching. 38(4), 419–434. DOI: https://doi.org/10.1080/02607476.2012.707918

[18] Al-Hassan, O., Al-Hassan, M., Almakanin, H., et al., 2022. Inclusion of children with disabilities in primary schools and kindergartens in Jordan. Education 3–13. 52(8), 1089–1102. DOI: https://doi.org/10.1080/03004279.2022.2133547

[19] Spears, D., Okan, Y., Hinojosa-Aguayo, I., et al., 2021. Can induced reflection affect moral decision-making? Philosophical Psychology. 34(1), 28–46. DOI: https://doi.org/10.1080/09515089.2020.1861234

[20] Edwards, S., 2017. Reflecting differently. New dimensions: Reflection-before-action and reflection-beyond-action. International Practice Development Journal. 7(1), 2. DOI: https://doi.org/10.19043/ipdj.71.002.

[21] Al-Barakat, A., Al-Hassan, O., AlAli, R.M., et al., 2023. Role of female teachers of childhood education in directing children towards effective use of smart devices. Education and Information Technologies. 28(6), 7065–7087. DOI: https://doi.org/10.1007/s10639-022-11481-y

[22] Garzon, A., 2018. Unlicensed EFL teachers coconstructing knowledge and transforming curriculum through collaborative-reflective inquiry. Profile: Issues in Teachers' Professional Development. 20(1), 73–87. DOI: http://dx.doi.org/10.15446/profile.v20n1.6232

[23] Fraihat, M., Khasawneh, A., Al-Barakat, A., 2022. The effect of situated learning environment in enhancing mathematical reasoning and proof among tenth grade students. Eurasia Journal of Mathematics, Science and Technology Education. 18(6), em2120.

[24] Hillmayr, D., Reinhold, F., Holzberger, D., et al., 2024. STEM teachers' beliefs about the relevance and use of evidence-based information in practice: A case study using thematic analysis. Frontiers in Education. 8. DOI: https://doi.org/10.3389/feduc.2023.1261086

[25] Jacob, R., Hill, H., Corey, D., 2017. The impact of a professional development program on teachers' mathematical knowledge for teaching, instruction, and student achievement. Journal of Research on Educational Effectiveness. 10(2), 379–407. DOI: https://doi.org/10.1080/19345747.2016.1273411

[26] Khasawneh, A., Al-Barakat, A., Almahmoud, S., 2023. The impact of mathematics learning environment supported by error-analysis activities on classroom interaction. Eurasia Journal of Mathematics, Science and Technology Education. 19(2), em2227. DOI: https://doi.org/10.29333/ejmste/12951

[27] Rastegar, M., Kermani, E.M., Khabir, M., 2017. The relationship between metacognitive reading strategies use and reading comprehension achievement of EFL learners. Open Journal of Modern Linguistics. 7(2), 65–74. DOI: https://doi.org/10.4236/ojml.2017.72006

[28] Yan, Z., Chiu, M.M., Ko, P.Y., 2020. Effects of self-assessment diaries on academic achievement, self-regulation, and motivation. Assessment in Education: Principles, Policy & Practice. 27, 562–583. DOI: https://doi.org/10.1080/0969594X.2020.1827221

[29] Ratminingsih, N.M., Artini, L.P., Padmadewi, N.N., 2018. Incorporating self and peer assessment in reflective teaching practices. International Journal of Instruc-

tion. 10(4), 165–184.

[30] Papadakis, S., Kravtsov, H.M., Osadchyi, V.V., et al., 2023. Revolutionizing education: using computer simulation and cloud-based smart technology to facilitate successful open learning. Proceedings of the Two Workshops: Cloud-Based Smart Technologies for Open Education Workshop (CSTOE 2022) and Illia O. Teplytskyi Workshop on Computer Simulation in Education (CoSinE 2022); Kyiv, Ukraine; 22 December 2022. Available from: https://edusports.com.sg/wp-content/uploads/2023/12/V_Osadchyi_CoSinE_2023_FEU.pdf

[31] Papadakis, S., Kalogiannakis, M., 2020. A research synthesis of the real value of self-proclaimed mobile educational applications for young children. Mobile learning applications in early childhood education. Information Science Reference/IGI Global. 1–19. DOI: https://doi.org/10.4018/978-1-7998-1486-3.ch001

[32] Papadakis, S., 2022. Apps to promote computational thinking and coding skills to young age children: A pedagogical challenge for the 21st century learners. Educational Process: International Journal (EDUPIJ). 11(1), 7–13. Available from: https://eric.ed.gov/?id=EJ1346090

[33] Strawhacker, A., Lee, M., Bers, M.U., 2018. Teaching tools, teachers' rules: exploring the impact of teaching styles on young children's programming knowledge in ScratchJr. International Journal of Technology and Design Education. 28(2), 347–376. DOI: https://doi.org/10.1007/s10798-017-9400-9

[34] Sullivan, A., Bers, M.U., 2016. Robotics in the early childhood classroom: learning outcomes from an 8-week robotics curriculum in pre-kindergarten through second grade. International Journal of Technology and Design Education. 26(1), 3–20. DOI: https://doi.org/10.1007/s10798-015-9304-5

[35] Tülübaş, T., Karakose, T., Papadakis, S., 2023. A holistic investigation of the relationship between digital addiction and academic achievement among students. European Journal of Investigation in Health, Psychology and Education. 13(10), 2006–2034.

[36] Awdeh, A., 2023. Measurement and evaluation in education. Yarmouk University: Irbid, Jordan.