

PROFESSIONAL THINKING AND SCIENTIFIC IMAGINATION AND THEIR RELATIONSHIP TO PROFESSIONAL COMPETENCE AMONG SECONDARY SCHOOL HISTORY TEACHERS IN DIYALA GOVERNORATE

RECONSTRUINDO A ZONA DE DESENVOLVIMENTO PRÓXIMO NA ERA DIGITAL: OS INFLUENCIADORES DO TIKTOK COMO “OUTROS MAIS CAPAZES” NA APRENDIZAGEM DA LÍNGUA INGLESA

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Abstract

The goals of this research are as follows.

- Determine how far down the path to professional thought the history instructors at the secondary school level are.
- To gauge the level of scientific imagination among history instructors at the secondary level.
- To assess secondary school history teachers' level of expertise in their field.

Aiming to determine if there was a connection between the sample's professional thought and competence was the primary objective. Four hundred secondary school history instructors from Diyala's General Directorate of Education (both male and female) make up the study's research sample. The sample represented 30% of the overall population of 1335 educators. Using a stratified random sampling procedure, the study's sample consisted of 634 male instructors and 701 female teachers. The researcher has come up with three methods to achieve the goals of the study. The original professional thinking tool was developed on the foundation of Konstantinovia's (1988) idea. The foregoing led to the final version of the scale with 30 items across 3 domains. Among them were the domains of cognition, creativity, and practicality. The second instrument computed scientific imagination according to Augustin's (2015) understanding of the concept. Each of the three characteristics of scientific sensitivity, scientific creativity, and scientific productivity were covered by 25 items in the previous edition of the instrument. A test of expert-level knowledge and skill made up the third tool. According to Glasser's Choice Theory (2019), this metric is

Resumo

Os objetivos desta pesquisa são os seguintes.

- *Determinar em que ponto do caminho rumo ao pensamento profissional se encontram os professores de história do ensino médio.*
- *Avaliar o nível de imaginação científica entre os professores de história do ensino médio.*
- *Avaliar o nível de especialização dos professores de história do ensino médio em sua área de atuação.*

O objetivo principal foi determinar se havia uma relação entre o pensamento profissional e a competência da amostra. Quatrocentos professores de história do ensino médio da Direção Geral de Educação de Diyala (homens e mulheres) compõem a amostra da pesquisa. A amostra representou 30% da população total de 1.335 educadores. Utilizando um procedimento de amostragem aleatória estratificada, a amostra do estudo consistiu em 634 professores do sexo masculino e 701 do sexo feminino. O pesquisador desenvolveu três métodos para atingir os objetivos do estudo. A ferramenta original de pensamento profissional foi desenvolvida com base na ideia de Konstantinovia (1988). Isso levou à versão final da escala com 30 itens distribuídos em 3 domínios. Entre eles estavam os domínios de cognição, criatividade e praticidade. O segundo instrumento calculou a imaginação científica de acordo com a compreensão do conceito de Augustin (2015). Cada uma das três características — sensibilidade científica, criatividade científica e produtividade científica — foi abordada por 25 itens na edição anterior do instrumento. Um teste de conhecimento e habilidade de nível especializado compôs a



based on. The scale consists of 30 elements that are organized into three categories.

- g. Concepts
- h. Teachers' awareness
- Teaching context.

The study reached the following results:

- The history instructors of Diyala's General Directorate of Education are very competent.
- The history instructors at Diyala's General Directorate of Education have a scientific mindset.
- Diyala's history instructors are highly qualified professionals in their field.
- The research sample shows a strong and statistically significant relationship between professional competence and professional thinking.

Keywords: Professional Thinking. Scientific Imagination. Teacher Competence. History Education. Secondary School Teachers.

terceira ferramenta. De acordo com a Teoria da Escolha de Glasser (2019), essa métrica se baseia. A escala consiste em 30 elementos organizados em três categorias.

- g. Conceitos
- h. Consciência dos professores
- Contexto de ensino.

O estudo chegou aos seguintes resultados:

- *Os professores de história da Direção Geral de Educação de Diyala são muito competentes.*
- *Os professores de história da Direção Geral de Educação de Diyala possuem uma mentalidade científica.*
- *Os professores de história de Diyala são profissionais altamente qualificados em sua área.*
- *A amostra da pesquisa mostra uma relação forte e estatisticamente significativa entre competência profissional e pensamento profissional.*

Palavras-chave: *Pensamento Profissional. Imaginação Científica. Competência do Professor. Ensino de História. Professores do Ensino Médio.*

1 FIRST: RESEARCH PROBLEM

As thinking skills and problem solving become more important goals in their own right, teacher acquiring new ideas, skills and experiences become essential. Modern teaching methods that focus on learning instead of teaching and dialogue instead of listening are definitely being introduced. Inquiry-based approaches instead of simple transmission are the recent trends in education. These methods help to develop thinking processes and give students the opportunity to express their understanding in their own language as opposed to that of the teacher.

There is generally little information and engagement between teachers and new innovations and creative ideas that have become part of life. To meet future demands with the production of new ideas, it is essential that teachers to recognize and professionally develop the abilities of the students (Atiya, 2015: p. 303)

Field research by Al-Mawla (2023) and Ibrahim (2023) indicates hindrances to the teaching of history. These hindrances involve not having enough mastery of advanced technologies and modern teaching methods to teach students adequately. Weak reasoning

skills and insufficient preparation to teach are other hindrances. Due to such deficiencies, teachers often do not think professionally. This has caused problems in educational reform and, in some cases, has led teachers to want to leave the profession.

The researcher conducted a field visit at the Ministry of Education also and observed that there is a deficiency of scientific imagination and professional competence among teachers.

Accordingly, the current study seeks to answer the following questions:

- Do secondary school history teachers possess professional thinking?
- Do secondary school history teachers possess scientific imagination?
- Is there a relationship between professional thinking, scientific imagination, and professional competence among secondary school history teachers in Diyala Governorate?

1.1 Second: significance of the research

The importance of the current study can be outlined as follows:

1. The significance of professional thinking is to help teachers learn and improve their skills, to cope with the tremendous flow of information of a different nature, and to overcome unforeseen difficulties.
2. Scientific imagination is important because it is closely related to the creative capacities of teachers and is an important part of any successful educational process.
3. The research sets a criterion for professional competence and stresses its importance for the history teacher of secondary school.
4. The presence of a professional mindset enables secondary school history teachers to continuously updating their knowledge and enhancing their educational expertise given the rapid flow of information in environment.

1.2 Third: research objectives

The present study seeks to achieve the following objectives:

1. The objective of the study is to find the level of professional thinking of history teachers of secondary schools.
2. To investigate how much scientific imagination secondary school history teachers, exhibit.
3. To determine the professional competence level of secondary school history teachers.
4. To find out the relationship between professional thinking and professional competence among the research sample.

1.3 Fourth: research boundaries

The current study is delimited by the following parameters:

1. **Spatial Boundaries:** The General Directorate of Education in Diyala.
2. **Human Boundaries:** A sample of secondary school history teachers within the General Directorate of Education in Diyala.
3. **Temporal Boundaries:** The academic year (2025–2026).
4. **Scientific Boundaries:** Male and female secondary school history teachers.

1.4 Fifth: definition of terms

1.4.1 Professional thinking

A cognitive and systematic process through which personal knowledge, scientific experiences, and professional values are employed, analyzed, and utilized to generate appropriate solutions in alignment with professional standards.

1.4.2 Scientific imagination

A cognitive process and a fundamental attribute of intellectual effort and cultural awareness through which individuals construct conceptual images or phenomena, enabling the acquisition of new modes of thinking.

1.4.3 Professional competence

A set of knowledge, skills, values, attitudes, and abilities required by teachers to successfully perform specific tasks. It involves acquiring the necessary competencies to execute activities effectively, understand social requirements, and apply them with a high level of efficiency and professionalism.

2 CHAPTER TWO THEORETICAL FRAMEWORK AND PREVIOUS STUDIES

2.1 First axis: theoretical framework

- Professional Thinking
- Scientific Imagination
- Professional Competence

2.2 Second axis: previous studies

1. Studies addressing professional thinking in relation to other variables
2. Studies addressing scientific imagination in relation to other variables
3. Studies addressing professional competence in relation to other variables

2.2.1 First axis: theoretical aspects

2.2.1.1 First: professional thinking

The preparation and professional development of teachers have now become prime concerns. The springboard of rapid evolution of present-day life, challenge/structural change has become an increasingly decisive matter. These developments necessitated a reconsideration of education systems across the world, both at the general level and within teaching practices more specifically.

Subsequently, many educational systems brought training programs for the teachers in order to provide them with pedagogic knowledge and make them a better professional. These efforts seem to be motivated, at least in part, by an ever-increasing awareness of change and the need to adapt to it. From this point of view, professional development can be viewed as an instrument that reiterates the status of the teaching profession and provides opportunities for teachers to enact their social function in a setting marked by rapid and continuous change (Hamada, 2015, p. 67).

The literature has approached the concept of professional thinking from a number of perspectives including a metacognitive perspective. Some researchers look at it as a process of dealing with professional tasks in a particular domain of activity. Some people see it as a special orientation concerning the principle of professional practice. In spite of this discrepancy, the category 'professional thinking' is most often used in the double sense (Andrey, 2019, p. 35).

Theory of Professional Thinking

Konstantinovia's Theory

The training and professional growth of teachers has become a significant issue. There has been a rapid alteration of the present-day life owing to the challenge/structural change. As a result of these developments, education systems all over the world, both at the general level and within teaching practices more specifically, have had to be reconsidered.

As a result, many educational systems introduced teacher training programs so that teachers could get pedagogic knowledge and become better professionals. According to the statement, the above activities are basically motivated by the increasing awareness

of change. In this sense, professional development can be seen as a tool that reinforces the status of the teaching profession and enables teachers to fulfil their social function in a constantly changing context (Hamada, 2015, p. 67).

The literature has offered a number of ways of looking at professional thinking, including a metacognitive perspective. According to certain researchers, it is a treatment professional task in a specific area of activity. According to some people, it is a specific orientation concerning the principle of professional practice. According to Andrey (2019, p. 35), 'professional thinking' is one category that is most used in the double sense.

2.2.1.2 Second: scientific imagination

Both philosophy and psychology have taken a great deal of interest in scientific imagination. Such popular interest seems to stem from a science's contribution to human culturisation through the ages. Among all living things, human beings are the only ones who have a historical consciousness. This consciousness is not merely a geographical or temporal one. Rather, this consciousness is built on selective awareness and the emergence of reflective consciousness. As a result of this consciousness people can express their desires and utilize them as means for self-realization (Nasr, 1984, p. 5).

Scientific imagination can be seen as the intellectual activity of anticipating things on scientific and logical grounds by the teacher. In this way, it contributes to scientific progress and throughout history, has been linked to the emergence of a number of discoveries. In the realm of teaching history, scientific imagination holds a particularly important role.

It assists in obtaining conceptual knowledge, helping to reflect on the present and future context in addition to developing a variety of thinking skills in teachers. It might also inspire motivation and new strategies for history teaching, and stimulate teachers to expand their scientific knowledge and work experience.

History, as a subject, is also a fruitful domain for stimulating a scientific imagination due to the varied nature of its themes and contexts. This enables teachers to investigate the changing relations between education, technology and society and anticipate future developments and responses (Abdel, 2020, p. 163).

Constructivist Theory of Scientific Imagination

Constructivist Theory has gained prominence but the ideas are not brand new. The Greek philosophers Socrates, Plato and Aristotle (320–470 BC), who discussed the development of knowledge, already show early signs of constructivist thinking.

From a cognitive angle, which was developed in response to the behaviorist theory, the constructivism may be traced back to the philosophy of Plato. Plato believed that knowledge does not pass down. The task of teaching is not to impart knowledge but to help learners remember it. For Plato, recollection is the search or quest for and finding out essential ideas, and inferring new ideas from them.

In the same way, Socrates stressed the importance of school where students independently arrive at conclusions without being taught. Plato and Socrates so often conceptualized learning as a discovery through the senses (Al-Dulaimi, 2014, p. 13).

In the mid-4th century AD, Augustine of Hippo stated that sensory experience should be the foundation for seeking truth particularly where intellectual inquiry tensions with institutional authority. Later writers such as John Locke, who wrote between the seventeenth and eighteenth centuries, argued that a human being can only know his own experience.

In the 1800s, Immanuel Kant codified the principles of cognitive theory. Kant argued that you can't acquire knowledge through sensory input only. The logical analysis of actions and objects contributes to developing knowledge, while prior experiences are a core generator of new knowledge (Al-Dulaimi, 2014, p. 13).

2.2.1.3 Third: professional competence

The term “competence” quickly made its presence felt in the educational world, beginning with the USA and followed by Australia and Europe. Nation like UK, Switzerland and Belgium etc were the first to reform their educational systems by this newly emerging paradigm. Inevitably, educational policymakers transitioned from a focus on objectives to a focus on competencies, but the distinction was not always clear (Boutin, 2004, p. 28).

The phrase this professional competence or professional competencies is multipurpose. It is often employed without enough consideration of the conceptual and

practical defining features that distinguish it. There has been an ambiguity and inconsistency in its application with respect to its ontological basis and its functions.

Due to the complexity of the issue, it is necessary to clarify concepts carefully and critically examine the implications of various interpretations with practical consequences. The concept of professional competencies refers to the interdependence required by educational assessment processes and the requirements of a profession and the labor market. Competence is, however, manifested differently in educational contexts and national systems, suggesting that things that might be the same do not necessarily appear the same for everyone (Manuel&Tamayo, 2023, p. 117).

Theory Addressing Professional Competence

Choice Theory

Within the framework of Choice Theory, William Glasser raises two central questions concerning professional competence.

- What is the primary concern or fundamental psychological problem underlying professional competence among individuals?
- What is the core psychosocial process that continuously resolves this concern? (Ahuja, 2018, p. 41)

Reality Therapy and Choice Theory were both created by modern psychiatrist William Glasser (1925–2013). He received his bachelor's, master's, and doctoral degrees in psychiatry in 1953 from Case Western Reserve University in Cleveland, Ohio, where he studied clinical psychology after being born on May 11, 1925, in Ohio.

Between 1954 to 1957, he earned his psychiatric degree in Los Angeles, California, at the Veterans Administration Center and the University of California, Los Angeles. From 1956 to 1986, Glasser was a private practitioner in Los Angeles.

Glasser created Choice Theory and improved Reality Therapy in the 1970s, using influences from William Powers' control theory methods. These methods continue to spark controversy in the field of psychology since they place more weight on free will and actions than on biological or mental disorders (Ahuja, 2019, p. 38).

2.2.2 Second axis: previous studies

The researcher reviewed previous studies across three main categories as follows:

2.2.2.1 First: studies addressing professional thinking with other variables

Study of Al-Mawla (2023)

- **Objective:** The study aimed to examine professional thinking and its relationship with positive orientation among secondary school teachers.
- **Location:** The study was conducted in Iraq, at the University of Diyala, College of Education for Human Sciences.
- **Population:** Secondary school teachers within the General Directorate of Education in Diyala Governorate.
- **Sample:** The sample consisted of 600 male and female teachers from the Directorate of Education in Diyala (Baqubah District). Participants were selected using a stratified random sampling method with proportional allocation.
- **Instruments:** The researcher developed a professional thinking scale and a positive orientation scale.
- **Statistical Methods:** The study employed several statistical techniques, including:
 - A t-test for independent samples
 - A t-test using a single sample
 - The Z-test
 - As a measure of internal consistency, Cronbach's alpha
 - Coefficient of Pearson correlation
- **Results:** The findings indicated a statistically significant correlation between professional thinking and positive orientation. No significant differences were found in this relationship based on gender or years of service (Al-Mawla, 2023).

2.2.2.2 Second: studies addressing scientific imagination with other variables

Study of Ahmed and Abdullah (2023)

- **Objective:** The study aimed to investigate the relationship between scientific imagination, metacognitive skills, and attitudes toward physics.
- **Location:** The study was conducted in the Kingdom of Saudi Arabia at Qassim University.

- **Population:** The study population consisted of students from the College of Science and Arts at Qassim University.
- **Sample:** The sample included 121 students (22 males and 99 females) from the Department of Physics, College of Arts, Qassim University.
- **Instruments:** The study utilized three instruments:
 - A scientific imagination scale
 - A metacognitive skills scale
 - An attitude toward physics scale
- **Statistical Methods:** In order to examine the data, we used:
 - Coefficient of Pearson correlation
 - Analyzing data with multiple linear regression
- **Results:** The findings indicated statistically significant correlations between attitudes toward imagination in the field of physics. A substantial link was found between scientific imagination and metacognitive abilities. Nonetheless, metacognitive skill and attitude toward physics is not significantly correlated. Results this shows that scientific imagination cannot be predicted directly through metacognitive skills. However, once we look at the overall score of the metacognitive skills scale, prediction is possible. Moreover, it was found that imaginations of science could not be predicted from attitude towards science.

2.2.2.3 Third: studies addressing professional competence with other variables

Study of Al-Faqir (2024)

- **Objective:** The study aimed to examine creative teaching skills and their relationship with professional competence among primary school teachers.
- **Location:** The study was conducted in Palestine.
- **Population:** The population consisted of male and female primary school teachers during the academic year (2023–2024) in the Directorate of Education of South Hebron.
- **Sample:** The sample included 265 teachers from the primary stage affiliated with the Directorate of Education of South Hebron for the academic year (2023–2024).
- **Instruments:** The study employed:

- A creative teaching skills scale
- A professional competence scale
- **Statistical Methods:** After verifying the validity and reliability of the instruments, they were administered to the sample.
- **Results:** Research at the South Hebron Directorate of Education found that elementary school teachers had a high degree of creative pedagogical competence.
- Overall, there were no discernible variations in the mean scores of creative teaching abilities according to gender, academic background, years of experience, or area of specialty. On the other hand, yearly performance reviews revealed disparities.
- Similarly, there were disparities in yearly assessment but no discernible differences in professional ability according to gender, specialty, academic qualification, or years of experience.
- Also, according to Al-Faqir (2024), there is a favorable and statistically significant correlation between primary school teachers' professional competency and their ability to teach creatively.

3 CHAPTER THREE: RESEARCH METHODOLOGY AND PROCEDURES

- Research Methodology
- Subsequently: Study Participants
- Sample gathered from research
- Professional Competence Scale, Scientific Imagination Scale, and Professional Thinking Scale are the research instruments that are categorized as number four.
- Methods of Statistics

This chapter provides a detailed presentation of the research methodology and the procedures followed in defining the research population and sample. It also outlines the steps taken in constructing and adopting the research instruments, as well as the statistical methods used to analyze the research results, as follows:

3.1 First: research method

The researcher used the descriptive (correlational) method because it suits the nature and purpose of the present research. The approach is frequently used in studies, which describe phenomena and problems as they are, or the ideal state, the phenomena should attain under given criteria. It also enables the formulation of recommendations or proposals to improve the existing conditions and bring them in line with the desired standard (Al-Basyouni, 2013, p. 107).

3.2 Second: research population

The research population consists of history teachers working in intermediate and secondary daytime schools under the General Directorate of Education in Diyala Governorate during the academic year (2025–2026). The total population comprises 1,335 teachers, including 634 male teachers (47%) and 701 female teachers (53%), distributed across districts.

3.3 Third: research sample

A sample is a smaller subsection of the original population from which the researches perform the major processes of the study. The success of the research essentially relies on the use of proper sampling techniques (Mahjoub, 2005, p. 149).

The study uses the stratified random sampling technique, which enables the researchers to use the gender (male-female) and years of services (5 years or more, 10 years or more, 15 years or more) to identify the sample used equally.

Experimental Sample: The universe of research, which included history professors at the intermediate level in the General Directorate of Education in Diyala, with a number of 1,335 teachers. The researcher sample was 400 teachers. The subset is about 30 percent of the total. This is considered adequate for representing the original population.

3.4 Fourth: research instruments

A research instrument is a methodological term referring to the means through which a researcher collects the necessary data to answer research questions or test hypotheses (Al-Assaf, 1995, p. 100).

To achieve the objectives of the present study and measure its variables, three instruments were required:

- A scale to measure professional thinking
- A scale to measure scientific imagination
- A scale to measure professional competence among secondary school history teachers

The following section presents a detailed account of the procedures adopted in constructing these research instruments.

3.5 First instrument: professional thinking scale

One of the primary objectives of the present study was to identify the level of professional thinking among secondary school history teachers in the General Directorate of Education in Diyala. To achieve this objective, the researcher followed a set of systematic procedures in constructing the scale.

The scale consisted of 32 items, including 16 positively worded items and 16 negatively worded items. These items were distributed across three domains:

- Cognitive domain: 11 items
- Creative domain: 10 items
- Practical domain: 11 items

The response alternatives were structured according to a five-point Likert scale:

- Completely applies to me
- Often applies to me
- Sometimes applies to me
- Rarely applies to me
- Does not apply to me at all

Scores were assigned as follows:

- For positive items: (5, 4, 3, 2, 1)
- For negative items: (1, 2, 3, 4, 5)

This structure follows the Likert scaling approach, where each item is rated across five levels (Odeh, 1985, p. 179). It is also recommended that half of the items reflect a positive اتجاه and the other half a negative اتجاه toward the construct being measured (Abu Allam, 2006, p. 383).

3.5.1 Validity of scale items (expert review)

After defining the domains and drafting the initial version of the items, the researcher presented the 32 items to a panel of experts and specialists in teaching methods, educational and psychological sciences, and measurement and evaluation.

The purpose of this step was to assess the validity of the items by obtaining expert opinions regarding:

- The appropriateness of the items
- The clarity of wording
- The suitability of response alternatives
- The alignment of items with the research population

Based on the feedback received, necessary revisions and refinements were made.

3.5.2 Pilot study (clarity of instructions)

After preparing and logically evaluating the first form of the scale by the researcher and expert evaluators, a pilot study was conducted. A structured pilot application is necessary, which does not diminish the role of logical analysis and expert judgment. The pilot can enhance both processes (Mikhail, 2016, p. 106).

The last step or stage in the construction of the item refers to the administration of scale in the trial form to a small group of subjects (participants), having the same characteristics as the sample for the actual study.

To achieve this, the researcher applied the scale on pilot sample which was 45 teachers inclusive:

- 21 male teachers
- 24 female teachers

These participants were randomly selected from history teachers affiliated with the General Directorate of Education in Diyala.

The researcher analyzed the pilot data statistically using:

- Percentages
- Means
- Tests for differences between group means
- Correlation coefficients between test scores

(Sayed Suleiman, 2014, p. 111).

3.5.3 Sample for statistical analysis

The researcher uses Nunnally's criterion in which participants in the sample tested statistically should be between 5 and 10 for every item. In other words, (Nunnally, 1978, p. 262) each item must be answered by at least five respondents.

As a result, the statistical analysis used a sample of 160 participants, selected by a stratified random sampling with a proportional distribution. The sample represented about 21% of the total.

3.5.4 Item discrimination power

Item discrimination refers to the ability of a test item to differentiate between individuals who possess a high level of the trait being measured and those who demonstrate a lower level of that trait (Ahman, 1971, p. 218).

Results of the Independent Samples t-Test for Item Discrimination of the Professional Thinking Scale

[The section introduces the statistical analysis results related to item discrimination using the independent samples t-test.]

Table 1

Significance at 0.05	Calculated t-value	Std. Dev.	Lower Group Mean	Std. Dev.	Upper Group Mean	No.
Significant	6.166	0.840	1.826	1.087	3.118	1
Significant	4.341	0.721	3.425	0.913	4.195	2
Significant	4.743	0.740	3.768	0.710	4.509	3
Significant	6.211	0.784	3.591	0.637	4.548	4
Significant	5.460	1.086	3.591	0.556	4.607	5
Significant	5.983	0.980	3.473	0.572	4.509	6
Significant	6.562	0.775	3.787	0.491	4.705	7
Not Significant	1.781	0.968	3.087	0.788	3.426	8
Significant	8.841	0.784	3.591	0.549	4.881	9
Significant	7.562	1.079	3.003	0.533	4.391	10
Significant	7.913	0.941	3.101	0.541	4.411	11
Significant	5.584	1.035	3.277	0.437	4.234	12
Significant	9.028	0.877	2.983	0.580	4.431	13
Significant	6.025	0.989	3.199	0.625	4.274	14
Significant	9.432	1.073	2.748	0.530	4.470	15
Significant	9.019	0.872	2.728	0.878	4.431	16
Significant	8.491	1.081	2.924	0.606	4.529	17
Significant	7.349	0.988	2.924	0.748	4.313	18
Significant	9.953	0.898	2.768	0.693	4.489	19
Significant	4.004	0.967	3.258	0.786	4.019	20
Significant	6.777	0.999	2.924	0.749	4.215	21
Significant	7.822	0.996	3.022	0.602	4.411	22
Significant	5.524	1.104	3.140	0.809	4.293	23
Significant	6.266	0.979	3.513	0.554	4.587	24
Significant	7.543	0.893	3.454	0.526	4.646	25
Significant	7.629	0.798	3.258	0.643	4.450	26
Significant	4.085	0.812	3.532	0.782	4.234	27
Significant	8.841	0.826	2.983	0.752	4.489	28
Significant	8.916	0.775	3.101	0.573	4.411	29
Significant	7.490	1.083	3.062	0.658	4.509	30
Not Significant	0.721	0.693	2.896	0.844	3.016	31
Significant	8.945	0.795	3.003	0.847	4.587	32

3.5.5 Correlation between item score and total scale score

This method is based on calculating the correlation between the score of each individual item and the total score of the scale. An item is considered discriminative if its correlation coefficient with the total score is high (Abbas et al., 2009, p. 265).

Table 2

Item–Total Correlation Coefficient of the Scale

Tabulated Value	Correlation Coefficient	No.	Tabulated Value	Correlation Coefficient	No.
0.156	0.459	16	0.156	0.268	1
	0.422	17		0.335	2

	0.398	18		0.284	3
	0.404	19		0.393	4
	0.326	20		0.395	5
	0.358	21		0.379	6
	0.337	22		0.405	7
	0.414	23		0.329	8
	0.318	24		0.387	9
	0.371	25		0.405	10
	0.368	26		0.379	11
	0.427	27		0.421	12
	0.344	28		0.403	13
	0.385	29		0.320	14
	0.392	30		0.351	15

3.5.6 Correlation between item score and domain total score

An essential metric for determining which domain of behavior is being evaluated is the degree to which an item's score correlates with the overall score of that domain (Anastasi, 1982, p. 206).

In order to confirm the strength of item linkage, the researcher used the Pearson correlation coefficient to find the relationship between each item score and the overall score of its relevant domain. At the 0.05 level of significance and with 158 degrees of freedom, all of the correlation coefficients were found to be statistically significant, surpassing the tabulated value of 0.156. These findings are shown in the table below.

Table 3

Correlation Coefficient Between Item Score and Domain Total Score

Correlation Coefficient	Third Domain	No.	Correlation Coefficient	Second Domain	No.	Correlation Coefficient	First Domain	No.
0.412		21	0.395		11	0.497		1
0.389		22	0.429		12	0.515		2
0.304		23	0.321		13	0.536		3
0.414		24	0.423		14	0.492		4
0.424		25	0.494		15	0.397		5
0.372		26	0.352		16	0.428		6
0.344		27	0.464		17	0.432		7
0.348		28	0.367		18	0.396		8
0.522		29	0.424		19	0.456		9
0.431		30	0.372		20	0.509		10

3.5.7 Correlation between domain scores and the total scale score

Using the Pearson correlation coefficient, the researcher checked the strength of the link between the domain scores and the overall construct by determining the relationship between the scores of each domain and the total score of the scale.

At the 0.05 level of significance and with 158 degrees of freedom, all of the correlation coefficients were found to be statistically significant, surpassing the tabulated value of 0.156. You can see these results in the table below.

Table 4

Correlation Between Domain Scores and the Total Scale Score

Tabulated Value	Correlation Coefficient	Domain
0.156	0.586	Cognitive
	0.612	Creative
	0.495	Practical

3.5.8 Psychometric properties of the professional thinking scale

Psychometric properties are essential for any measurement instrument, particularly validity and reliability of scores. The process of measurement requires specific conditions in tool construction; therefore, specialists in measurement emphasize the necessity of verifying both validity and reliability (Allam, 2000, p. 184). The researcher examined these properties as follows:

3.5.8.1 First: validity of the scale

Validity refers to the inferences derived from test scores in terms of their appropriateness, meaning, and usefulness. In other words, it reflects the extent to which a test measures what it is intended to measure (Abu Allam, 2011, p. 465).

3.5.8.2 Second: reliability of the scale

Reliability is a fundamental requirement for measurement tools when assessing a given phenomenon. It refers to the consistency of results, meaning that similar scores are obtained when the instrument is reapplied to the same group under identical conditions (Abu Al-Diyar, 2012, p. 35).

3.5.9 Final form of the professional thinking scale

The final version of the professional thinking scale consists of 30 items, including 15 positive and 15 negative items.

The response format follows a five-point Likert scale:

- This is very true for me.
- That's something that happens to me quite a bit.
- It doesn't always apply to me.
- I seldom find it relevant
- It has absolutely nothing to do with me.

Scoring is assigned as follows:

- Positive items: (5, 4, 3, 2, 1)
- Negative items: (1, 2, 3, 4, 5)

The hypothetical mean of the scale is 90, with a maximum score of 150 and a minimum score of 30.

After completing the scale construction and verifying the discriminative power of its items, as well as its psychometric properties (validity and reliability) through statistical analysis, the scale became ready for administration to the main research sample of 400 secondary school history teachers in the General Directorate of Education in Diyala.

3.6 Second instrument: scientific imagination scale

To achieve the objectives of the study, a second instrument was required, namely the scientific imagination scale. After reviewing relevant literature and previous studies, the researcher decided to construct a new scale suitable for the age group of the research

sample and consistent with the study objectives, particularly due to the absence of an appropriate existing instrument.

The researcher followed these steps in constructing the scale:

- Defining the concept to be measured
- Identifying the dimensions of the concept
- Formulating items for each dimension
- Conducting statistical item analysis
- Establishing psychometric indicators of the scale (Allen & Yan, 1979, p. 118)

The scale consisted of 26 items, including 13 positive and 13 negative items, distributed across three dimensions:

- Scientific sensitivity: 9 items
- Scientific creativity: 9 items
- Scientific productivity: 8 items

Response alternatives followed a five-point Likert scale:

- Completely applies to me
- Often applies to me
- Sometimes applies to me
- Rarely applies to me
- Does not apply to me at all

Scores were assigned as follows:

- Positive items: (5, 4, 3, 2, 1)
- Negative items: (1, 2, 3, 4, 5)

This structure aligns with Likert scaling principles, where each item is rated across five levels (Odeh, 1985, p. 179).

3.6.1 Validity of scale items (expert review)

After defining the dimensions and drafting the initial items, the researcher presented the 26 items to a panel of experts in teaching methods, educational and psychological sciences, and measurement and evaluation.

The purpose was to evaluate item validity in terms of:

- Appropriateness

- Clarity
- Suitability of response alternatives
- Alignment with the characteristics of the research population

3.6.2 Pilot study (clarity of instructions)

The pilot study consists of administering the scale to a small sample in order to check the clarity of items and language as well as to find possible weaknesses before administering it finally (Al-Omrani, 2013, p. 104).

In that regard, the scale has been applied to a sample of 40 male and female teachers whose selection was random and the distribution according to sex was on history teachers in the General Directorate of Education in Diyala.

3.6.3 Statistical analysis of scientific imagination scale items

The statistical evaluations of the testing items are necessary to determine the efficiency of the instrument in measuring what should be measured (Smith 1966, p. 68)

For this purpose, the researcher performed statistical analysis for a sample of 160 teachers, a sample different from the main sample, selected randomly with equal distribution according to gender from history teachers, affiliated with the General Directorate of Education in Diyala.

3.6.4 Item discrimination power

This procedure is a fundamental step in constructing educational and psychological scales. It aims to determine the ability of each item to distinguish between individuals with high and low levels of the measured trait.

Two extreme groups were selected based on total scores, and each item was analyzed using the independent samples t-test to determine the significance of differences between the upper and lower groups (Edward, 1957, p. 152).

3.6.5 Item discrimination of the scientific imagination scale

[This section introduces the statistical results related to item discrimination for the scientific imagination scale.]

Table 5

Significance at 0.05	Calculated t-value	Std. Dev.	Lower Group Mean	Std. Dev.	Upper Group Mean	No.
Significant	7.083	0.963	2.283	0.766	3.612	1
Significant	4.210	0.869	2.863	0.735	3.594	2
Significant	3.142	0.973	3.216	0.577	3.758	3
Significant	5.376	0.902	3.371	0.735	4.325	4
Significant	4.727	0.852	3.045	0.676	3.829	5
Significant	4.150	0.991	3.000	0.651	3.750	6
Significant	3.405	1.106	2.763	0.875	3.496	7
Significant	2.952	0.980	2.847	0.829	3.425	8
Significant	3.762	1.007	3.378	0.717	4.087	9
Significant	3.376	0.886	3.293	0.875	3.934	10
Significant	4.472	1.036	2.776	0.869	3.698	11
Significant	4.324	0.910	2.991	0.875	3.824	12
Significant	4.558	0.842	2.356	0.731	3.131	13
Significant	2.657	1.025	3.266	0.615	3.750	14
Significant	3.740	1.103	3.227	0.683	3.967	15
Significant	4.768	0.995	2.567	0.963	3.574	16
Significant	5.682	0.778	3.442	0.650	4.321	17
Significant	8.008	0.639	2.362	0.942	3.752	18
Significant	5.589	0.969	2.815	0.922	3.955	19
Significant	5.942	1.050	2.411	0.879	3.652	20
Significant	3.567	0.807	3.139	0.776	3.748	21
Significant	5.572	1.023	2.399	0.860	3.535	22
Significant	4.795	0.854	3.220	0.947	4.152	23
Significant	6.454	0.833	2.936	0.996	4.214	24
Significant	3.534	0.879	3.063	0.804	3.705	25

3.6.5.1 Correlation between item score and total score of the scientific imagination scale

To ensure that each item had a strong link with the overall construct, the researcher computed the relationship between each item's score and the total score of the scale using the Pearson correlation coefficient.

At the 0.05 level of significance and with 158 degrees of freedom, all of the correlation coefficients were found to be statistically significant, surpassing the tabulated value of 0.156. These results are shown in the table below.

Table 6

Item–Total Correlation Coefficients for the Scientific Imagination Scale

Tabulated Value	Correlation Coefficient	No.	Tabulated Value	Correlation Coefficient	No.
0.158	0.348	14	0.158	0.292	1
	0.301	15		0.367	2
	0.322	16		0.395	3
	0.289	17		0.309	4
	0.342	18		0.269	5
	0.268	19		0.341	6
	0.347	20		0.324	7
	0.370	21		0.273	8
	0.339	22		0.380	9
	0.381	23		0.334	10
	0.313	24		0.352	11
	0.316	25		0.291	12
				0.373	13

3.6.5.2 Correlation between item score and domain total score

The researcher used the Pearson correlation coefficient to determine the connection between the score of each item and the total score of the domain to which it belonged, therefore validating the item's strong association with its domain.

With 158 degrees of freedom and a significance threshold of 0.05, every correlation coefficient was determined to be statistically significant, above the computed value of 0.156. The table below displays these outcomes.

Table 7

Correlation Coefficient Between Item Score and Domain Total Score

Correlation Coefficient	Third Domain	No.	Correlation Coefficient	Second Domain	No.	Correlation Coefficient	First Domain	No.
0.399		1	0.412		1	0.382		1
0.385		2	0.367		2	0.411		2
0.394		3	0.389		3	0.396		3
0.333		4	0.406		4	0.351		4
0.415		5	0.381		5	0.386		5
0.367		6	0.423		6	0.402		6
0.343		7	0.355		7	0.366		7
0.364		8	0.358		8	0.315		8
			0.297		9			

3.6.5.3 Correlation between domain scores and the total scale score

By calculating the connection between the total score of the scale and the scores of each domain, the researcher was able to use the Pearson correlation coefficient to verify the strength of the link between the domain scores and the overall construct.

With 158 degrees of freedom and a significance threshold of 0.05, every correlation coefficient was determined to be statistically significant, above the computed value of 0.156. The results are shown in the table below.

Table 8

Correlation Between Domain Scores and the Total Scale Score

Tabulated Value	Correlation Coefficient	Domain
0.156	0.486	Scientific Sensitivity
	0.493	Scientific Creativity
	0.506	Scientific Productivity

Psychometric Properties (Validity and Reliability)

The most essential properties of any measurement instrument are its validity and the reliability of its scores (Allam, 2000, p. 184).

First: Validity of the Scale

The primary question concerning any testing instrument is the extent of its validity. In essence, validity examines whether the test measures what it is intended to measure and not something else. Thus, validity refers to the appropriateness of the method or instrument in achieving the objectives of the study (Atifa, 2002, p. 391).

Second: Reliability of the Scale

Ensuring objectivity in the analysis process requires acceptable levels of reliability in the measurement instrument. Achieving such reliability depends on the clarity of coding rules and procedures.

Reliability refers to the consistency of results obtained from the measurement instrument. This means that under identical conditions, categories, analytical units, and time frames, the same results should be obtained when the test is reapplied, regardless of who conducts the analysis or when it is conducted (Atifa, 2002, p. 392).

Final Form of the Scientific Imagination Scale

The final version of the scientific imagination scale consists of 25 items distributed across three dimensions:

- Scientific sensitivity: 8 items
- Scientific creativity: 9 items
- Scientific productivity: 8 items

The scale includes 13 positively worded items and 12 negatively worded items.

Responses are based on a five-point Likert scale:

- Completely applies to me
- Often applies to me
- Sometimes applies to me
- Rarely applies to me
- Does not apply to me at all

Scoring is assigned as follows:

- Positive items: (5, 4, 3, 2, 1)
- Negative items: (1, 2, 3, 4, 5)

The hypothetical mean of the scale is 75.

After completing the construction of the scale and verifying its item discrimination power and psychometric properties (validity and reliability) through statistical analysis, the instrument became ready for application to the main research sample of 400 secondary school history teachers in the General Directorate of Education in Diyala.

3.7 Third instrument: professional competence scale

To achieve the objectives of the present study, a third instrument was required, namely the professional competence scale for secondary school history teachers in the General Directorate of Education in Diyala.

The scale consists of 30 items, including 15 positive and 15 negative items, distributed equally across three domains (10 items per domain).

Response alternatives follow a five-point Likert scale:

- Completely applies to me

- Often applies to me
- Sometimes applies to me
- Rarely applies to me
- Does not apply to me at all

Scores are assigned as follows:

- Positive items: (5, 4, 3, 2, 1)
- Negative items: (1, 2, 3, 4, 5)

This structure aligns with Likert scale principles, ensuring that half of the items are positively oriented and the other half negatively oriented toward the construct (Abu Allam, 2006, p. 383).

3.7.1 Pilot study (clarity of instructions)

After ensuring the clarity of instructions, comprehension of statements, and appropriateness of response alternatives, as well as identifying potential difficulties faced by respondents and estimating the time required for completion, a pilot study was conducted. This step is essential in constructing educational and psychological scales to identify strengths and weaknesses (Ghuraiba, 2002, p. 82).

The scale was administered to a pilot sample of 46 teachers, including:

- 25 male teachers
- 21 female teachers

The participants were randomly selected from history teachers affiliated with the General Directorate of Education in Diyala, distributed according to gender.

3.7.2 Statistical analysis of professional competence scale items

Scientific and educational research does not end with the collection of data related to the research problem and hypotheses. The research objectives cannot be fully achieved without analyzing these data after collection (Ghbari & Abu Shaeira, 2010, p. 362).

3.7.3 Item discrimination power

Each item was analyzed using the independent samples t-test for two equal-sized groups to determine the significance of differences between the upper and lower groups (Edward, 1957, p. 152).

3.7.4 Item discrimination of the professional competence scale

[This section introduces the statistical results related to item discrimination for the professional competence scale.]

Table 9

Significance at 0.05	Calculated t-value	Std. Dev.	Lower Group Mean	Std. Dev.	Upper Group Mean	No.
Significant	8.511	0.933	3.140	0.583	4.568	1
Significant	6.144	1.070	3.199	0.607	4.352	2
Significant	3.604	0.935	2.983	0.545	3.578	3
Significant	6.963	1.063	3.101	0.696	4.450	4
Significant	7.629	0.998	3.003	0.685	4.411	5
Significant	5.053	0.892	3.160	0.562	3.972	6
Significant	7.531	0.974	3.160	0.626	4.489	7
Significant	9.148	0.959	3.042	0.554	4.587	8
Significant	6.717	0.753	1.913	0.937	3.145	9
Significant	3.998	0.634	3.245	1.000	3.967	10
Significant	2.747	0.653	3.855	0.797	4.286	11
Significant	10.052	0.697	2.337	0.724	3.878	12
Significant	3.737	0.999	3.186	0.643	3.863	13
Significant	2.875	0.893	3.560	0.659	4.047	14
Significant	2.642	0.688	3.874	0.578	4.236	15
Significant	4.052	0.697	3.064	0.636	3.647	16
Significant	8.301	0.992	3.090	0.620	4.571	17
Significant	8.677	0.854	3.188	0.628	4.591	18
Significant	6.354	0.948	3.364	0.524	4.414	19
Significant	9.771	0.790	3.070	0.667	4.611	20
Significant	4.075	0.902	2.624	0.712	3.338	21
Significant	10.229	0.986	2.835	0.617	4.650	22
Significant	9.462	0.785	2.815	0.965	4.611	23
Significant	5.157	0.994	3.011	0.693	3.964	24
Significant	7.910	0.901	3.011	0.835	4.493	25
Significant	3.453	0.811	2.855	0.780	3.447	26
Significant	4.517	0.880	3.345	0.873	4.199	27
Significant	7.332	0.912	3.011	0.836	4.395	28
Significant	8.516	0.909	3.109	0.689	4.591	29
Significant	6.028	1.017	3.227	0.896	4.473	30

3.7.5 Correlation between item score and total score of the professional competence scale

In order to evaluate the item's relative importance in respect to the overall construct, the researcher used the Pearson correlation coefficient to determine the item's relative importance in relation to the scale's total score.

At the 0.05 level of significance and with 158 degrees of freedom, all of the correlation coefficients were found to be statistically significant, surpassing the tabulated value of 0.156. These results are shown in Table (29).

Table 10

Item–Total Correlation Coefficients for the Professional Competence Scale

Tabulated Value	Correlation Coefficient	No.	Tabulated Value	Correlation Coefficient	No.
0.156	0.368	16	0.156	0.424	1
	0.279	17		0.292	2
	0.327	18		0.413	3
	0.421	19		0.351	4
	0.340	20		0.263	5
	0.315	21		0.319	6
	0.322	22		0.361	7
	0.293	23		0.298	8
	0.356	24		0.351	9
	0.335	25		0.322	10
	0.364	26		0.410	11
	0.375	27		0.365	12
	0.286	28		0.246	13
	0.416	29		0.348	14
	0.395	30		0.354	15

3.7.6 Correlation between item score and domain total score

To confirm the item's strong link with its domain, the researcher used the Pearson correlation coefficient to determine the item's score's relationship to the domain's overall score.

Because they were more than the calculated value of 0.156 at a significance level of 0.05 and degrees of freedom (158), the results showed that all correlation coefficients were statistically significant. These findings are shown in the table below.

Table 11*Correlation Coefficient Between Item Score and Domain Total Score*

Correlation Coefficient	Third Domain	No.	Correlation Coefficient	Second Domain	No.	Correlation Coefficient	First Domain	No.
0.378		1	0.442		1	0.436		1
0.423		2	0.396		2	0.352		2
0.354		3	0.426		3	0.408		3
0.436		4	0.397		4	0.479		4
0.362		5	0.358		5	0.428		5
0.356		6	0.397		6	0.383		6
0.425		7	0.439		7	0.410		7
0.397		8	0.416		8	0.324		8
0.394		9	0.389		9	0.434		9
0.413		10	0.408		10	0.415		10

3.7.7 Correlation between domain scores and the total scale score

The researcher employed the Pearson correlation coefficient to examine the relationship between the scores of each domain and the total score of the scale, in order to assess the strength of the association between the domains and the overall construct.

The results showed that all correlation coefficients were statistically significant, as they exceeded the tabulated value of 0.156 at a significance level of 0.05 and degrees of freedom (158). The table below presents these findings.

Table 12*Correlation Between Domain Scores and the Total Scale Score*

Tabulated Value	Correlation Coefficient	Domain
0.156	0.472	Conceptual Understanding
	0.490	Teachers' Perception
	0.486	Teaching Context

3.7.8 Psychometric properties of the scale

First: Validity

Validity is considered a fundamental requirement for effective measurement instruments when assessing a given phenomenon. It refers to the extent to which the scale is suitable for measuring a specific purpose or aspect, that is, the ability of the instrument

to accurately measure the trait or characteristic it is intended to assess (Abu Jado, 2014, p. 399).

Second: Reliability of the Scale

Reliability refers to the degree of stability in the scores obtained from the instrument over time. A high level of reliability reflects accurate measurement, where scores remain consistent and stable, placing individuals within the same classification category across repeated measurements (Abu Samira&Al-Titi, 2020, p. 27).

Final Form of the Professional Competence Scale

The final version of the professional competence scale consists of 30 items, including 15 positive and 15 negative items.

Responses are based on a five-point Likert scale:

- Completely applies to me
- Often applies to me
- Sometimes applies to me
- Rarely applies to me
- Does not apply to me at all

Scoring is assigned as follows:

- Positive items: (5, 4, 3, 2, 1)
- Negative items: (1, 2, 3, 4, 5)

The hypothetical mean of the scale is 90.

After completing the construction of the scale and verifying the discriminative power of its items, along with its psychometric properties (validity and reliability) through statistical analysis, the scale became ready for administration to the research sample of 400 secondary school history teachers in the General Directorate of Education in Diyala.

3.7.9 Final application of the three research instruments

Upon finishing the quantifier preparation of the instruments in their final form (the professional thinking scale, the scientific imagination scale, and the professional

competence scale) in Appendices (6), (8), (10), the researcher applied the three instruments with a view to achieve the objectives of the study.

The instrument was distributed on the dates shown in (8), (18) and (27) for the basic research sample which is made up of (400) secondary school history teachers belonging to a general directorate of education in Diyala.

Sampling was done over 6 districts.

- Al-Muqdadiyah
- Baqubah
- Al-Khalis
- Baladrooz
- Khanaqin
- Kifri

Each participant obtained three scores:

- One for the professional thinking scale
- One for the scientific imagination scale
- One for the professional competence scale

These scores were analyzed according to the variables of gender and years of service.

The data collection process was conducted over a defined period, starting on Sunday, 26/10/2025, and ending on Sunday, 20/11/2025.

3.8 Fifth: statistical methods

The researcher relied on the Statistical Package for the Social Sciences (SPSS), in addition to Microsoft Excel, for data analysis, instrument construction, achieving research objectives, analyzing results, and interpreting findings. The statistical methods used include:

1. **Percentage (%)** Used to determine the statistical significance of expert agreement regarding the validity of the professional thinking, scientific imagination, and professional competence scales.
2. **Pearson Correlation Coefficient** Used to determine:
 - The relationship between item scores and total scale scores

- The relationship between item scores and domain scores
 - The relationship between domain scores and total scale scores
 - The reliability coefficient
 - The correlation between research variables
3. **Cronbach's Alpha** Used to calculate the reliability coefficient.
 4. **Independent Samples t-Test** Used to:
 - Determine the discriminative power of scale items
 - Examine statistically significant differences based on gender

4 CHAPTER FOUR

- First: Presentation of Results
- Second: Interpretation of Results

4.1 First: presentation of results

This chapter presents the findings obtained by the researcher in accordance with the objectives of the study. It also discusses these findings in light of the relevant literature and previous studies reviewed earlier.

4.1.1 First objective: identifying professional thinking among secondary school history teachers

To achieve this objective, the mean score of the research sample, consisting of 400 teachers, was calculated using the professional thinking scale. The results showed that the mean score was 114.765, with a standard deviation of 13.643.

To examine the significance of the difference between the sample mean and the hypothetical mean of the scale (90), a one-sample t-test was conducted. The calculated t-value was 36.304.

When compared with the tabulated t-value of 1.96 at a significance level of 0.05 and degrees of freedom (399), it was found that the calculated value exceeds the tabulated

value. This indicates a statistically significant difference between the sample mean and the hypothetical mean, in favor of the sample mean.

This result suggests that the participants demonstrate a high level of professional thinking. The table below illustrates these findings.

Table 13

Results of the One-Sample t-Test for the Difference Between the Sample Mean and the Hypothetical Mean (Professional Thinking Scale)

Significance at 0.05	Tabulated t-value	Calculated t-value	Degrees of Freedom	Hypothetical Mean	Std. Deviation	Sample Mean	Sample Size
Statistically Significant	1.96	36.304	399	90	13.643	114.765	400

4.1.2 Second objective: identifying scientific imagination among secondary school history teachers

To achieve this objective, the mean score of the research sample, consisting of 400 participants, was calculated using the scientific imagination scale. The results showed that the mean score was 83.085, with a standard deviation of 7.322.

To test the significance of the difference between the sample mean and the hypothetical mean of the scale (75), a one-sample t-test was conducted. The calculated t-value was 22.083.

When compared with the tabulated t-value of 1.96 at a significance level of 0.05 and degrees of freedom (399), it was found that the calculated value exceeds the tabulated value. This indicates a statistically significant difference between the sample mean and the hypothetical mean, in favor of the sample mean.

This result suggests that the participants demonstrate a high level of scientific imagination. The table below presents these findings

Table 14

Significance at 0.05	Tabulated t-value	Calculated t-value	Degrees of Freedom	Hypothetical Mean	Std. Deviation	Sample Mean	Sample Size
Statistically Significant	1.96	22.083	399	75	7.322	83.085	400

To examine the differences across each dimension of scientific imagination among the research sample, the mean, standard deviation, calculated t-value, and tabulated t-value were computed, as presented in the following table.

Table 15

Results of the t-Test for the Significance of the Difference Between the Sample Mean and the Hypothetical Mean for Each Dimension of the Scientific Imagination Scale

Significance at 0.05	Tabulated t-value	Calculated t-value	Degrees of Freedom	Hypothetical Mean	Std. Deviation	Sample Mean	Sample Size	Dimension
Statistically Significant	1.96	17.940	399	24	2.631	26.360	400	Scientific Sensitivity
Statistically Significant	1.96	18.405	399	24	3.211	26.955	400	Scientific Creativity
Statistically Significant	1.96	14.666	399	27	3.761	29.758	400	Scientific Productivity

4.1.3 Third objective: identifying professional competence among secondary school history teachers

To achieve this objective, the mean score of the research sample, consisting of 400 participants, was calculated using the professional competence scale. The results showed that the mean score was 113.860, with a standard deviation of 12.745.

To test the significance of the difference between the sample mean and the hypothetical mean of the scale (90), a one-sample t-test was conducted. The calculated t-value was 37.443.

When compared with the tabulated t-value of 1.96 at a significance level of 0.05 and degrees of freedom (399), it was found that the calculated value exceeds the tabulated value. This indicates a statistically significant difference between the sample mean and the hypothetical mean, in favor of the sample mean.

This result suggests that the participants demonstrate a high level of professional competence. The table below presents these findings

Table 16

Significance at 0.05	Tabulated t-value	Calculated t-value	Degrees of Freedom	Hypothetical Mean	Std. Deviation	Sample Mean	Sample Size
Statistically Significant	1.96	37.443	399	90	12.745	113.860	400

To examine the differences across each domain of professional competence among the research sample, the mean, standard deviation, calculated t-value, and tabulated t-value were computed, as presented in the following table.

Table 17

Results of the t-Test for the Significance of the Difference Between the Sample Mean and the Hypothetical Mean for Each Domain of the Professional Competence Scale

Significance at 0.05	Tabulated t-value	Calculated t-value	Degrees of Freedom	Hypothetical Mean	Std. Deviation	Sample Mean	Sample Size	Domain
Statistically Significant	1.96	33.216	399	30	4.587	37.618	400	Concepts
Statistically Significant	1.96	34.532	399	30	5.026	38.678	400	Teachers' Perception
Statistically Significant	1.96	29.545	399	30	5.121	37.565	400	Teaching Context

4.1.4 Fourth objective: the correlational relationship between professional thinking and professional competence among the research sample

To examine this objective, the Pearson correlation coefficient was used to determine the relationship between professional thinking and professional competence among the research sample, which consisted of 400 participants.

The results showed that the correlation coefficient was 0.113. When compared with the tabulated value of 0.097 at a significance level of 0.05, it was found that the calculated correlation coefficient exceeds the tabulated value.

This indicates the presence of a positive and statistically significant relationship between the two variables. The table below presents this result.

Table 18

Significance at 0.05	Tabulated Value	Correlation Coefficient	Sample Size	Variables
Statistically Significant	0.097	0.113	400	Professional Thinking
			400	Professional Competence

4.2 Second: interpretation of results

First Objective: This may result from the subject specialization and the requirements for classroom practice. History is an analytical and interpretative discipline concerned with the relationships between cause and effect. It is the linking of the past with the present and comparison between unique civilizations and cultures, developments and interconnections.

These kinds of demands require teachers to always engage in higher order thinking. Moreover, different situations in classrooms, varying levels of students and the need to manage the discussion and dialogue compel the teacher to take informed actions. This entails choosing suitable strategies, organizing the subject matter, identifying learning difficulties, and evaluating learning in a manner that displays understanding rather than recall.

Second Objective: A view of scientific imagination such as a complex cognitive-professional dimension where creative thinking interacts with pedagogical competence and experience may explain this result. In this context, scientific imagination is not an airy fantasy but a structured mental ability allowing one to reconstruct knowledge, anticipate new possibilities, and devise future-oriented notions based on a scientific and logical foundation.

From a cognitive perspective, scientific imagination is closely linked to the teacher's knowledge structure. As the teacher's knowledge base expands and their experience in analyzing concepts increases, their capacity for scientific imagination correspondingly develops.

Third Objective: This result may be attributed to the interaction between concepts, perception, and context as core components of teachers' professional knowledge base. Professional competence is not limited to the possession of subject knowledge. It reflects an integrated system combining cognitive, perceptual, and

contextual dimensions, enabling teachers to apply their knowledge effectively within the teaching situation.

This integration is reflected through its three dimensions, which together shape professional performance.

Fourth Objective: This result may be explained by the nature of the interaction between knowledge and practice in educational performance. Professional thinking represents the cognitive framework that guides teachers' behavior and decisions in the classroom. Professional competence, in turn, reflects the actual level of performance resulting from that thinking.

As teachers develop higher levels of professional thinking, particularly in analysis, decision-making, problem-solving, and reflective practice, this is positively reflected in their professional competence in planning, implementation, evaluation, and classroom management.

Professional thinking enables teachers to apply their subject knowledge flexibly, select appropriate strategies, and address classroom challenges effectively, leading to improved professional performance.

5 CHAPTER FIVE CONCLUSIONS – RECOMMENDATIONS – SUGGESTIONS

5.1 First: conclusions

In light of the research findings, the researcher reached the following conclusions:

1. Continuous classroom practice, systematic planning, and reflective engagement in teaching contribute to the development of professional thinking. In addition, pre-service professional preparation in colleges of education has a positive impact on this development.
2. The possession of scientific imagination among history teachers appears to result from the interaction between the analytical nature of the subject and professional experience, as well as classroom practices that emphasize interpretation and cognitive reconstruction of events. The accumulation of experience and the management of historical dialogue further support the development of scientific imagination.

3. Teachers' professional competence emerges from the interaction of a comprehensive system of cognitive, experiential, and value-based factors. It develops through a cumulative process that begins with structured academic preparation and is reinforced through continuous classroom practice.

5.2 Second: recommendations

1. The intention of study 1 was to raise awareness among secondary school history teachers that professional thinking represents the cornerstone for improving teaching practices.
2. Emphasizing the important role of scientific imagination in enabling teachers to reconstruct classroom practices in novel ways.
3. It is vital to make professional competence as one important factor to improve the quality of educational performances in addition to strengthening planning, implementation and evaluation.

5.3 Third: suggestions for future research

1. The research investigates the relationship among professional thinking, scientific imagination, and professional competence at other educational stages.
2. Examining the nexus between professional thinking as well as scientific imagination along with extra variables not covered in the present study, such as professional motivation and strategic planning.
3. Repeating the study using different research samples for further exploration of the relationship between professional thinking, scientific imagination, and professional competence.

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