

MODERN ROLES OF SAUDI TEACHER IN DEVELOPING HIGHER-ORDER THINKING SKILLS AMONG LEARNERS FOR MEETING THE CHALLENGES OF THE AGE OF TECHNOLOGY AND KNOWLEDGE EXPLOSION

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ABSTRACT: *The present study aimed to identify the modern roles of Saudi teacher in the development of higher-order thinking skills to meet the challenges of the age of technology and knowledge explosion. To achieve the study objectives, the descriptive-survey method was adopted. Two questionnaires were prepared: The first one measure higher-order thinking skills that should be developed among learners to meet the challenges of the age of technology and knowledge explosion and the second measures the modern roles for the Saudi teacher to develop higher-order thinking skills. The tools were applied to (216) teachers from Abha. The study showed that the most important challenges are the speed of the production of knowledge, the spread of technology as well as the speed and intensity of the exchange of information and knowledge and the growing knowledge of electronic control and globalization, cultural and national identity, and changing the concepts and methods of human life. The participants agreed on all higher-order thinking skills that should be developed among learners. The participants' agreement on all modern roles of the Saudi teachers for the development of higher-order thinking skills was high. There are no statistically significant differences at the significant level (0.05) between the means of responses attributed to the variables of (gender- specialization- years of experience- qualification- the educational stage)*

KEYWORDS: thinking, technology, knowledge explosion, teacher roles, challenges

INTRODUCTION

Today, we live in a world of rapid change with complicated problems in all sides of life: economic, political, social and cultural. Therefore, educators find several problems to meet the challenges of tomorrow world. Those problems are related to the preparation of individuals so that they would be capable of succeeding in the future career and contributing to the future plans of developing the community. The critical need to find creative suggestions and solutions for contemporary problems of the world of challenges and knowledge explosion necessitates teaching students higher-order thinking skills because they help them to successfully adapt to life and learning. In fact, in the future, they will not need special knowledge as much as they need general capacity enabling them to apply renewable knowledge.

Despite several educators emphasize the importance of the training on the higher-order thinking skills in the age of knowledge explosion and rapid changes; the total framework of education has not realized satisfactory results for this goal yet. That is

because of the lack of clarity about what this thinking style means, how far its skills can be integrated and developed among learners, and how they would be introduced: as a separate topic or as part of specific educational topics.

Therefore, educational institutions have to highlight the importance of teaching higher-order thinking skills and have to provide appropriate opportunities that stimulate thinking so that learners would be capable of effectively handling any type of future changes. That, in turn, emphasizes the need and importance of teaching and developing thinking in teaching curricula and providing educational atmosphere encouraging thinking. In order that teaching thinking would be successful, it has to focus on thinking skills and strategies and has to use educational subjects to enhance their achievement and understanding among learners (Asr, 2001).

Many studies greatly blamed teachers being a major reason for the educational crisis in many communities in the world and a major obstacle in the educational renovation to address the age of information and technology. However, a fair perspective emphasizes that teachers can be the source of solution not the source of problem, and that the revolution of the educational renovation cannot be successful unless it is headed by teachers. Information technology does not mean diminishing the teacher role nor dispensing with it, as sometimes figured; actually it grants him a different role that has to vary according to the task of education such as knowledge achievement, developing higher-order thinking skills and allowing learners to gain the capacity of self-learning. Now, teachers are not the only source and carrier of knowledge, but also they are instructors participating learners in their journey of continual learning and discovery.

In the age of technology and knowledge explosion, teachers have to develop learners' creativity by encouraging their autonomy, adopting cooperative social teaching methods, and being creative, self-confident, flexible, persevering, fast learner and ambitious. As well, they have to sensitively receive stimuli, be capable of solving problems, be self-dependent, free oneself from stress, and assure autonomy and subjectivity (AlMahdy 2009).

The cornerstone of developing and teaching thinking and developing higher-order thinking skills among learners is that teachers have to understand well their roles and tasks inside school. Hence, they have to understand well the required roles, tasks and activities of learners. In fact, teachers are the pillar of that system and their impact cannot be denied which would necessitate identifying the modern roles of teachers in terms of contemporary challenges to teach students higher-order thinking skills for meeting the challenges of the age of technology and knowledge explosion.

Some local, Arab and foreign studies that represent precious efforts in the field of education were explored, such as: (AlZyoudy, 2012), (AlSahoor, 2008), (AlZahrany, 2003), (AlMahdy, 2009), (Radwan, 2009), (Brunner, 2001), (AlGhamdy, 2001), (The Tenth Meeting of Education Leaders "Teachers in Modern Age", 2003), the recommendations of (A Seminar on Education and Globalization, 2004) and (AlHawaat, 2004). Their results emphasize the several effects of challenges of the age of technology and knowledge explosion on education. These effects include educational systems, their objectives, functions, elements "school, teacher, learner and curriculum", and the importance of developing teacher roles and competences to meet

these challenges and to achieve the development of the higher-order thinking skills among learners so that they would be capable of meeting those challenges. Through her experience in education, the author noticed that there were deficiencies in developing higher-order thinking skills despite the studies recommended the need of teaching them at schools. Also she noticed that teacher roles are traditional and do not accord with contemporary world challenges and developments that put more pressure on the teacher preparing programs as asserted by (AlZahrany, 2003). Accordingly, the author attempts to identify the modern roles of Saudi teachers in developing the higher-order thinking skills among learners to meet the age of technology and knowledge explosion.

Paragraph of the Problem

The major problem of the study can be summarized in the following question: What are the modern roles of Saudi teacher in the development of higher-order thinking skills among learners to meet the challenges of the age of technology and knowledge explosion?

Questions:

That major questions can be divided into:

1. What are the most prominent challenges of the age of technology and knowledge explosion?
2. What are the higher-order thinking skills that should be developed by Saudi teachers among learners to meet the challenges of the age of technology and knowledge explosion from the perspective of teachers?
3. What are the modern roles of Saudi teachers in the development of higher-order thinking skills among learners to meet the challenges of the age of technology and knowledge explosion from the perspective of teachers?
4. Are there any differences between the means of responses attributed to the variables of (gender- specialization- years of experience- qualification- the educational stage)?

Objectives

The study is an attempt to realize the following objectives:

1. Identifying the most prominent challenges of the age of technology and knowledge explosion.
2. Identifying the higher-order thinking skills that should be developed by Saudi teachers among learners to meet the challenges of the age of technology and knowledge explosion from the perspective of teachers?
3. Identifying the modern roles of Saudi teachers in the development of higher-order thinking skills among learners to meet the challenges of the age of technology and knowledge explosion from the perspective of teachers?
4. Exploring differences between the responses attributed to the variables of (gender- specialization- years of experience- qualification- the educational stage).

Significance

The significance of the study can be presented as follows:

- The study presents a list of modern roles of Saudi teachers that are useful in the programs of the preparation of pre-service and in-service teachers.

- It presents developing the higher-order thinking skills as a solution for meeting the challenges of the age of technology and knowledge explosion which would benefit educators and those who are concerned in applying them to curricula inside and outside schools.
- It presents the most important challenges in the age of technology and knowledge explosion that may benefit researchers in that domain.
- It connects together the modern roles of teachers in developing the higher-order thinking skills to meet the challenges of the age of technology and knowledge explosion which would help the concerned parties to take appropriate decisions for reconsidering the training and qualification of teachers.

Limitations

The study is confined to the following limitations:

- The study was applied in Abha, KSA.
- It was applied to male and female teachers of different specializations, qualifications, years of experience and educational stages in KSA.
- It explored the higher-order thinking skills (creative thinking, critical thinking, meta-cognitive thinking and high-grade thinking), the challenges of the age of technology and knowledge explosion and the modern roles of Saudi teachers in developing those skills for meeting those challenges.
- It was applied in the academic year 2016/2017.

Study Terms

The Challenges of the Age of Technology and Knowledge Explosion:

They are the changes of new concepts, ideas and applications that have come about lately in the contemporary world. They include all the cognitive, technological, information, economic, political and cultural dimensions.

Modern Roles:

They are all the nontraditional teacher roles performed in the process of teaching in order to develop the higher-order thinking skills among learners to meet the challenges of the age of technology and knowledge explosion.

Higher-Order Thinking Skills:

They are the capacities that a learner needs to realize the highest levels of efficiency for meeting the challenges of the age of technology and knowledge explosion. They include creative thinking, critical thinking, meta-cognitive thinking and high-grade thinking.

Conceptual Framework

Higher-Order Thinking Skills:

They are the capacities that a learner needs to realize the highest levels of efficiency (AlShebl, 2006). They are also known as the occurrence of high-level thinking. When a learner gets new information, they are stored in memory then they are related, arranged and evaluated in order to realize the objective (Shehata & AlNaggar 2003: 304). Pieces of literature refer that the most important higher types of thinking are creative thinking, critical thinking, meta-cognitive thinking and high-grade thinking.

Creative Thinking:

It is a mental process and activity happening throughout one's life. Also it is one of the higher patterns of thinking requiring mental capacities of higher efficiency and effectiveness especially in finding nontraditional solutions and ideas.

Jarwan (2003) defines it as a highly complicated comprehensive process including interwoven cognitive, emotional and ethical factors in order to formulate an active mental state among learners. Kilgour (2006) defines it as the process of unprecedently incorporating mental images and previous experiences in order to realize a suitable genuine solution of the concerned problem.

Critical Thinking:

It is one of the most complicated forms of thinking because it is related to several behaviours such as logic and problem-solving. It is also closely related to abstract thinking and contemplative thinking in having some common characteristics. Psychologists and education scholars are clearly interested in such thinking because of its reflections on the process of learning and the capacity of problem-solving (AlAtoom et al, 2009). Mohanan (1997) defines it as a process of evaluating the claims of knowledge. Bailin et al (1999) define it as a process of evaluating the mental product represented in discussions, proofs and evidences, besides it is the deliberate thinking based on responsibility and suitable standards and criteria in the process of evaluating the mental product.

Meta-cognitive Thinking:

It refers to behaviors and actions aiming at gaining knowledge by mental processes and the capacity of arranging and evaluating the learning styles and self-control before, during and after learning by planning, monitoring and evaluating one's performance. Those processes depend on identifying the problem, information and data, setting up hypotheses interpreting it, and using different research skills (Obaydat and Abo AlSameed, 2005). That requires finding methods and strategies regulating thinking which would help gaining information, research thinking and higher skills (Kelada, 2005).

High-Grade Thinking:

It refers to a group of detailed mental activities that requires a mental judging and analysis of complicated situations according to several standards. It includes several solutions and avoids simple solutions and phrases. The thinker's task is to formulate or find a meaning wherever there is no meaning; i.e. finding a meaning despite the lack of clarity of a situation or experience (AlAtoom et al, 2009).

High-grade thinking is considered one of the educational dimensions that gained the interest of educators in recent years as a key factor for realizing the educational objectives of the process of teaching and learning and guaranteeing the effective cognitive development that helps people to make the utmost use of their mental energy to achieve the success and suitable adaptation in education and public life.

LITERATURE REVIEW

Many studies have been conducted on higher-order thinking skills and methods of developing it. They identified the required skills according to the educational levels and tested a number of different strategies of developing one or more skills of higher-order thinking skills. However, all studies emphasize the importance of developing higher-order thinking skills among learners especially in the age of technology and knowledge explosion. Moreover, some studies tackled contemporary challenges and their impact on teaching; others handled the modern roles of Saudi teachers in developing higher-

order thinking skills among learners to meet the challenges of the age of technology and knowledge explosion. Some studies explored teacher roles in terms of some challenges. Some of those studies are presented as follows:

AlSahoor (2008) aimed at promoting teachers to meet the educational challenges in the age of globalization. It adopted the promoting descriptive-survey method based on a questionnaire applied to a sample of (390) male and female teachers. The sample was randomly selected from Zarqa, Jordan. The proposed form was constructed and evaluated by specialists. The results showed that the scores of the sample were high in all the dimensions of the questionnaire. Problems that face teachers on using educational technology in education are varied, such as: the lack of encouragement of teachers to use modern technology, the insufficient time of using computer and internet, and their poor English which is the global language of computers.

AlZahrany (2003) aimed at identifying the most prominent contemporary global challenges facing the institutions of preparing teachers in public schools in KSA. Also, it attempted to prepare a proposal of promoting the program of preparing teachers in public schools. Results showed those the most prominent contemporary global challenges are globalization, technology, internet, computer, educational TV, space communications). Those challenges pose more stress on teacher preparing programs. AlMahdy (2009) aimed at presenting a proposal highlighting the aspects of teachers' renewable roles in the age of technological and cognitive flow in terms of the guidelines of Islamic educational thought through uncovering the most important effects of the cognitive and technological revolution on the present teacher roles in community. It also aimed at identifying the most important teacher roles required for the age of knowledge by applying the fundamental analysis. It concluded that identifying a system of preparing teachers in the age of knowledge depended mainly on a clear specific educational philosophy emphasizing teachers' self-development and the components of comprehensive preparation such as perfect technological preparation.

Radwan (2009) aimed at identifying the changeable teacher roles in post-modern communities. It concluded that the most important future bases of preparing teachers in a post-modern community depend on the creative rational knowledge philosophy, comprehensiveness, interaction by exploring other cultural experiences, maintaining identity or cultural subjectivity, adopting decentralism, partnership, integration between theory and practice, relating academic experience to professional experience through effective teaching situations and inserting meditation to be a component of teacher preparing programs.

Khaleel (2010) attempted to identify creative thinking of primary stage students and the teacher's methods of developing it. It adopted a descriptive (documentary) method through the concerned records and documents. After collecting, analysing and discussing data in the chapters, the study concluded that teachers develop students' creative thinking when they adopt various methods according to the educational situation and incorporate them to curriculum.

AlZyoudy (2012) was an attempt to measure the role of information and communication technology (ICT) of the project "Education Reform for knowledge Economy" ERfKE in developing students' life skills in Jordanian public schools. A

cluster sample consisted of (1019) students who were randomly selected. The questionnaire consisted of (36) paragraphs divided into eight domains that measure students' life skills included in the project "Education Reform for knowledge Economy" ERfKE. The results showed the high level of the role of information and communication technology in developing students' life skills in Jordanian public schools.

Comment on Literature Review:

It is noticed that there were few studies tackling teacher roles and contemporary challenges. In addition, there were no studies relating these roles to the development of thinking skills. Some studies aimed at preparing programs of teacher roles like the present study. However, the present study handled the modern roles of Saudi teachers in developing the higher-order thinking skills among learners.

Moreover, the literature review focused on using educational technology and some methods and programs to meet the contemporary challenges while the present study focused on developing thinking skills among learners to meet the challenges of the age of technology and knowledge explosion.

METHODOLOGY AND PROCEDURES

Method:

The study adopted the descriptive-survey method in order to describe and analyze contemporary global challenges that necessitate serious actions by education through the development of higher-order thinking skills among learners of public schools that were included in the theoretical framework, the literature review and the field study. All those procedures attempted to identify the higher-order thinking skills Saudi teachers should develop among learners to meet the challenges of the age of technology and knowledge explosion. Additionally, they aimed at surveying their opinions as for the modern roles of Saudi teachers in developing higher-order thinking skills among learners to meet the challenges of the age of technology and knowledge explosion.

Population and Sample

The population of the study included all the teachers and workers in Saudi schools during the academic year 1437-1438H (2015-2016). The sample was randomly selected from the primary population in Abha, the city of the author, which is characterized by rural and urban areas. The respondents were reached by social media such as Google Plus. They were (300) teachers but after retrieving the forms they became (216) teachers who were statistically analyzed. The respondents varied in characteristics and variables such as gender, specialization, years of experience, qualification and educational stage.

Tools

In order to realize the objectives, the author prepared two questionnaires. The first one measures higher-order thinking skills that should be developed among learners to meet the challenges of the age of technology and knowledge explosion and the second measures the modern roles for the Saudi teacher to develop higher-order thinking skills among learners to meet the challenges of the age of technology and knowledge explosion. They were prepared according to the following steps:

First: The questionnaire of higher-order thinking skills the teacher should develop among learners:

1) The questionnaire's objective:

The questionnaire aimed at identifying the higher-order thinking skills a teacher should develop among learners to meet the challenges of the age of technology and knowledge explosion in KSA.

2) Building the questionnaire:

The author prepared a list of higher-order thinking skills teachers should develop among learners to meet the challenges of the age of technology and knowledge explosion in KSA. She depended on studies conducted on developing higher-order thinking skills, the Saudi Teacher's Guide in Developing Thinking Skills and the learning objectives in KSA. Then she turned that list into a questionnaire of the Saudi teachers' opinions in order to identify the skills they should develop among learners in public schools. The questionnaire consisted of a number of paragraphs distributed to four domains: (creative thinking skills, critical thinking skills, meta-cognitive thinking skills and high-grade thinking skills). The total questionnaire paragraphs of the first draft composed of (36) paragraphs.

3) External Validity of the Questionnaire:

In order to verify the external validity of the questionnaire, its first draft was reviewed by a group of reviewers and specialists in education and psychology. They proposed some points for improving the questionnaire; the author modified it according to those opinions.

4) The Validity of Internal Consistency of the Questionnaire:

In order to verify the internal consistency of the questionnaire, the author calculated Pearson Correlation Coefficient of the whole questionnaire by SPSS. The following table shows the results:

Table (1): The Internal Consistency of the Questionnaire of Higher-Order Thinking Skills:

Domain	Number	Significant Level	Pearson Correlation Coefficient
Creative Thinking Skills	20	.010	.559*
Critical Thinking Skills	20	.002	.645**
Meta-cognitive Thinking Skills	20	.021	.510*
High-Grade Thinking Skills	20	.017	.527*

** Statistically significant at .01

*Statistically significant at 0.05

Table (1) showed that there was a statistically significant correlation between the total domains of the questionnaire. That indicated that the questionnaire was objectively built and could utilize in collecting data related to the study.

5) The Reliability of the Questionnaire:

The author applied Cronbach's Alpha (α) in order to verify the scales's reliability. The results are shown in Table (2):

Table (2) Cronbach's Alpha (α) for Measuring the Reliability of the Higher-Order Thinking Skills Questionnaire:

Domain	Number of Paragraphs	Cronbach's Alpha (α) Value
Creative Thinking Skills	5	0.70
Critical Thinking Skills	16	0.76
Meta-cognitive Thinking Skills	3	0.71
High-Grade Thinking Skills	5	0.72
Total Thinking	29	0.74

Table (2) showed that the reliability indices were higher than (70%) in all the domains of the questionnaire; they were (74%) in the total of the questionnaire which is a good value. That indicated that the questionnaire was highly reliable and could be applied to the sample.

6) The Final Form of the Questionnaire:

After modifying the questionnaire according to the reviewers' opinions, it became ready in its final form with its primary components. The questionnaire's paragraphs were (29) paragraphs distributed to all the domains as showed in Table (3).

Table (3): The distribution of the paragraphs of the questionnaire of higher-order thinking skills according to the primary domains in the final form

Domain	Number of Paragraphs
1- Creative Thinking Skills	5
2 Critical Thinking Skills	16
3 Meta-Cognitive Thinking Skills	3
4 High-Grade Thinking Skills	5
Total	29

In order to list the responses, the questionnaire utilized four-type Likert scale (strongly agree, agree, disagree, and strongly disagree). That scale was adopted because of its flexibility providing respondents more opportunity to accurately answer the questions in terms of several alternatives. A letter explaining to the teachers the required actions was enclosed to the questionnaire.

Second: The questionnaire of the modern roles of Saudi teacher in the development of higher-order thinking skills among learners to meet the challenges of the age of technology and knowledge explosion:

1) The questionnaire's objective:

The questionnaire aimed at identifying the modern roles of Saudi teachers in developing higher-order thinking skills among learners to meet the challenges of the age of technology and knowledge explosion.

2) Building the questionnaire:

The author used the literature review to prepare a list of modern roles of Saudi teachers in developing higher-order thinking skills among learners to meet the challenges of the age of technology and knowledge explosion. She depended on studies conducted on modern roles of teachers in contemporary age and on contemporary challenges. Then she turned that list into a questionnaire of the Saudi teachers' opinions in order to identify the modern roles they should adopt in developing higher-order thinking skills among learners to meet the challenges of the age of technology and knowledge explosion. The questionnaire consisted of a number of paragraphs distributed to four domains: (The modern roles of Saudi teachers in developing creative thinking skills, the modern roles of Saudi teachers in developing critical thinking skills, the modern roles of Saudi teachers in developing meta-cognitive thinking skills, and the modern roles of Saudi teachers in developing high-grade thinking skills). The total questionnaire paragraphs of the first draft composed of (42) paragraphs.

3) External Validity of the Questionnaire:

In order to verify the external validity of the questionnaire, its first draft was reviewed by a group of reviewers and specialists in education. They proposed some points for improving the questionnaire; the author modified it according to these opinions.

4) The Validity of Internal Consistency of the Questionnaire:

In order to verify the internal consistency of the questionnaire, the author calculated Pearson Correlation Coefficient of the whole questionnaire by SPSS. The following table shows the results:

Table (4): The Internal Consistency of the Questionnaire of Modern Roles of Saudi Teachers:

Domain	Number	Significant Level	Pearson Correlation Coefficient
The Modern Roles of Saudi Teacher in Developing Creative Thinking Skills	20	.004	.619**
The Modern Roles of Saudi Teacher in Developing Critical Thinking Skills	20	.010	.561*
The Modern Roles of Saudi Teacher in Developing Meta-cognitive Thinking Skills	20	.000	.790**
The Modern Roles of Saudi Teacher in Developing Higher-Grade Thinking Skills	20	.001	.686**

* Statisticaally significant at 0.05

** Statisticaally significant at 0.01

Table (4) showed that there was a statistically significant correlation between the total domains of the questionnaire. That indicated that the questionnaire was objectively built and could be depended on in collecting data related to the study. Thus, it measured what it claimed to measure.

5) The Reliability of the Questionnaire:

The author applied Cronbach's Alpha (α) in order to verify the scales's reliability. The results are shown in Table (5):

Table (5) Cronbach's Alpha (α) for Measuring the Reliability of the Questionnaire of Modern Roles of Saudi Teachers

Domain	Number of Paragraphs	Cronbach's Alpha (α) Value
Developing Creative Thinking	10	0.80
Developing Critical Thinking	10	0.72
Developing Meta-cognitive Thinking	7	0.74
Developing High-Grade Thinking	6	0.71
Total Thinking	33	0.78

Table (5) showed that the reliability indices were higher than (70%) in all the domains of the questionnaire; they were (78%) in the overall total of the questionnaire which is a good value. That indicated that the questionnaire is highly reliable and could be applied to the sample.

6) The Final Form of the Questionnaire:

After modifying the questionnaire according to the reviewers' opinions, it became ready in its final form with its primary components. The questionnaire's paragraphs were (33) distributed to all the domains as showed in Table (6)

Table (6): The paragraphs distribution to the questionnaire of modern roles of Saudi teachers according to the primary domains in the final form

Domain	Number of Paragraphs
The Modern Roles of Saudi Teacher in Developing Creative Thinking Skills	10
The Modern Roles of Saudi Teacher in Developing Critical Thinking Skills	10
The Modern Roles of Saudi Teacher in Developing Meta-Cognitive Thinking Skills	7
The Modern Roles of Saudi Teacher in Developing High-Grade Thinking Skills	6
Total	33

In order to list the responses, the questionnaire adopted four-type Likert scale (strongly agree, agree, disagree, strongly disagree). A letter explaining to the teachers the required actions was enclosed to the questionnaire.

Procedures of Applying the Two Tools:

After preparing the two questionnaires, their final forms became ready to be applied to the sample as follows:

- 1- The author distributed the two questionnaires simultaneously to the same respondents.
- 2- She sought the help of the Department of Services in the Education Office in Abha in distributing some forms to teachers at Abha schools.
- 3- She distributed the two questionnaires via social media (What App and Facebook) and via emails.
- 4- The respondents were asked to answer the two questionnaires together.

5- After retrieving the forms, incomplete and unclear forms were excluded. Also those who answered only one questionnaire were excluded.

6- The author categorized data into tables according to the domains and variables so that they would be statistically treated.

The author statistically analyzed data into tables so that they would be statistically treated in order to achieve the objectives of each domain. In order to determine if the arithmetic means are (strongly agree, agree, disagree, or strongly disagree), the author gave a numeric value for each answer to a paragraph (4, 3, 2, 1). Then, she divided them as shown in Table (7)

Table (7): Indicators of determining the scores of responses

No	Degree	Score	Indicator
1	Strongly disagree	1	1 – 1,75
2	Disagree	2	1,76 – 2,50
3	Agree	3	2,51 – 3,25
4	Strongly agree	4	3,26 – 4

Statistical analysis

The study adopted Statistical Package for the Social Sciences (SPSS) for statistically treating and analyzing data. The following statistical methods were applied:

- 1- Pearson Correlation Coefficient for verifying the internal consistency of the two questionnaires.
- 2- Cronbach's Alpha (α) Index for verifying the reliability of the the two questionnaires.
- 3- Arithmetic means, standard deviations and percentages of the responses.
- 4- (T-test) of two independent samples in order to measure the differences between males and females.
- 5- One-way analysis of variance (ANOVA) for measuring the differences between the responses according to the variables of (qualification, stage and years of experience).
- 6- Two-way analysis of variance for measuring the differences between the responses according to the variable of specialization.

RESULTS

Results related to the responses of the first question:

As for answering the first question, “What are the most prominent challenges of the age of technology and knowledge explosion?” the author searched the theoretic literature review related to the challenges of the age of technology and knowledge explosion. She made a list of the most prominent challenges that should be met by developing higher-order thinking skills among learners in public schools. Those challenges are:

- 1- The increasing speed of the production and accumulation of knowledge.
- 2- Employing knowledge and cognitive activities in production.
- 3- The growth of knowledge branches and the overlap between them which is known as “Cross-disciplinary studies”.
- 4- Generating and spreading new technology and material.
- 5- The unlimited technological creativity known as “Creating knowledge”.

- 6- The intensity and speed of the exchange of information and knowledge and the low cost of that.
- 7- The growth of electronic control and its programs being related to the modern communication technology and its unlimited capacities "Internet".
- 8- Reinforcing the process of communication to be more interactive and global.
- 9- Making deep changes in one's concepts, life styles, work, ambitions and all the sides of everyday life through technological applications.
- 10- Globalizing the economy and the appearance of joint transcontinental global markets
- 11- The increasing capital flows, direct foreign investments and global companies as a catalyst for global economy.
- 12- The productive and financial structure of countries is timely and spatially related and integrated known as digital economy and e-commerce.
- 13- Reducing trade barriers between countries.
- 14- Moving from autonomy and state sovereignty to participation and interaction in global affairs and international peace
- 15- The emergence of global or multidimensional citizenship of the state and world with all its different cultures.
- 16- The accelerating of secularism in managing a liberal state and the public participation in governance.
- 17- Democracy, freedom, human rights and citizenship became primary topics in world policies
- 18- The melting of cultural identities in one universal culture free of linguistic, national and cultural belongings.
- 19- The emergence of biotechnological culture "genes" which would radically change our human life.

Thus, the challenges of the age of technology and knowledge explosion include all cognitive, technical, economic, political and cultural sides of human life. Each challenge includes scientific, intellectual and applied arguments. Even, each one affects the other. All those challenges form the atmosphere of education affecting all its elements and processes according to the systems' curriculum. Therefore, a well-prepared generation possessing all the higher-order thinking skills should be prepared. That is the major mission of teachers because they are affected by those challenges. They have to develop higher-order thinking skills among learners so that they would be able to meet them. Hence, Saudi teachers have to play the modern roles in developing higher-order thinking skills among learners to meet the challenges of the age of technology and knowledge explosion.

Results related to the responses of the second question:

In order to answer the second question, "What are the higher-order thinking skills that should be developed by Saudi teachers among learners to meet the challenges of the age of technology and knowledge explosion from the perspective of teachers?", the author has analyzed the results of the questionnaire of higher-order thinking skills that should be developed by Saudi teachers among learners. The arithmetic means, standard deviations and percentages of responses showed the results in each domain as follows:

Creative Thinking Skills:

The author has analyzed the arithmetic means, standard deviations and percentages of responses on creative thinking skills that should be developed by Saudi teachers among

learners to meet the challenges of the age of technology and knowledge explosions. Table (8) shows the results:

Table (8) Arithmetic means, standard deviations and percentages of the domain of creative thinking skills.

Creative Thinking Skills	Mean	Standard Deviation	Percentage
Fluency	3.93	.42	98%
Flexibility	3.61	.94	90%
Originality	3.61	.94	90%
Elaboration	3.88	.53	97%
Sensitivity to problems	1.94	.24	48%
Total	3.39	.32	85%

Table (8) showed that the teachers' agreement on creative thinking skills was high. The total mean was (3.39) rated (85%) which indicated that the importance of that type of thinking in meeting the challenges of the age of technology and knowledge explosion. However, there was contrast in the minor creative thinking skills. Fluency ranked first with a mean (3.93) rated (98%) which is a high degree because fluency is essential for other skills. Flexibility ranked second; authenticity ranked third with a mean (3.88) rated (97%) which is a high degree. Then the third rank was fluency and authenticity with a mean of (3.61) rated (90%) which is a high degree, too. That indicated the need of integrating creative thinking skills and that they are proximate in a high degree. However, sensitivity to problems ranked last not being agreed on by teachers, its mean was (1.94) rated (48%) which might be because of the level of learners who might not meet this skill or because it was located in a late position after other skills. That led that teachers excluded it from being developed among learners.

Critical Thinking Skills:

The author has analyzed the arithmetic means, standard deviations and percentages of responses on critical thinking skills that should be developed by Saudi teachers among learners to meet the challenges of the age of technology and knowledge explosions. Table (9) shows the results:

Table (9) Arithmetic means, standard deviations and percentages of the domain of critical thinking skills

Critical Thinking Skills	Mean	Standard Deviation	Percentage
Identifying hypotheses	2.84	.45	71%
Deducing and debriefing information	2.87	.39	72%
Deduction and analysis	3.80	.69	95%
Logical sequencing	3.63	.80	91%
Investigating double standards	3.71	.76	93%
Assessing arguments	2.85	.40	71%
Finding wrong relations and images	3.89	.52	97%
Differentiating facts, opinions and claims.	3.75	.75	94%
Identifying logical fallacies	3.80	.68	95%

Inference	2.96	1.37	74%
Investigating the credibility of news and narrators	1.94	.24	48%
Identifying strong proof, evidence or claim.	1.93	.28	48%
Identifying points of contrast in inference.	1.90	.40	48%
Determining if information is or is not related to the topic.	2.76	.57	69%
Identifying the accuracy of information, absorbing it and deliberately judging it	3.83	.63	96%
Predicting the results of a decision	3.77	.75	94%
Total	3.14	.18	78%

Table (9) showed that there was contrast in the teachers' responses about critical thinking skills which might be resulted by the plenty of skills and their overlap with other types of thinking leading to the contrast of opinions compared to other thinking skills. However, the total degree of responses agreeing on critical thinking skills was (3.14) rated (78%).

At the level of each skill, the skill of finding wrong relations and images ranked first with a mean (3.89) rated (97%) which is a high degree. That skill is important for the age of knowledge explosion and should be developed among learners. The following skill was that of identifying the accuracy of information, absorbing it and deliberately judging it with a mean (3.83) rated (96%) which is a high degree. Then the skills of identifying logical fallacies and deduction and analysis with a mean (3.80) rated (95%) which is a high degree, too. Those two skills are important for the knowledge explosion. The skill of predicting the results of a decision ranked fourth with a mean (3.77) rated (94%) which is a high degree. Similarly, the skill of differentiating facts, opinions and claims scored a mean of (3.75). Those skills are necessary and should be developed among learners. The skill of investigating double standards ranked sixth with a mean (3.71) rated (93%) followed by that of logical sequencing with a mean (3.63) rated (91%) which is a high degree. All of those skills meet the challenges in the age of technology and knowledge explosion.

However, other skills scored less agreement degree. They are arranged as follows: The skill of Inference scored (2.96) rated (74%), Deduction scored (2.87) rated (72%), assessing arguments scored (2.85) rated (71%), identifying hypotheses scored (2.84) rated (71%), and finally determining if information is or is not related to the topic scored (2.76) rated (69%). It appeared that all these skills include differentiating, inference, investigating, and accuracy, hypothesizing and verifying information. All of them are essential skills for meeting the challenges of the age of technology and knowledge explosion.

In addition, there were three skills that were not agreed by teachers; they are: the credibility of news, identifying strong proof, evidence or claim and identifying points

of contrast in inference. That might be because those skills are complex and difficult to be understood by learners.

Meta-cognitive Thinking:

The author has analyzed the arithmetic means, standard deviations and percentages of responses on metacognitive thinking skills that should be developed by Saudi teachers among learners to meet the challenges of the age of technology and knowledge explosions. Table (10) shows the results:

Table (10) Arithmetic means, standard deviations and percentages of the domain of meta-cognitive thinking skills

Meta-cognitive Thinking	Mean	Standard Deviation	Percentage
Planning	3.77	.71	94%
Organization	3.58	.95	89%
Evaluation	3.71	.78	93%
Total	3.69	.45	92%

Table (10) showed that teachers strongly agree on all the meta-cognitive thinking skills. The mean of all the skills was (3.69) rated (92%). Planning ranked first with a mean (3.77) rated (94%), and then there was evaluation scoring a mean of (3.71) rated (93%). Finally, there was the skill of organization scoring a mean of (3.58) rated (89%). All of them rated a high degree of agreement which would indicate that all the meta-cognitive thinking skills are essential for meeting the age of technology and knowledge explosion. Those skills help learners to be more intellectual and skillful in meeting the challenges.

High-Grade Thinking Skills:

The author has analyzed the arithmetic means, standard deviations and percentages of responses on high-grade thinking skills, which should be developed by Saudi teachers among learners to meet the challenges of the age of technology and knowledge explosion. Table (11) showed the results:

Table (11) Arithmetic means, standard deviations and percentages of the domain of high-grade thinking skills.

High-Grade Thinking Skills	Mean	Standard Deviation	Percentage
Solving open-ended problems	3.85	.57	96%
Analyzing and modeling data	3.81	.62	95%
Formulating predictions	2.69	.67	67%
Observations	2.64	.69	66%
Description	2.72	.62	68%
Total	3.14	.27	79%

Table (11) pointed out that teachers generally agree on high-grade thinking skills; the mean was (3.14) rated (79%). The skill of solving open-ended problems ranked first scoring a mean of (3.85) rated (96%) which is a high agreement degree. It was followed

by the skill of analyzing and modeling data scoring a mean of (3.81) rated (95%) which is a high agreement degree. Those two skills meet the technological challenges and knowledge explosion; thus teachers highly agreed on developing them. They less agreed on the other skills. The skill of description ranked third scoring a mean of (2.72) rated (68%) followed by that of formulating predictions scoring a mean of (2.69) rated (67%). Then there was the skill of observations scoring a mean of (2.64) rated (66%). All of them scored an agreement degree indicating that they essential for meeting the challenges of the age of technology and knowledge explosion.

The total higher-order thinking skills:

The author has analyzed the arithmetic means, standard deviations and percentages of responses on the total higher-order thinking skills that should be developed by Saudi teachers among learners to meet the challenges of the age of technology and knowledge explosions. Table (12) showed the results.

Table (12) Arithmetic means, standard deviations and percentages of the domain of the total higher-order thinking skills

The total higher-order thinking skills	Mean	Standard Deviation	Percentage
Creative Thinking Skills	3.39	0.32	85%
Critical Thinking Skills	3.14	0.18	78%
Meta-cognitive Thinking	3.69	0.45	92%
High-Grade Thinking Skills	3.14	0.27	79%
The total questionnaire	3.34	0.17	84%

Table (12) indicated that teachers agreed on the importance of all the total higher-order thinking skills for meeting the challenges of the age of technology and knowledge explosion and also it showed that they have to be developed among learners. The percentage of the total skills was (84%) with a mean (3.34). However, the ranking of the importance and developing of skills was varied according to teachers. Meta-cognitive thinking skills were ranked first with a mean (3.69) rated (92%) which is a high degree, followed by the creative thinking skills with a mean (3.39) rated (85%) which is a high degree, too. Being equal in level and percentage, critical thinking skills and higher-grade thinking skills were both ranked third with a mean (3.14) rated (79%).

Results related to the responses of the third question:

In order to answer the third question, “What are the modern roles of Saudi teacher in the development of higher-order thinking skills among learners to meet the challenges of the age of technology and knowledge explosion?”, the author has analysed the results of the concerned questionnaire. The arithmetic means, standard deviations and percentages of responses showed the results in each domain as follows:

The Modern Roles of Saudi Teacher in Developing Creative Thinking Skills:

The author has analyzed the arithmetic means, standard deviations and percentages of responses on the modern roles of Saudi teachers in developing creative thinking skills among learners to meet the challenges of the age of technology and knowledge explosion. Table (13) shows the results:

Table (13) Arithmetic means, standard deviations and percentages of the domain of modern roles of Saudi teachers in developing creative thinking skills.

The Modern Roles of Saudi Teacher in Developing Creative Thinking Skills:	Mean	Standard Deviation	Percentage
Helping learners to generate knowledge (ideas) and creativity using modern technology and creating the educational programs they need	2.18	0.70	54%
Providing appropriate opportunities for learners for creative expression	3.69	0.77	92%
Encouraging learners to be initiative and adventurous and to freely manipulate ideas	3.68	0.77	92%
Accustoming learners on treating things around them and choosing situations that provide new ideas	2.06	0.64	51%
Providing opportunities for active interaction among learners and providing the necessary components	2.64	0.86	66%
Using questions that stimulate creative thinking	3.55	1.00	89%
Providing appropriate time and sources in order to experiment ideas.	2.57	0.83	64%
Preparing and developing different cognitive experience among learners	3.55	0.97	89%
Encouraging playing, experimenting, curiosity , inquiry and group interaction	3.37	1.10	84%
Effective planning that makes learning enjoyable and significant.	3.57	0.91	89%
Total	3.08	0.30	77%

Table (13) pointed out that teachers generally agreed on the modern roles of Saudi teachers in developing creative thinking skills. The total mean was (3.08) rated (77%). However, their opinions varied between “I agree, I strongly agree and I disagree”. There were six roles that were highly agreed on; they are arranged as follows: "Providing appropriate opportunities for learners for creative expression" with a mean (3.69) rated (92%); this role is missed in our schools. It was followed by "Encouraging learners to be initiative and adventurous and to freely manipulate ideas" with a mean (3.68) rated (92%) which is an essential role for meeting knowledge explosion and technological challenges. Then came "Effective planning that makes learning enjoyable and significant" with a mean (3.57) rated (89%), followed by "Using questions that stimulate creative thinking" and “Preparing and developing different cognitive experience among learners” with a mean (3.55) rated (89%). At the fifth rank came “Encouraging playing, experimenting, curiosity, inquiry and group interaction" with a mean (3.37) rated (84%). Those are the modern roles that teachers believe they have to do in order to develop creative thinking skills among learners so that they can meet the challenges of the age of technology and knowledge explosion.

After that, these two roles had a less agreement degree: “Providing opportunities for active interaction among learners and providing the necessary components” with a

mean (2.64) rated (66%), followed by “Providing appropriate time and sources in order to experiment ideas” by a mean (2.57) rated (64%).

Teachers did not agree on the rest of the roles which were: “Helping learners to generate knowledge (ideas) and creativity using modern technology and creating the educational programs they need” and “Accustoming learners on treating things around them and choosing situations that provide new ideas”. That might be the result of weak modern technology, the lack of teachers’ experience on them, and the weak renovation and creativity.

The Modern Roles of Saudi Teacher in Developing Critical Thinking Skills:

The author has analyzed the arithmetic means, standard deviations and percentages of responses on the modern roles of Saudi teachers in developing critical thinking skills among learners to meet the challenges of the age of technology and knowledge explosion. Table (14) shows the results:

Table (14) Arithmetic means, standard deviations and percentages of the domain of modern roles of Saudi teachers in developing critical thinking skills

The Modern Roles of Saudi Teacher in Developing Critical Thinking Skills:	Mean	Standard Deviation	Percentage
Encouraging learners to express their opinions about all what they see and hear in daily life	3.75	.61	94%
Helping learners to develop their feeling of having knowledge by developing their critical thinking	3.59	.82	90%
Encouraging learners to compare their perspectives to other perspectives	3.65	.82	91%
Guiding learners to speculate about the available material, the process of learning and its objectives	3.52	.91	88%
Guiding learners to differentiate facts and opinions	3.56	.88	89%
Guiding learners to explore the available hypotheses	3.64	.79	91%
Guiding learner to identify points of ambiguity and contrast in the text or mission	3.81	.64	95%
Helping learners to be open-minded and accept all the possible sources of knowledge	2.13	.79	53%
Giving learner freedom to choose the track of research	2.74	.81	68%
Guiding learners to the importance of continually evaluating the objectives, processes, product and the accompanying failure or success.	2.01	.73	50%
The Total domain	3.24	.32	81%

Table (14) pointed out that teachers agreed on the modern roles of Saudi teachers in developing critical thinking skills by total mean (3.24) rated (81%). Most of the roles were highly agreed on. They are arranged as follows: “Guiding learner to identify points of ambiguity and contrast in the text or mission” was ranked first with a mean (3.81) rated (95%), followed by “Encouraging learners to express their opinions about all what they see and hear in daily life” with a mean (3.75) rated (94%), then

“Encouraging learners to compare their perspectives to other perspectives” with a mean (3.65) rated (91%), followed by “Guiding learners to explore available hypotheses” with a mean (3.64) rated (91%), then “Helping learners to develop their feeling of having knowledge by developing their critical thinking” with a mean (3.59) rated (90%). After that “Guiding learners to differentiate facts and opinions” got a mean (3.56) rated (89%). At last, there was the role of “Guiding learners to speculate about the available material, the process of learning and its objectives” with a mean (3.52) rated (88%). The role of “Giving learner freedom to choose the track/stream of research” was ranked eighth with a less agreement degree with a mean (2.74) rated (68%). Teachers did not agree on the role of “Helping learners to be open-minded and accept all the possible sources of knowledge” and that of “Guiding learners to the importance of continually evaluating the objectives, processes, product and the accompanying failure or success”. That might be the result of the fear of being open-minded, its negative effects and the difficulty and complexity of continually evaluating everything by learners; hence teachers believe that this role isn’t essential and unneeded.

The Modern Roles of Saudi Teacher in Developing Meta-cognitive Thinking Skills:

The author has analyzed the arithmetic means, standard deviations and percentages of responses on the modern roles of Saudi teachers in developing meta-cognitive thinking skills among learners to meet the challenges of the age of technology and knowledge explosion, as shown in Table (15):

Table (15) Arithmetic means, standard deviations and percentages of the domain of modern roles of Saudi teachers in developing meta-cognitive thinking skills

The Modern Roles of Saudi Teacher in Developing Meta-cognitive Thinking Skills:	Mean	Standard Deviation	Percentage
Designing learning situations in groups and encouraging learners to think loudly	3.64	.79	91%
Providing meta-cognitive culture in an atmosphere where learners feel comfortable to speak out what they do not know.	3.62	.86	91%
Helping learners to develop deep educational bases that could be applied in different lessons and topics	2.06	.75	51%
Providing opportunities for learners for continual self-evaluation on what they know and do not know	2.76	.84	69%
Taking good care of the mutual understanding of objectives among learners in meta-cognitive activities	2.10	.74	52%
Providing social support to help learners to develop their self-knowledge	3.31	1.10	83%
Helping learners to transfer learning sides (cognitive, skillful and emotional) into other life situations.	3.67	.78	92%
The Total domain	3.02	.43	76%

Table (15) showed that teachers generally agreed on the modern roles of Saudi teachers in developing metacognitive thinking skills. The total mean was (3.02) rated (76%). However, they did not agree on two roles: “Helping learners to develop deep

educational bases that could be applied in different lessons and topics” and “Taking good care of the mutual understanding of objectives among learners in meta-cognitive activities”. That might be because it was difficult for learners to handle those roles as developing deep educational bases and to take a good care of mutual understanding among learners.

In addition, the role of “Providing opportunities for learners for continual self-evaluation on what they know and do not know” scored a mean (2.76) rated (69%) with an agreement degree. But they strongly agreed on four roles, which are: “Helping learners to transfer learning sides (cognitive, skillful and emotional) into other life situations” scored a mean (3.67) rated (92%) followed by “Designing learning situations in groups and encouraging learners to think loudly” with a mean (3.64) rated (91%). Then came “Providing meta-cognitive culture in an atmosphere where learners feel comfortable to speak out what they do not know” with a mean (3.62) rated (91%), too. The following role was “Providing social support to help learners to develop their self-knowledge” with a mean (3.31) rated (83%).

The Modern Roles of Saudi Teacher in Developing High-Grade Thinking Skills:

The author has analyzed the arithmetic means, standard deviations and percentages of responses on the modern roles of Saudi teachers in developing high-grade thinking skills among learners to meet the challenges of the age of technology and knowledge explosion. Table (16) showed the results:

Table (16) Arithmetic means, standard deviations and percentages of the domain of modern roles of Saudi teachers in developing high-grade thinking skills

The Modern Roles of Saudi Teacher in Developing High-Grade Thinking Skills	Mean	Standard Deviation	Percentage
Taking a good care of the learners' speculations on open-ended issues.	2.87	.79	72%
Encouraging learners to think about and make dialogues about knowledge and letting them be engaged in philosophical issues and dialogues.	2.83	.83	71%
Using internet lessons to design open-ended educational activities	3.59	.94	90%
Encouraging learners to learn main ideas and integrate in classroom dialogues	3.50	.94	88%
Using internet and different modern technology in teaching and encouraging learners to use them in learning.	3.57	.91	89%
Guiding learners to get necessary knowledge and information by using the internet and providing them the appropriate consultancy	3.81	.52	95%
The Total Questionnaire	3.36	.46	84%

Table (16) pointed out that learners agreed on all the modern roles of Saudi teachers in developing high-grade thinking skills. The total mean was (3.36) rated (84%) which is a high agreement degree. The first and second roles scored less agreement degree. The role “Taking a good care of the learners' speculations on open-ended issues” scored a

mean (2.87) rated (72%) and the role “Encouraging learners to think about and make dialogues about knowledge and letting them engaged in philosophical issues and dialogues” scored a mean of (2.83) rated (71%). Other roles rated high agreement degree; they are arranged as follows: “Guiding learners to get necessary knowledge and information by using the internet and providing them the appropriate consultancy” scored a mean (3.81) rated (95%), followed by “Using internet lessons to design open-ended educational activities” with a mean (3.59) rated (90%), followed by “Using internet and different modern technology in teaching and encouraging learners to use them in learning” with a mean (3.57) rated (89%). At last came the role of “Encouraging learners to learn main ideas and integrate in classroom dialogues” with a mean (3.50) rated (88%).

The Modern Roles of Saudi Teacher in Developing the Total Higher-Order Thinking Skills:

The author has analyzed the arithmetic means, standard deviations and percentages of responses on the modern roles of Saudi teachers in developing the total higher-order thinking skills among learners to meet the challenges of the age of technology and knowledge explosion. Table (17) showed the results:

Table (17) Arithmetic means, standard deviations and percentages of the domain of modern roles of Saudi teachers in developing total higher-order thinking skills.

The Modern Roles of Saudi Teacher in Developing the Total Higher-Order Thinking Skills :	Mean	Standard Deviation	Percentage
Developing Creative Thinking	3.08	0.30	77%
Developing Critical Thinking	3.24	0.32	81%
Developing Metacognitive Thinking Skills:	3.02	0.43	76%
Developing Higher-Grade Thinking Skills:	3.36	0.46	84%
The total questionnaire	3.18	0.19	79%

Table (17) showed that teachers agreed on all the modern roles of Saudi teachers in developing the total higher-order thinking skills. The total mean was (3.18) rated (79%). The modern roles of developing higher-order thinking skills had the most scores with with a mean (3.36) rated (84%) which is a high agreement degree, followed by the modern roles of developing critical thinking skills with a mean (3.24) rated (81%), followed by the modern roles of creative thinking skills with a mean (3.08) rated (77%). The modern roles of developing metacognitive thinking skills by a mean (3.02) rated (76%).

Results related to the responses of the fourth question:

In order to answer the fourth question “Are there any differences between the means of responses attributed to the variables of (gender- specialization- years of experience- qualification- the educational stage)? The author has analyzed the responses of the two responses by using appropriate statistical methods. The results showed that all the differences were not statistically significant which indicated that there were no differences in the means attributed to (gender – specialization – years of experience – qualification – educational stage). That meant that all the teachers (with the different

gender, specialization, experience, qualification and educational stage) agreed on the responses of the two questionnaires (The questionnaire of higher-order thinking skills that should be developed among learners to meet the challenges of the age of technology and knowledge explosion and the questionnaire of modern roles of Saudi teachers in developing higher-order thinking skills among learners to meet the challenges of the age of technology and knowledge explosion).

That indicated that all those skills and modern roles are essential for meeting the challenges of the age of technology and knowledge explosion at all levels of total education and subjects without exception for the two genders.

CONCLUSION

1. The study showed that the most important challenges were the speed of the production of knowledge, the spread of technology, as well as the speed and intensity of the exchange of information and knowledge, the growing knowledge of electronic control and globalization, cultural and national identity, and changing the concepts and methods of human life.
2. The rate of teachers' agreement on the total creative thinking skills were high with a mean (3.39) rated (85%).
3. Teachers agree on the total critical thinking skills with a mean (3.14) rated (78%).
4. Teachers highly agree on all the metacognitive thinking skills with a mean of (3.69) rated (92%).
5. Teachers agree on the total higher-order thinking skills with a mean (3.14) rated (79%).
6. Teachers agree on the importance of all the total higher-order thinking skills for meeting the challenges of the age of technology and knowledge explosion and that they have to develop among learners. The percentage of the total skills was (84%) with a mean (3.34).
7. Teachers generally agreed on the modern roles of Saudi teachers in developing creative thinking skills. The total mean was (3.08) rated (77%).
8. Teachers agreed on the modern roles of Saudi teachers in developing critical thinking skills with an total mean (3.24) rated (81%).
9. Teachers generally agreed on the modern roles of Saudi teachers in developing metacognitive thinking skills with a mean (3.02) rated (76%).
10. They agreed on all the modern roles of Saudi teachers in developing higher-grade thinking skills with a mean (3.36) rated (84%).
11. They agreed on all the modern roles of Saudi teachers in developing the total higher-order thinking skills with a mean (3.18) rated (79%).
12. There were no statistically significant differences at the significant level (0.05) between the means of responses attributed to the variables of (gender- specialization- years of experience- qualification- the educational stage).

RECOMMENDATIONS

1. The need of developing higher-order thinking skills through dependent educational curricula.

2. The need of raising the consciousness of teachers, learners and parents to the challenges of the age of technology and knowledge explosion and the methods of meeting them.
3. The modern roles of Saudi teachers should be included in the programs of teacher preparation.
4. Teaching an integrated subject on the challenges of the age of technology and knowledge explosion in the programs of the teacher preparation.
5. Preparing training programmes for in-service teachers in developing higher-order thinking skills among learners to meet the challenges of the age of technology and knowledge explosion.
6. Making use of the list of modern roles of Saudi teachers in improving and updating training programs for pre-service and in-service.

Suggestions

1. Conducting a study on the practicing of Saudi teachers of modern roles in developing thinking skills.
2. Conducting a study on the degree of awareness of Saudi teachers on the challenges of the age of technology and knowledge explosion.
3. Conducting a study on the relation of developing the higher-order thinking skills to meeting the challenges of the age of technology and knowledge explosion.

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