The Effectiveness of the Instructional Model with Interactive Processes (4E X 2) in Developing Doctrinal Concepts and Comprehension Monitoring Skills Among Secondary School Students

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ABSTRACT

This study aimed to identify the effectiveness of the Instructional Model with Interactive Processes (4E X 2) in developing doctrinal concepts among first-grade secondary students. It also sought to identify effectiveness of this model in developing comprehension monitoring skills among first-grade secondary students. It aimed to determine the nature of the relationship between comprehension monitoring skills and the development of doctrinal concepts among first-grade secondary students. To achieve the study objectives, the experimental approach with a quasi-experimental design was adopted. The research sample was selected from (67) first-grade secondary school students: (33) students in the experimental group, and (34) students in the control group. The study results indicated that there are statistically significant differences between the mean scores of students of the two groups experimental and the control group in the test of doctrinal concepts as a whole and different cognitive levels in favor of students of the experimental group. There are statistically significant differences between the mean scores of the students of the experimental and control groups in the scale of comprehension monitoring skills (awareness of comprehension processes, self-monitoring, and self-evaluation) in favour of students of the experimental group. There is a statistically significant relationship between the comprehension monitoring skills and the development of doctrinal concepts among students of the experimental group (who studied using the Instructional Model with Interactive Processes (4E X 2)). There is a positive relationship that is not statistically significant between these variables among students of the control group. It is recommended that planners and developers of *Tawheed* curriculum pay attention to constructivist models such as the Instructional Model with Interactive Processes (4E X 2) to develop doctrinal concepts and enhance students' comprehension monitoring skills when building *Tawheed* curricula at the secondary level. Finally, the research presented a set of recommendations and suggestions.

Keywords
Instructional Model with Interactive Processes (4E X 2) - Doctrinal Concepts - Comprehension Monitoring Skills

Article Received: 14th March 2021, Revised: 10 April 2021, Accepted: 03 May 2021

Introduction

Doctrinal concepts form the basic building blocks of doctrinal knowledge, as facts, principles, generalizations, rules, legal rulings, trends and values are formed from them. As a result, teaching doctrinal concepts according to the Qur'an and the Sunnah, together with imparting them to students, helps in understanding doctrinal knowledge properly and clearly. Additionally, teaching them also helps to address, organize, understand and distinguish doctrinal topics based on their characteristics. They improve the ability to classify, compare, analyze and think.

Doctrinal concepts in Islamic education curricula are classified into three categories. First, doctrinal concepts in terms of divinities; they include the concept of Allah's names, attributes and actions, together with faith, Islam, charity, and related issues. Second, doctrinal concepts related to prophethood. They include concepts related to the sections and topics of the study of prophethood, such as the concept of revelation, prophets and messengers, the miracles of the messengers, and the divine books revealed to them. Third, doctrinal concepts related to unknown. It includes the unseen, such as: life after death, the Resurrection of the Hour, the Resurrection, bringing people to life, reckoning, Heaven, Hell, the intercession, vision, jinn and angels, and related issues of (Hindi, 2009; Farag & Tantawi, 2011).

The development of doctrinal concepts is one of the goals of teaching the faith subject because it plays a positive role in the learner himself/herself, linking his/her relationship with his Lord, the universe around him and life in general. It forms a correct understanding of religion, facing challenges with a firm belief, and keeping away from all deviations. In addition, it is a basis for comprehension, interpreting and applying doctrinal knowledge in new situations that have not been previously learned, and it reduces the

quantitative and qualitative complexity of doctrinal knowledge.

Alves (2014) emphasized the importance of developing the learner's conceptual development because it opens up the horizon of awareness and contemplation of the learner. Researchers have recognized the active role of the human being in building conceptual knowledge (Wells, 1994). Effective learning of concepts provides the learner with the ability to understand them, and to create a kind of gradual awareness of these concepts and thought processes (Alves, 2014). Hence the processes and skills of monitoring comprehension as a behavioral procedure that allows the learner to monitor the process of his/her comprehension of concepts and judge their occurrence. It also allows him/her to identify the most important strategies that can be followed in understanding these concepts.

Monitoring comprehension is one of the aspects of metacognition, and it reflects a series of procedures and strategies that the learner uses to follow up performance and monitor changes related to it. Any conceptual knowledge cannot occur or be produced except through one's monitoring of apparent performance, and all internal processes related to information processing (Flavell, 1981).

Literature Review

Doctrinal Concepts

Concepts are defined as "a construct defined by a special name, or a symbol created by certain things, symbols, or events that share common features with each other (Aral, 2006). Kelada (2004) asserts that the concept is defined as components of an abstract experience based on types of knowledge and mental experiences, previously learned. Doctrinal concepts are defined as "abstract mental perceptions that have common characteristics and features that distinguish them from others. They are formed by the previous and current experiences of the individual, and are expressed in a word, term or phrase."

Tolba (3013) points out that concepts are among the most important learning outcomes by which scientific knowledge is organized into a meaningful mental form, and represent the organizing elements and guiding principles for any knowledge acquired in any educational situation. Acquiring concepts has become a major goal of learning because it increases the learner's ability to interpret many phenomena and events. They help him/her to classify many things, events and situations, and group them into categories that are easy to learn.

Ostergaard, et al. (2007) believe that a deep comprehension of phenomena and events does not arise only through the experiences of the senses, but experiences must be transformed into concepts. Vygotsky considers the formation of concepts to be a repetitive and vital activity. The concept appears and is formed in the context of a complex process aimed at solving some problems. The formation of this concept is not isolated or something without change, but it is an active part of the mental process, which works continuously for communication, comprehension and problem solving (Wellings, 2003). Vygotsky pointed out that the process of conceptualization is a complex activity in which all the basic mental functions are exercised. It is a complex and phased process that requires successive processes practiced by the learner through his/her presence in specific situations. It is a stage prior to the development of the concept, or in other words, it is the first stage in the development of the concept (Wellings, 2003).

Thinkers point to the need to diversify experiences in learning the concept. The diversity of experiences increases the development and deepening of the concept because, based on diversity, the learner discovers more characteristics, attributes, connotations, and interrelationships between concepts (Alves, 2014). Su et al., (2014) also indicate that in learning concepts, the learner can go beyond memorizing these concepts and perceive a higher level of thinking only when he tests his mental model related to these concepts through problem solving and inquiry. To achieve a deep understanding of concepts, the teacher should generally use instructional models, strategies, and educational activities that enhance critical thinking processes, learning and forming new concepts.

The process of acquiring doctrinal concepts depends on focusing the basic concepts and mental models that learners use in understanding the doctrinal content. It stimulates their previous knowledge and experiences, their practice of higher mental processes and activities, addressing their sentiments, moving their feelings and stirring

their emotions. Employing teaching strategies by teachers leads to learners' interaction. It encourages learners to analyze, interpret, predict, evaluate and reflect data.

Researchers have focused on doctrinal concepts. Many diagnostic studies were conducted on them, such as Al-Radwan (2003), concluding that there is a weakness in the level of the upper elementary stage students in its three grades in acquiring the doctrinal concepts, included in Islamic education textbooks. Al-Hamid (2009) concluded that there is a weakness in first-grade secondary students' achievement of doctrinal concepts contained in *Tawheed* (monotheism) textbook. AL-Saudi (2012) showed that fourth-grade students' average acquisition of doctrinal concepts was (0.52), which is less than educationally acceptable level (60%).

As a result, many studies were conducted with the aim of developing doctrinal concepts, including AL-Kiam (2010), revealed the impact of metacognition and constructive learning strategies in acquiring doctrinal concepts and developing passing judgments and decision-making skills in the subject of Islamic sciences for secondary school students compared to the usual method. Al-Baydi (2012) showed the effectiveness of a proposed program in the light of the objectives of Islamic *Sharia* in developing doctrinal concepts and *Sharia* rulings of secondary school students. Al-Daoud (2017) concluded that there is an effect of the guided imagery strategy on achieving doctrinal concepts at the levels of (remembering, comprehension, and application) for fourth-grade students. Al-Ghubawi (2018) proved the effectiveness of the mind mapping strategy in developing the doctrinal concepts of intermediate school students. Sabr (2018) pointed out an effect of a flipped learning strategy on developing doctrinal concepts of Tawheed for intermediate third grade students. Al-Oumi (2020) showed an effective learning model in developing concepts and problem-solving skills of secondary school students. Al-Shahrani (2020) pointed out the effectiveness of the PQ4R strategy in developing doctrinal concepts for three levels, remembering, comprehension, and applying, among first-grade intermediate students.

Comprehensive Monitoring

Kim and Phillips (2016, 2014), and Kim (2016) argued that monitoring comprehension is the ability to think of and evaluate one's understanding of a learning subject, whether in spoken or written form. They widely viewed it as "a strategy that helps the learner solve a contradiction or failure to comprehend when reading different texts. It is also the ability to know what was done right or wrong and to integrate new information with previous knowledge (Khonamri & Kojidi, 2011).

Ortega (2001) indicates that monitoring comprehension is a process by which an individual feels responsible for thinking processes. Although monitoring comprehension may seem automatic, it includes metacognitive awareness, or what is known as the ability to reason in thinking.

Monitoring comprehension is one of the aspects of metacognitive control in reading comprehension, which is the process by which the individual assesses his state of understanding of information (Oakhill, Hartt, & Samols, 2005). It directs the cognitive processes of the reader when he/she strives to build meaning, and through which one can check comprehension. Moreover, conscious application of appropriate strategies may correct comprehension. It is the ability of the learner to know what he/she has done correctly or wrongly; to link new information with already existing knowledge, with control over comprehension; and to use cognitive and metacognitive strategies automatically in building and developing comprehension. However, the individual may equipped with a variety of reading strategies, one needs a high level of ability to use his/her own reading strategies: the ability to monitor comprehension (Zipke, 2007; Han & Stevenson, 2008).

Consequently, monitoring comprehension is referred to as a part of metacognition that indicates the individual's knowledge and thinking about thinking and knowledge (Phakiti, 2003, 2006). This may be related to metacognition that consists of metacognitive knowledge and control metacognition. Metacognitive knowledge is found in long-term memory. It is what a person knows about his own cognitive process, while metacognitive control operates in the working memory of the individual, and expresses his ability to use metacognitive knowledge to achieve specific goals through various cognitive activities, such as planning and monitoring comprehension (Han, 2017).

Accordingly, monitoring comprehension is one of the higher-level cognitive processes involved in comprehension because it indicates evaluation, organization, and reflection in the construction of meaning, and the recognition of failure of comprehension. It contributes to the processes of evaluation and reform during comprehension. The lack of monitoring of comprehension may lead to the construction of meaning inaccurately (Kim, Vorstius & Radach, 2018). Zinar (2000), Han and Stevenson (2008), and Han (2012) note that monitoring comprehension is important as it is among a variety of higher-order operations; also, it alerts the learner about the failure of comprehension, and compensates for weaknesses in the skill of understanding. It enables him/her to follow what one reads and checks whether it is logical or not. Yu-Fen (2006) and Connor et al. (2015) agree that monitoring comprehension allows the learner to demonstrate comprehension of task requirements, identify the most important aspects of the learning topic, focus attention on key content, monitor activities practiced to determine if comprehension is occurring, engage in a self-questioning process to determine whether objectives have been achieved, and take corrective action upon discovering cases of failure in comprehension. It also makes the learner aware of cognitive and metacognitive strategies that are directed towards building comprehension of concepts and linking new ideas with previous knowledge. It raises awareness of the effort exerted towards comprehension, in addition to controlling and monitoring the strategies used in building comprehension. Monitoring comprehension is defined as conscious and unconscious strategies used to identify and repair gaps in comprehension that may occur during the learning process, in addition to encouraging students to consciously monitor their comprehension of the text and control cognitive activities (Connor, Radach, Vorstius, Day, McLean, and Morrison, 2015).

Brown (1987) posits that effective comprehension control requires a balance between automatic and controlled processes. When comprehension occurs smoothly, the process is automatic without much conscious interest; but when a 'trigger event' occurs, controlled treatment is activated to 'correct' comprehension errors.

Pillow and Anderson (2006) note that monitoring comprehension provides the brain with a high level of stimulation during the learning process; provides it with strong insights while learning concepts, as well as providing feedback on when cognitive processes occur and when they stop working. Here, monitoring comprehension is divided into two parts. First. reflective monitoring which occurs during and after the process of learning concepts, and it relates to judgments made regarding knowledge and concepts recovered from memory and confidence in it. Second, expected monitoring which takes place before starting the process of learning concepts, and it is a set of judgments issued by anticipating future responses, including judgments for ease of learning for these concepts; strategies that will be used to address them; judgments about their learning; predictions that appear during learning concepts; predicting the use of experience derived from the current learning situation; and how to employ them in a future learning situation; and finally the sense of knowledge judgments that relate to judgments made on the information being learned.

Researchers emphasize that comprehension monitoring skills reflect the learner's ability to recognize the problem in comprehension the learning material, identifying its source and correcting it. This is done is when the learner evaluates his/her comprehension and awareness that he/she is facing a problem in understanding the learning material. This problem contains inconsistent and contradictory information, contradicting previous knowledge. He/She consciously begins searching for information that leads to a solution (Han & Stevenson, 2008; Oakhill, Hartt, & Samols, 2005). The learner also uses self-monitoring skills in storing information related to the learning task, drawing conclusions, discovering inconsistencies between aspects of knowledge, and making comparisons between new information and previous knowledge, likely to be more stable than the newly obtained information (Ehrlich, 1996; Ehrlich, Remond, & Tardieu, 1999; Oakhill, Harrt, & Samols, 2005).

Many studies have been conducted that emphasize the importance of comprehension monitoring skills. Khonamri and Kojidi (2011) argue that comprehension monitoring skills play a role in developing metacognitive awareness of reading strategies and understanding the texts, discovering errors and asking questions about the comprehension process. In addition, being able to

monitor comprehension enables the learner to use a set of skills and monitoring strategies. They include determining the meaning, questioning, reflecting, monitoring, summarizing, and searching for important information. Han's study (2017) also indicates that monitoring comprehension requires different cognitive processes and involves high-level skills that help the learner discover information errors that occur when reading the learning material. Kim and Phillips (2016) suggest that comprehension monitoring skills are learnable and can be taught in the context of language learning, enhancing the learner's ability to detect contradictions in the learning subject. Agutu, Gichohi, and Wamalwa (2019) also support that comprehension monitoring skills have positive effects on the academic performance of a learner who has difficulties reading texts and building comprehension. They can be used as an intervention strategy to correct deficiencies in comprehension.

Instructional Model with Interactive Processes

Instructional Model with Interactive Processes (4E X 2) supports knowledge acquisition and use, active learning, and inquiry-based learning (Brickman, Gormally, Armstrong and Hallar, 2009: 1). It includes three integrated educational aspects, namely: metacognitive reflection, educational inquiry models, and formative assessment; they promote the development of concepts (Jeff et al., 2008). Instructional Model with Interactive Processes (4E X 2) connects a strong conceptual understanding of content with inquiry learning experiences. It integrates what we know and understand about teaching and inquiry-based learning with effective evaluation and metacognitive reflection. Model (4E x 2) allows the teacher to develop and implement deep and meaningful inquiry-based learning experiences, facilitate educational practices based on formative evaluation, promote deep understanding of concepts and learning content, and develop scientific and practical skills for all students.

Instructional Model with Interactive Processes (4E X 2) focused on combining inquiry models that were initiated by Bybee et al. (2006) when using scientific inquiry as a method for students to learn science, technology, engineering, and mathematics (STEM), in addition to what Atkin and Karplus (1962) presented in the three-stage learning cycle: exploration, invention, and discovery. In addition, 5E educational model includes participation, exploration, explanation, clarification, and evaluation (Jeff, Horton & Smart, 2008). Eisenkraft (2003) added two stages, elicitation or extraction and expansion, resulting in the 7E learning cycle. Although these models immerse students in inquiry-based learning experiences by creating an experience of imbalance, these aforementioned models did not address the importance of evaluation and metacognitive reflection that should occur during each stage of learning (inquiry). They both represent two distinct constructs of the 4E x 2 model as well as the inquiry-based learning construct (Jeff, Horton & Smart, 2008). The following discussion shows these three components of the model:

Metacognitive Reflection

Metacognition is a high-level thinking process, as it plays an important role in learning and teaching practices. It is one of the thinking skills that the learner needs in solving problems, in controlling one's own learning activities, thinking about ideas clearly, and comprehension concepts. It is also important in self-organized learning because it strongly affects the learner's motivation, and hence self-regulation of behavior (Schwartz & Perfect, 2002; Karaduman & Erbas, 2017; Aram & Wiyarsi, 2020). Metacognition includes both comprehension and controlling an individual's cognitive processes (White & Frederiksen 2005). It refers to what the individual knows or thinks about himself/herself and others as cognitive beings, and about his/her relationships with actions, goals, various cognitive strategies and experiences. Additionally, it indicates one's awareness and control not only for cognitive processes, but also for emotions and motives (Louca, 2003). It also refers to identifying and organizing the cognitive processes of the individual as a critical component of innovative thinking (Jia et al., 2019).

According to the pertinent literature, the field of metacognition is divided into cognitive perception knowledge (cognitive, procedural and conditional knowledge). It refers to what we know about knowledge, our thinking and learning, and the organization of cognitive perception in terms of (planning, directing, testing, reviewing and evaluating strategies) (Baker & Brown, 1984; Flavell, 1979; Ma & Baranovich, 2015). In short,

cognitive knowledge refers to the knowledge of our thinking, but the regulation of cognitive perception refers to actively directing our thinking (Young & Worrell, 2018). It is classified into metacognitive knowledge, metacognitive experience, and metacognitive control (Efklides, 2006). It is a multidimensional mental process, including metacognitive perception, experiences and skills, as well as theory of mind and cognitive beliefs (Koulianou & Samartzi, 2018).

Metacognition also includes deep analysis and awareness of key thinking processes for effective learning. Metacognitive reflection plays a role in focused reflective practice in relation to the concepts being inquired (Shepardson & Britsch 2001). There are three important principles for successful metacognitive education: the inclusion of metacognitive processes in the learning content to ensure relevance to them; informing the learner of the benefits of the metacognitive activity to exert more efforts in the learning process: and lengthy training to ensure the smooth and continuous application of the metacognitive activity (Chevron, 2014; Veenman et al., 2006).

Metacognitive reflection consists of three areas: metacognitive knowledge, knowledge organization, and cognitive processing. Metacognitive reflection skills are important in teaching comprehension and using knowledge, solving problems related to new situations, and the ability to explain, synthesize and generalize hypotheses. Metacognitive reflection needs high capacities that go beyond the limits of concrete thinking (Al-Gaseem, Bakkar & AL-Zoubi, 2020).

Schwartz and Perfect (2002) identified metacognitive knowledge, metacognition, and metacognitive awareness. Metacognitive knowledge refers to an individual's knowledge about his cognitive strengths and weaknesses, but metacognitive awareness refers to feelings and experiences that occur before, during and after the implementation of cognitive activities.

Formative Assessment

Assessment is an essential component that is inseparable from the educational process. According to Cambridge Dictionary, assessment is the act of judgment or determination of the amount, value, quality or importance of something, or the judgment or decision that is made (Cambridge University Press, 2019). It is a systematic activity that is fundamentally similar to curriculum plans, and is used to discover what students (people) know and can do (Baird, Andrich, Hopfenbeck, & Stobart, 2017). Formative assessment is one of the types of assessment that implies continuous assessment during the educational process that provides expanded feedback (Scriven, 1967). It can be an indicator of a meta-assessment (Siweya & Letsoalo, 2014).

Formative assessment is defined as “all activities performed by teachers and / or their students, which provide information for use as feedback to modify the teaching and learning activities in which they participate (Black & Wiliam 1998). It is an interactive process that serves as a tool to improve teaching and learning for all participants (teacher to know how to adapt the following lessons, and students to know areas of improvement), and to make the educational process more dynamic and flexible (Babinčáková, Ganajová, Sotáková, & Bernard, 2020). Black and Wiliam (2009) note that practice in the classroom is formative to the extent that evidence about student achievement is elicited, interpreted, and used by teachers, learners, or their peers to make decisions about next steps in teaching that are probably better than the decisions they would have made in the absence of the evidence obtained.

It is also seen as a process of evaluating and judging the performance of the learner and using results in shaping the improvement of efficiency, in addition to being a process in which the teacher and the learner interact through learning activities. Moreover, the learner receives feedback about what he/she knows, what he/she understands, and what he/she is doing. Researchers have affirmed the idea of self-evaluation, peer evaluation, questioning, feedback and sharing of learning expectations as main strategies for formative evaluation. They reiterated the need to develop the learner's ability to self-reflective judgment, ownership of evaluation and the real desire to learn and practice independent learning, rather than just urging him/her to achieve specific grades. It intends that for the teacher to be a guide to acquiring knowledge and not as the person on whom the learning process depends (Revilla-Cuesta, Skaf, Manso & Ortega-López, 2020; Babinčáková et al., 2020; Shewbridge, Van Bruggen, Nusche, & Wright, 2014; Barnett, 2007). Formative assessment is an essential

component of classroom work. Developing it can raise standards of excellence, and it becomes important when the resulting evidence is used to adapt teaching to meet students' needs (Black & Wiliam, 1998).

Inquiry Instructional Model

Inquiry is defined as a set of interrelated processes through which scientists and students ask questions about the natural world and investigate various phenomena. Students gain knowledge, develop a rich understanding of concepts, principles, paradigms and theories, formulate interpretations through evidence, connect interpretations with knowledge, and convey and justify these interpretations (NRC 2000, 24). It includes the formulation of a question that can be answered through the practice of inquiry processes. inquiry questions should be authentic and real, and allow the learner to be given opportunities to build their own understanding of the real world.

Inquiry is a dynamic process in which the learner is open to complex questions and situations. The learner seeks to know and understand the world and how it works, as it is a position that permeates all aspects of life. It is necessary to build and innovate the path of knowledge. It is based on the belief that understanding is built through a process of performances and interactions, as it is a process for posing and solving problems, searching for knowledge and building new understanding. and it rotates. It is about discovering and moving in an organized way from one level of comprehension to a higher level. In addition, it is a process that refers to monitoring thinking and learning, documenting observations, and analyzing them to develop research questions focused on the phenomenon in order to enhance the learning process as a lifelong process. Inquiry-based learning seeks to build a better understanding, shaping, reshaping understanding and reforming educational practices prevailing in schools. It is seen as a conceptual umbrella under which a set of educational techniques, methods and objectives fall. The learner is allowed to practice intentional, systematic and purposeful methods of collecting information and documenting experiences. The learner also has the opportunity to practice generating analyzes, rich in details and insights, achieving and developing independence and innovative and critical thinking (Fandino-Parra, 2011: 275-277). Therefore, the inquiry process should be inserted into the curriculum so that the learner can generate knowledge and visualize and interpret the findings and practices associated with inquiry. Current curricula should focus on allowing students to learn to make informed and balanced decisions about how science affects their lives. How do they use knowledge to solve problems? This type of learning is achieved through using active, learner-centered learning strategies, including inquiry-based learning (Brickman et al., 2009).

Scientific insights gained through inquiry-based education are better in terms of learning and retention compared to traditional or direct approaches to education (Blanchard et al., 2010; Lee & Shea 2016). The learner becomes able to build his/her own knowledge on the basis of real experience, and build the questions that are inquired. It provides the learner with opportunities for repeated dealing with concepts and allows him/her to scaffold the conceptual understanding until it is integrated into the long-term memory. In this regard, the teacher plays a facilitating role as he/she listens to students and guides them during exploration (Lee & Shea 2016: 220; Marshall, 2013; Magee & Flessner, 2012). In inquiry teaching, the teacher should change his perception of science because it is closely related to a set of outcomes (i.e. a set of facts, concepts, relationships, generalizations, and principles that should be conveyed to students), to being a mental process represented in observation, measurement, classification, use of relationships, deduction, prediction, and hypothesis. This requires the teacher to develop planning inquiry activities with high levels of open-mindedness, and to take into account the dimension of knowledge as a building process during the implementation of the inquiry activities in the classroom (Perez & Furman, 2016).

Singer et al. (2011) confirms that the teacher should focus less on students' acquisition of scientific knowledge, and give greater focus on the learner’s understanding and use of knowledge and scientific ideas, in addition to practicing inquiry processes. The teacher should also change teaching strategies, moving from the passive transfer strategy (lecture / text / clarification) to a different one, in which the learner exercises inquiry processes using questioning strategies that

allow the learners to participate in an open discussion process with each other instead of responding only to closed-ended factual questions.

In the light of these three components, the Instructional Model with Interactive Processes (4E X 2) consists of the following stages (Hestenes, Wells & Swackhamer 1992; Hake 1998; Bransford, Brown & Cocking, 2000; Wilson & Clarke 2004; Stiggins 2005; Van Zee, Iwasyk, Kurose, Simpson & Wild 2001), illustrated in Figure 1:

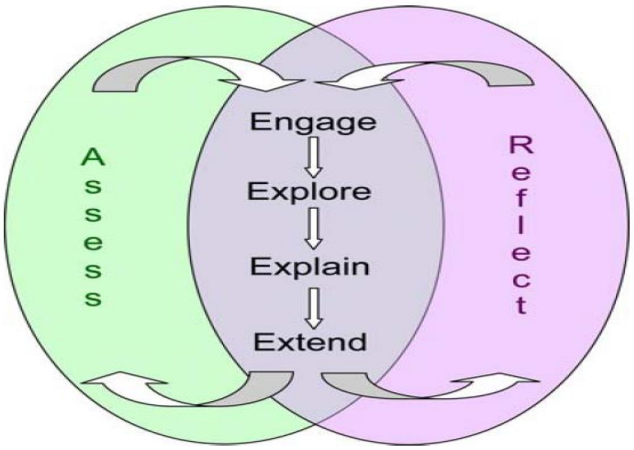

Figure 1: Components of the Instructional Model with Interactive Processes (4E X 2)

1. Engage: It aims at attracting the learner's attention and arousing motivation and desire to learn. In inquiry-based learning models, the process of arousal or engaging requires verification of prior knowledge, recognition of students' conceptual perceptions, and scientific questions. At this stage, the link between inquiry-based learning and metacognitive thinking is done through the use of different techniques, such as brainstorming, graphic organizers, and questioning. Formative evaluation is verified through the use of pre-tests, KWHL maps, and the use of contradictory events. At this stage, it is important to develop students' questioning skills. Inquiry into the original questions generated from students' experiences is the central strategy of teaching. Bringing alternative concepts and prior knowledge to students is also important to facilitate the experience of imbalance required to initiate conceptual development.
2. Explore: Once the teacher actively engages the learner, the learner can be led to the exploration stage. At this stage, the learner predicts, tests, generalizes, collects, explains and explains. Among the questions that enhance the occurrence of these processes are the questions of What-if type? What are the best ways to address the problem? What happens when? What data / information do you need to collect? Reflective thinking and constructive evaluation are essential to guide the learner in the course of the learning process. Formative assessment processes and intellectual practices are meaningfully intertwined. Metacognitive reflection enables the learner to study the problem and reflect on it, and to identify one's weaknesses during the discovery process. It may require the learner to complete a part of A KWHL chart, asking him/her to identify and explain the confusion or weakness in one's plan. The three components of metacognitive reflection, constructive assessment, and inquiry deepen learning during the exploration stage. Learning through inquiry becomes the focus of the teaching process. The teacher should provide targeted stimuli to encourage the learners to think deeply about inquiry, and to practice metacognitive reflection in their interactions with the natural world and their own thought processes.
3. Explain: The learner begins to construct the meaning and determine if the previous knowledge and alternative concepts in the engagement stage coincide with what he/she reached at the exploration stage. The meaning-building process begins when an exchange of information, findings and evidence occurs, so that the learner may an opportunity to clarify what has been understood in terms of concepts and skills, and the learner is given the opportunity to present concepts, processes and skills, leading to a deeper understanding. The learner presents a set of questions about what patterns were noticed. What evidence indicates the validity of the claim? How can a good explanatory model be provided? Are there

additional explanations of the results? This stage includes interpreting data and results, presenting evidence, exchanging results in written, oral or using technology, and providing multiple interpretations of the reached results.

Extend: If learning stops at the explanation stage, the learner can go back to his previous knowledge. Therefore, at this stage, the learner is allowed to apply his new knowledge in a meaningful way that helps him strengthen his understanding of the concepts he/she acquired, developing one's mental representations. In this regard, the learner is asked to deepen new knowledge by asking question, such as: How can it be applied …? What happens if …? Where can you use the following ...? At this stage, evaluation strategies can be used that require the learner to explore new ideas that have been studied. Observations, representations and discussions can be used in small or large groups. In order for the evaluation to be constructive, the learner is required to identify one's weaknesses in the process of applying the knowledge, respond to the teacher's comments, and ensure that the inquiry takes place and expands on it. The metacognitive reflection practiced at this stage is to reflect on the quality and number of applications, the ability to extend ideas and concepts, and the skill in transferring knowledge and new ideas. It also increases the extension activities based on the difficulty of the studied concepts, the degree of their importance, and students' understanding of them.

Research Problem

Doctrinal concepts are the basis of the cognitive structure of Islamic faith, and the most important educational goals that Tawheed approaches seek to develop among secondary school students. However, studies and research in this field confirm students' low level of doctrinal concepts. Al-Radwan (2003) and AL-Saudi (2012) indicated that students' academic achievement of doctrinal concepts was less than the educationally acceptable level. Al-Hamid (2009) pointed out that first-grade students' achievement of the doctrinal concepts contained in the Tawheed course was weak and below the educational acceptable level. The general achievement rate is (53.69%). An important factor in developing doctrinal concepts is monitoring students for their understanding while studying doctrinal concepts. Connor et al. (2015) indicates that despite the existence of many processes responsible for understanding such as working memory and prior knowledge, the learner's poor performance in the learning process is due to lack of effective comprehension monitoring skills (Connor et al., 2015; Cain, Oakhill, & Bryant, 2004).

A pilot study was conducted on a random sample of (32) first-grade students; (20) test items were presented to them to determine students' level in some doctrinal concepts. The results showed that the percentage of students' answers to the questions was (34%), indicating the weakness of these students in doctrinal concepts. In addition, a scale of the skills of monitoring the comprehension of the complex texts was built, aiming to measure the level of these skills among first-grade secondary students. The scale included (20) statements, and was applied to the same sample. The degree of students' possession of comprehension monitoring skills was weak with an arithmetic mean of (1.17). This confirms the need for first-grade secondary students to develop doctrinal concepts and monitor comprehension. The researcher also noticed, through his supervisory experience, the problems of secondary school students related to doctrinal concepts. These problems are shown in students' weakness of memorization of doctrinal concepts without understanding them, together with their inability to explore the relationship between doctrinal concepts and their use in new doctrinal situations. The researcher also noted the weakness of students' practice of comprehension monitoring skills, represented in the mental processes that students carry out while studying the doctrinal content, and their ability to monitor, control, and correct these processes.

An interview was also conducted to get acquainted with the views of ten Islamic education teachers at the secondary level, who have experience in teaching the subject of Tawheed. The interview included two questions, namely: What is the level of secondary school students in the concepts of doctrines? What is the level of monitoring the comprehension of the doctrinal texts among secondary school students? Eight of them agreed on the low level of students in doctrinal concepts, and all agreed on the weakness of their practice of monitoring comprehension processes while studying the doctrinal content.

Perhaps students' weakness in the level of doctrinal concepts and monitoring comprehension may be, from the researcher's point of view, due to the teacher and his teaching method, as the teaching performances focus on the traditional methods centered around the teacher. Many studies, AL-Sadhan (2006), Afif (2009) and Almqati (2018), that dealt with evaluating methods of teaching Islamic education and their obstacles that Islamic education teachers focus on traditional methods that depend on automatic memorization of information, facts and concepts. This is attributed to teachers' lack of familiarity with modern strategies, and their weak knowledge and skills necessary for effective teaching. The studies that focused on teaching the Islamic faith have recommended the necessity of reducing the traditional teaching methods in teaching doctrinal concepts, and focusing on modern teaching strategies and models that help provide students with knowledge, information, concepts, principles, and doctrinal facts. They provide them with greater opportunities for positive participation, and encourage them to think, debate, dialogue and ask questions in a way that leads to interaction with the doctrinal content. In addition, it is necessity to direct the researchers' attention to using modern teaching strategies and models related to developing doctrinal concepts and other research variables, and to test them in teaching Tawheed (Al-Oumi, 2020; Al-Shahrani, 2020; Al-Ghubawi, 2018; Sabr, 2018; Al-Baydi, 2012; AL-Kiam, 2010). Among these models is Instructional Model with Interactive Processes (4E X 2) which has proven effective in developing achievement, and correcting misconceptions of chemical concepts, self-efficacy, literacy, and professional experiences (Obaid et al., 2017; AL-Sheikh, 2013; Al-Khamisi, 2014; Jeff et al., 2011; Jeff et al., 2008).

In order to solve this problem, the following main question can be asked: What is the effectiveness of the Instructional Model with Interactive Processes (4E X 2) in developing doctrinal concepts and skills of monitoring comprehension among first-grade secondary students?

The main question is divided into the following sub-questions:

1. What is the effectiveness of the Instructional Model with Interactive Processes (4E X 2) in developing doctrinal concepts among first-grade secondary students?
2. What is the effectiveness of the Instructional Model with Interactive Processes (4E X 2) in developing comprehension monitoring skills among first-grade secondary students?

What is the nature of the relationship between the development of comprehension monitoring skills and the development of complex concepts among first-grade secondary students?

Research Hypotheses

The current research sought to verify the validity of the following hypotheses:

1. There is no statistically significant difference, at ($\alpha \leq 0.05$) level, between the mean scores of the experimental group students (who studied using the Instructional Model with Interactive Processes (4E X 2)) and the control group students (who studied using the usual method) in the posttest of doctrinal concepts.
2. There is no statistically significant difference, at ($\alpha \leq 0.05$) level, between the mean scores of the experimental group students (who studied using the Instructional Model with Interactive Processes (4E X 2)) and the control group students (who studied using the usual method) in the posttest of comprehension monitoring skills.

There is no significant correlation relationship, at ($\alpha \leq 0.05$) level, between the development of doctrinal concepts and comprehension monitoring skills among first-grade secondary students that differ according to the teaching treatment used (Instructional Model with Interactive Processes (4E X 2) - the usual method).

Research Objectives

The research sought to achieve the following objectives:

1. Identify the effectiveness of the Instructional Model with Interactive Processes (4E X 2) in developing doctrinal

concepts among first-grade secondary students.
2. Identify effectiveness of the Instructional Model with Interactive Processes (4E X 2) in developing comprehension monitoring skills among first-grade secondary students.

Determine the nature of the relationship between comprehension monitoring skills and the development of doctrinal concepts among first-grade secondary students.

Research Importance

The current research gains significance from the following:

1. It is considered a response to modern educational trends that call for the necessity of employing teaching models that enhance inquiry, metacognitive reflection and formative evaluation in order to develop doctrinal concepts and monitor comprehension through positive participation of students in the educational situation.
2. It provides a theoretical foundation for the Instructional Model with Interactive Processes (4E X 2) and how it develops doctrinal concepts and monitor comprehension of secondary school students. This research will add a new dimension of knowledge in this field.
3. It directs *Tawheed* curriculum planners and developers' attention on how to prepare a teacher's guide in the light of the procedures of the Instructional Model with Interactive Processes (4E X 2) in order to achieve the development of doctrinal concepts and monitor comprehension of secondary school students, in addition to making use of this model in Islamic education programs, and training in-service teachers in it.

Encouraging Islamic education teachers and supervisors to adopt the Instructional Model with Interactive Processes (4E X 2) in teaching *Tawheed*, together with training in it, and evaluating performance in its light.

Research Methodology and Procedures

Research Methodology

The current research adopted the experimental approach with a quasi-experimental design to find out the effectiveness of the independent variable the (Instructional Model with Interactive Processes (4E X 2)) on the dependent variables (doctrinal concepts and comprehension monitoring skills).

Research Sample

The research sample was selected from (67) first-grade secondary school students from in Al-Khubar, Eastern Region, Kingdom of Saudi Arabia, by a simple random method: (33) students in the experimental group, and (34) students in the control group.

Preparation of Research Instruments and Experimental Material

To achieve current research objectives, the following research instruments and experimental material were prepared:

1. Test of Doctrinal concepts:

Test of Doctrinal concepts was prepared on "Oneness of Divinity and Worship" unit, which was set for first-grade secondary school students in Tawheed course. The test included (33) items of the multiple choice type for the cognitive levels (remembering, comprehension, application, analysis, synthesis and evaluation). After completing the construction of the test, it was presented to a group of jurors to verify its validity. It was also applied to a sample of (33 students) in Al-Khubar Secondary School, Department of Education, Eastern Region. To measure the test reliability coefficient by the method of retesting, and it was found that it is equal to (0.90), indicates that the test has a high degree of reliability. The discrimination factor for the test items ranged from (0.35) to (0.80), indicating that the test has a discriminant factor that can be trusted. The validity of the internal consistency was also measured by the correlation coefficients between the scores of the pilot study sample students, at each knowledge level separately, and the test scores as a whole. The results indicated that the value of the correlation coefficients for the levels of recall, comprehension, application, analysis, synthesis, and evaluation are respectively (0.81), (0.87), (0.86), (0.90), (0.88), (0.85), indicating

that the test has a high degree of internal consistency of its vocabulary. In addition, according to the performance time of the test, it was (45) minutes. Table (1) illustrates the specification of the test of doctrinal concepts for first-grade secondary students.

Table 1. Specifications of the test of doctrinal concepts included in "Oneness of Divinity and Worship" Unit

No.	Doctrinal concepts	Recall	Understanding	Application	Analysis	Synthesis	Evaluation	No. of questions	Percentage
1.	Oneness of Divinity and Worship its importance	1	1	1	1	1	0	5	15.15
2.	Proving Oneness of Divinity and Worship and its conditions	1	2	1	0	0	1	5	15.15
3.	Worship	2	4	3	2	2	4	17	51.51
4.	Comprehensiveness of worship and its rules	1	1	1	0	1	2	6	18.18
	No. of questions	5	8	6	3	4	7	33	%100
	Percentage	15,15	24.24	18.18	9.09	12.12	21.21	%100	

A scale of Comprehensive monitoring skills

A scale of comprehension monitoring skills was based on the educational literature, Arabic and foreign academic studies, that dealt with the skills of monitoring comprehension and methods of measuring them. The scale included (30) statements that measure three main skills, namely: awareness of comprehension processes, self-monitoring, and self-evaluation. The scale statements were phrased in a way that reflect students' practice of comprehension monitoring skills while studying the doctrinal content. Responses to statements are in the form of a triple gradation (always, sometimes, and never). Positive statements take the scores (1, 2, 3) respectively, and negative statements take the opposite scores (1, 2, 3). The highest score that a student can obtain on the scale is (90), and the lowest score is (30). Then the scale was submitted to a group of jurors to ensure its A apparent validity. Some necessary modifications were made. Accordingly, the scale included - in its final form - (30) skills, shown in Table (2) as follows:

Table 2: Final form of the comprehension monitoring skills scale for first-grade secondary students

No.	Key skills	No. of statements	No. of statements on scale
1.	Awareness of comprehension processes	10	1-10
2.	Self-monitoring	10	11-20
3.	Self-evaluation	10	21-30
	Total	30	1-30

Preparing a teacher's guide in the light of the Instructional Model with Interactive Processes (4E X 2)

This guide aims to provide a set of teaching procedures, directions and instructions, for Islamic education teachers to use in developing the doctrinal concepts and skills of monitoring comprehension among first-grade secondary students, the Instructional Model with Interactive Processes (4E X 2). The guide included several elements, namely: an introduction to the guide, objectives, importance, the concept of the instructional model with interactive processes, the scientific basis for it, the relationship of the model to doctrinal concepts and monitoring skills, the model procedures, the role of the teacher and the learner in it, and the proposed time plan for teaching the oneness of divinity and worship, and the teaching procedures for *Tawheed* lessons for first-grade secondary students using the model. To ensure the validity and integrity of the preparation of the guide, it was presented to a group of jurors. The necessary modifications were made, and thus the teacher's guide - in its final form - became applicable.

Pre-application of research instruments:

The test of doctrinal concepts and the scale of comprehension monitoring skills were pre-applied to the experimental and control research groups. Table (4) shows pre- application results of research instruments.

Table 4. The value of "t" indicating the difference between the mean scores of the students of the two experimental groups and the control group students in the pre-test of doctrinal concepts, and the scale of comprehension monitoring skills

Variable	Group	No.	Mean	Standard deviation	df	t-test	Significance level
Doctrinal concepts	Experimental	33	8.24	2.45	65	0.649	Insignificant
	Control	34	7.82	2.81			
Comprehension monitoring skills	Experimental	33	45.12	12.22	65	0.292	Insignificant
	Control	34	44.35	9.14			

It is evident from Table (4) that the values of (t) are insignificant in light of the test of doctrinal concepts and the scale of comprehension monitoring skills. This indicates the two research groups are equivalent concerning the test of doctrinal concepts, and the scale of comprehension monitoring skills.

Teaching the two research groups:

The researcher interviewed the teacher of the experimental group class before starting teaching to show him the goal of the experiment and how to implement it according to the teacher's guide, especially unit of oneness of divinity and worship, using the Instructional Model with Interactive Processes (4E X 2). Then he began to implement the experiment, as it took four weeks, five lessons per week, the time of teaching the unit. As for the control group teacher, it was taught in the usual method, taking into account the equivalence of the teachers of the experimental and control groups in terms of qualification and teaching experience, as well as the equal length of time for teaching and the number of classes.

Post-application of research instruments:

After completing the teaching unit of oneness of divinity and worship for the students of the experimental and control groups, the research instruments were post- applied. The results of post-application were analyzed.

Research results, interpretation and discussion:

In light of the research problem and hypotheses, the results are present as follows:

First: The effectiveness of the Instructional Model with Interactive Processes (4E X 2) in developing doctrinal concepts among first-grade secondary students:

To answer the first research question: What is the effectiveness of the Instructional Model with Interactive Processes (4E X 2) in developing doctrinal concepts among first-grade secondary students ?The first hypothesis was tested: There is no statistically significant difference, at ($\alpha \leq 0.05$) level, between the mean scores of the experimental group students (studied using he Instructional Model with Interactive Processes (4E X 2)) and the control group (studied using the usual method) in the posttest of doctrinal concepts. To test the validity of this hypothesis, the mean scores of students of the experimental and control groups in the posttest of the doctrinal concepts, the significance of the difference between the two means, using t-test for the two independent groups, and the size of the effect were measured. Table (5) shows these results.

Table 5. The value of (t) and its statistical significance for the difference between the mean scores of the experimental and control group students in the posttest of doctrinal concepts, and the size of the effect

Variable	Control	No.	Mean	Standard deviation	df	t-value	Sig.	d- value Cohen's d
Knowledge	Experimental	33	4.182	.769	65	5.267	0.01	1.287
	Control	34	3.118	.880				
comprehension	Experimental	33	7.242	.792	65	5.777	0.01	1.412
	Control	34	5.559	1.481				
Application	Experimental	33	5.242	.708	65	6.909	0.01	1.688
	Control	34	4.059	.694				
Analysis	Experimental	33	2.364	.489	65	4.69	0.01	1.146
	Control	34	1.765	.554				
Synthesis	Experimental	33	2.727	.719	65	7.721	0.01	1.887
	Control	34	1.559	.504				
Evaluation	Experimental	33	4.970	1.045	65	4.721	0.01	1.154
	Control	34	3.588	1.328				
Doctrinal Concepts Test	Experimental	33	26.727	2.388	65	9.697	0.01	2.370

Table 5 shows that the values of "t" are statistically significant, at (0.01) level, indicating that there are statistically significant differences between the mean scores of students of the two groups experimental and the control group in the test of doctrinal concepts as a whole and different cognitive levels in favour of students of the experimental group. Then, the first null hypothesis is rejected .It is also clear from Table (5) that the size of the effect of using the Instructional Model with Interactive Processes (4E X 2) in the test of the doctrinal concepts as a whole, its different cognitive levels are large. The previous results generally indicate the effectiveness of the Instructional Model with Interactive Processes (4E X 2) in test of doctrinal concepts among first-grade secondary students. This may be due to the fact that the use of the Instructional Model with Interactive Processes (4E X 2) enhances the belief that formation of doctrinal concepts is an active part of the mental process, which is constantly working for communication, comprehension, and problem solving. It is a complex activity in which all basic mental processes are exercised (Wellings, 2003). It also allowed the learner to go beyond memorizing these concepts and reach a high level of thinking, and to adopt a mental model about the concept that he/she learned. This model can be tested this model by problem-solving and inquiry (Su et al., 2014). This can be attributed to the (4E X 2) model that supports the processes of

acquiring and using conceptual knowledge, and inquiry-based learning because it integrates three integrated educational constructs, namely: metacognitive thinking, educational inquiry models, and formative assessment. These constructs interact with each other to develop concepts (Jeff et al., 2008; Brickman et al., 2009)

This result is consistent with studies that have indicated the effectiveness of programs, strategies and models of teaching that promote the development of the doctrinal concepts and *Sharia* rulings among the students (Al- Oumi, 2020; Al- Shahrani, 2020; Al- Ghubawi, 2018; Al- Daoud, 2017). It also agrees with studies that have confirmed the efficacy of a (4E X 2) model in developing concepts, self-efficacy and literacy, and correcting misunderstanding concepts (Obaid et al., 2017; AL-Sheikh, 2013; Al- Khamisi, 2014; Jeff et al., 2011).

Additionally, this result can be interpreted in light of the (4E X 2) model. It allows the teacher to develop and implement deep and meaningful learning experiences based on inquiry, as the learner practices many basic processes, such as exploration, invention, discovery , explanation and clarification and evaluation ,and expansion that will make him/her engaged in the experience of inquiry learning, in addition to facilitating educational practices based on formative evaluation, and enhancing a deep understanding of concepts (Jeff, Horton and Smart 2008).

The outperformance of the experimental group students in each of the cognitive levels for learning concepts (remembering - comprehension - application - analysis - synthesis - evaluation) is attributed to adoption of the inquiry educational models component that allows the learner to ask questions about doctrinal concepts and verify them. Then one acquires knowledge at the level of remembering. Knowledge or concepts acquired through inquiry-based education are better in terms of learning and retention compared to traditional or direct education approaches, as well as providing the learner with opportunities for repeated chances to concepts, allowing one to scaffold the conceptual understanding until these concepts are incorporated into the long-term memory, and become more recallable (Blanchard et al., 2010; Lee & Shea 2016; Marshall, 2013; Magee & Flessner, 2012). The inquiry educational models component also enables the learner to develop a rich understanding of these concepts at the level of comprehension. The learner builds his own understanding, applies it to new situations at the level of application, analyzes their components at the level of analysis, formulates interpretations through evidence, connects interpretations with knowledge, at the level of synthesis, and transmits and justifies these interpretations through a corrective process. Hence, the Instructional Model with Interactive Processes (4E X 2) enhances inquiry as a dynamic process in which the learner is open to complex questions and situations. The learner seeks to know, understand, apply, analyze, construct and evaluate doctrinal concepts. It represents an important path for him/her to build and create conceptual knowledge, as it represents a path for the process of searching and discovering knowledge, building new understanding, moving in an orderly manner from one level of understanding to a higher level, and generating analyzes rich in details and insights about it. (Brickman et al., 2009; Fandino – Parra, 2011; Perez & Furman, 2016).

The outperformance of the students of the experimental group at each of the higher cognitive levels (analysis - structure - evaluation) can also be explained by the fact that the Instructional Model with Interactive Processes (4E X 2) contains the metacognitive reflection component, which is a high-level thinking process needed by the learner to analyze and solve doctrinal problems, adjusting learning activities, thinking of

ideas clearly, and understanding concepts, being aware of cognitive processes to synthesize ideas together to put them into a holistic form; (Schwartz & Perfect, 2002; Karaduman & Erbas, 2017; Aram & Wiyarsi, 2020). In this component, the learner is able to understand and control cognitive processes (White & Frederiksen, 2005), in addition to assessing the conceptual knowledge (Baker & Brown, 1984; Ma & Baranovich, 2015), actively learn and guide thinking (Young & Worrell, 2018). The existence of the metacognitive reflection component in the Instructional Model with Interactive Processes (4E X 2) helped the learner in conducting deep analyzes of the concepts being learned, and conducting some kind of reflective practices around them (Shepardson & Britsch, 2001). It also strengthened the practice of metacognitive processes when learning the doctrinal concepts to ensure that they are linked to them, and to know the benefit of all activities related to learning these concepts, as well as to make more effort when learning them and trying to apply them in new situations, bypassing the idea of learning and thinking about concepts at a concrete level (Al-Gaseemet al., 2020; Chevron, 2014; Veenman, 2006).

The outperformance of the experimental group students can also be attributed to the formative evaluation component, which allows the teacher to continuously evaluate the student's learning of doctrinal concepts and provide feedback on his learning process. The results of learning the concepts can be used to improve the learner's efficiency to reach high levels of mastery of these concepts (Cambridge University Press, 2019). This component allows the learner to ask questions about the concepts that are being learned, develop his/her ability to practice self-reflective judgment, evaluation and have the real desire to learn and practice independent learning (Revilla-Cuesta et al., 2020; BabinčAková, et al., 2020; Shewbridge et al., 2014; Barnett, 2007).

This result is also interpreted in light of the Instructional Model with Interactive Processes (4E X 2) that gives the teacher less space to focus less on students' acquisition of doctrinal knowledge, while giving more focus on the learner's understanding and use of this knowledge and the practice of inquiry processes. Based on this model, the teacher should change the main mechanism of education, and move from the negative transmission mechanism (the lecture) to the orientation mechanism in which the learner practices inquiry processes, using questioning strategies that allows the learner to participate in an open discussion process with his peers instead of only responding to closed-ended factual questions (Singer et al., 2011).

In addition, the outperformance of the students of the experimental group can be attributed to the fact that the Instructional Model with Interactive Processes (4E X 2) includes a stage of engagement, which increases the degree of the learner's attention, excites the motivation and desire to learn, invokes previous knowledge, as well as asking questions, using contradictory events to create the experience of imbalance requiring the learner to begin to develop his/her understanding of doctrinal concepts. It also includes the exploration stage in which the learner practices prediction, testing, generalization, synthesis, reasoning and interpretation, and thinking deeply about inquiry. It leads to the practice of metacognitive thinking in one's interactions with doctrinal issues and thought processes. It also includes the explanation stage, which allows him/her to build meaning, exchange and clarify information, doctrinal concepts, results, and evidence related to the subject of learning. In addition to the extension stage in which the learner applies his/her new knowledge in a meaningful way that helps him/her consolidate understanding the concepts he/she acquired, and develop mental representations, broaden ideas and concepts (Hake, 1998; Bransford et al., 2000; Wilson & Clarke, 2004; Stiggins, 2005; van Zee, Iwasyk et al., 2001).

Second: The Effectiveness of the Instructional Model with Interactive Processes (4E X 2) in developing comprehension monitoring skills among first-grade secondary students.

To answer the second research question: What is the effectiveness of the Instructional Model with Interactive Processes (4E X 2) in developing comprehension monitoring skills of first-grade secondary students? Test the second hypothesis: "There is no statistically significant difference, at ($\alpha \leq 0.05$) , between the mean scores of the experimental group students (who studied using the Instructional Model with Interactive Processes (4E X 2)) and the control group students (who studied using the usual method) in the post-scale of comprehension monitoring skills. To test the validity of this hypothesis, the mean scores of the students of the experimental and control groups were measured in the post-scale of comprehension monitoring skills, and the significance of the difference between the two means, using t-test for the two independent groups, and the size of the effect, "d". Table (6) shows these results.

Table 6. The value of (t) and its statistical significance for the difference between the mean scores of the experimental and control group students in the post-scale of comprehension monitoring skills (planning, self-monitoring, and self-evaluation), and the size of the effect

Variable	Group	No.	Mean	Standard deviation	df	t-value	Sig.	d- value Cohen's d
Awareness of comprehension processes	Experimental	33	22.789	3.060	65	2.836	0.006	.70
	Control	34	20.735	2.864				
Self-monitoring	Experimental	33	22.939	2.883	65	3.065	0.003	.80
	Control	34	20.824	2.769				
Self-evaluation	Experimental	33	23.333	2.642	65	3.384	0.001	.83
	Control	34	21.177	2.578				
Comprehension Monitoring skills	Experimental	33	69.061	8.485	65	3.146	0.002	.80
	Control	34	62.735	7.971				

The results in Table (6) indicate that the values of "t" are statistically significant at the level of (0.01). This indicates that there are statistically significant differences between the mean scores of the students of the experimental and control groups in the scale of comprehension monitoring skills (awareness of comprehension processes, self-monitoring, and self-evaluation) in favor of students of the experimental group. Then it is possible to reject the second null hypothesis of the research. It is also evident from Table (6) that the size of the effect of using the Instructional Model with Interactive Processes (4E X 2) in the scale of comprehension monitoring skills (awareness of comprehension processes, self-monitoring, and self-evaluation) is large. The previous results generally indicate the effectiveness of the Instructional Model with Interactive Processes (4E X 2) in the comprehension monitoring skills scale (awareness of understanding processes, self-monitoring, and self-evaluation) among first-grade secondary students. This may be due to the fact that the use of the Instructional Model with Interactive Processes (4E X 2) enhances the learner's monitoring comprehension in, understanding of the task requirements, identifying the most important aspects of the subject of learning, focusing attention on doctrinal concepts, monitoring the activities practiced to determine the extent of the occurrence of the understanding, being aware of the processes of comprehension, and engaging in a self-questioning process to verify the occurrence of the comprehension (Connor et al., 2015).

This can also be attributed by the fact that the (E x 24) model emphasizes that the monitoring comprehension is a process by which the individual feels responsible for thinking processes. These processes are automatic, including metacognitive awareness or what is known as the ability to think in thinking. This model includes one of the important educational components represented in metacognitive thinking that allows the learner to think about and evaluate understanding the learning material. It helps to employ strategies that help in awareness of goals

and planning processes, and the strategies used in understanding, and awareness of the knowledge used in understanding and awareness by analyzing and discussing the information contained in the learning subject (Kim & Phillips, 2016, 2014; Kim, 2016).

This result is also consistent with studies that emphasize the importance of developing comprehension monitoring skills. They play an effective role in developing metacognitive awareness of learning strategies, discovering errors and asking questions about the process of understanding, and employing a set of monitoring skills and strategies represented in determining meaning, questioning, reflection, summarizing, and searching for important information (Khonamri & Kojidi, 2011; Han, 2017).

Likewise, the outperformance of the students of the experimental group in comprehension monitoring skills can be attributed by the existence of the metacognitive thinking component as it is one of the components of the Instructional Model with Interactive Processes (4E X 2). It plays an important role in activating the thinking skills that the learner needs when thinking about ideas clearly and understanding concepts, awareness of comprehension processes, self-monitoring and self-control behavior, self-evaluation, strengthening awareness processes, controlling cognitive processes and organizing cognitive perception in terms of (planning, directing, testing, reviewing and evaluating strategies) (Ma & Baranovich, 2015; Karaduman & Erbas, 2017; Jia et al., 2019; Aram & Wiyarsi, 2020).

These results are interpreted in the light that the Instructional Model with Interactive Processes (4E X 2) consists of the engagement stage, in which the learner uses various techniques, such as brainstorming, graphic organizers, and asking questions that enhance metacognitive thinking responsible for reflective practice when learning, or when recalling prior knowledge, self-monitoring, and controlling the learning process.

It includes the exploration stage in which the learner practices metacognitive thinking, representing a basis for guiding the learning process through awareness of comprehension processes, studying the problem and reflecting on it, and identifying one's weaknesses during the discovery process. This happens by enhancing the processes of self-monitoring and self-evaluation so that the learner can identify and explain the point of confusion or weakness in one's learning process. During in the explanation stage, the skills of monitoring comprehension are strengthened by starting to construct meaning and determining whether previous knowledge and alternative concepts in the arousal stage coincides with what he reached in the discovery stage, or when clarifying the concepts and skills that have been understood, evaluating the quality and accuracy of interpretations, and confirming the results. During the extension stage, the learner exercises comprehension monitoring skills (comprehension monitoring processes, self-monitoring, self-evaluation). This is to determine whether development in understanding occurred, and that there was no loss in one's previous knowledge; to determine the extent of one's ability to develop mental representations, to identify one's weaknesses in the process of applying knowledge, and to determine the extent of one's ability to transfer new ideas and accuracy in generalizing experience (Hestenes et al.,, 1992; Hake 1998; Bransfordet al., 2000; Wilson & Clarke 2004; Stiggins, 2005). In general, this result can be interpreted in the light that the (4E x 2) model, through the metacognitive thinking component, enhanced the learner's knowledge of personal thinking processes, his/her ability to describe thinking, control, self-control, self-monitoring and follow up on all one's mental performance, and ability of self-evaluation of all his thoughts and beliefs.

Third: The relationship between the development of doctrinal concepts and the skills of monitoring comprehension among first-grade secondary students:

To answer the third research question: What is the nature of the relationship between the development of doctrinal concepts and comprehension monitoring skills among first-grade secondary students? The third hypothesis: "There is no significant correlation relationship, at ($\alpha \leq 0.05$) level, between the development of doctrinal concepts and comprehension monitoring skills among first-grade secondary students that differ according to the used teaching treatment

(the Instructional Model with Interactive Processes (4E X 2) and the usual method).

To test the validity of this hypothesis, correlation coefficients were calculated between the scores of students of the experimental and control groups in the test of doctrinal concepts, and their scores in the scale of comprehension monitoring skills. Table (7) shows these results.

Table 7. Correlation coefficients between the scores of students of the experimental and control groups in the test of doctrinal concepts and the scale of comprehension monitoring skills

Variables	Group	No.	Correlation coefficient	Significance level
Doctrinal concepts and comprehension monitoring skills	Experimental	33	0.414	0.017
	Control	34	0.235	0.188

It is evident from Table (7) that there is a statistically significant relationship between the comprehension monitoring skills and the development of doctrinal concepts among students of the experimental group (who studied using the Instructional Model with Interactive Processes (4E X 2)). There is a positive relationship that is not statistically significant between these variables among students of the control group. Hence, the third hypothesis can be rejected as «there is a statistically significant correlation relationship, at ($\alpha \leq 0.05$) level, between the development of comprehension monitoring skills and the development of doctrinal concepts among first-grade secondary students that differ according to the used teaching treatment (the Instructional Model with Interactive Processes (4E X 2) and the usual method).

The statistically significant and positive correlation among students of the experimental group confirms that their monitoring of understanding while studying doctrinal concepts is one of the important factors in developing doctrinal concepts. Comprehension monitoring skills are responsible for the occurrence of understanding processes in working memory (Connor et al., 2015; Han, 2017). The existence of a statistically significant and positive relationship between the dependent research variables (understanding doctrinal concepts and Comprehension monitoring skills) among the students of the experimental group underlies the strength of the independent variable, (4E x 2) model, which includes certain stages: engagement, exploration explanation and extension. Based on these stages, three integrated educational constructs interact, namely: metacognitive thinking, educational inquiry models, and formative assessment, enhancing the practice of a number of comprehension monitoring skills that develop concepts (Jeff et al., 2008).

This can be interpreted in the light that comprehension monitoring skills allow the learner to follow up with performance and monitor changes in it. The learner's access to conceptual knowledge can only occur or result through individual monitoring of the process of learning these concepts, and all internal processes associated with processing information and concepts at the deep level (Flavell, 1981). This result is consistent with what was indicated by Pillow and Anderson (2006) that comprehension monitoring provides the brain with a high level of arousal during the learning process. It provides it with strong insights while learning concepts, in addition to providing it with feedback on when cognitive processes occur and when they stop working. Pillow and Anderson (2006) also noted that comprehension monitoring enhances reflective monitoring that occurs during and after the concept learning process, helping the learner make judgment about knowledge and concepts retrieved from memory. This builds confidence in them, and promotes anticipated monitoring that takes place before beginning the concept learning process. It helps the learner make a judgment about the ease of learning concepts, the strategies to be used in addressing them, judgments about

their learning, and the predictions that appear during learning concepts and predictions.

It is also possible to explain the statistically significant relationship between the development of comprehension monitoring skills and the development of doctrinal concepts among students of the experimental group. Comprehension monitoring allows the learner to take corrective actions when discovering cases of failure in understanding concepts, and awareness of cognitive and metacognitive strategies that are directed towards building understanding of new concepts and linking them with knowledge, together with awareness of the effort expended towards understanding doctrinal concepts (Connor et al., 2015). This result is consistent with Agutu et al. (2019) that comprehension monitoring skills have positive effects on the learner's academic performance who suffers from difficulties reading texts and building comprehension. They can be used as an intervention strategy to correct comprehension deficiencies. This explains the weak relationship among students of the control group, which is due to lack of effective comprehension monitoring skills (Connor et al., 2015; Cain et al., 2004).

Research recommendations and suggestions

In light of the previous results, the researcher recommends the following:

1. The necessity for the planners and developers of *Tawheed* curriculum to pay attention to the constructive educational models such as the Instructional Model with Interactive Processes (4E X 2) to develop doctrinal concepts and enhance students' comprehension monitoring skills when building *Tawheed* curricula at the secondary level.
2. Directing the attention of Islamic education teachers and supervisors towards the importance of using the Instructional Model with Interactive Processes (4E X 2) in the formation of doctrinal concepts, and the development of various comprehension monitoring skills, such as awareness of understanding processes, self-monitoring, and self-evaluation, through conducting training courses.
3. Designing training programs for teachers and supervisors on how to use the Instructional Model with Interactive Processes (4E X 2) in teaching doctrinal concepts, and developing students' different comprehension monitoring skills.

The research also provides suggestions for conducting the following research in the field of teaching and learning *Tawheed*, including studying the effect of the Instructional Model with Interactive Processes (4E X 2) in developing conceptual understanding and solving doctrinal problems among students in different educational stages; studying the effectiveness of the doctrinal in developing doctrinal concepts, thinking tendencies, self-organization, and reflective thinking skills among students at different stages of education.

References

[1]. Afif, S. A. (2009). *Obstacles to teaching Islamic education subjects at the secondary level from the point of view of its supervisors and teachers in Makkah.* Unpublished Master Thesis, Department of Curricula and Teaching Methods, College of Education, Umm Al-Qura University: Makkah Al-Mukarramah.

[2]. Agutu, M. H., Gichohi, P., and Wamalwa, B. (2019). Effects of Comprehension Monitoring on Academic Performance of Primary School Pupils in Nakuru West Sub-County, Kenya. *International Journal of Academic Research in Business and Social Sciences*, 9(11), 284–312.

[3]. Al-Baydi, M. S. (2012). *The effectiveness of a proposed program in light of the objectives of Islamic law to develop doctrinal concepts and legislative provisions among secondary school students in the Republic of Yemen*. Unpublished PhD thesis, Curriculum and Instruction Department, Institute of Educational Studies, Cairo University: Cairo.

[4]. Al-Daoud, T. S. (2017). *The effect of using the guided imagination strategy on the*

achievement of nodal concepts among fourth grade students in Jordan. Unpublished MA Thesis, Curriculum and Instruction Department, College of Educational Sciences, Al-Bayt University: Mafraq.

[5]. Al-Gaseem, M. Bakkar, B. and AL –Zoubi, S. (2020). Metacognitive thinking skills among talented science education students. *Journal for the Education of Gifted Young Scientists*, 8(2), 897-904.

[6]. Al-Ghubawi, T. (2018). The effectiveness of the mental maps strategy in developing the doctrinal concepts of middle school students in the Kingdom of Saudi Arabia. *The Islamic University Journal for Educational and Psychological Studies*, 26 (2), pp. (214-243).

[7]. Al-Hamid, A. H. (2009). *The extent to which students of the first grade of secondary school have achieved the doctrinal concepts mentioned in the prescribed monotheism book.* Unpublished Master Thesis, Department of Education, College of Social Sciences, Imam Muhammad bin Saud University: Riyadh.

[8]. Al-Khamisi, M, A. (2014). The effectiveness of the 4EX2 model on self-efficacy, scientific enlightenment, and academic achievement among second-year middle school students in the science subject. Egyptian Journal of Scientific Education, 17 (3), 83-117.

[9]. AL- Kiam, H. I. (2010). *The effect of my metacognition and constructive learning strategies in acquiring doctrinal concepts and developing the skills of judgment and decision-making in the subject of Islamic sciences for high school students in Jordan.* Unpublished PhD thesis, College of Educational and Higher Psychological Studies, Amman Arab University for Postgraduate Studies: Amman.

[10]. Almqati, S. I. (2018). Obstacles to applying modern teaching strategies in teaching Sharia science courses at the secondary level to the curriculum system from the teachers 'point of view. Journal of Human and Administrative Sciences, Majmaah University, p. (13), p. (17-46).

[11]. Al-Oumi, S. F. (2020). *The effectiveness of the learning-for-use model in developing the concepts and skills of solving complex problems among secondary school students*. Unpublished Master Thesis, Department of Curricula and Teaching Methods, College of Education, Imam Abdul Rahman bin Faisal University: Dammam

[12]. Al-Radwan, A. (2003). The extent to which students of the higher basic stage have acquired the concepts of belief in Islamic education textbooks. Unpublished Master Thesis, Department of Curricula and Teaching Methods, College of Education, Yarmouk University: Irbid.

[13]. AL-Sadhan, G. A. (2006). *Methods and methods of teaching the Tajweed course at the primary level*. Unpublished Master Thesis, Department of Curricula and Teaching Methods, College of Education, King Saud University: Riyadh.

[14]. AL-Saudi, K. A. (2012). The degree to which the fourth-grade students acquire the basic concepts of the doctrines mentioned in the Islamic education textbooks for the first three grades in the Basira district. *Studies - Educational Sciences* - Jordan, Vol. (39), No. (2), pp. (451-467).

[15]. AL-Shahrani, M. (2020). *The effectiveness of the PQ4R strategy in developing nodal concepts among first intermediate students.* Unpublished MA Thesis, Department of Curricula and Teaching Methods, College of Education, University of Bisha: Bisha.

[16]. AL-Sheikh, H. A. (2013). The Effectiveness of 4EX2 Model on Self-Effectiveness and Academic Achievement of Commercial High School Students in Management, *Journal of Education* - College of Education, Al-Azhar University, 156 (5), 267 - 304.

[17]. Alves, P. (2014). Vygotsky and Piaget: Scientific concepts. *Psychology in Russia: State of the Art*, 7 (3), 24-34.

[18]. Aral, N. (2006). *Analysis of the effect of computer assisted teaching on the concept*

development in six-year-old children attending kindergarten (Project No: 2003-09-13-001). Ankara: Ankara University Scientific Research Projects.

[19]. Aram, M. and Wiyarsi, A. (2020). The student metacognitive skills and achievement in chemistry learning: correlation study. *Journal of Physics: Conference Series*. 1567 (2020), doi:10.1088/1742-6596/1567/4/042005.

[20]. Atkin, J., and Karplus, R. (1962). Discovery of invention?, *Science Teacher*, 29(5), 45–47.

[21]. Babinčáková, M., Ganajová, M., Sotáková, I., and Bernard, P. (2020). Influence of formative assessment classroom techniques (FACTs) on student's outcomes in chemistry at secondary school. *Journal of Baltic Science Education*, 19(1), 36-49. https://doi.org/10.33225/jbse/20.19.36

[22]. Baird, J. A., Andrich, D., Hopfenbeck, T. N., and Stobart, G. (2017). Assessment and learning: Fields apart? *Assessment in Education: Principles, Policy and Practice*, 24(3), 317-350. https://doi.org/10.1080/0969594X .2017.1319337.

[23]. Baker, L. and Brown, A. L. (1984). Metacognitive skills and reading. In P. D. Pearson, R. Barr, M. L. Kamil & P. Mosenthal (Eds.), *Handbook of reading research* (pp. 353–394). New York, NJ: Longman.

[24]. Bennett, R. E. (2011). Formative assessment: A critical review. *Assessment in Education: Principles, Policy & Practice*, 18(1), 5-25. https:// doi.org/10.1080/0969594X.2010.513678.

[25]. Brickman, P.; Gormally, C.; Armstrong, N. and Hallar, B. (2009). Effects of Inquiry Based Learning on Students Science Literacy Skills and confidence. *International Journal for The Scholarship of Teaching and learning* ,3(2), 252-263.

[26]. Black, P., & Wiliam, D. (1998). Assessment and classroom learning. *Assessment in Education*, 5(1), 7–74.

[27]. Black, P., & Wiliam, D. (2009). Developing the theory of formative assessment. Educational Assessment, Evaluation and Accountability. *Journal of Personnel Evaluation in Education*, 21(1), p 40. doi:10.1007/s11092-008-9068-5 Retrieved from http://dx.doi.org/10.1007/s11092-008-9068-5.

[28]. Blanchard, M. R., Southerland, S. A., Osborne, J., Sampson, V., Annetta, L. A., & Granger, E. (2010). Is inquiry possible in light of accountability? A quantitative comparison of the relative effectiveness of guided inquiry and verification laboratory instruction. *Science Education*, 94(4), 577-616.

[29]. Bransford, J. D., Brown, A. L., & Cocking, R. R. (2000). *How people learn: Brain, mind, experience, and school*. Washington, DC: National Academies Press.

[30]. Brown, A.L. (1987). Metacognition, executive control, self-regulated and other more mysterious mechanisms. In F.E. Weinert & R.H. Kluwe (Eds.), *Metacognition, motivation, and understanding* (pp.65 -116). Hillsdale, NJ: Lawrence Erlbaum Associates.

[31]. Bybee, R. W., Taylor, J. A., Gardner, A., Scotter, P. V., Powell, J. C., Westbrook, A., et al. (2006). *The BSCS 5E instructional model: Origins, effectiveness, and applications*. Colorado Springs: BSCS.

[32]. Cain, K., Oakhill, J., & Bryant, P. (2004). Children's reading comprehension ability: Concurrent prediction by working memory, verbal ability, and component skills. *Journal of Educational Psychology*, 96, 31–42.

[33]. Cambridge University Press. (2019). *Assessment. Cambridge advanced learner's dictionary & thesaurus website*: https://dictionary. cambridge.org/dictionary/english/assessment

[34]. Chevron, M.P. (2014). A metacognitive tool: Theoretical and operational analysis of

skills exercised In structured Concept Maps, Perspectives in Science, http://dx.doi.org/10.1016/j.pisc.2014.07.001.

[35]. Connor, C. M., Radach, R., Vorstius, C., Day, S. L., McLean, L., & Morrison, F. J. (2015). Individual differences in fifth graders' literacy and academic language predict comprehension monitoring development: An eye-movement study. *Scientific Studies of Reading*, 19(2), 114-134.

[36]. Ehrlich, M. (1996). Metacognitive monitoring in the processing of anaphoric devices in skilled and less-skilled comprehenders. In C. Cornoldi & J. Oakhill (Eds.), *Reading comprehension difficulties: Processes and remediation* (pp.221-249). Mahwah, NJ: Lawrence Erlbaum Associates.

[37]. Ehrlich, M., Remond, M., & Tardieu, H. (1999). Processing of anaphoric devices in young skilled and less skilled comprehenders: Differences in metacognitive monitoring. *Reading and Writing: An Interdisciplinary Journal*, 11, 29-63.

[38]. Eisenkraft, A. (2003). Expanding the 5E model: A proposed 7E model emphasizes ''transfer of learning'' and the importance of eliciting prior understanding. *The Science Teacher*, 70(6), 56–59.

[39]. Fandino–Parra, Y. (2011). English teacher training programs focused on reflection. *Educ.Educ*., 14 (2), 269-285.

[40]. Flavell, J. H. (1979). Metacognition and cognitive monitoring s new area of cognitive—developmental inquiry. *American Psychologist*, 34(10), 906–911.

[41]. Flavell, J.; Speer, J.; Green, F. and August, D. (1981). The Development of the Comprehension monitoring & Knowledge about Communication. *Research in Child Development*, 46 (5), 1-57.

[42]. Hake, R. (1998). Interactive-engagement versus traditional methods: A six-thousand-student survey of mechanics test data for introductory physics courses. *American Journal of Physics*, 66(1), 64–74.

[43]. Han, F. (2012). Comprehension monitoring in English reading as a foreign language. *New Zealand Studies in Applied Linguistics*, 18, 36-49.

[44]. Han, F. (2017). Comprehension Monitoring in Chinese Reading among Chinese Adolescent Readers. *Theory and Practice in Language Studies*, 7 (4), 241-247.

[45]. Han, F., & Stevenson, M. (2008). Comprehension monitoring in first and foreign language reading. *University of Sydney Papers* in TESOL, 3, 73-110.

[46]. Hestenes, D., Wells, M., & Swackhamer, G. (1992). Force concept inventory. *The Physics Teacher*, 30, 141–158.

[47]. Hindi, S. D. (2009). Methods of Teaching Islamic Education: "Theoretical foundations, models and practical applications." Amman: Dar Al-Fikr, Distributed Publishers.

[48]. Jeff. C., Horton, B. and Smart, J. (2008). 4EX2 Instruction Models Uniting Three Learning Constructs Improve Praxis in Science and Mathematics Classrooms, *Journal of Science Teacher Education*, DOI 10.1007/s10972-008-9114-7.

[49]. Jeff. C., Smart, J. and Horton, R. (2011). Tracking Perceived and Observed Growth of Inquiry Practice: A Formative Plan to Improve Professional Development Experiences. *Science Educator*, 20, (1), 12- 22

[50]. Jia, X.; Li, W., & Cao L. (2019). The role of metacognitive components in creative thinking. *Frontiers in Psychology*, 10, 1-11.

[51]. Karaduman, G., & Erbaş, A. (2017). Investigation of primary school teacher candidates' metacognitive awareness level. *Journal for the Education of Gifted Young Scientists*, 5(4), 31-48.

[52]. Kelada, F. S. (2004). *Fundamentals in Science Teaching*. Alexandria: University Knowledge Dar.

[53]. Khonamri, F. and Kojidi, E. (2011). Metacognitive Awareness and Comprehension

Monitoring in Reading Ability of Iranian EFL Learners. *PROFILE*, 13 (2), 99-111.

[54]. Kim, Y. and Phillips (2016). Five Minutes a Day to Improve Comprehension Monitoring in Oral Language Contexts: An Exploratory Intervention Study With Pre-kindergartners From Low-Income Families. *Top Lang Disorders*, October–December, 2016.

[55]. Kim, Y.; Vorstius, C. and Radach, R. (2018). Does Online Comprehension Monitoring Make a Unique Contribution to Reading Comprehension in Beginning Readers? Evidence from Eye Movements. *Sci Stud Read*. 2018; 22(5): 367–383. doi:10.1080/10888438.2018. 1457680.

[56]. Kim, Y.-S. G. (2016). Direct and mediated effects of language and cognitive skills on comprehension or oral narrative texts (listening comprehension) for children. *Journal of Experimental Child Psychology*, 141, 101–120.

[57]. Kim, Y. S. & Phillips, B. (2014). Cognitive correlates of listening comprehension. *Reading Research Quarterly*, 49, 269–281.

[58]. Koulianou, M. and Samartzi, S. (2018). Greek teachers' metacognitive awareness on reading strategies. *New Trends and Issues Proceedings on Humanities and Social Sciences*, 5 (1), pp. 68–74. Available Online at: www.prosoc.eu.

[59]. Lee, C. & Shea, M. (2016). An Analysis of Pre-service Elementary Teachers' Understanding of Inquiry-based Science Teaching. *Science Education International*, 27 (2), 219-237.

[60]. Louca, E. (2003). The concept and instruction of metacognition. *Teacher Development*, 7(1), 9-30.

[61]. Ma, A., & Baranovich, P. (2015). Promoting self-regulation in vocabulary learning among Chinese EFL learners. *A needs Analysis*, 24(1), 137–146.

[62]. Magee, P., & Flessner, R. (2012). Collaborating to improve inquiry-based teaching in elementary science and mathematics methods courses. *Science Education International*, 23(4), 353-365.

[63]. National Research Council. (2000). *Inquiry and the national science education standards: A guide for teaching and learning*. Washington, DC: National Academy Press.

[64]. Oakhill, J. V., Hartt, J., & Samols, D. (2005). Levels of comprehension monitoring and working memory in good and poor comprehenders. *Reading and Writing: An Interdisciplinary Journal*, 18, 657-686.

[65]. Oakhill, J. V., Hartt, J., & Samols, D. (2005). Levels of comprehension monitoring and working memory in good and poor comprehenders. *Reading and Writing: An Interdisciplinary Journal*, 18, 657-686.

[66]. Obaid, K. K. and Muhammad, A. K. and Hussein, A. L. (2017). The effect of the 4EX2 paradigm in modifying the misunderstanding of chemical concepts of third-grade intermediate students. *Journal of Educational and Psychological Research*, Issue (54), 600-623.

[67]. Ortega, B. V. (2001). A study of the impact of responsible thinking processes in an elementary school. *Humanities & Social Science*, 61(10-A), 3891.

[68]. Ostergaard, E.; Hugo, A. and Dahlin, B. (2007). From phenomenon to concept: Designing phenomenological science education. In: V. Lamanauskas & G. Vaidogas. *Proceedings of the 6th IOSTE Symposium for Central and Eastern Europe*, pp.123-129.

[69]. Perez, M. and Furman, M. (2016). What is a scientific experiment? The impact of a professional development course on teachers' ability to design an inquiry-based science curriculum. *International Journal of Environmental & Science Education*, 11(6), 1387-1401.

[70]. Phakiti, A. (2003). A closer look at the relationship between cognitive and metacognitive strategy use to EFL reading achievement test performance. *Language Testing*, 20, 20-56.

[71]. Phakiti, A. (2006). Theoretical and pedagogical issues in ESL/ EFL teaching of strategic reading. *University of Sydney Papers in TESOL*, 1, 19-50.

[72]. Pillow, B. H., Anderson, K. L, (2006). Children's awareness of their own certainty and guessing. *British Journal of Development Psychology*, 24, 823-649.

[73]. Revilla-Cuesta, V.; Skaf, M.; Manso, J. and Ortega-López, V. (2020). Student Perceptions of Formative Assessment and Cooperative Work on a Technical Engineering Course. *Sustainability*, 12, 4569; doi:10.3390/su12114569.

[74]. Sabr, A. A. (2018). The effect of the flipped learning strategy on the development of nodal concepts in the monotheism subject for the third intermediate grade students. *International Journal of Arts, Humanities and Social Sciences*, Vol. (8), pp (39-91).

[75]. Schwartz, B., and Perfect, T. (2002). Introduction: Toward an applied metacognition. In T. J. Perfect & B. L. Schwartz (Eds.), *Applied metacognition* (pp. 1-14). Cambridge, UK: Cambridge University Press.

[76]. Scriven, M. (1967). *The methodology of evaluation*. Washington, DC, USA: American Educational Research Association.

[77]. Shepardson, D. P., & Britsch, S. J. (2001). The role of children's journals in elementary school science activities. *Journal of Research in Science Teaching*, 38(1), 43–69.

[78]. Shewbridge, C., Van Bruggen, J., Nusche, D., and Wright, P. (2014). OECD reviews of evaluation and assessment in education Slovak Republic. *OECD Publishing*. https://doi.org/10.1787/9789264117044-en.

[79]. Singer, J.; Lotter, C.; Feller, R. and Gates, H. (2011). Exploring a Model of Situated Professional Development: Impact on Classroom Practice. *Journal of Science Teacher Education*, 22:203–227. DOI 10.1007/s10972-011-9229-0

[80]. Siweya, H. J., & Letsoalo, P. (2014). Formative assessment by first-year chemistry students as predictor of success in summative assessment at a South African university. *Chemistry Education Research and Practice*, 15(4), 541-549. https://doi.org/10.1039/c4rp00032c

[81]. Stiggins, R. (2005). From formative assessment to assessment FOR learning: A path to success in standards-based schools. *Phi Delta Kappan*, 87(4), 324–328.

[82]. Su, T., Cheng, M. T., and Lin, S. H. (2014). Investigating the effectiveness of an educational card game for learning how human immunology is regulated. *CBE-Life Sciences Education*, 13(3), 504-515.

[83]. Tolba, E. G. (2013). The effectiveness of using the modified structural learning cycle model in acquiring scientific concepts, solving various types of physical problems, and developing thinking tendencies among first-grade secondary students. *The Educational Journal*, Academic Publication Council, Kuwait University, 12 (108), 385-438.

[84]. Farag, M. A., & Tantawi, M. A. (2011). *Islamic religious concepts and foundations of their formation*. Khwarazm Scientific Publishers and Libraries: Jeddah.

[85]. Van Zee, E. H., Iwasyk, M., Kurose, A., Simpson, D., & Wild, J. (2001). Student and teacher questioning during conversations about science. *Journal of Research in Science Teaching*, 38(2), 159–190.

[86]. Veenman, M., Van Hout-Wolters, B., Afflerbach, P., (2006). Metacognition in learning: Conceptual and methodological considerations. *Metacognition Learning*, 1, 3-14.

[87]. Vygotsky, L. (1962) *Thought and Language Cambridge*, Mass.: MIT Press.

[88]. Wellings, P. (2003). School Learning versus Life Learning: the interaction of spontaneous and scientific concepts in the development of higher mental processes. Retrieved from *http:// Idt.stanford.edu/paulaw/STANFORD/ 370x-paula_wellings_final_paper. Pdf.*

[89]. Wells, G. (1994). Learning and teaching "Scientific Concepts" Vygotsky's ideas revisited. This paper was presented at the Conference," Vygotsky and the Human Sciences," *Moscow*, Sept.1994. 1-22.

[90]. White, B. Y., & Frederiksen, J. R. (2005). A theoretical framework and approach for fostering metacognitive development. *Educational Psychologist*, 40(4), 211–223.

[91]. Wilson, J., & Clarke, D. (2004). Towards the modelling of mathematical metacognition. *Mathematics Education Research Journal*, 16(2), 25–48.

[92]. Yang, Y. (2002): Reassessing Readers' comprehension monitoring. *Reading In foreign*, 14(1), 18 -42.

[93]. Yang, Y. (2006). Reading strategies or comprehension monitoring strategies? *Reading Psychology*, 27,313-343.

[94]. Young, A., & Worrell, F. (2018). Comparing metacognition assessments of mathematics in academically talented students. *Gifted Child Quarterly*, 62(3), 259–275.

[95]. Yu-Fen, Y. (2006) Reading Strategies or Comprehension Monitoring Strategies? *Reading Psychology*, 27:4, 313-343, DOI: 10.1080/02702710600846852.

[96]. Zinar, S. (2000). The relative contributions of word identification skill and comprehension-monitoring behaviour to reading comprehension ability. *Contemporary Educational Psychology*, 25, 363-377.

[97]. Zipke, M. (2007). *Metalinguisitc Instruction improves third graders' reading comprehension*. Unpublished doctoral dissertation, The City University of New York.