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EVALUATING THE EFFICACY OF AN ARABIC METALINGUISTIC AWARENESS TRAINING PROGRAM

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Abstract:
Recently both academics and professional standards have demonstrated the essential role teachers' knowledge about metalinguistic awareness plays in pupils' literacy achievement. This study aimed to explore whether an intensive training program in Arabic metalinguistic awareness increases teachers' knowledge and improves their performance. Changes from pre-test to post-test knowledge and reporting confidence of 25 trainees were investigated. Participants showed significant gains in their knowledge and skills of Arabic metalinguistic awareness upon post-test. In addition, participants reported higher confidence in teaching Arabic metalinguistics after attending the course. Findings from this research bring recommendations toward developing Arabic metalinguistic awareness-related approaches for educators. The importance of professional development is discussed.

Keywords: Arabic metalinguistic awareness, professional development, explicit knowledge, online teaching

1. Introduction

The ability to accurately and fluently read is fundamental in today's world; it's an essential skill to develop at a young age, not just for a child's development and intellectual maturation but also for success in school, the workplace, and current society (Garcia-Herrera et al., 2018; Hasenäcker et al., 2020). According to the reading system framework by Perfetti and Stafura (2014), reading comprehension involves two interacting abilities: word decoding and language comprehension. Both of these abilities are underpinned by shared or direct effects of a person's ability to consciously reflect on

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and manipulate the structure and function of language, also known as metalinguistic awareness (McGhee-Bidlack, 1991). The reading system framework states that metalinguistic awareness contributes to reading development via three separate processes.

1) Phonological awareness: the ability to explicitly and consciously interpret and manipulate spoken sounds (Ehri et al., 2001; Goswami, 1990).
2) Morphological awareness: the awareness of, and the ability to reflect on, and manipulate, the smallest meaningful units (morphemes) in spoken language (Deacon & Kirby, 2004; Law & Ghesquiere, 2017).
3) Orthographical knowledge: understanding the writing system of a language, letter patterns, and word structure (Apel et al., 2012; Cain, 2007; Conrad et al., 2013; Seymour et al., 2003).

Research across various alphabetic languages, such as Arabic and English, has supported the role of these metalinguistic variables as vital predictors of reading achievement and students' reading development independent of nonverbal skill, word reading skill, and vocabulary (Carlisle, 2003; Ehri et al., 2001; Foorman et al., 2012; Florit & Cain, 2011; Goswami, 1990, 2005; Kirby et al., 2012; Nagy et al., 2006; Roman et al., 2009; Snowling, 2006; Tibi & Kirby, 2018). For instance, in Arabic, metalinguistic skills have been found to explain a significant proportion of reading comprehension outcomes. For example, among typically developing Arabic readers from 1-6th grades, Asadi et al. (2017) found a significant contribution between morphological awareness of orthographic knowledge and reading comprehension across age groups. In addition, Vaknin-Nusbaum and Saiegh-Haddad's (2020) longitudinal study of second-grade children found that morphological knowledge significantly predicted progress in reading skills of Arabic-speaking children over the course of the year. Moreover, in a study of 3rd grade Arabic-speaking children, Tibi and Kirby (2018) reported phonological awareness, as assessed through phoneme tasks including phoneme deletion and sounds blending, to be a significant predictor of reading comprehension.

As predicted by the reading system framework (Perfetti & Stafura, 2014), intervention studies focusing on the systematic and explicit instruction of metalinguistic awareness skills have frequently demonstrated improved early decoding and reading comprehension attainment and reduced reading failure among children at risk of reading failure (Bos et al., 1999; Carlisle et al., 2011; Mather et al., 2001; Moats & Foorman, 2003; Podhajski et al., 2009; Snow et al., 2005; Washburn & Mulcahy, 2019). Compared with unsystematic or implicit forms of instruction, where children acquire knowledge naturally or learn through self-exploration without conscious operations (Ellis, 1994), explicit teaching of metalinguistics has been found to support better gains in reading outcomes consistently (phonics instruction: Carlisle et al., 2011; Podhajski et al., 2009; morphological awareness instruction: Carlisle, 2003; Tong et al., 2011; Wolter & Dilworth, 2014; and orthographic awareness instruction: Florit & Cain, 2011; Goswami, 2005). For instance, in an 8-week intervention study of kindergarten, first and second grade (n = 75) English-speaking children, Apel and Diehm (2014) explored whether an increased explicit morphological awareness would enhance morphological knowledge and reading

ability among students from low socioeconomic status. Students explicitly taught and engaged in morphological awareness tasks focused on increasing affixation knowledge (i.e., affixation is a morphological process in which a bound morpheme is linked to a morphological base). Apel and Diehm found that the children benefited from explicit instruction in morphological awareness, as learners could recognise and comprehend the meaning of new words by manipulating morphemic units. Further support for the benefit of explicit metalinguistic teaching was provided by Singson et al. (2000), who reported a similar finding of the benefit of explicit morphological instruction's positive contribution to word decoding among upper elementary grades from third to sixth. In addition, Berninger et al. (2010) reported that students in grades 1 to 6 who received explicit morphological awareness instructions had improved their reading comprehension abilities and spelling of morphologically complex words.

Similar findings have been reported for the explicit instruction of phonological and orthographical skills. Makhoul (2017) investigated the role of phonological awareness training in Arabic reading acquisition among first-grade typical readers (n = 181) and students at risk of developing reading failure (n = 25) due to low socioeconomic status. The study concluded that both groups reported enhanced post-test scores in phonological tasks and word reading skills after explicit phonological training. While in a longitudinal study conducted by Manis et al. (1993), children with reading difficulties between the ages of nine and fifteen (n = 21) received orthographical and phonological explicit instructions. Their findings showed that once phonological and orthographical awareness was improved, students' word recognition and spelling also improved. Similarly, Berninger et al. (2000) reported that typical readers at the first-grade level (n = 128) had improved their post-test scores in word reading tasks after an orthographical instruction.

Although the explicit teaching of metalinguistics has been shown to be beneficial in supporting children's reading development, not all school curriculums reflect this. For instance, in Saudi Arabia, the literacy instruction curriculum generally lacks a focus on the broad range of metalinguistic skills while instead placing a greater focus on a single variable such as orthographic skills (Al Ghanem & Kearns, 2015; Al-Jarf, 2007), limiting students' awareness of phonology and morphology and potentially impacting students' reading achievement. The Saudi curriculum makes no reference to morphological instruction until fourth grade, when a separate textbook of grammar is used, the grammar curriculum treats morphological awareness instruction as a function of vocabulary instruction and offers no explicit instruction for morphology in relation to reading skills (Al-Jarf, 2007).

Given the demonstrated importance of metalinguistic knowledge to literacy achievement in the Arabic language (Al Ghanem & Kearns, 2015; Mahfoudhi et al., 2010; Tibi et al., 2020; for a review see Bin Sawad & Law, 2022), the limitation of the Saudi literacy curriculum may be one contributing factor in explaining the poor performance of Saudi Arabian students on the 2011 and 2016 Progress in International Reading Literacy Study (PIRLS), where they scored below the average, ranking forty-four on a list of fifty countries (Mullis et al., 2017). This poor performance was additionally noted in the

2018 reading assessment portion of the Program for International Assessment (PISA) as Saudi Arabian 15 year olds were found to average a score of 399 in reading, compared to the global average of 489 (PISA, 2018). In contrast, the United Kingdom, which includes England, whose curriculum offers a more balanced focus on explicit metalinguistics instruction, reported slightly above average scores in reading: 504 (PISA, 2018).

Although a curriculum focused on the development of phonological awareness, morphological awareness, and orthographic knowledge skills among early readers could be beneficial, the success of its delivery is dependent on the skills and knowledge of teachers as they are the facilitators and mediators between pupils and the learned materials. Effective literacy instruction requires teachers must be familiar with the fundamentals of literacy and language and understand how to explicitly apply that knowledge (Grossman, 1992; Mathes et al., 2005; McCutchen et al., 2002; Moats, 2009; Shulman, 1987; Swerling & Zibulsky, 2014). Sanders et al. (1993) referred to this necessary explicit knowledge as content knowledge. According to Shulman (1987), content knowledge represents the subject-specific material to be taught the "what" and the "how," allowing students to become actively conscious of their learning by comprehending how to complete a task, and what is the expected outcome (Torgesen, 2004). For example, explicitly teaching the prefix '*un-*' meaning '*not*' can help students figure out the meaning of the *unstated* word. A corresponding example in the Arabic language could be explicitly teaching the suffix '*-ان*' meaning 'two' can support readers in discovering the meaning of the word '*كوبان*' (Saiegh-Haddad, 2013). Furthermore, it has been argued that greater metalinguistic knowledge not only makes it easier for teachers to explicitly teach these skills but it additionally helps teachers identify and respond to students' specific reading difficulties and errors (Schmitterer & Brod, 2021; Titley et al., 2014; Zipke, 2021) as well as increases confidence and literacy teaching self-efficacy (Bos et al., 1999; Carlisle et al., 2011; Fielding-Barnsley & Purdie, 2005; Moats & Foorman, 2003, 2004; McCutchen et al., 2002).

For instance, Carlisle et al. (2011) examined the influence of teachers' knowledge of language-related concepts on students' reading growth among first to third-graders. Carlisle and colleagues found that students who took classes taught by instructors who have a deep understanding of metalinguistics performed better on reading comprehension tasks. Similarly, McCutchen et al. (2002) reported that an intensive professional development course focused on the development of teachers' phonological and orthographical awareness knowledge development and its application in a classroom setting resulted in a positive impact on students' conscious manipulation of written words. These studies, along with others (Clark et al., 2017; Piasta et al., 2009), have demonstrated the importance of teachers' metalinguistics knowledge on students' literacy outcomes. According to the Peter Effect principle, teachers cannot give what they do not have (Applegate & Applegate, 2004). Therefore, teachers who do not possess sufficient knowledge about language constructs may not be able to adequately deliver the explicit instruction required to support students' literacy development or address and identify particular literacy needs.

However, teachers are often found to lack explicit metalinguistic knowledge while possessing implicit abilities (e.g., identifying syntactic errors), potentially limiting their ability to explicitly teach and support students' reading achievement (Arrow et al., 2019; Binks-Cantrell et al., 2012; Bos et al., 2001; Fielding-Barnsley & Purdie, 2005; Goldfeld et al., 2020; Mather et al., 2001; Moats & Foorman, 2003; Spear-Swerling & Brucker 2004; Washburn et al., 2011). For instance, Bos et al. (2001) examined the explicit and implicit abilities of metalinguistic knowledge and reading-related concepts of 538 pre-service and in-service teachers. They concluded that teachers could not answer half of the questions correctly, and almost two-thirds lacked basic explicit knowledge. Similarly, in a recent study of 221 Saudi Arabian teachers, Bin Sawad & Law (2022) found that, on average, teachers struggled to correctly answer one-half of the explicit metalinguistic knowledge items presented, where the average teacher participant could only properly answer 11 of the 28 questions.

To address this knowledge gap, some studies have reported the positive benefit of professional development programmes focused on developing metalinguistic knowledge among teachers and its downstream benefit on students. For example, Hurry et al. (2005) conducted a study investigating teachers' change of practice after attending a professional development course focused on morphological awareness. Findings indicated that participating teachers changed their teaching practices to become more morphology focused and student-centred, which helped improve students' reading performance. Similarly, a study by Podhajski et al. (2009) demonstrated that teachers who participated in a professional development program concerning language structure and function were better equipped to assist their pupils' decoding ability. Podhajski et al. (2009) noted that increased knowledge of teachers was found to transfer to students through enhancing their phonological awareness and ability to map sounds to their corresponding letters, thus, supporting growth in students' decoding abilities (also see, Fielding-Barnsley & Purdie, 2005; Joshi et al., 2009). Therefore, it is crucial to increase metalinguistic knowledge among educators in order to enhance their competence in assessing students' performance, identify specific areas of reading deficiency, and explicitly address individual learning needs.

Scholars have recognised the prominent role of increasing explicit metalinguistic knowledge among educators in improving students' reading (e.g., Ehri et al., 2001; Panel (US) et al., 2000)). However, teacher preparation programs in Saudi Arabia follow the national curriculum standards, focusing on orthographic skills alone, with no requirement for educators to show or obtain explicit knowledge of Arabic language concepts, including phonology and morphology (Al Ghanem & Kearns, 2015; Alqahtani, 2020; Taibah & Haynes, 2011). As a result, Saudi primary teachers often lack explicit knowledge and skills related to these concepts (Bin Sawad & Law, 2022).

Although the training referenced above has been delivered in face-to-face sessions, online learning could be a potential low-cost training medium that may offer a means of addressing the training needs of a larger and more remote population, such as teachers in Saudi Arabia.

2. Online Professional Development

Not everyone in the educational field completely agrees with adopting the online delivery method. Many educational scholars have argued that those who have little or no experience with online courses may suffer anxiety and worry while considering the choice of online learning (Dunst & Raab, 2010). In addition, participants could face problems with technical impairments such as opening a link or submitting a task. Someone who is new to online learning might not know what to anticipate or might have previously used an online learning tool that was poorly designed. A bad learning experience could be worse than having none at all (Dunst & Raab, 2010). However, online learning presents an excellent alternative potential for face-to-face professional development (Cornelius & Macdonald, 2008). In a quantitative quasi-experimental study, Coughlin and Kajder discovered that pupils of teachers who took part in online professional development with a significant collaborative component showed a 72% improvement in academic performance. The study's control group only demonstrated a 5% increase in achievement (Coughlin & Kajder, 2009).

To optimise student learning, any framework for effective professional development should be standards-driven and meet to the requirements of the instructors. Professional development that is effective should be ongoing, constructed with resources that are available and relevant, and correctly implemented for the best outcomes. It should also be interactive, collaborative, and interest-driven (Elliott, 2017). To ensure that teachers learn the most and that standards are being met, instructional leaders must create or choose professional development programmes that have the characteristics of effective professional development (Darling-Hammond et al., 2009; Lutrick & Szabo, 2012).

It is essential to create an online professional development that is directly tied to district needs and job-embedded (Education Act, 2011). However, there might not always be a choice for personalised online professional growth. In any case, instructional leaders should create online professional development from scratch as opposed to converting an already-existing face-to-face programme to an electronic one (Gagne et al., 2005).

Based on this past work it is evident that offering low-threshold, easily reachable, timely metalinguistic knowledge, and skills training to current and future teachers could be beneficial in many ways, ultimately supporting the literacy attainment of their students. Although only one of the 20 successful professional metalinguistic training studies reviewed by Hudson et al. (2021) was delivered online (Gormley & Ruhl, 2007), the potential effectiveness of an online learning metalinguistic professional development course remains high. Gormley & Ruhl (2007) found that professional online learning produces similar positive gains as traditional face-to-face delivery. Furthermore, during the past decade, there has been a steady growth in online courses across numerous themes and topics (Elliott, 2017), in which online learning has become the norm in adult higher education and professional development (Elliott, 2017; Galimullina et al., 2020; Lindgren & McDaniel, 2012). Studies evaluating the effectiveness of online professional development for teachers have demonstrated this method to deliver low-cost, high-

quality, and accessible training to teachers, mainly those in geographically remote areas (Bragg et al., 2021; Dede, 2006; Zhao et al., 2005). Furthermore, Means et al. (2009) meta-analysis of 51 studies reveals that online learning has success rates that are at least as good as or possibly even better than traditional learning (i.e., face-to-face).

Online learning allows for a more personalised learning experience (Şendağ & Ferhan Odabaşı, 2009) which allows participants to take advantage of internet surfing and engage in collaboration and information sharing from far and near distances, discussing topics of interest, asking questions, addressing concerns in a 24/7 mode (Bubb & Earley, 2007). As a result, several studies have reported that online learning encourages better critical thinking abilities (Şendağ & Ferhan Odabaşı, 2009), provides better cost and time effectiveness (Elliott, 2017; Franck & Langenkamp, 2000; Masys, 2002), improved accessibility and flexibility (Cabello-Hutt et al., 2018; Masys, 2002; McDaniel et al., 1998; Thede et al., 1994), and consistently (Benson, 2004; Doğan & Adams, 2018; Rouse, 1999; Thede et al., 1994).

Furthermore, online professional development programs have been found to help reduce costs for both educational districts and states (Dede, 2006). Such programs eliminate the imposition of costs rising from educators travelling from or to the place that provides face-to-face or traditional training delivery (Elliott, 2017). Moreover, when teachers take professional training online, this spares the administrator the burden and the cost of finding a substitute (Howard & McGrath, 1995).

Online professional development for educators may also offer a path of increasing participation as time constraints frequently hinder teachers' ability to undertake meaningful professional development outside of what administrators include in the school timetable (Darling-Hammond & Snyder, 2000).

Studies evaluating the effectiveness of online learning have identified several variables and design principles that have been found to produce a direct and indirect impact on the success of the training delivered. As a result, specific models and frameworks of successful online professional development delivery and design have been proposed, such as the Community of Inquiry (CoI) framework, which was used to govern the design of the training offered in this study.

3. Rational of this Study

Research on the English language has revealed that teachers who learn more about metalinguistics are better able to recognise and help beginning readers and struggling readers as well as clearly teach language principles to children; however, nothing is known about this effect in the Arabic language. It is difficult to directly use metalinguistic awareness training programmes from studies of English and other European languages in an Arabic setting since Arabic is a Semitic language with different metalinguistic features. For instance, due to the prevalence of derivational morphology and the usage of diacritics in Arabic spelling, it is crucial to understand and be able to precisely measure the influence of metalinguistic awareness training programs among Arabic-speaking teachers. For this study, data will be used from Saudi Arabia, a country with a population

of approximately 31 million, of which 8 million are teachers (OECD, 2019). As much of the literacy instruction offered in Saudi Arabia is focused on orthographic skills alone (Al Ghanem & Kearns, 2015); a recent study by Bin Sawad & Law (2022) has reported that aspects and knowledge such as phonological awareness and morphological awareness are not well developed among educators in Saudi Arabia, therefore potentially impacting students reading attainment.

As discussed above, gaps in metalinguistic knowledge lessen teachers' ability to explicitly teach language concepts to children and identify and support struggling readers. To address this gap in knowledge and skill, this current study will determine the effectiveness and feasibility of an online Arabic metalinguistic awareness training programme. Piloting this designed program will evaluate the developed training course and assess its impact on teachers' performance using results from a validated post-test assessment.

The course aims to give educators a chance to gain knowledge and confidence in the theoretical aspects of reading comprehension and language development, incorporating Arabic metalinguistics as a correlated variable. The course also introduces classroom activities by which explicit teaching is acquired. The present study will provide significant insights into the influence of online metalinguistic training on teachers' growth knowledge and skills and offer a model of a cost-effective and flexible approach to addressing the identified knowledge gap among Saudi teachers. This study will document and provide examples of teachers' performance prior to and after attending the metalinguistic awareness training. And the implication of such training will be discussed in the Saudi context.

4. Methodology

This study will apply a quasi-experimental pre-test and post-test design. Pre-test and post-test study designs involve assessing a dependent variable (teachers' knowledge and skills) before and after an intervention with an independent variable (online professional training). Although this seems to be similar to the standard experimental design, the quasi-experimental design is actually a correlation (non-experimental) design since, most of the time, participants in the study are not chosen at random (Edmonds & Kennedy, 2017). Because of the lack of a true experimental design, result causality cannot be established in quasi-experimental research; instead, linkages between interventions and outcomes are developed (Stratton, 2019).

Pre-test and post-test research techniques have been employed in various disciplines, including education, health, mental health, and medicine-nursing, since the 18th century (Stratton & Tan, 2019). Because it is a quick and practical way to evaluate a target population to which an intervention has been implemented, the method has continued in common usage. Pre-test/post-test studies are widely available in the literature, allowing for comparisons between them and meta-analyses of earlier studies of this kind (Jackson et al., 2013; Neuman & Cunningham, 2009; Orafi & Borg, 2009; Vaisman & Kahn-Horwitz, 2020). Also, pre-and post-test evaluation permits quick

evaluation of an intervention and offers a way to improve the instructor's teaching approach. In addition to being a practical research technique, pre-test, and post-test design enables statistical analysis of data using recognised statistical techniques (Stratton, 2019).

A potential drawback of the pre-test and post-test design is that a pre-test will probably increase their awareness of the test itself and tell them of the limited information needed to do better on a post-test. Pre-testing also enables participants to familiarise themselves with terms, which makes it easier to take a post-test and achieve higher results. However, using a quasi-experimental pre-test and post-test methodology will provide quick and useful means to evaluate the developed online training programme and produce a flexible and affordable option to solve the discovered knowledge gap among Saudi teachers.

This research study primarily wants to answer the following research question, *what impact does short-duration, intensive, online, explicit professional development training of Arabic metalinguistic awareness have on the knowledge, confidence, and skills of educators in Saudi Arabia?* using a quasi-experimental pre-test and post-test design in which measurements are taken on participants both before and after they are involved in training. Quasi-experimental research follows basic steps, 1) administering a pre-test; 2) administering an intervention, 3) administering a post-test, and 4) analysing the difference between the pre-test and the post-test scores (Edmonds & Kennedy, 2017). If pre-test scores were lower than post-test scores, a researcher could assume that the implemented training was successful. The later design tool can also evaluate participants' perceptions and comfort levels in applying the learned materials (Stratton & Tan, 2019). Based on research, it can be presumed that the increased knowledge would increase performance and perceived confidence (Dickinson & Caswell, 2007; Jackson et al., 2013; Neuman & Cunningham, 2009; Orafi & Borg, 2009; Vaisman & Kahn-Horwitz, 2020; Wasik et al., 2006). The primary goal of the suggested online Arabic metalinguistic awareness professional development course is to help teachers gain the necessary knowledge for providing explicit classroom instructions.

4.1 Community of Inquiry (CoI) Model

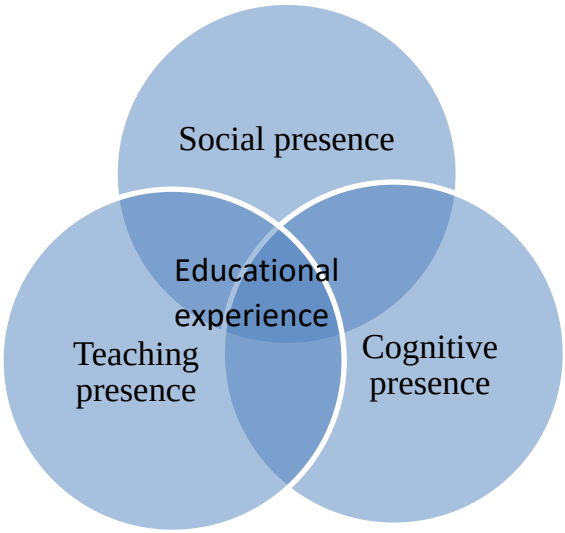
The Community of Inquiry (CoI) framework developed by (Garrison et al., 2000) was used to inform the design and development of our online Arabic metalinguistic awareness professional development course. This model provides a "*process for creating a deep and meaningful (collaborative-constructivist) learning experience*" (Mehta et al., 2016, p.412). Researchers have adopted the CoI framework and reported it as a valid, reliable, and efficient framework used as a paradigm for designing effective online learning settings (Arbaugh et al., 2008; Garrison et al., 2010).

The CoI model defines the behaviours and processes required to enable knowledge generation in asynchronous online contexts through the establishment of various forms of "presence" (Garrison et al., 2010). The CoI framework presents three main effective elements that are required for the production of an effective educational experience (Figure 4.1), which were all features of the training offered in this study:

1) Social presence: identified as participants' interactions. This learning experience does not always occur naturally in an online learning setting (Richardson et al., 2016). Therefore, it is vital to construct a community of learners that feel engaged and connected virtually through asynchronous methods using discussion boards or videos (Elliott, 2017). To create a condition where participants can safely share thoughts, recommendations, comments, and knowledge, the design of our online learning model sought to include a discussion forum to share concerns, questions, and comments easily at all times.
2) Cognitive presence: how learners interact with the content in an online learning setting to construct knowledge (Dunlap et al., 2016). As educators gain more explicit information, they can take on more responsibility for applying this knowledge in classroom practices.
3) Teaching presence: the design and instruction of online training and the facilitation of discourse to promote reflective and critical thinking (Dunlap et al., 2016). As part of our model design, recorded videos and virtual interaction via discussion forums aided the instructor and participants' interaction and the online delivery.

Utilizing the CoI model expanded our opportunity to uncover factors that moderate or extend the relationship between the framework's components and the course outcomes (Elliott, 2017; Garrison et al., 2010). This study aims to evaluate the knowledge and skills of participants after they complete online professional training. Additionally, it aims to contribute to the body of knowledge on CoI in the context of the most recent, demanding, and thorough online learning. Evaluation of this framework has found that the combination of all three factors helps to ensure for successful online educational experience (Dunlap et al., 2016; Elliott, 2017). Therefore, the CoI framework was used to guide the construction of the Arabic metalinguistic awareness program for educators.

Figure 1: The Community of Inquiry (CoI) Model

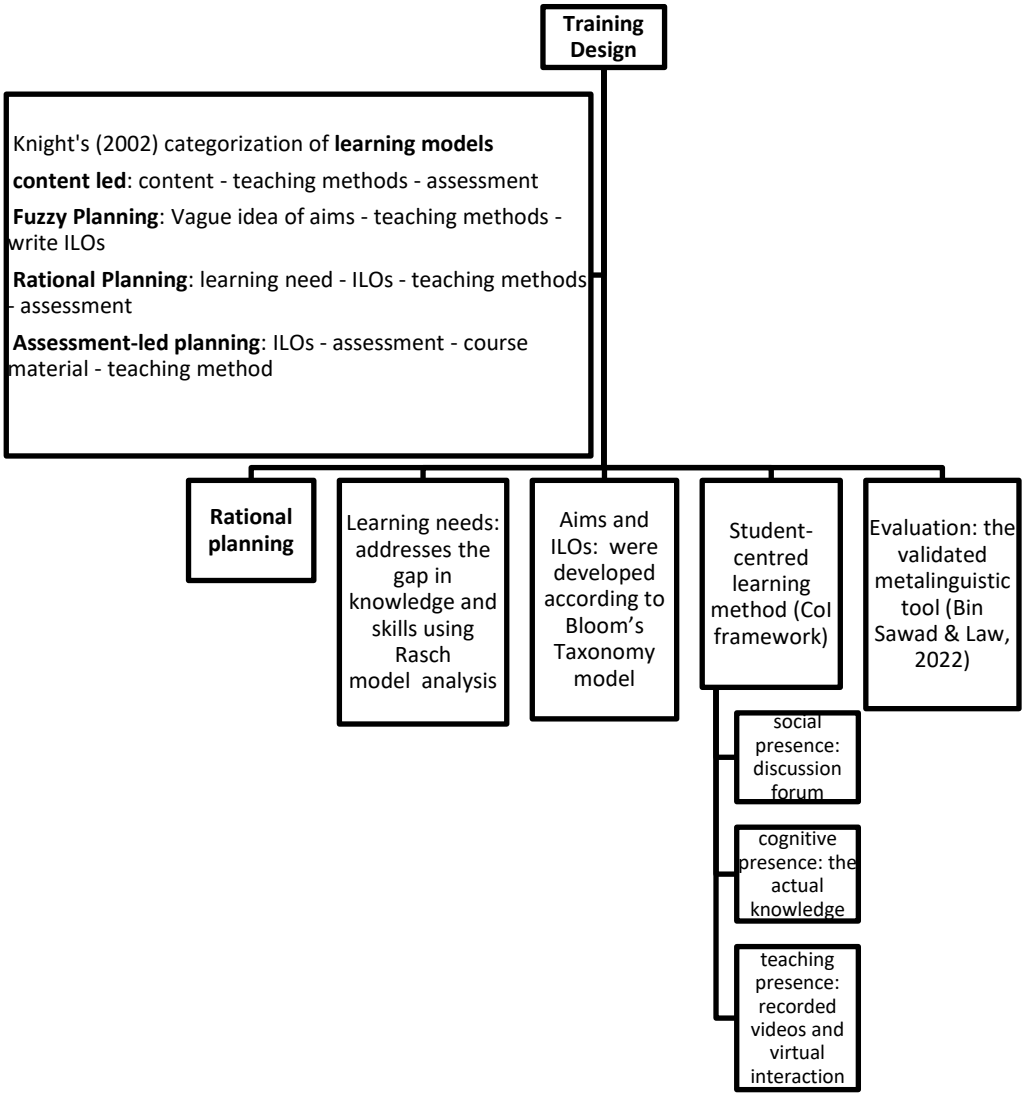


4.2 Training Design

The rational planning model is viewed as effective and is still a used model. It is a procedure for comprehending an issue by creating and assessing planning criteria, formulating alternatives, putting them into action, and lastly, keeping track of how the alternatives selected are doing (Knight, 2002). Modern planning has been heavily reliant on the rational planning concept since the rational planning idea prioritises learners' knowledge gaps.

Therefore, the design of the online training course material used in this study was underpinned by Knight's (2002) Rational Planning categorisation of learning models, depicted in (Figure 2), as this model places the learners' needs as the starting point of the design. As the goal of this professional learning model was to address a specific need and knowledge deficit of teachers. Within the Rational Planning model, the learners' needs are first identified, and then learning outcomes are selected accordingly, followed by the designation of the teaching approach.

Figure 2: Stages of Creating the Study Design



Accordingly, the training offered within this study was developed after applying the Arabic metalinguistic knowledge assessment tool to identify teachers' difficulties (Bin Sawad & Law, 2022). To examine the relative difficulty of the metalinguistic knowledge assessment items, Rasch model analysis for a dichotomous response was used (Devrilmez et al., 2019). Items from most difficult to easiest were ranked using a Wright map, which provides a qualitative evaluation of the relation between the distribution of item difficulties and performance abilities (Devrilmez et al., 2019). Results revealed that the most difficult items for the teachers were centred around explicit morphological awareness and phonological awareness. While the least difficult questions were primarily based on orthographical knowledge and implicit morphological skills. Based on defined difficulties and the fact that the Saudi Arabian higher education system primarily follows an orthographical approach (Al Ghanem & Kearns, 2015), the learner's needs were identified as morphological and phonological knowledge.

According to Rational Planning model, the programme aims and Intended Learning Outcomes (ILOs) were established according to the identified learners' needs (see Table 1). Aims and ILOs were developed according to Bloom's Taxonomy model (Bloom et al., 1956). Bloom's taxonomy is a set of ranked models with six levels. Each level is a classification of an educational learning objective, starting from the lower levels (knowledge, comprehension, application) to higher levels (analysing, synthesising, and evaluation). The developed learning outcomes are stated below as the programme's aims and ILOs (see Table 1).

The third step of the Rational Planning model turns the focus to the design of the teaching method. Rational planning reflects the student-centred approach as a primary method to achieve learning outcomes (Knight, 2002). Student-centred learning method encourages learners to take on greater responsibility for their learning by actively linking their previous knowledge and seeking meaningful answers; in addition, it helps build learners' confidence and promotes social interaction with peers, educators, researchers, and the school (O'Neill & MacMahon, 2005). According to Bourner (1997), individualised learning is a crucial component of student-centred learning. The individualised learning method usually allows for self-reliance because it enables students to advance at their own pace. Online learning is thought to be the ideal method for individualised learning (Gikandi et al., 2011). Accordingly, this study hoped to form an effective online professional development training while undertaking previously established factors of Rational planning while using the CoI model to guide the design of the online training materials.

To satisfy the assessment portion of the Rational Planning model and in keeping in line with previously reported professional development studies (Bos et al., 1999; Foorman & Moats, 2004; McCutchen et al., 2002; Moats & Foorman, 2003), the impact of training on teachers' explicit metalinguistic knowledge was measured using our validated metalinguistic assessment tool (Bin Sawad & Law, 2022).

Table 1: Programme Aims and Intended Learning Outcomes ILOs

Programme Aims	
A1	To acquire an understanding of the major factors which influence the acquisition and development of reading in Saudi Arabia
A2	To gain detailed knowledge and become familiar with major theories and models of Arabic metalinguistics and their contribution to reading comprehension.
A3	To enhance participants' awareness of the implications of metalinguistic theory on early teaching of reading comprehension.
Intended Learning Outcomes ILOs	
ILO1	Describe particular Arabic language characteristics such as Diglossia that could influence reading development (A1)
ILO2	Describe the basic aspects of Arabic metalinguistics, including phonological awareness, morphological awareness, and orthographical knowledge (A1, A2)
ILO3	Describe and identify research methods that are commonly used in the study of reading comprehension (A2, A3)
ILO4	Develop activities to help support morphological awareness and phonological awareness within the classroom (A3)
ILO5	Critically read some of the primary reading curriculums provided by the higher ministry of education of Saudi Arabia for the purpose of identifying the instruction curriculum that lacks a focus on morphological and phonological awareness instruction (A2, A3)

Note: A= Aims, ILO= Intended Learning Outcomes. Adopted from Bloom's Taxonomy model (Bloom et al., 1956).

4.3 Course Content and Structure

Course content primarily focused on morphological and phonological awareness since the previously established metalinguistic assessment reported a lack of teachers' knowledge among these core metalinguistic elements (Bin Sawad & Law, 2022). Content materials were drawn from several reliable sources from Arabic and English literature (see Table 2). The course content was reviewed by Arabic linguistic specialists' feedback was used to designate appropriate adaptations before launching the training. Furthermore, Arabic language experts were consulted when translating content taken from previously reported English training courses such as (Newman, 2018) and (Wolter & Green, 2013).

A description of the themes and content delivered with the four units that make up the course can be found in Table 2. Each unit contained audio presentations, readable sources, video links, and supporting PowerPoint slides. Further support was provided through the provision of the course resources. A full description of the offered recourses can be found in Table 3. At the completion of each unit, participants were directed to read or engage with attached materials (i.e., articles and videos) and contribute to the discussion forum.

Table 2: Online Course Units and Included Topics

Unit	Unit's length	Main topic	Subtopic	Resources
Unit 1: Definitions and Theory	40-45 minutes	• Introduction • Keywords • Theory and definitions of reading acquisition • Metalinguistic awareness	• What is reading? - Reading in Saudi Arabia - Arabic diglossia - Saudi dialects and standard Arabic • What is reading division - Simple View of Reading theory - teaching reading - teaching reading comprehension - common challenges whole language approach vs. metalinguistic awareness approach • Metalinguistic awareness supports reading comprehension - reading difficulties (dyslexic, hyperlexic, and garden variety) • Divisions and definitions of Arabic metalinguistics: (phonology, morphology, and orthography)	(Chekayri, 2018) (Cain, 2010) (Clarke et al., 2013) (Funnell & Stuart, 1995)
Unit 2: Phonological Awareness	60-70 minutes	• Phonological awareness and phonics • Vowelisation	• Phonics and phonological awareness (blending - deletion - semination - addition) • Identifying the number of sounds in a word • Words syllable and sounds • Vowelisation and reading • Deep orthography vs. transparent orthography (i.e., added phonological information) • Arabic vowelisation and its effect on reading and reading comprehension	(Newman, 2018) (Saiegh-Haddad & Joshi, 2014) (Chekayri, 2018) (Tibi, 2016) (Tibi & Kirby, 2018) (Aldhahri & Alhassani, 2021)
Unit 3: Morphological Awareness	60-70 minutes	• Arabic morphological awareness • Arabic roots and patterns	• Derivational morphology and inflectional morphology what are they with examples • Arabic roots and patterns, including examples and activates • Why explicit morphological awareness is important • How does morphological awareness correlate to reading comprehension	(Wolter & Green, 2013) (Chekayri, 2018) (Tibi et al., 2019) (Saiegh-Haddad & Joshi, 2014) (Tibi, 2016) (Boudelaa & Marslen Wilson, 2001)
Unit 4: Recommended Classroom Activities and Practices	40-50 minutes	• Phonological awareness activities • Morphological awareness activities	Activities related to phonological awareness: • Teach (oral and written) blending and segmenting skills by breaking up words • How many individual speech sounds are in the following words? • Sound identification (number of sounds per word)- rhyming activities Activities related to morphological root awareness: • Please write three words that share a given root • Determine the number of morphemes in a word	(Newman, 2018) (Wolter & Green, 2013) (Chekayri, 2018) (Tibi et al., 2019) (Tibi, 2016) (Tibi & Kirby, 2018)

Table 3: Course Resources and Structure

Resource	Description
1. Discussion forum	It's an open space for questions, concerns, and comments. It's monitored by the course designer and an IT member.
2. Ethics note	Toward the beginning of the course a consent letter was attached indicating that participants are to remain anonymous, but their contributions could be used for research purposes. A contact official email to respond to all concerns and queries was included.
3. Course support materials	A written manual showed steps on how to complete the online course effectively, while reminding participants of the available provided materials (e.g., discussion forum, IT support).
4. Purpose	A PIS (participant information sheet) was attached briefly explaining the purpose of the study and the importance of participant's contribution.
5. (Pre-test) knowledge and skill and self-rate measure	Prior to intervention, a pre-test measure was established; this measure was designed to assess a large population in order to identify educators' knowledge gaps and to prompt participants to self-assign to a follow-up training study (Bin Sawad & Law, 2022).
6. Reading resources	Reading materials were in both languages English and Arabic. Participants who cannot read English were encouraged to download an attached booklet with the necessary translation of important theories and methods.
7. Video links	The author recommended other sources such as a YouTube link to learn about reading and reading comprehension (Linda Farrell). Along with the link the author offered translation in the booklet. https://www.youtube.com/watch?v=BhpHr3SC7hk
8. Components of the course that follow the CoI model	Cognitive presence: • Each unit clearly communicates what participants will learn in the next 30-40 minutes. • Each unit also provides video, written, reading, audio, and practicing exercises explaining and facilitating the Arabic metalinguistic content. • Personal reflections and thoughts are encouraged. • Several inquiries are made to link prior knowledge to the subject matter being learned. Teaching presence: • Creating introductory audio of the researcher the purpose of the study and the importance of participants' contribution. • Check email and discussion forum regularly and reach out for those who need help or post reflections. • Hold online office hours. • Fix any problems that have been brought up, such as blank pages or invalid links. • Be present in the discussion forum when active. • Provide participants with general recommendations on how to successfully complete the online course. Social presence: • Post a welcome and thank you message for attending, setting expectations for communication. • Publish a course supportive guide as part of the course materials. • Provide participants with an opportunity to introduce themselves and their interests if they wish to do so via the discussion forum or email. • Encourage all educators to respond to other educators and participate in the discussion board. • Provide initial and sample activities that participants can expand upon.
9. (Post-test) knowledge and skill and self-rate measure	A validated survey was used to evaluate post-course knowledge acquisition and quality (Bin Sawad & Law, 2022).

Participants had access to the course materials through the University of Jeddah's blackboard because they were either faculty or students. However, other participants who were unable to access the University of Jeddah's blackboard were sent all of the course materials and information through email, along with a direct link to the post-test. After logging in, participating educators were first offered general recommendations that were adopted from the University of South Florida (2020) on how to complete an online course effectively, which include:

1) Take time to get familiar with each unit (i.e., keywords, definitions, and related concepts).
2) Listen carefully to the recorded lectures.
3) Actively read the attached documents.
4) While reading or listening make sure to take notes and write personal concerns, questions, or reflections.
5) Even though each unit includes an audio that lasts for about an hour, the attached reading materials, videos, and the sample for the exercises require more time to study the chapter and fully understand the included knowledge and skills. Set aside study time and breaks, then give yourself time between units to adequately process information.
6) It is highly encouraged to participate in the offered discussion forum and never hesitate to raise concerns or ask questions.

Participants were told that their participation was voluntary and that they were able to withdraw at any time. Participants were also provided with a copy of the participant information sheet PIS and the study's objectives. Following these instructions, participants were able to navigate through the course's main components starting from unit one. The discussion forum was open to participants at all times, and they received notifications when someone responded. At last, an assessment was made available to measure the quality and feasibility of the course.

4.4 Participants

Participants were chosen at random for this study. Non-probability sampling is used since this study intended to prove a hypothesis true. When there is little to no prior knowledge available, researchers employ the non-probability sampling method to make an assumption. This technique aids in the quick return of data and creates a foundation for additional study (Etikan, 2017). Initially, an online survey link to evaluate educators' metalinguistic knowledge in Saudi Arabia was conducted (Bin Sawad & Law, 2022). Various official Saudi organisations, including school principals, heads of universities and colleges (i.e., education departments), and groups on social media platforms, including Twitter, WhatsApp, Telegram, and Facebook, were used to promote the study and survey link. Each group and organisation granted their consent before sharing the online survey link. The final number of responses received was 221, all of which came from Saudi Arabian instructors and preservice teachers.

Respondents to the earlier survey were asked to indicate whether they would be interested in taking part in a metalinguistic awareness course by providing their email

addresses. Of the 221 participants, 25 expressed interest in participating in a metalinguistic awareness professional development course. The sample of participants in this study resulted in a range of demographics across gender, years of teaching experience, education, and employment status, see Table 4.

A possible limitation of my sampling is what is called self-selection bias, also known as volunteer bias, which is the bias that might develop when people have the freedom to decide whether or not they wish to take part in a research project (McGonagle & Freedman, 2017). Self-selection can result in a biased sample and have an impact on the generalizability of my findings because participants frequently differ from nonparticipants in ways that are important to the research. Self-selection bias will significantly influence the outcomes when a sample solely consists of individuals who are willing to take part in the training.

Self-selection bias can't always be totally eliminated. However, asking participants if they'd be interested in participating in a study might help you determine how motivated they might be to participate in the training programme and how much the earlier survey caught their attention to learn more. So, you can determine to what extent volunteer bias may have compromised the external validity of your study's findings.

Table 4: Demographic variables of the participants

Demographic	Demographic variables	N	Percentage
Gender	Male	7	18.9
	Female	18	48.6
Years of experience	0-2 years	10	27
	3-5 years	3	8.1
	6-10 years	2	5.4
	11-15 years	3	8.1
	16-20 years	3	8.1
	More than 20 years	4	10.8
Employment status	General Ed	9	24.3
	Special Ed	10	27
	University lecturers	3	8.1
	Pre-service teachers	3	8.1
Education level	BA of Arabic literature	7	18.9
	M.Ed. Arabic literature	2	5.4
	PhD of Arabic literature	1	2.7
	BA of special education	7	18.9
	M.Ed. special education	8	21.6

Note: Abbreviations: *n* (number) Ed (education) BA (bachelor) M.Ed. (master's degree) PhD (Doctor of Philosophy).

A link to the online training was provided to the 25 participants three months after they completed the initial survey. All participating learners accessed the platform and viewed the metalinguistic training through the link or their emails. Participants took an average of three weeks to finish the online course and the post-assessment.

4.5 Course Evaluation

The researcher employed a quantitative approach to answering the research question, *what impact does short-duration, intensive, explicit professional development training in Arabic metalinguistic awareness have on the knowledge, confidence, and skills of educators in Saudi Arabia?* The researcher evaluated course effectiveness through differences in participants' survey inventory (pre-assessment and post-assessment).

4.6 Knowledge and Skill Measure (Pre-test and Post-test)

A. Pre-test

In the initial phase (i.e., three months prior to intervention), a pre-test measure was established (Bin Sawad & Law, 2022); this measure was designed to assess a large population (i.e., 221 educators) in order to identify educators' knowledge gaps in Saudi Arabia and to prompt participants to self-assign to a follow-up training study.

In order to learn more about the survey participants' backgrounds, the first section of the questionnaire included questions taken from Goldfeld et al. (2020). Five demographic questions asked participants about their gender, educational background, number of years of teaching experience, and occupation. The knowledge and skill assessment tool initially included 47 questions representing the three metalinguistic subcomponents (phonological awareness, morphological awareness, and orthographic awareness) shown in the Reading Systems Framework (Perfetti et al., 2014) were created in accordance with the underlying theories, research, and previous literature to assess teachers' knowledge of fundamental Arabic metalinguistic constructs (Bos et al., 2001; Moats, 1994). Test questions and inquiries were primarily drawn and followed the pattern of previously issued international measures (Binks-Cantrell et al., 2012; Foorman, 2003; Goldfeld et al., 2020; Moats, 1994). Due to unique Arabic language characteristics, many items were not applicable to use; therefore, some knowledge and skills items were developed by the author, piloted, validated then added.

The questions were primarily multiple-choice, with only two questions asking participants to type in a maximum of three words to answer. Among multiple-choice questions, five choices were given, one of which was correct and one stating (don't know) as an answer. The (don't know) choice was offered to eliminate the guessing factor and to measure the amount of knowledge gained effectively. The test encompassed almost all related topics and knowledge covered in training.

All questions correctly responded to were awarded one point, while all incorrect responses, including responses of "don't know", were awarded 0 points. Questions that required the participant to morphologically decompose a given word into its base and affix, were scored so that correct responses were awarded one point, while incorrect or missing responses were given zero. Therefore, each item was scored either 0 or 1, with a total of 47 items.

B. Post-test

The initial survey was given to 221 Saudi Arabian educators, and its validity was checked using a Rasch model to look at how challenging the evaluation items were for

metalinguistic understanding. Following survey validation, the number of knowledge items was reduced from 47 to 28. The evaluation test was found to be moderately challenging for Saudi Arabian educators. The validated survey was used to assess the post-course knowledge acquisition and skills after the online training had been implemented.

4.7 Self-rate Measure

It should come as no surprise that teachers need to feel confident in their skills and knowledge in order to deliver successful literacy instruction (Washburn et al., 2011). Meeks et al. (2017) examined what teachers know about the critical elements of early literacy and how they perceive their preparedness for this work in a systematic review of the literature. Findings indicated that teachers had little oral language skills and that knowledge and self-rated performance were adversely related to these results. Meeks et al. came to the conclusion that teachers who possess the necessary skills and knowledge have more confidence in their abilities, which enhances students' gain in school.

Accordingly, participants were asked to rate their teaching ability in reading and literacy, language, phonics, comprehension, and teaching students with learning and reading disabilities along a scale of: *minimal, moderate, very good, or expert* adapted from other publications (Goldfeld et al., 2020; Washburn et al., 2011). This measure has been added toward the end of pre-test and post-test measurements. The self-rate portion of the assessment tool included 13 items that measured teachers' self-rate and beliefs which were originally adapted from other publications (Goldfeld et al., 2020; Washburn et al., 2011). It provides insight into teachers' confidence and knowledge regarding Arabic metalinguistics. Moreover, it will permit comparison among participants' self-rate and readiness changes following the metalinguistic training program. For the pre-test and post-test self-rate questions, Cronbach's alpha equalled 0.9.

5. Results

5.1 Teachers Score Changes

The purpose of this study was to determine whether extensive Arabic metalinguistic awareness training boosts teachers' knowledge and enhances their performance. The knowledge and reporting confidence of 25 trainees were compared between the pre-test and post-test. Following the post-test, the participants had significantly improved their knowledge and proficiency in Arabic metalinguistic awareness.

Participants' pre-test and post-test scores were compared, and the results demonstrated a significant increase in their scores. Educators improved their knowledge from a pre-test mean score of 11.5 (SD=3.11) to a post-test mean of 20.4 (SD=3.12), t (95) = −11.03, p<.001. A large effect size of 0.81 for the intervention was found; indicating that the findings have practical significance.

When exploring individual items, the proportion of improvement in correct responses ranged from 2.7% pre-test lowest score to 24.3% post-test lowest score. The two items revealed the greatest pre-test and post-test enhancements relating to explicit

morphological knowledge (item 16: 54% increase) and explicit phonological knowledge (item 6: 43% increase). However, the least change was observed in items (21 and 26: 2.7% increase); both items required implicit knowledge. See Table 5 for individual items.

This result is consistent with earlier research such as Hurry's et al. (2005), who explored how teachers changed their practises after taking a morphological awareness-focused professional development course. Findings showed that participating teachers modified their instructional strategies to become more student-centred and morphology-focused, which increased students' reading performance.

Table 5: Changes in Proportions of Correct Answers

Item	Pre-test (*n*%)	Post-test (*n*%)
1. A phoneme refers to	27	51.4
2. How many individual speech sounds are in (عشْبٌ)	8.1	24.3
3. How many individual speech sounds are in (الصنْدوق)	8.1	45.9
4. How many individual speech sounds are in (الشمسْ)	8.1	40.5
5. How many individual speech sounds are in (رَكِبَ)	35	64.9
6. The /و/w/ sound in the word (Owd) عودis considered:	2.7	45.9
7. The /aa/ /ى/ sound at the end of the word أقصى(aqsaa) is considered:	10.8	37.8
8. Which of the following is the best example of a phonemic awareness activity?	29.7	59.5
9. Connected pronouns (inflectional morphemes) in Arabic are useful in determining:	43.2	59.5
10. Which pattern represents the feminine plural of the word (يفعل)	45.9	51.4
11. Arabic has many types of subject pronouns which are	27	54.1
12. Determine the number of morphemes in the following word: قرأ	21.6	43.2
13. Determine the number of morphemes in the following word: قرأت	18.9	54.1
14. Determine the number of morphemes in the following word: يقرأون	24.3	40.5
15. Determine the number of morphemes in the following word: سيقرأون	40.5	45.9
16. Morphemic analysis is	10.8	64.9
17. A morpheme refers to:	16.2	54.1
18. Based on the contained root, which word does not belong in this list: (علم)	10.8	40.5
19. Please morphologically decompose the following words to isolate their rootsيتمايلان	13.5	56.8
20. Please morphologically decompose the following words to isolate their roots افستسقيناكموها	21.6	43.2
21. Please write three words that share the following roots كلم	54.1	56.8
22. Please write three words that share the following roots خدم	51.4	59.5
23. Please write three words that share the following roots أمسك	54.1	59.5
24. If a 4th grade student gives the wrong analogy (e.g., big: bigger – hot::… and he uses the word hottest instead of hotter) which of the following is most likely true?	35.1	51.4
25. Which of the following is a successful way to teach morphological awareness:	29.7	40.5
26. To support a student who writes بأر instead of بئر a teacher should focus on his/her:	32.4	35.1
27. When a student finds it difficult to distinguish the following sounds \غ\ و \خ\ when reading, it may be a result of	51.4	48.6
28. Which of the following options best explains the difference between the long vowel /a/ /ا/in Arabic and the consonant /a/ /أ/?	45.9	51.4

Note: (*n*%) – number in percentile (see validated survey in Appendixes)

5.2 Rasch Analyses Score Changes

Rasch analysis was used to determine the change in teachers' gained knowledge (Wolfe & Chiu, 1999). The analysis was conducted with WINSTEPS software and only focused

on teachers' performance before and after the training; analysing the difficulty and fit of assessment questions was beyond the scope of this study; a good synopsis can be found in (chapter 3).

Teachers' knowledge gain was assessed via the change in the Rasch scores (i.e., the difference in teachers' knowledge). Participants' ability measures are placed on a logit scale to determine the probability a given teacher has of correctly answering a specific item after attending the training. A modified procedure of (Wolfe & Chiu, 1999) for pre-test and post-test was used. Their approach helps analysts spot the change in item difficulty from pre-test to post-test. The subsequent findings (i.e., person and item measures in logits) were used to conduct paired *t*-tests.

The estimated mean person ability for the pre-test was –0.500 logits (SD=0.619). On the other hand, the post-test mean person ability was 1.236 logits (SD=0.661). Teachers showed an overall increase in their ability from pre-test to post-test. This finding reveals that teachers have higher knowledge and ability on post-test since their scores are higher on the logits scale.

A. Phonological Group Score Change

Compared to the pre-test items, which had a mean score of 0.406 (SD=0.220), the phonological awareness group's items showed the largest improvement, with a post-test mean score of 0.706 (SD=0.2166). For instance, a few pre-test items seemed difficult since they required both explicit and implicit knowledge. But in the follow-up test, it dramatically rose following training (e.g., Table 4, Items 3 and 4).

B. Morphological Group Score Change

The mean score for the morphological awareness group items improved from the pre-test mean of 0.408 to 0.688 (SD=0.161) on the post-test. For instance, difficult pre-test inquiries, like counting the number of morphemes in a word, showed a considerable rise in post-scores (e.g., Table 4, Items 15 and 20).

C. Orthographical Group Score Change

The orthographic knowledge category's pre-test scores were 0.540 (SD=0.175), slightly lower than the post-test scores of 0.645 (SD=0.222).

5.3 Teachers' Group Differences

In addition, the author examined whether the group occupation differences affected the effectiveness of the training. An independent *t-test* using a logit scale was conducted to measure pre-test and post-test differences in group means (i.e., general educators, special educators, preservice teachers, and university lecturers). The calculation of the *t-value* offers a more apparent magnitude of the differences between the latter groups' means. Results showed that the groups increased their mean gain; for example, primary general educators reported an increase from –.58 (SD=0.478) to 1.14 (SD=0.553), and special educators revealed increased logits mean from -.50 (SD=0.638) to 1.34 (SD=0.719), while preservice teachers reported the most increase from –0.87 (SD=0.420) to 1.23 (SD=1.190)

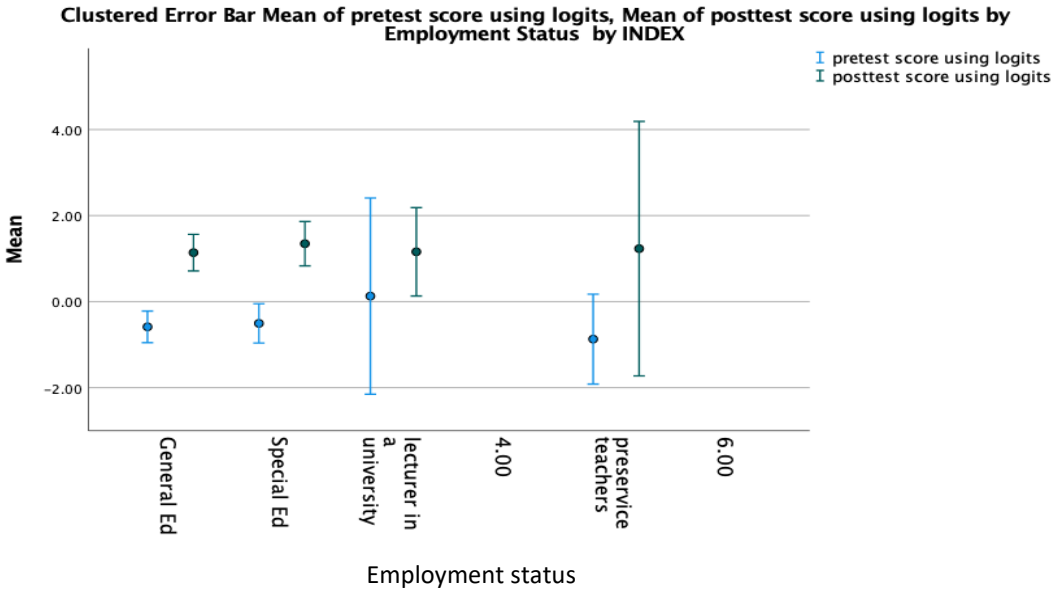
in their post-test scores (see Table 6 and Figure 3 For visual demonstration). The comparison of change of means between the pre-test and post-test demonstrated a positive increase among groups.

Table 6: One-way ANOVA Descriptive Mean and SD

Total logits score	**Employment status**	***n***	**M**	**SD**
Pre-test	General ed.	9	-0.58	0.478
	Special ed.	10	-0.50	0.638
	University lecturers	3	0.13	0.917
	Preservice teachers	3	–0.87	0.420
Post-test	General ed.	9	1.14	0.553
	Special ed.	10	1.34	0.719
	University lecturers	3	1.16	0.413
	Preservice teachers	3	1.23	1.190

Note: *n* (number) – M (mean) – SD (Standard Deviation)

Figure 3: Mean percentage of answers correct on the measure of metalinguistic survey for all four groups from pre- to post-intervention assessment



5.4 Comparison of Pre-test and Post-test Self-rate and Ability

In addition to knowledge and skills, participants also displayed small changes in their confidence and self-rate ability. Table 7 illustrates teachers' self-rated ability and reported confidence about their knowledge and readiness to teach Arabic metalinguistics and related reading concepts explicitly. Teachers were asked to rate their abilities before and after the training. Participants' self-rate and teaching confidence show an increase when comparing tests. This training program was primarily focused on phonological and morphological awareness. Therefore, it's noticeable that a higher scale change was observed among those metalinguistic concepts. Participants' phonological awareness was rated *very good* (40%) post-training compared to *minimal* (50%) before training. Moreover, morphological awareness rated *moderate* (45%) post-training to *minimal* (45%) before training.

Table 7: Self-Rated Ability and Reported Confidence; n (%)

Item	Pre-test					Post-test				
	Minimal	Moderate	Very good	Expert	Mean	Minimal	Moderate	Very good	Expert	Mean
Teach (phonemic awareness)	10 (50)	4 (20)	4 (20)	2 (10)	1.9	3 (15)	7 (35)	8 (40)	2 (10)	2.45
Teach (morphological awareness)	9 (45)	4 (20)	6 (30)	1 (5.0)	1.95	4 (20)	9 (45)	6 (30)	1 (5.0)	2.20
Teach (reading fluency)	4 (20)	8 (40)	6 (30)	2 (10)	2.3	2 (10)	7 (35)	9 (45)	2 (10)	2.55
Teach (reading comprehension)	5 (25)	6 (30)	6 (30)	3 (15)	2.35	3 (15)	9 (45)	7 (35)	1 (5.0)	2.30

Note: The Likert-type scale includes 1 = minimal, 2 = moderate, 3 = very good, and 4 = expert.

Frequencies are presented as *n (%)* for each variable.

Overall, all three categories have increased significantly, highlighting the significance of evidence-informed design that incorporates a theoretical framework to direct teachers' learning (Steinert et al., 2006). This study demonstrated that explicit training in metalinguistic constructs for Saudi Arabian educators could effectively improve their knowledge of Arabic metalinguistics and language structure. Moreover, educators with a better understanding of language constructs are more likely to reveal higher confidence and believe in the importance of metalinguistic knowledge for teachers and students.

6. Discussion and Conclusion

The main aim of the proposed Arabic metalinguistic awareness professional development is to facilitate the development of required metalinguistic knowledge of teachers with the goal of improving the delivery of explicit and systematic instruction of metalinguistic awareness to their students. Findings have indicated that early explicit and systematic instruction of metalinguistic awareness improves pupils' early reading skills and reduces reading failure (Arrow et al., 2019; Bos et al., 1999; Hurry & Sylva, 2007; Moats, 1994; Mather et al., 2001; Washburn & Mulcahy, 2019). However, the research has shown that the success of explicit metalinguistic awareness instruction is often dependent on teacher knowledge (Ball & Blachman, 1991; Bradley & Bryant, 1985; Cunningham et al., 2004; Foorman et al., 2012; McCutchen et al., 2002). Therefore, it is vital that teachers acquire explicit metalinguistic knowledge to enhance their students' conscious manipulation of the language (Bowers et al., 2010; Carlisle et al., 2011; Podhajski et al., 2009). However, a recent assessment of the metalinguistic knowledge of the Arabic language of Saudi teachers (Bin Sawad & Law, 2022)) revealed that, on average Saudi teachers lacked mastery of many basic concepts and struggled to answer items that required both explicit and implicit morphological and phonological knowledge. These results highlight the need for accessible and targeted professional development designed

with teachers' knowledge gap in mind to maximise learning gain for teachers. Hence, this study set out to develop and assess the effectiveness of online professional development training for educators following several frameworks and models.

Online education could be seen as a drawback when there is no face-to-face connection between participants in online instruction, individuals become disinterested and unmotivated. Due to technological challenges, participants may also have trouble opening links or submitting tasks. However online learning offers a great substitute for in-person professional development and can offer educators, especially those in geographically remote areas, accessible, high-quality, and economical training (Bragg et al., 2021; Dede, 2006; Zhao et al., 2005). In addition, the training was informed by the CoI and the assessment of this approach has revealed that the combination of the three elements (i.e., social presence, cognitive presence, and teaching presence) contributes to successful online learning (Dunlap et al., 2016; Elliott, 2017). As a result, the CoI framework served as a guide for the development of the Arabic metalinguistic awareness programme for educators.

Generally, the results of this study demonstrated that the online professional development module, informed by the CoI and Rational models, was successful in improving participating teachers' metalinguistic knowledge and perceived confidence. The change in scores for each of the three metalinguistics groups (phonological awareness, morphological awareness, and orthographical knowledge), compared to the literature, will be discussed in the following sections.

First of all, the phonological awareness group's items showed the most improvement, with a post-test mean score of 0.706 (SD=0.2166), compared to the pre-test items, which had a mean score of 0.406 (SD=0.220). For instance, several questions that demanded both explicit and implicit knowledge appeared challenging in the pre-test. However, it significantly increased after training in the follow-up test (e.g., Table 4 items 3 and 4). This extensive training and scaffolded support of explicit and implicit Arabic phonological-related questions (e.g., How many individual speech sounds are in الصُّندوق) helped increase teachers' knowledge and assessment results. The pre-test results are similar to those of Mather et al. (2001) and Washburn et al. (2011). They reported that teachers correctly responded to items requiring implicit knowledge but struggled with questions including both implicit and explicit aspects. The results of the post-test, however, were comparable to those of the systematic review by Hudson et al. (2021), suggesting that the phonological and morphological awareness training programmes for teachers had improved teachers' knowledge and abilities.

Second, the post-test scores of morphological awareness group items reported an improvement in the mean score of 0.688 (SD=0.161) compared to the pre-test mean of 0.408 (SD=0.165). For example, challenging pre-test questions, such as determining the number of morphemes per word or decomposing morphologically complex words, revealed a significant increase in post-scores (e.g., Table 4, Items 15 and 20). Undoubtedly this improved knowledge is supported by the explicit morphological knowledge acquired through this metalinguistic training. First, unit three explicitly and thoroughly covered Arabic roots and morphemes. Then, in unit four, various examples of related

classroom exercises that encourage implicit morphological knowledge were presented. As previously stated by (Mather et al., 2001 and Washburn et al., 2011), questions that call for both implicit and explicit knowledge are among the most difficult to answer but having both in our training seemed to help teachers' comprehension and abilities.

Finally, the pre-test results for the category of orthographic knowledge were 0.540 (SD=0.175), slightly lower than the post-test results of 0.645 (SD=0.222). Even though this group reported a post-test improvement, the low pre-test scoring was unexpected, given that the Saudi education system focuses predominantly on orthographical approaches (Al Ghanem & Kearns, 2015). This poor pre-test performance, which was primarily in the explicit orthographic knowledge category, suggests that the current Saudi preparation programmes may not be giving professionals enough professional training in the explicit orthographical knowledge that underpins explicit instructions. As a result, an immediate alteration in professional training is required. In addition, although this training was largely a morphological and phonological training programme, a broad introduction to all three variables, including orthographic knowledge, in unit one, coupled with supplementary reading resources, seemed to support educators' post-test explicit knowledge of orthography. Conclusively, all three categories have increased significantly, highlighting the significance of evidence-informed design that incorporates a theoretical framework to direct teachers' learning (Steinert et al., 2006).

Based on an item-level analysis, it appears that for some items, the participants, on average, showed slight improvement by less than 5% or exhibited negative learning. These items were (Table 4, Items 21, 26, and 27). The first item felt with morphological category, while the last two focused on orthographic knowledge. A potential reason for this lack of significant growth could be the lack of time to explore the subject's materials thoroughly. Perhaps implementing a longer intensive course may have adequately covered all topics (Fernández Ruiz & Panadero, 2022). For instance, a review of the research on the impact of professional growth on knowledge was conducted by Steinert et al. (2006). They found that longer courses tended to produce better outcomes not found in shorter training. Therefore, it could be necessary to extend the course duration in the future to allow participants enough time to learn the required knowledge and skills. Additionally, this course did not prioritise orthographic knowledge; perhaps a programme that equally prioritises all three categories is needed.

Following successful research that showed explicit metalinguistic professional training useful in classroom instruction (Fielding-Barnsley & Purdie, 2005; Hurry et al., 2005; Hudson et al., 2021; Joshi et al., 2009; Podhajski et al., 2009), this study conducted professional development training to overcome the knowledge gap of metalinguistic awareness. The increase in mean scores and the shift in teachers' ability from pre-test to post-test parallel previous studies and indicate that teachers have learned the materials well enough to respond more accurately. This provides proof that concept theory is considered useful as an instructional strategy. In recognition of some national literacy curriculums, such as the National Curriculum in England (2014), teachers should be able to teach word reading and reading comprehension by enhancing their students' metalinguistic knowledge. Unlike the literacy instruction curriculum in Saudi Arabia

typically places more emphasis on a single variable like orthographic skills than it does on a wider range of metalinguistic skills, which may have an effect on students' reading performance by limiting their knowledge of phonology and morphology (Al Ghanem & Kearns, 2015; Al-Jarf, 2007). As a result, throughout this training period, instructors who participated in this programme got a variety of research-based materials mainly on explicit morphology and phonology, including definitions, theories, methodologies, reading resources, and classroom exercises. Toward the end of the training, the increased post-test scores revealed evidence of training success.

Online professional development training holds promise as an accessible and efficient method; shortly, it will become more prevalent in teachers' training (Smith, 2014). First, the course design adopted rational planning, primarily led by teachers' actual needs and knowledge gaps (Knight, 2002). The course content, on the other hand, follows the three integrated elements of the Community of Inquiry Model that contribute to a thriving online learning community (Rourke et al., 1999). The framework hypothesised effective online knowledge building as the outcome of teaching presence, social presence, and cognitive presence. Our professional development considered using all three presences when developing the online training to deliver content knowledge.

Another upward strategy is the active social learning opportunity. The professional development online training involved a forum in which participants were encouraged to share their thoughts, concerns, and recommendations. This opportunity helped participants engage and discuss their beliefs, concepts, and successful teaching approaches related to their classroom practices.

Moreover, this professional development attempted to reflect previous studies (Bin Sawad et al., 2022) and support teachers' actual needs (Bin Sawad & Law, 2022). This endeavour will help teachers adapt instructions related to their student's needs or increase awareness in their place of work. As many scholars stated, participants with increased knowledge are expected to significantly impact their place of work (Kunter et al., 2013; Misra, 2018; OECD, 2010). As a result, it is expected that participating educators might feel obligated to assist other educators and apply the new knowledge and skills to support beginning readers and students with reading difficulties.

This training also provided insights into how educators preview their professional abilities before and after training. The reported increased confidence appeared to parallel with Dierking and Fox's (2013) study, which indicates that teachers' teaching confidence can be gained with increased knowledge. Therefore, increased knowledge results in increased confidence which is believed to enhance classroom practices and pupils' achievement (Moat & Foorman, 2003, 2004; McCutchen et al., 2002). Accordingly, it is recommended to implement continuous professional development training following evidently based approaches to support educators' knowledge and confidence.

Students' improved performance usually results from teachers' change of practice post to professional training (Dunne et al., 2000; Doğan & Adams, 2018). Though, educators need to plan to attend and seek professional training continuously and be equipped to meet all students' particular needs. Promoting this Arabic metalinguistic awareness course was achieved through an online platform. The carefully designed

materials may support the crucial need to enhance teaching approaches of morphology, phonology and orthography in Saudi Arabia. The findings of this study are particularly relevant for educators in Saudi Arabia, who have a solid implicit ability to detect errors but limited content knowledge to explain why.

7. Limitations

Finding out whether participants are motivated to take part in the training programme and how much the earlier survey piqued their curiosity in learning more could provide great insight to the value of my research. Due to self-selection bias, the sampling method may have limitations, hence it may be desirable to use random assignment when conducting an experiment so that subjects have a known or equal probability of being selected.

Other limitations of the professional development could be the variety of participating teachers (i.e., pre-service teachers, university lecturers, primary general teachers, and special education teachers). This variation of teachers' qualifications makes it challenging to observe teachers' change of practice and their subsequent influence on pupils' gain. Utilising this training on special or general primary school teachers only, followed by observing the impact of change in classroom practices, can allow for more insightful and concrete evidence. Also, there could have been more participants in the training in Saudi Arabia for generalisation purposes. Another shortcoming of the programme is its brief duration; a longer duration, including all three metalinguistic variables, may have allowed teachers to comprehend the subject matter more thoroughly. Online learning presents an excellent alternative potential for face-to-face professional development (Cornelius & Macdonald, 2008), and can provide instructors, particularly those in geographically isolated places, with affordable, high-quality, and accessible training (Bragg et al., 2021; Dede, 2006; Zhao et al., 2005). Nonetheless, online learning could be presented as a limitation as well. Online training prevents face-to-face interaction between learners; as a result, participants lose interest and motivation. Participants may also experience issues opening links or submitting tasks due to technological difficulties.

Conflict of Interest Statement
The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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