Pegem Journal of Education and Instruction, Vol. 14, No. 1 , 2024 (pp. 100-110)

RESEARCH ARTICLE WWW.PEGEGOG.NET

Reflective Practices Among Secondary School Computer Science Teachers: Their Point of View

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Abstract

Reflective practice is an essential catalyst through which the benefits of teaching and learning can be reaped. rough it, weaknesses and strengths can be identi ed in a way that helps raise the level of addressing challenges that may arise as well a overcome them. is paper presents the critical re ective practices among computer science secondary school teachers from their point of view in Riyadh, Saudi Arabia. To this extent, the study aims to determine the degree of critical re ective practices among computer science secondary school teachers in Riyadh from their perspective. e paper also seeks to investigate the e ects of variables such as gender, quali cations and experience on the perceptions of the aforementioned teachers, towards the critical re ective practices among computer science secondary school teachers. e study tool is a questionnaire which consisted of two dimensions and was distributed to a population of 739 participants. From this, the study sample comprised (223) computer science teachers working in secondary school in Riyadh. e ndings revealed that there is no signi cant di erence in the estimation degree concerning the critical re ective practices due to the gender. From the results, it was also established that there is no signi cant di erence in the degree of estimation in relation to the critical re ective practices due to educational quali cation variables. On the contrary however, there is a signi cant di erence in the degree of estimation in regard to the critical re ective practices due to the years of experience variable. ese di erences were evident in a group of those with more than 10 years of experience. e other ndings produced by the study highlight that the participants are in agreement about the importance of critical re ective practices. e degree of re ective practice, which is from the participants' point of view, is considered to be of a high value. e majority of the subjects opted to agree with the practice of re ection a er a training session. It was determined from the results that some of the most common strategies favored by practitioners involved the communal practice of mind re ection with individuals from outside the school.

Keywords: computer science teachers, reflection, reflective practices, views.

Introduction

Schools have realized that thinking skills are a focal point of twenty-first century education, and perhaps the most essential of those skills is critical thinking with reflection (Johnson, 2011). To this extent, people are able to act purposefully due to critical thinking, which is a type of mental processes. Likewise, individuals can suppress and prevent the repetition of habitual patterns, stereotypes, biases and assumption through this mental process. Furthermore, the information available is evaluated and judged upon and through this, logic, comparisons and inferences can be used to allow access to specific ideas, theories or behaviors (Altin & Saracalo lu, 2018). There are several types of thinking, includin critical, analytical, creative, and re ective thinking. Of the aforementioned, critical thinking o en emanates when there is a discussion on academia. is is a unique characteristic of the human mind which distinguishes it from other creatures. Here teachers re ect on the situations at hand, analyze them into their elements, and draw the necessary plans to understand these situations, in order to reach the desired results (Halpern et al., 2012).

As a term, 'critical thinking' is ubiquitous in the current pool of literature and it carries numerous variations of how it is de ned. For Halpern (1993), critical thinking and higher-order thinking skills are interchangeable in their applica Additionally, they are valued as a talent for collecting and analyzing information, extracting the main ideas, and drawing conclusions (Halpern, 2001). Contrastingly, Facione (1990) takes a di erent view of how critical thinking should be understood. e author argues that as a construct, critical thinking is separate from other thinking skills and that not all cognitive skills should be associated with critical thinking, with the exception of interpretation, analysis, evaluation, inference, explanation, as well as the self (Halpern & Butler, 2011).

e concept of re ective practice and its birth are o en attributed to the work of the renowned philosopher John

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How to cite this article: Alshamrani LM (2024). Reflective Practices Among Secondary School Computer Science Teachers: Their Point of View. Pegem Journal of Education and Instruction, Vol. 14, No. 1, 2024, 100-110

Source of support: Nil.

Conflict of interest: None.

DOI: 10.47750/pegegog.14.01.12

Received: 02.01.2023

Accepted: 03.07.2023 **Publication:** 01.01.2024

Dewey, who in 1933, published a book titled 'How We Think'. Therein, he discusses the importance of contemplation in building on developed experience and in actuality, this is the basis for teaching and learning processes. Furthermore, he alludes to the necessity of discovering experiences that lead individuals towards comprehensive awareness which in turn, helps to convert experience into learning. Dewey was an advocate for teachers to practice reflection in social contexts and other environments which cater for learning to occur. Accordingly, analyzing teacher's ideas through their teaching practice is vital as it can encourage variation of practice methods and lead to the desired development in teaching practices (Ward & Gracey, 2006). Within his school of thought, John Dewey alluded to the concept that reflective thinking was a process through which a person comprehended aspects of an experience and could link it to a previous occurrence. This allows the individual to systematically navigate between the aforementioned experiences through deep thinking. He further illustrates that reflective thinking occurs in a society which nurtures interaction based on optimism, especially in difficult situations and this consequently fosters one's personal and intellectual growth (Rodgers, 2002).

Florez (2001) states that reflective thinking is a process which comprises four stages, the first of which involves the collection of data on occurrences inside the classroom. The collected data is then analyzed to cater for planning methods in which the desired activities are determined and any available alternatives are established. The fourth stage requires for the plan to be evaluated, which would then give birth to new perspectives and perceptions for improving teaching practices. In this regard, reflective practitioners should accept that their teaching practices as well as the associated motives, will come into question so that ultimately, teaching can be improved.

The need to improve the recruitment, preparation, qualification and development of teachers was prioritized as one of the strategic objectives set out by the National Transformation Program, an economic action plan which is part of the Kingdom's Vision 2030 (Jawdah, 2019). Due to these developments, reflective practice takes centre stage as the most appropriate gateway to professional development and staff preparation, in contrast to traditional preparation models (Keshik, 2019).

Given the above, the connection between reflection and critical thinking can be understood. When teachers are able to reflect on their practice, they can implement more effective practices of better quality because they are able to make informed decisions based on their experience (Reagan, 1993). According to Loughran (1996), reflection works best in unorthodox situations and through this process, the learner is given vital support and better able to grasp the information being received. In addition to this, reflection as a process equips the teacher with the ability to guide and direct learning in the most appropriate method of delivery. Reflective thinking enables people to analyze prior knowledge and construct new concepts based on experiences and this ultimately aids the professional development of that teacher (Finlay, 2008). The parallelism between reflection and meta-cognitive thinking grants us the cognitive structure we need to be able to explain how people can alter their decisions and actions based on their goals (McAlpine, Weston, Berthiaume, Fairbank-Roch & Owen, 2004)

For students to acquire the necessary skills in reasoning, their teachers need to be able to teach and model re ective practice. Likewise, teachers themselves need to have learned re ective practice during their initial education and training, and would have continued developing their re ective skills throughout their careers. In actuality, many new teachers lack the knowledge and experience of how to transfer the thinking strategies they learned in college to classroom teaching. Students are o en asked to 'think' without teaching them how to do so, or without teaching them the possibility of di erent types of thinking. In some cases, a clear de nition or rationale for critical re ective practice is not a orded to the learners. A study by Alessio & Charles (2019) focused on one of the most important ways to develop and prepare teachers in various elds, which is to initiate re ective practices. is is because such practices put the self-development of teachers and educators to the test by evaluating their teaching practices. In turn, this enables teachers to raise their level of self-awareness and develop their professional growth, as they analyze their contemplative practices. In other words, teachers can evaluate their own practice through observations, criticism, logical analysis, and their openness to those around them. Choy et al., (2019) are also of the opinion that practicing the process of re ection in the classroom o en equips teachers with the ability to solve classroom problems on their own and makes them more aware of the beliefs and values they have towards the teaching process. is leads to the teachers being more involved in curriculum development and allows for more interaction with the processes of change within the school (Qhoos, 2017). Furthermore, teachers are able to take responsibility for their professional development and meet the educational and behavioral needs of their students through constantly practicing the process of reviewing their goals, teaching methods and educational tools (Qhoos, 2017).

Aim of the Study

Given the aforementioned, the current study explores the extent to which Saudi computer science teachers are aware of re ective practices and whether they apply them. e paper also seeks to reveal which strategies are used by the participants as mechanisms for re ection. Additionally, certain variables such as gender, experience and quali cations on teachers'

re ective practices are discussed in relation to their e ects on teachers' re ective practices.

e main question of the study can be determined as **What are the Critical Reflective Practices Among Computer Science Teachers in Riyadh from their Point of View?**

Research Questions

1. What is the estimation degree of the critical reflective practices by male and female teachers?
2. Are there any statistically significant differences in the estimation degree of the critical reflective practices due to the gender variable?
3. Are there any statistically significant differences in the estimation degree of the critical reflective practices due to the variable years of experience?
4. Are there any statistically significant differences in the estimation degree of the critical reflective practices due to the educational qualification variable?
5. What strategies do teachers use to reflect on their practices?

Objectives of the Study

The study at hand presents a myriad of aims which include determining the degree of the critical reflective practices among computer science secondary school teachers in Riyadh from their point of view. The study also sought to analyze the critical reflective practices among the aforementioned teachers from their perspectives. Similarly, finding an effect of the variables of qualifications and experience on the perceptions of the participants was also among the study's objectives. For the final objective, the study was designed to determine strategies used by computer science secondary school teachers in Riyadh to reflect on their practice.

Definition of Terms

Reflective Practice

Reflective practice is defined as a continuous learning process used as an imperative tool by students and educators to ensure the success of learning and development. In this process, individuals can recall their actions as a source of personal development and betterment. Reflective practice is built on the principle that 'experience' alone does not always guarantee learning, but 'reflection of what one has experienced' results in learning and personal growth (Finlay, 2008).

As part of this research, teachers can use reflective practice techniques to evaluate their actions in an objective manner. They can also analyze emotions, results, experiences of their actions, as well as effectiveness of their exertions. By doing so, plans for improving teaching styles and instructional practices can be made and implemented.

Critical Practice

Critical practice can be defined as the blueprint used by critics and observers with the aim of understanding and evaluating a given field of knowledge. Applying critical practice serves the goal of developing the ability and skills needed to explore beyond the usual aspects of any given profession. This comprises any unintended effects, causes, and consequences and to do so, one has to approach this from a critical and evaluative perspective (Ahmed, 2020)

In this research, critical practice is defined as the strategy that the teacher uses to understand and evaluate the educational process with the aim of developing the teaching proficiency and exploring beyond the boundaries of goals set for the educational process. As a result, the teachers can approach their practice from a critical and evaluative angle so as to unearth any unintended side effects, causes, and consequences.

Study Delimitations

In this study, there are a few delimitations which should be acknowledged. That been said, the aforementioned should not affect full appreciation of the merits brought forth by the research. The first delimitating factor is the subject at hand; the current study only focused on reflective practices for computer science secondary school teachers. In other words, the subject could be broader in future studies. Likewise, there were limitations in relation to the location as all aspects of the study were conducted in Riyadh, Saudi Arabia. The sample was also limited to 223 computer science teachers in secondary schools. The last delimitation is the period, which was restricted to the third semester of 2021/22.

Study Tools

The study tools comprised perimeter sources in the form of books, periodicals, and scientific journals that dealt with the variables of the study in the last ten years. The study's questionnaire represents the second tool; it was designed by the researcher and consisted of two axes.

Review of Literature

The nature of learning and teaching commends that as individuals, we need to observe challenges through multiple lenses of different variations, and this is an aspect of reflective practice. It is common belief that activating reflective practice acts as a vital component of sustainable professional development and teacher education. ere is a relationship between reflection and development, and re ection leads to rapid development, which in turn fosters improvement of the processes that take place in the classroom and learning outcomes (Qutoshi, 2018)s, teachers and learners rely on informed thinking in instances which require

problem-solving, decision-making, and critical thinking processes.

In the twenty- rst century, learning and teaching at school have been a ected by globalization and the technological revolution. is is in addition to what has emerged from digital technologies and the ongoing development of exible learning spaces. ese developments purport to maximize re ective practice by educators and this is based on Benade (2015) who illustrated a project in which several New Zealand case studies were used to engage educators and leaders in interviews to explore their experiences of the future-digital re ective convergence. is highlighted theoretical and critical explanatory approaches, and the data shows the relationships between re ective practice and learning in the twenty- rst century. e relationships emerged as a result of analyzing and comparing educational theoretical discourses produced by a group of former principals and leaders on the one hand, and teachers on the other hand.

Baljoun and Kawther (2010) fractionate the processes of re ective practice into three fundamental phases, the rst of which is referred to as a descriptive process. is approach requires individuals to describe and analyze reality using critical thinking skills. e next stage would involve the process of conjuring up a plan for implementing change and this ultimately leads to the nal stage, which is to improve the outcome of similar situations in the future. Similarly, another aspect of the nal stage is that bene ts can be extracted from any new situations that arise.

One of the gems of practicing re ection in teaching and learning can be found in encouraging the practitioner to view challenges from multiple perspectives. Re ective practice can have positive influence on how teacher education is designed and how professional development can be made truly sustainable. To this extent, conscious reflection is a vital catalyst for supporting teaching and learners in problem-solving and decision-making processes, as well as nurturing critical thinking abilities A study by Abdulwali et al., (2017) investigated teachers' perceptions regarding their experiences with re ective practices and re ective teaching. A three-dimensional questionnaire was the main tool for data collection and it was distributed to 458 (237 male and 221 female) science teachers working at high schools in Saudi Arabia. e results indicated that teacher practices were at a high level from the participants point of view and this holds true for nearly all re ective activities covered in the three dimensions. is included aspects such as the extent and area of practicing re ection, as well as ways of engaging in such practice. In relation to the gender and experiences in the teaching profession, the results revealed that no signi cant di erences in the teachers' perceptions of their practices of re ective activities could be con rmed.

Critical re ective practices lead to a change in teachers' teaching style, which ultimately leads to better performance through clari cation and observation. In addition, this allows for the analysis of the convictions and beliefs that teachers hold about their professional roles and responsibilities. us, it can be concluded that re ection provides a basis for the growth of individuals intellectually and professionally. is requires teachers and researchers to provide everything related to the nature of thinking and learning (Schoonard et al., 2020).

e teachers' critical re ective practices reinforce the beliefs of their teaching selves, which consequently re ects positively on the teachers' sense of their ability to achieve the desired learning goals and bolsters their con dence in the methods used in teaching. Additionally, such practices also highlight the degree of their e ectiveness associated with the achievements of their students, as well as a ect teachers' attitudes toward their teaching behavior while raising awareness of their di cult roles (Tshering et al., 2022).

Regarding the role of critical reflective practices in developing the level of awareness of practices, the process of contemplation enhances the role of the researcher in critical re ective practices. To this extent, the teacher's sense of doubt or dissatisfaction is aroused and all actions therea er are fully examined. In such cases, the practitioner plays the role of the researcher, as he begins to collect information and data, focusing on his personal behavior within the professional context (Aldahmash, 2020).

Furthermore, practitioners simultaneously take the role of the critic who monitors and follows his/her actions so that he/she stands away from the experience itself. By doing so, the teacher can observe the practice through the lenses of a critic and thus plan for an intervention if necessary. Critical re ective practices are a powerful force for educational change and an e ective approach to professional development (Nazir et. al., 2022). is is because critical re ective practice is an integrated way of thinking and doing.

In education, signi cant focus is placed on learning and behavior. In addition, re ective practice culminates in greater levels of self-awareness about the nature and impact of one's performance. erefore, by obtaining such awareness, prospects of professional growth and development can be realized (Decker et al., 2021). ere are many studies that have proven the role of critical re ective practices and their impact on the professional development of teachers, as well as achieving unlimited professional growth. e growing trends in education have drawn the attention of educators to the interest in constructivist theory in learning. e premise states that the learner builds knowledge through the processes of interaction and integration with the educational content and the surrounding environment. erefore, these trends came to be at the forefront of the factors that contributed to the emergence of the idea of critical re ective practices in the educational eld.

Research conducted by Scott and Issa (2008) sought to identify the relationship between reflection practices implemented by teachers, student satisfaction and learning outcomes. The data was collected from (45) students using a questionnaire, interviews and blogs. The findings confirmed a positive relationship between reflective practices, students' performance and the rate of their responses. The results also highlighted a gradual increase in the development of cognitive challenges and the development of assessment skill.

In their study, Ogonor and Badmus (2006) aimed to investigate the e ect of re ective teaching on the beliefs of student teachers concerning their future roles. A questionnaire was favored as the data collection tool from a sample of 304 nal year students at Teachers College in Nigeria. e results also con rmed that there is an e ect of teachers' beliefs about re ective practice on their current and previous knowledge in education, their professional growth, their previous experiences, and their pursuit of achieving excellence.

A separate study conducted by Abu Askar and colleagues (2017) sought to identify the level of appreciation of science teachers for their re ective practices in the northern Gaza governorate from their perceptions. e authors chose to use the analytical descriptive approach and a questionnaire was lled out by 131 male and female participating teachers. Upon completion, one of the stand-out results was that the re ective practices of science teachers were at a moderate level.

Minott (2009) conducted a qualitative study which included observing the practices, interviews, and documentation analysis of four teachers. e author also sought to identify the extent to which the participants used the principles of re ective teaching in implementing the teaching steps. eseresults indicated that three of the four teachers were more re ective in their teaching practices. is is because they used the principles of re ective teaching in most of the teaching steps and activities. Additionally, the ndings demonstrated that the application of re ective practices positively a ects the teaching contexts and situations.

In another study, AlRashidi (2018) focused on estimating the level of reflective practices among secondary school teachers in Buraidah city in Saudi Arabia from their perspectives. e author opted for a descriptive approach using the re ective practices scale on a sample of 257 male and female secondary school teachers. e results showed that the level of use of re ective practices by the research sample was moderate. Moreover, it was established that there were no statistically signi cant di erences in the level of use of re ective practices by the research sample due to the variables of gender and specialization.

A model of in-service teacher training which serves to develop teachers' abilities to practice and implement re ective processes in teaching was suggested by Schön, a renowned researcher and academic. It has been observed that teachers face di culties when trying to implement and practice everything they have learnt due to the complex nature of teaching. is problem is further compounded if no planning was done because teachers are expected to think, analyze, and re ect on every detail of their teaching process. In the realm of practice, teaching is not limited to being a set of abilities and expertise acquired by the practitioner, but it is also the manifestation of the thinking process, the formation of ideas and notions of what occurs in the classroom (Schön, 1984).

Ostaz (2011) investigated science teachers' abilities in practicing re ective thinking to solve educational challenges they encounter while teaching at the primary level in Gaza. Furthermore, they sought to determine the e ects of certain variables such as gender, experience, academic quali cations, as well as the type of institution i.e., public schools, UNRWA schools, in relation to reflective thinking. The research comprised 108 participants and the researcher gathered data using a re ective thinking scale. e scale included a total of nine issues which science teachers could possibly face while engaged in their daily practices. e results from the study pointed to the fact that practitioners are yet to reach satisfactory levels of mastery for re ective thinking. In fact, the levels were below 70%, which fails to meet the current expectations. Furthermore, significant differences were noticed in favor of experienced teachers for the experience variable.

In a study by Shaheen (2012), the levels of re ective practices in faculty members employed at Al-Quds Open University and the link to their attitudes toward professional self-development were investigated. The findings, from 117 participating faculty members, demonstrated that the practitioners had achieved mastery of re ective practices beyond satisfactory. It was also noted that there were no statistically signi cant di erences found concerning academic qualifications, the college, or the years of experience. at been said, the results revealed signi cant relationships between the participants' attitudes toward professional development and their re ective practices.

Methodology

Study Approach

In order to achieve the objectives of the study, a descriptive method was used, which can be defined as a specialized descriptive approach to data and facts collection, compilation and tabulation. This is in addition to analyzing the exact depth of adequate analysis; it also includes a degree of interpretation of these results and therefore, it is used as a measurement approach. Classification and interpretation methods are also utilized in order to extract significant conclusions, and thus extract meaningful conclusions.

Sample and Sampling

The study population is comprised of computer science secondary school teachers in Riyadh, Saudi Arabia. The entire population number is 739 male and female participants and from this, a random sample of (223) computer science secondary school teachers was selected. (48.5%) of the participants were males and (51.5%) of them were females. (38.8%) of the participants had more than 10 years of experience, while (33.2%) of them had anything between five to 10 years' worth of experience. However, (28%) of the participants had less than 5 years. As for qualifications, (58%) of the participants were holders of bachelor's degrees, and (30.2%) had obtained Master's degrees. Those with PhD degrees made up (11.7%) of the participating population.

Research Tool

The research tool used is the questionnaire in order to achieve the objectives of the study and answer its questions

The questionnaire contains a set of items, which support the research topic through its direct relationship with the research objectives and questions.

Description of the Research Tool (Questionnaire)

The questionnaire contained two main parts:

- **The first part** consists of demographic data on the research sample.
- **The second part** consists of the axes of the questionnaire, consisting of (2) main axes which serve the objective of the study.

To collect the answers to the questionnaire, a three-point Likert scale was used with degrees for one (disagree), two (neutral) and three (agree). Participants were asked to rate the extent to which they agreed or disagreed with each statement.

Internal Consistency

The researcher calculated the internal consistency by calculating the Pearson correlation coefficient between each phrase and axis that it belonged to as shown in the table below:

From Table (1), the researcher concludes that all Pearson correlation coefficients between each phrase and the axis that it belonged to, come with a high degree and are significant at (0.01). This indicates a high degree of validity of the internal consistency of the axes' items.

Reliability of Questionnaire

To ensure of the reliability of questionnaire, the researcher used Cronbach's Alpha test as shown in the following table

From Table (2), the researcher concludes that the reliability coefficient values of the questionnaire axes were all of high scores and the total score of reliability was (0.822), which is a positive indication. It refers to the validity of the questionnaire for the application and the reliability of its results.

Table 1: Pearson correlation coefficient between each phrase and axis

e estimation degree of the critical re ective practices of male and female teachers		Strategies used by teachers to re ect on their practice	
N	*Correlation Coefficient*	*N*	*Correlation Coefficient*
1	.897**	1	.559**
2	.799**	2	.681**
3	.786**	3	.743**
4	.618**	4	.831**
5	.704**	5	.662**
6	.611**	6	.701**
7	.804**	7	.699**
		8	.742**

**. Correlation is significant at the 0.01 level (2-tailed).

Table 2: Cronbach's Alpha Coefficients

Axis	*Cronbach's Alpha*	*N of Items*
The estimation degree of the critical reflective practices by male and female teachers.	.863	7
Which strategies do teachers use to reflect on their practice?	.806	8
Total Score	.822	15

Ethical Considerations

The study at hand was guided by ethical principles which were formulated on informed consent, confidentiality, voluntary participation and anonymity. Thus, the consent of all participants was obtained before any aspects of the research were initiated. This was done though an email which clarified every detail of the study, including the aims and how the data would be used. When completing the consent form which was communicated as an online survey, the participants were assured of their anonymity. Likewise, the participants provided their signatures and acknowledged that they always reserved the right to withdraw at any point. The researcher can confirm that all protocols were observed which therefore ensured strict adherence to the above-stated ethical principles.

Statistical Method

For the research and its goals, the researcher used the (SPSS) program by analyzing frequencies, percentages, means, standard deviations, Person correlations, Cronbach's Alpha, and equation of the range as follows: ((1: 1.66) Disagree, (1.67: 2.33) Neutral, (2.34: 3.0) Agree)

Results and Discussion

The estimation degree of the critical reflective practices of male and female teachers

To study the estimation degree of the critical reflective practices of male and female teachers, the researcher used the mean, standard deviation and the rank for each phrase as follows:

From Table (3), the researcher concludes that the estimation degree of the critical re ective practices of male and female teachers was represented by the (agree) option, with a mean of (2.54) and the standard deviation as (0.72), which is considered to be a low value. us,there is clear similarity between the opinions of the participants regarding this axis and because all the items on the survey had low values of standard deviation, this also shows the uniformity of the participants' opinions on those items.

e results in Table (3) represent the degree of re ective practices among secondary school computer science teachers in Riyadh. e degree of re ective practice, which is from the participants' point of view, is considered to be of a high value and from the results, 'practicing re ection a er attending a training session' was the most important. It was ranked rst and had a mean average of (2.70) out of 3. With a mean average of (2.69), the statement which declared that 're ection practice a er a visit from the supervisor or school principal' was ranked second. 'Re ection practice a er the end of teaching a unit' was ranked third and (2.65) was the average mean. e fourth position was represented by 're ection practice a er the end of the lesson', which had a mean of (2.49). us, these ndings are consistent with a similar study conducted by Ferraro (2000), which highlighted the high levels of habitual teacher re ection on their experiences. It was also shown that such practices result in progress toward techniques of e ective development. Similarly, a study by Obaidat (2017) produced comparable results which support those of this current study. erein, the high rates of re ective practice levels by primary school teachers were evident. e consistency in the ndings also applies to the results in studies by Rayyan (2014) and Shaheen (2012). e former indicated high levels of re ective practice among mathematics practitioners, whereas the latter research asserts that from their point of view, the participating faculty members had high levels of re ective practices. e ndings of this study are in contrast to the work of Farwana (2006), which demonstrated that the participating teachers had low levels of knowledge in regard to re ective practices.

To determine the possibility of any statistically significant differences in the estimation degree of the critical reflective practices due to the gender variable, the researcher used the independent sample t-test.

From Table (4), there is no significant difference in the estimation degree of the critical reflective practices due to the gender variable, where (sig = 0.612). This result was more than (0.05) and this agreed with findings by Abdulwali et al., (2017),

Table 3: The Means and Standard Deviation for the First Axis

No	Phrase	Mean	Std. Deviation	Rank
1	Practicing re ection a er attending a training session.	2.70	.871	1
2	Re ection practice a er a visit from the supervisor or school principal	2.69	.719	2
3	Practice re ection while writing the lesson plan	2.48	.469	5
4	Re ection practice during the lesson	2.41	.532	6
5	Re ection practice a er the end of teaching a unit	2.65	.845	3
6	Re ection practice a er the end of the lesson	2.49	.931	4
7	Re ection practice a er meeting parents	2.39	.682	7
General mean		2.54	0.72	

Efe (2009), Ostaz (2011) and Rayan (2013). in their studies, the results showed that there are no significant differences in the teachers' views about their reflective practices in relation to their gender. When compared to the outcomes of research conducted by Abu Sultan and colleagues, (2017), it is explicitly clear that the results of this study oppose their findings. The aforementioned team of researchers produced a study in which there were no significant differences due to the variables of experience gained and academic qualifications. However, that study also produced findings which highlighted the statistically significant differences due to the variable of gender and this was in favor of the female participants.

To establish whether there were any statistically significant differences in the estimation degree of the critical reflective practices due to the years of experience variable, the researcher used the One-Way Anova -test.

From Table (5), there is a significant difference in the estimation degree of the critical reflective practices due to the years of experience variable. Here, the result showed (sig = 0.00), which is less than (0.05), and these differences were attributed to the group in which the participants had more than 10 years of experience. e results contradict ndings by Rayan (2013) in which it was con rmed that there was slight signi cance in the level of re ective teaching practices and this favored teachers with less experience.

These results also oppose the findings in a study by Abdulwali and colleagues (2017). In their research, the results showed that there are no signi cant di erences in the teachers' views about their reflective practices in relation to their experiences in the teaching profession. Additionally, Boukahos also contends that no relationship could be established between re ective thinking and the number of years gained as experience by the participating instructor.

However, numerous teachers have clearly demonstrated that experienced practitioners are more probable to engage in re ective teaching practices and the same cannot be said about those with little or no experience (Efe, 2009; Ostaz, 2011).

From table (5), it is apparent that the amount of experience gained by a practitioner has an impact on their level of re ective practice. is is contrary to the results found in the works of Rashidi & Javidanmehr (2012), and Ansarin et al. (2015). In these studies, it was established that teaching experience has no signi cant e ect on the quality or level of teaching practice. On the other hand, Saylor (2013) was of the opinion that a strong correlation exists between re ective teaching and experience gained. Likewise, Impedovo & Malik (2016) reported that practitioners with credible experience demonstrated critical attitude toward their practice with the aim of improving student achievement. e ndings of this research are consistent with the ndings stated in the studies by Saylor (2013) and Impedovo & Malik (2016).

us, it can be concluded that despite the notion that the amount of teaching experience has no effect on the e ectiveness of re ective teaching practice, there is substantial evidence to show that the opposing theory is true. In other words, the more experienced a teacher is, the higher the likelihood of re ective practice being implemented. To this extent, this study asserts that practitioners with more years of experience engage in re ective practice more than those with less experience. is is based on the ndings which highlighted a di erence between senior teachers and their novice counterparts regarding re ective practice.

To investigate any statistically signi cant di erences in the estimation degree of the critical re ective practices due to the educational quali cation variable, the researcher used the One-Way Anova -test.

From Table (6), there is no signi cant di erence in the estimation degree of the critical reflective practices due

Table 4: Significant Differences in the Estimation Degree of the Critical Reflective Practices Due to the Gender

Male		*Female*				
Mean	*SD*	*Mean*	*SD*	*T*	*Df*	*Sig*
3.22	0.784	3.59	0.699	1.271	221	0.612

Table 5: Significant Differences in the Estimation Degree of the Critical Reflective Practices Due to the Years of Experience Variable.

Less than 5 years		*Between 6 and 10 years*		*More than 10 years*				
Mean	SD	Mean	SD	Mean	SD	*F*	*Df*	*Sig*
4.19	0.601	3.19	0.688	5.17	0.433	52.684	220	0.00

Table 6: Significant Differences in the Estimation Degree of the Critical Reflective Practices Due to the Educational Qualification Variable

Bachelor		Master		PhD		F	Df	Sig
Mean	SD	Mean	SD	Mean	SD			
3.77	0.703	3.69	0.711	3.72	0.688	13.761	220	0.121

Table 7: The Means and Standard Deviation for the second Axis

No	*Phrase*	*Mean*	*Std. Deviation*	*Rank*
1	Individual practice of mind reflection.	2.64	0.57	3
2	Individual practice of reflection in writing.	2.44	0.801	4
3	Practice of mind reflection with a colleague within the same school.	2.66	0.702	2
4	Practice of mind reflection with another individual outside the school.	2.81	0.432	1
5	Practice of reflection in writing with a colleague at the same school.	2.39	0.801	6
6	Practice of reflection in writing with another individual outside the school.	2.41	0.651	5
7	Group practice of mind reflection with colleagues within the same school.	2.33	0.688	7
8	Group practice of mind reflection with teachers outside the school.	2.19	.831	8
General mean		2.48	0.68	

to educational qualification variable. These findings are consistent with other studies such as Ostaz (2011) and Shaheen (2012) which concluded that that there were no statistically significant differences based on educational qualification variable on teachers' reflective practices.

What strategies do teachers use to reflect on their practices?

To study the strategies, use by teachers to reflect on their practice, the researcher used the mean, standard deviation, and the rank for each phrase as follows:

From Table (7), we conclude that strategies teachers use to reflect on their practice were highlighted through the (agree) option. The mean was (2.48) and standard deviation as a low value of (0.68). This indicates homogeny in the opinions of the study sample members on this axis. Similarly, all the questionnaire items had low values of standard deviation, indicating homogeny in the opinions of the study sample on the aforementioned items

A er ranking the items, rst place was given to the item which stated the "practice of mind re ection with another individual outside the school". e second item in ranking was "practice of mind re ection with a colleague within the same school". As shown in the table, the highest ranked were those practitioners who engage in communal practice of re ection with colleagues within the same school or from elsewhere.

e items ranked in the middle of the standings include "individual practice of mind reflection" and "individual practice of re ection in writing". is supports the notion of re ection-in-action as presented by Schon (1987); the author suggested that this type refers to the importance of practitioner awareness of their decisions while engaged in practice and their ability to take necessary action when called upon.

e last two items in the ranking were "mind re ection in writing with a group of teachers within the school" and "mind re ection in writing with a group of teachers outside the school." Writing in groups whether inside or outside the school was ranked last in the table.

Conclusion

This research has revealed the computer science teachers' reflective practice in high schools in Saudi Arabia. The estimation degree of the critical reflective practices of male and female teachers was highlighted through the (agree) option. is study has produced ndings which revealed that teachers unanimously agree on the importance of implementing critical re ective practices. Most of the participating teachers opted to agree with the practice of re ection a er a training session. ere is no signi cant di erence in the estimation degree of the critical re ective practices due to the gender or quali cation variable. However, the results presented a signi cant di erence in the estimation degree of the critical re ective practices due to the years of experience variable. ese di erences were found in the group which had participants with more than 10 years of experience.

It is evident that teachers employed di erent strategies to re ect on their practice. A er ranking the items, rst place was given to the item which stated that "practice of mind re ection with another individual outside the school". e second item in ranking was "practice of mind re ection with a colleague within the same school". Given what is shown in the standings, it is clear that teachers who practice re ection communally with others were ranked higher.

is study proposes that teachers be thoroughly trained on practicing strategies used in re ective approaches through courses and workshops. In addition to this, there is a need to help practitioners develop their professional conduct and motivate them to engage in re ective practices. Similarly, the study advocates spreading awareness on the importance of re ective thinking. e nal recommendation is for the teacher's supervisor to request the practitioner to maintain a re ective journal with the aim of constantly engaging in re ective practice.

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