Education Journal
2022; 11(5): 214-230
http://www.sciencepublishinggroup.com/j/edu
doi: 10.11648/j.edu.20221105.12
ISSN: 2327-2600 (Print); ISSN: 2327-2619 (Online)

The Effectiveness of a Training Program Based on Cloud Computing in Developing Reflective Teaching Skills and Self-Efficacy Among Mathematics Teachers

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To cite this article:
Mansour Samir Elsayed Elseidy. The Effectiveness of a Training Program Based on Cloud Computing in Developing Reflective Teaching Skills and Self-Efficacy Among Mathematics Teachers. *Education Journal*. Vol. 11, No. 5, 2022, pp. 214-230.
doi: 10.11648/j.edu.20221105.12

Received: January 29, 2022; **Accepted**: February 21, 2022; **Published**: September 8, 2022

Abstract: The research aimed to identify the effectiveness of a proposed training program based on cloud computing applications in developing reflective practices and self-efficacy among mathematics teachers. As a teacher, they applied the experimental program and the study tools represented in the cognitive achievement test related to reflective teaching skills, the note card for the performance aspects of practicing reflective teaching skills, and the self-efficacy scale. The results of the research revealed the effectiveness of the program in what it aimed at. Where a statistically significant difference was found at the level ($\alpha \leq 0.01$) between the mean scores of the research sample who studied the program in the pre and post applications of the achievement test and the observation card for reflective teaching skills, and the self-efficacy scale in favour of the post application, and the research recommended the need to adopt reflective teaching, tools and strategies In preparing and developing programs for preparing mathematics teachers before and during the service, in addition to increasing the number of training hours in educational preparation, it is necessary to generalize the training program based on cloud computing applications, and study its effectiveness in developing the knowledge and skill aspects of teachers.

Keywords: Training Program, Cloud Computing, Reflective Teaching, Self-Efficacy, Mathematics Teachers

1. Introduction

The twenty-first century is characterized by rapid development and increasing scientific and technological progress in all fields of knowledge. This requires more challenges and responsibilities to prepare individuals, who have the ability to question, solve problems, contemplate, deal with flexibility, and contribute to have a life of harmony. This will be through thinking and contemplation, and a constant readiness to continuous learning, interest in using modern technological teaching strategies and methods and making them more dependent on the learner, and benefiting from them in their practical lives away from the culture of memorization [24].

Traditional forms of learning are no longer suitable to keep pace with social learning processes and meet its requirements, which made the e-learning opportunity suitable for solving the problems of traditional education, and this development led to the emergence of the so-called cloud computing, which relies on transferring information to educational platforms that are accessed through Internet without being restricted to a specific place [77].

The theories that support the electronic cloud stem from the philosophy of the constructivist theory. When the teacher uses electronic cloud systems and applications, he feels his ownership of the education system, which pushes him towards continuous activity in order to build his knowledge instead of discovering it logically. Knowledge construction process occurs, either individually, or collectively through social applications provided by the electronic cloud, which allows students to communicate and participate in making learning contents [39].

Employing the electronic cloud in educational situations also depends on the principles of motivation theory, which affirms that the learner's motive to participate in electronic cloud applications is based on three main motives, including those related to intrinsic motives based on personal

enjoyment, and social commitment, which means participatory building of content and exchanging it with others. This helps in the development of capabilities, contemplation and thinking. Finally, external motivation focuses on the self-development of the learner and the development of his abilities and skills. There is no doubt that cloud computing, with what it provides to the learner is an umbrella that contains various media and files that he can use and interact with individually or collaboratively without being restricted to a prior preparation of an environment that helps in the processes of self-development [52].

By reviewing the results of many studies, it was emphasized the need to use the electronic cloud in teaching mathematics because of its effectiveness in developing many important learning outcomes for mathematics teachers, including these studies: [43, 53, 61, 67]. Many previous research and scientific conferences recommended the importance of using cloud computing applications in the educational process to develop many important learning outcomes, including the studies: [15, 46, 64]. Recommendations of several conferences, including: The Third International Conference of the Faculty of Education, October 6 University in cooperation with the Association of Arab Educators entitled: The Future of Teacher Preparation and its Development in the Arab world for the year (2017) [36], the first international forum of the Faculty of Education, Benha University, entitled: Applications of Technology in Education for the year (2017) [25], the nineteenth Scientific Conference on Information Systems and Computer Technology (2012) [70], all of which recommended taking advantage of cloud computing as a technological innovation that increases the effectiveness of the educational process because of its characteristics and advantages that allow the development of learning outcomes through the electronic courses.

Reflective teaching, as one of the modern trends in teaching and learning mathematics, emphasizes the need to give mathematics teachers the opportunity to reflect on their teaching, which contributes to strengthening their ability to follow and evaluate their own learning path towards learners, and make them more reflective in facing difficult situations, enriching all aspects of their learning, increasing their awareness during the implementation of activities and making it the focus of the educational process.

Reflective teaching is a form of learning that requires deliberation in the problem and observation of learning situations, taking into account previous experiences, and then generating new knowledge, and then the learners can give meaning to their learning processes by linking the previous cognitive requirements with the experiences of the present and future in their learning [38]. Constructivism is one of the theories that has a clear impact on reflective teaching, as it sees learning as an active process through which learners reflect on their previous or current knowledge and experiences to generate new ideas, knowledge and concepts. Learning is considered an integrated cycle that begins with experience and continues through contemplation of this experience, from which the desired behavior stems [60].

Recent trends in professional development programs for mathematics teachers focus on reflective teaching skills in response to contemporary requirements to prepare the future teacher. This aims to continuously develop teaching practices for mathematics teachers, and thus ensure better education for learners. In the processes of analysis and interpretation of the nature of reflective practices during teaching, teachers deal with the educational and pedagogical problems they face in the educational situation of varying degrees of complexity, and thus develop their professional and reflective abilities, and produce meaningful and more efficient learning [17].

Accordingly, the preparation of mathematics teachers should be based on the interest in developing reflective teaching skills, as the mathematics teacher should be a contemplative thinker in the teaching processes that he carries out, such as planning, implementation, evaluation, and directing his reflective thinking in what he does. This increases his awareness of performance that he practices inside the class, which generates the ability to self-criticism of his educational practices, and this increases his conviction of the importance of making appropriate adjustments to his undesirable practices, which contributes to the development of his behavior as a mathematics teacher [38].

Reflective teaching revolves re-thinking and reflective thinking, describing it as a process of continuous proactive examination or testing of personal beliefs, practices and experiences. It is an internal dialogue with oneself through which a person recalls, examines and evaluates his current and past experiences, beliefs and perceptions. During the reconstruction and organization of the experiences that are meditated [5] " Vygotsky pointed out that reflective teaching is important in helping the teacher to be more reflective in his thought processes, and enable him to reach mastery in organizing his learning [34].

Piaget has also emphasized on the importance of reflective teaching in mathematics, explaining that the use of mathematics requires the learner to think about the mathematical relationships and rules he uses, and to shift from not being aware of them for being aware of them [26].

Reflective teaching is a systematic process characterized by continuity, in which the teacher takes organized steps aimed at improving his performance and professional development, including collecting and analyzing descriptive data, followed by self-evaluation to identify strengths and weaknesses, and then developing a plan for development.

pointed out that there are many benefits of reflective teaching for mathematics teachers in terms of ease of use, flexibility in using different educational contexts and programs, professionalism in developing planning and application, developing teacher behavior, interaction skills, and durability in saving time. Sufficient for teachers and their self-development, understanding the teaching and learning process, increasing the understanding of the strategies and information available to them, and raising the quality of learning opportunities provided to learners [26, 48].

In order to achieve the goals of reflective teaching and qualify a teacher who is able to raise the quality of learning

opportunities for his learners, he should be able to evaluate and judge his achievements, not only depend on achievement, which is known as self-efficacy, and stresses [75].

Self-efficacy is not just feelings sentimental only, but it is the individual's evaluation of himself and what he can do, the extent of his persistence and perseverance to complete this work, the amount of effort he exerts with the situations and problems he faces, his ability to confront them and his resistance to failure.

stressed that learners should be given time to meditate to reach meaning and respond to new situations, and through observation, contemplation and reflection, learners become more sensitive and aware of their behavioral patterns, and it is easier for them to identify the performances that shape their behavior [40, 59].

Therefore, preparing the mathematics teacher through a program that aims to develop his teaching practices has become an essential entrance to his preparation, as it enables the teacher to develop himself because he analyzes and evaluates his practices, initiates change and monitors the quality of this change. Therefore, the value of reflective teaching lies in the ability to refine classroom practice and improve The quality of the teaching and learning processes for the teacher and the learner, and confirms [74] that the development of the teaching practices of the teacher contributes to identifying the shortcomings of each learner, and determining the appropriate learning method and how to teach it in a better way.

explained that the concept of self-efficacy constitutes a major dimension of the social cognitive theory, which sees that the learner has the ability to control his behavior as a result of his personal beliefs. Learners have a system of self-beliefs that enable them to control their feelings and thoughts. Accordingly, how the learner thinks, believes and feels affects how he behaves, as these beliefs are the directions of the learner's behavior that works to explain his achievements based on the abilities, he believes he possesses, which makes him make his effort to achieve success. To determine the amount of effort that will be exerted in a particular activity, the greater the sense of efficiency, the greater the effort, perseverance and solidity [22].

confirmed that if the learner has a belief in his ability to perform a task, this will increase his focus, effort and involvement in this task [18], confirmed that the learner's awareness of his self-efficacy affects his academic performance in multiple ways. Learners who have a high awareness of their self-efficacy face challenging tasks, exert great effort, exhibit low levels of anxiety, show flexibility in the use of different learning strategies, have self-organized learning, display high accuracy in their self-assessment of their academic performance and a high internal motivation towards the profession [47].

Although the main objective of the mathematics teacher preparation programs in the faculties of education is to prepare the teacher who is capable of his teaching skills, it can only be prepared through the development of his contemplative practices, and the development of self-efficacy is important in teacher preparation programs, and in organizing educational activities and experiences that can To contribute to changing their beliefs, and preparing a teacher who has the desire, willingness and ability for continuous professional growth.

The researcher's sense of the problem has grown through the results of previous studies that confirmed the weakness of reflective teaching skills and teachers' self-efficacy, such as: [27, 32, 34, 35, 41, 72, 73].

The results of the study (Sarhan, Al-Ghamdi, 2017) also confirmed that (58%) of teachers had not heard about cloud computing technology, and (63%) of mathematics teachers at various levels confirmed that the class time is not sufficient to achieve the required communication from discussing with learners and making sure to understand the content, and that (71%) of the teachers confirmed that the subjects of the mathematics course are many. It is necessary to take into account the aspirations of this electronic generation of learners to provide a new technology that makes mathematics more fun and attraction.

Many previous research and scientific conferences also recommended the importance of using cloud computing applications in the educational process to develop many important learning outcomes, including the study of [15, 46, 55, 64], Additionally, recommendations of several conferences include: the Third International Conference of the Faculty of Education, 6 October University, in cooperation with the Arab Educators Association, entitled: The Future of Teacher Preparation and Development in the Arab World for the year (2017) [36], and the first international forum of the Faculty of Education, Benha University, entitled: Applications of Technology in Education For the year (2017) [25], the nineteenth scientific conference on information systems and computer technology (2012) [70], all of which recommended taking advantage of cloud computing as a technological innovation that increases the efficiency of the educational process. Cloud computing has many characteristics and advantages which allows the development of many learning outcomes through the publication of courses electronically. The researcher noticed, by reviewing research and conferences, their scarcity, to the researcher's knowledge, with interest in employing cloud computing applications in teaching mathematics. Because of the importance and necessity of keeping pace with technological innovations and employing them in the educational process to raise its efficiency and quality, the research sought to employ cloud computing applications in teaching mathematics.

The researcher also applied the observation checklist of reflective teaching skills and self-efficacy scale on a group of (20) mathematics teachers in order to identify the extent to which they possess reflective teaching skills and self-efficacy. The results showed that (90%) of the sample didn't have reflective teaching, its skills and methods, in addition to their low self-efficacy.

What implied in the vision of the Kingdom of Saudi Arabia 2030 is to strengthen the role of the teacher, qualify

and develop it, and in response to this, the National Transformation Program was implemented in the goals of the Ministry of Education. Its second goal is "improving teacher recruitment, preparation, qualification and development", which is identified among its indicators the improvement of self-efficacy.

2. Theoretical Framework and Previous Studies

The theoretical framework deals with a set of research variables represented in the concept of cloud computing, its characteristics and types, its importance in the teaching and learning process, the concept of reflective teaching, its skills, its importance, the concept of self-efficacy, its types, and dimensions, and the previous studies were integrated in a functional way with the theoretical framework. This can be addressed as follows:

2.1. Cloud Computing

2.1.1. Concept of Cloud Computing

Cloud computing, which is an information technology innovation, defines usability, that is, the ability to use the Internet in all corners of the educational process, all activities carried out by teachers, and related to the aspects of learning that they are going through [4].

It is defined as a technology that dealt with many applications that facilitate collaborative work so that the user can access through the computer and the internet to any of the stored files that you work with and share with others. It may be paid or free and does not require great experience to know how to deal with it [61].

Defined it as a set of applications provided by specialized technical companies that allow users to have multiple services such as transferring storage space from users' devices to the electronic cloud via the internet, exchanging and sharing files electronically. Thus, the user can access, share and publish data and documents without being available. They have the drivers for these apps on their devices [11].

According to cloud computing is as a set of applications, tools and software available on the Internet that learners can use to acquire knowledge content, store its files and share them with colleagues anywhere, synchronous and asynchronous [2].

It is clear from the researcher's point of view that cloud computing applications represent an easy-to-use technological innovation that includes several virtual resources, available on the internet. So, mathematics teachers can access through any device capable of connecting at any time and from anywhere to the internet and this is called self-service on demand. It allows them to process the data proposed to be stored over the network and shared with colleagues, and is available free of charge to them through a standard mechanism that enhances the use by different user platforms such as (workstations, personal computers, laptops, and mobile phones), thus enhancing their professional and educational performance.

2.1.2. Characteristics of Cloud Computing

Cloud Computing has many characteristics assured by the study of as follows [2, 28, 30, 71]:

1) The extreme speed in responding to users' needs with high flexibility in meeting these needs.
2) Cloudy Participation: allows the teacher to create collaborative workgroups that use the same data and all participants can modify and add. It also allows social communication through web tools (W0.3), exchanging experiences and knowledge, sharing teaching activities, sharing PowerPoint presentations and enrichment activities for learners to view, and files information, applications and software via the electronic cloud.
3) Self-service: allows the user to receive the service without interference from the supplier.
4) User-centric: it supplies the user with services and applications available in the electronic cloud according to his needs, such as applications, documents, Google, tables and databases, providing the capabilities of remote information processing related to creating, deleting and modifying files, sharing them with others, and saving them in the cloud structure using web.
5) Power: as it connects multiple computers together in the cloud, and is not limited to a single data source.
6) Storage: It enables the user to make backup copies of the information stored on the cloud with unlimited storage spaces, so that he can access them by searching among the components of the electronic cloud by uploading files.
7) Low cost: cloud computing applications provide the user with most applications and software free of charge, which saves cost, time and maintenance.
8) Accessibility and Usability: it allows the user to easily access and view applications, resources, and files stored in the cloud.

From the above, the researcher noted that cloud computing applications are characterized by diversity, interaction and flexibility in their characteristics that make them suitable for use in transferring the teaching process to learning.

2.1.3. Types of Computing Clouds

Cloud computing includes four main types, each of which contains a set of applications and services. They were identified by: [49, 3, 28], and [63] as follows:

1) Public Cloud: is available to all users and is built by many semantic-knowledge web servers and data centers operating in different parts of the world.
2) Private Cloud: is applied in organizations that have an internal network.
3) Community Cloud: supports a particular community with common interests such as resource requirements, availability, and ease of data flow.
4) Hybrid Cloud: is a mixture of public and private cloud. In a hybrid model, some resources are provided internal to the organization, and others are external.

Refers to many cloud computing applications and services that can be used in the educational process, including [71]:

1) Drive Google: is a cloud that contains many applications, including Google Docs that allow users to create, share and edit documents at the same time, spreadsheets allow creating and sharing lists and files related to lessons, and Google Slides that allows the teacher to provide feedback to learners on these offers. In addition to the application of Google drawings is explaining to learners how to make engineering and mathematical drawings during them.
2) Drop box: allows browsing the files on it without the need to connect to the Internet.
3) One Drive: allows users to simultaneously host and share office files, photos and videos with colleagues.
4) Semantic web applications (W0.3): such as video and photo sharing applications, presentations, educational blogs, charts, YouTube, and social networking tools.

2.1.4. Significance of Cloud Computing in Education and Learning Process

Cloud computing, including its applications, software and communication tools, helps in developing the educational process due to its advantages mentioned as follows [2, 3, 12, 28, 44]:

1) Diversity of teaching methods and styles: the teacher can achieve diversity in the methods of teaching content through cloud computing applications.
2) Distance Learning: cloud computing helps in providing lessons to distance learners, in addition to the ability to store and share teaching activities and PowerPoint presentations for synchronous and asynchronous viewing.
3) Electronic tests: The teacher can prepare electronic tests for learners with many advantages, and send projects, exercises and educational activities to the learner, in addition to the teacher's easy access to the projects submitted by the learner.
4) Free applications and software: The ability is for the teacher and learner to access many free software and applications without the need for this application to be available on the device of each teacher or learner.
5) Learner-centered learning: cloud computing applications support the learner's constructive learning through an active positive role during learning, as it allows the learner to search in many educational resources and sites and enables him to self-learn.
6) Encouraging cooperative learning and communication between the elements of the educational process: Computing supports teaching methods based on cooperative learning, as it allows creating separate files for each user and exchanging them among themselves, and receiving feedback from the teacher and their peers at any time and from anywhere.
7) Achieving sustainable development goals: The possibility of teacher and learner access to cloud computing applications and software contributes to achieving sustainable development goals through developing the various skills of the teacher and learner.
8) Provides better, more efficient and more diversified learning experiences: Using modern technological applications and software allow learning of study materials by providing interactive experiences and effective communication between learners, thus achieving meaningful learning.

It is clear from the above the importance of cloud computing applications in the teaching and learning process, and this was confirmed by many research results and recommendations for the importance of training teachers before and during service on how to employ them in the teaching and learning process, and to overcome their perceptions and beliefs about the obstacles to their use, and from this research [2, 3, 28, 50, 66].

The results of the study [9] and the study [42] Showed that one of the most important requirements for using cloud computing in education is to work to educate the educational staff about the importance of keeping pace with modern trends in the educational field, and to provide teachers with sufficient knowledge of the uses of cloud computing technology, and to train them on it. In addition to linking the newly developed cloud computing with educational administrative systems under one cloud umbrella.

The results of emphasized the need to work in providing the requirements for the use of cloud computing, and to provide teachers with sufficient knowledge and skills to use and employ computing in teaching, and to enhance the technical performance of teachers [12].

The results of the study of indicated the need to identify the factors that should be taken into account to integrate cloud computing applications into teaching engineering courses, and divide them into requirements related to basic infrastructure, requirements for accessing the laboratory with distance e-learning technology and employing applications Cloud computing in it [62].

The results of the study determined the main characteristics of the importance of cloud computing application in creating a specific learning environment on the development of teachers' professional competencies. Results showed that the use of cloud computing applications constitutes an appropriate environment for teachers' self-training [64].

The results of the study also showed that there are positive estimations towards the usefulness of cloud computing applications in the educational process, and the provision of a blended learning environment while meeting the needs of learners [45].

Many previous research and scientific conferences also recommended the importance of using cloud computing applications in the educational process to develop many important learning outcomes, including the study of [13, 15, 31, 46, 55, 64] and Recommendations of several conferences are: The Third International Conference of the Faculty of Education, October 6 University in cooperation with the Association of Arab Educators, entitled: The future of teacher

preparation and development in the Arab world for the year (2017) [36], And the first international forum of the Faculty of Education, Benha University, entitled: Applications of Technology in Education for the year (2017) [25], all of which recommended taking advantage of cloud computing as a technological innovation that increases the effectiveness of the educational process because of its characteristics and advantages that allow the development of many learning outcomes through the electronic publishing of courses.

2.2. Reflective Teaching

Reflective teaching is an educational response to the requirements of preparing future teachers. Stresses that preparing teachers in the light of reflective teaching and its premises; It should be centered around the development of contemplative practices. Meditation enables them to deal with the educational and pedagogical problems they face in the educational situation, of varying degrees of complexity, and thus develop their contemplative and professional abilities, which leads to meaningful, clearer and more specific learning [6].

explained that one of the most important requirements for professional and academic development is to rely on reflective practices during realistic teaching, which in turn leads to change the behavior practiced by the teacher, not only by providing him with information and knowledge in the pre-service preparation stage, but also by providing professional development methods that help him to practice meditation and analyze the educational situation, and push him to make teaching decisions based on understanding and thinking about the teaching situations in which the teacher works. Thus, reflective teaching seeks to positively change the teacher's behavior [65].

Stated that reflective teaching was based on responsibility and self-commitment to self-development, obtaining the necessary skills to review, analyze and study teaching methods. Reflective practices provide teachers with a vision of their teaching philosophy, and identify for themselves strengths and weaknesses. In addition, [78] noted that reflective teaching achieves the link between theory and practice, as it contributes to the exploration of new teaching models, the application of theories in reality, and enables the teacher to perform the dual role as a user and producer of knowledge [19].

There are many definitions of reflective teaching. In [5], it is as an intelligent and continuous work or activity during which teachers investigate carefully and re-think their educational experiences and teaching practices with the aim of improving these experiences and practices, rebuilding and organizing them. This work requires open minds, great care and responsibility on the part of teachers.

Stated that it is the ability to brainstorm professional ideas and practices by examining the teaching problems that confront him rationally to reach appropriate solutions to those problems [74].

added that it is the teacher's ability to carry out an active, conscious and careful mental inquiry about his beliefs, experiences, and conceptual and procedural knowledge in light of the reality in which he works, in a way that enables him to solve practical problems [65].

The previous definitions of reflective teaching can be summarized as "the process of monitoring and self-assessment that includes a number of practices carried out by the teacher and what these practices include in terms of planning, implementation and evaluation of the teaching process with the aim of making a change, improvement and developing these teaching practices and procedures during the teaching situation."

2.2.1. Reflective Teaching Skills

Teacher preparation programs have emphasized the importance of developing reflective teaching skills among teachers, in order to help them become more reflective and reflective in decision-making processes during the teaching process, and to determine the impact of these decisions on their professional competence and abilities.

Stated that it was necessary to establish a developed system to improve the quality of mathematics at all educational levels, and to increase the number of mathematics teachers while improving the quality of their professional preparation [1].

The National Commission on educational standards, and examination processes in America 2000 found that past focus on competencies or basic skills led teachers to lack reflective teaching skills, as well as their lack of competencies that would qualify them to compete in an accelerating global economy [51].

Stated that the reflective teaching skills should be taken into account by the teacher in terms of responsibility and commitment to self-development, possession of a broad knowledge base when teaching, continuous questioning of the self about the nature of teaching, not being aware of much of what is happening in the teaching process, and teaching experience alone is not enough. For continued professional growth, careful critical reflection on teaching practices leads to a deeper understanding of teaching and learners [6].

A reflective teaching skill helps the teacher in knowing and analyzing what is happening in the classroom environment. His work is done, as he enables him to think about his teaching practices, and analyze his beliefs before teaching. These stages are considered the beginning of the professional development journey for a mathematics teacher because reflective teaching practices help in raising awareness about beliefs and attitudes about teaching and learning process, and thus change them for the better [37].

Reflective teaching skills are based on several assumptions that the reflective mathematics teacher should take into account if he wants to improve his self-efficacy in teaching. Through reviewing literature [38, 58, 74], principles of reflective teaching, were: possession of a broad knowledge base about teaching, continuous self-questioning about the nature of teaching, teaching experience alone is not sufficient for his continued professional growth, responsibility and

commitment to self-development, using modern technology to search for developments in the field of specialization, meditation A careful reflection of teaching practices leads to a deeper understanding of teaching.

Therefore, it is necessary for the teacher who reflects on teaching to have an open and flexible mind, a degree of responsibility, enthusiasm and sincerity in working for professional development. He/she should increase his/her understanding of his/her own repertoire of strategies, and raising the quality of learning opportunities for his/her learners in the classroom.

Reflective teaching skills are defined as the teacher's ability to perform a mental activity in which he contemplates the problematic situation, analyzes it and suggests alternative solutions in the light of evidences and proofs that confirms the validity of the proposed solution [48].

mentioned reflective teaching skills as a form of learning that requires deliberation in the problem, observing learning situations, taking into account previous experiences, then generating new knowledge, and then gives meaning to the learning processes by linking past experiences with current and future experiences in the educational process [10].

Defined it as the teacher's ability to envision business, investigate different phenomena, analyze them into their various elements, conscious planning to resolve contradictions and uncover fallacies, propose specific solutions to the problematic situation, and evaluate the effectiveness of solutions [38].

It is clear from the researcher's vision of the above that reflective teaching skills are defined as critical analytical practices and performances used by the mathematics teacher to think about the procedures he is doing to plan, implement and evaluate the lesson, before taking them to make a decision or during or after them to evaluate them and make the decision to change or stay on those Procedures in the light of cloud computing applications, identified reflective teaching skills, which are: the ability to collect descriptive data, analyze it, evaluate the educational situation in light of similar situations, and develop a plan to reach creative solutions to problems [37, 74].

2.2.2. Significance of Developing Reflective Teaching Skills

Vygotsky has pointed out the importance of reflective teaching as it helps teachers and learners to be more reflective in their thinking processes, and to enable them to achieve mastery in organizing their learning [34]. Piaget emphasized on the importance of reflective teaching in mathematics, explaining that the use of mathematics requires conscious thinking about the mathematical relationships and rules that are used, and a shift from lack of awareness of them to conscious awareness of them.

It was explained that reflective teaching skills help the teacher [38, 74, 78]:

1) Analyze and make decisions, which may precede the learning process, occur during it, and afterwards.
2) Plan, monitor and evaluate his method of operations and the procedural steps he takes to pass judgment.
3) Contribute to the development of a sense of responsibility, an open mind and a careful critic.
4) Link ideas with previous and current cognitive experiences.
5) Control his thinking and use modern technological innovations.
6) Develop self-confidence in the face of various teaching and life tasks.
7) Facilitate teachers' development of their teaching theories, reflective and pedagogical practices and develop the foundations of their work in the classroom.
8) Contribute to the generation of new ideas and concepts.

In the context of research that focused on developing reflective teaching skills in mathematics teaching, the study of Arroyo- Lynch identified the impact of mathematics teachers' use of reflective teaching methods on their cognitive beliefs in mathematics content. The results indicated that those beliefs have changed for the better as a result of using the methods of reflective teaching. Reflective teaching, which was positively reflected on the professional growth of teachers and learners towards mathematics [14], as well as a study which demonstrated the effectiveness of a proposed training program using reflective teaching to develop some professional aspects of mathematics teachers in the preparatory stage and its impact on improving academic achievement in mathematics for second graders [29].

While the study of Hassan focused on identifying the effectiveness of a program based on the theory of metacognition in developing reflective teaching skills and self-efficacy among student teachers in the mathematics section in the Faculties of Education. The results indicated the need to increase the number of hours of educational preparation and the period of field training, in addition to the necessity of paying attention to the personal and social preparation of the student mathematics teacher by including in the curricula topics that seek to develop moral and social values and positive attitudes towards the profession [38].

The study of Ryan focused on identifying the degree of reflective practices of mathematics teachers and their relationship to teaching self-efficacy. The results showed a high level of reflective practices among the study sample and a positive relationship between the two variables [57].

The study of Boxley also focused on the use of some reflective teaching methods with student teachers during the field training period. The results showed a growth in the professional aspects related to the use of teaching methods, as well as a growth in student teachers' attitudes towards mathematics teaching, which had the greatest impact. in Mathematics education [19]. The study of Bughahous also focused on identifying the relationship of reflective thinking with teaching performance in general and teaching competencies in particular among student teachers specializing in science and mathematics, and the results concluded that there is no relationship between the level of reflective thinking and teaching performance and teaching competencies in particular [21].

The study of Al-Rashidi also focused on identifying the

degree of contemplative practices of secondary school teachers from their point of view, and the results concluded that the degree of teachers' practice in the secondary stage is medium, and there are no differences attributed to the effect of gender and specialization in the level of contemplative practices [7].

2.3. Self-Efficacy

Self-efficacy is one of the important determinants of learning, which expresses a set of judgments that are not related to what the individual accomplishes. Self-efficacy contributes to the impact of skill, previous cognitive experience and mental ability to understand, and it affects self-regulation processes such as setting goals, planning, self-monitoring and evaluation, and the use of strategies. High efficiency is also associated with the ability to control time, perform tasks, and use appropriate learning strategies [16].

defines self-efficacy as the teacher's belief in his ability to accomplish a task or set of tasks in light of his abilities and cognitive and motivational elements, which enables him to achieve the required level of performance [40], as defined by as what the individual believes about His capabilities and abilities, which are considered as a measure or standard of his abilities and ideas, and therefore self-efficacy affects the choice of educational activities in which he succeeds [22].

Sees it as the degree of teacher's belief in his ability to influence the performance of his learners better and take into account the individual differences between them [47].

Believes that self-efficacy is the teacher's belief in his ability to implement the behaviors necessary to produce specific performance achievements [69].

The mathematics teacher with high self-efficacy must conform to his conviction of his own ability, sets realistic and measurable goals, develops his strategies according to the teaching situations he is going through, and develops himself professionally and academically on an ongoing basis [56].

2.3.1. Types of Self-Efficacy

Identified four types, as follows [76]:

1) Cognitive processes: contribute to the cognitive processing of information that contains ambiguity, to the learning of predictive and organizational rules.
2) Motivational processes: Self-efficacy beliefs play a major role in self-regulation of motivation, outcome expectations, accepted goals, corresponding theories, and self-efficacy beliefs that influence causal attribution.
3) Emotional processes: teachers' beliefs about their coping abilities influence the amount of stress and depression they experience in teaching situations.
4) Choices Processes personal competency beliefs can shape the course of life by influencing the types of activities and environments teachers choose.

2.3.2. Dimensions of Self-Efficacy Scale

Self-efficacy enables teachers to control their feelings and thoughts, which is a contributing factor to the teacher's work and achievements, achieving success, increasing effort and perseverance, and gaining information. Stated that the mathematics teacher's feeling of comfort and enjoyment in the face of a new situation may increase his sense of interaction. Towards the task he faces [8].

The individual's self-efficacy is affected by four sources that are considered dimensions: the previous experience of his performance, his indirect experiences in watching the performance of others, verbal encouragement, and the physical physiological state. Teaching situations in which learners are the focus of the teaching process, which is what was recommended by many researches calling for the development of teaching methods and finding the best ones, and what would achieve educational goals depending on the involvement of the teacher and the learner in the learning process, due to the effectiveness of teaching methods, strategies, technological innovations and their applications, and their impact Effective in raising the level of self-efficacy. This is what was shown by the results of the studies That there is a positive correlation between self-efficacy and teaching, in addition to that teacher Those who are confident in their ability believe that they can have an impact on their learners [18, 56, 68].

The results of the study of Liljedahl and Oesterle also indicated that the increasing interest in the self-efficacy of the mathematics teacher affects his practices in the classroom [47].

3. Research Problem and Questions

The problem of the research was determined in "the low level of reflective teaching skills of mathematics teachers, in addition to their low self-efficacy in teaching mathematics". Therefore, the research sought to answer the following main question: "What is the effectiveness of a training program based on the use of cloud computing in developing reflective teaching skills and improving self-efficacy among mathematics teachers in the Kingdom of Saudi Arabia?". *This main question is divided into the following sub-questions:*

1st. What is the effectiveness of the training program based on the use of cloud computing in developing the cognitive aspects related to reflective teaching skills for mathematics teachers in the Kingdom of Saudi Arabia?

2nd. What is the effectiveness of the training program based on the use of cloud computing in developing the performance aspects related to reflective teaching skills for mathematics teachers in the Kingdom of Saudi Arabia?

3rd. What is the effectiveness of the training program based on the use of cloud computing in developing the self-efficacy of mathematics teachers in the Kingdom of Saudi Arabia?

4. The Significance of the Research

1) Responding to the National Transformation Program in the objectives of the Ministry of Education in the Kingdom of Saudi Arabia, inviting experts and specialists to modern trends in the field of technology and its applications in the field of teaching and learning,

and paying attention to the professional preparation of mathematics teachers before and during service.
2) Providing a theoretical framework on cloud computing, developing reflective teaching skills and self-efficacy, and benefiting from it in preparing research tools and designing the learning environment.
3) Providing mathematics teachers with reflective teaching skills, enabling them to conduct good technological teaching later on.
4) Developing the self-efficacy of mathematics teachers so that they can learn better in their teaching ability.
5) Mathematics teachers and mentors benefited from a program that contributes to the development of reflective teaching skills in line with the challenges of the age.

5. Research Objectives

1) Determining a list of reflective teaching skills that must be available to mathematics teachers.
2) Preparing a training program based on the use of cloud computing to develop reflective teaching skills and improve the self-efficacy of mathematics teachers in the Kingdom of Saudi Arabia to try to raise the performance and skill efficiency in the field of specialization.
3) Measuring the effectiveness of the program based on the use of cloud computing in developing reflective teaching skills and the associated cognitive aspects of mathematics teachers in the Kingdom of Saudi Arabia.
4) Measuring the effectiveness of the program based on the use of cloud computing in developing the self-efficacy of mathematics teachers in the Kingdom of Saudi Arabia.

6. Research Hypotheses

1) There is a statistically significant difference at the level ($\alpha \leq 0.01$) between the mean scores of the research sample in the pre and post applications of the achievement test related to the cognitive aspects of reflective teaching skills in favor of the post application.
2) There is a statistically significant difference at the level ($\alpha \leq 0.01$) between the mean ranks of the research sample scores in the two applications, pre and post, of a note card related to reflective teaching skills in favor of the post application.
3) There is a statistically significant difference at the level ($\alpha \leq 0.01$) between the mean ranks of the research sample in the two applications, the pre and post, of the self-efficacy scale in favor of the post application.

7. Research Limits

1) *Objective limits*: developing reflective teaching skills and improving self-efficacy.
2) *Human limits*: a sample of mathematics teachers in the intermediate stage, consisting of (20) teachers.
3) *Spatial boundaries*: middle schools (13, 14, 17, 19) in the city of Makkah.
4) *Time limits*: the application of the program based on the use of cloud computing during the second semester of the academic year (2020/ 2021 AD).

8. The Definition of the Terms

1) Program

A set of educational sessions based on cloud computing in the field of mathematics to develop reflective teaching skills, in addition to a set of educational activities based on various teaching situations depending on the nature and type of skills intended to be developed.

2) Cloud Computing

It is defined as a model for enabling permanent and direct access to the network on demand, and sharing a set of computer resources, which can be provided at a high speed to the user with little effort from management in interaction with service providers [3].

It is procedurally defined as a technique that enhances the facilities for the use of computer resources, and gives access to computer software, through which computer resources are provided as services, allowing mathematics teachers to access them via the Internet (the cloud), without the need for them to possess knowledge or experience, or control the infrastructure that supports. These services, i.e., Google Drive was selected because it offers mathematics teachers the ability to create various files such as documents, presentations, tables, forms, and drawings and access them from anywhere, synchronously or asynchronously.

3) Reflective Teaching Skills

It is defined as the ability to reflect and self-positive and continuous critical thinking of the teaching practices and procedures implemented by the teacher, with the aim of improving and developing these teaching practices and procedures in the teaching situation [20].

It is also defined as the teacher's ability to engage in the reflective practice of teaching in a continuous cycle of planning, monitoring and self-evaluation in order to understand his practices and the reactions that come from him during the teaching process [32].

It is procedurally defined as: "The critical analytical practices and performances carried out by the mathematics teacher by observing the reflection of the teaching plans during planning and implementation of reflective teaching, evaluating the teaching practices that he performs in the classroom, self-evaluation, and proposing alternatives to improve teaching performance, and the ability of the mathematics teacher is measured. To measure reflective teaching skills, the researcher used the observation checklist and the cognitive achievement test of the program prepared for that.

4) Self-Efficacy

It is defined as a belief in the ability to accomplish a task

or a set of tasks in light of his capabilities, cognitive and motivational elements, which enables him to achieve the required level of performance [69].

It is defined procedurally as the mathematics teacher's beliefs about his ability to organize and implement the plans required to achieve the goal to be achieved, and it is measured by the self-efficacy scale prepared for that.

9. The Methodology

The research used the quasi-experimental approach for one group with a tribal and remote measurement, to measure the effectiveness of the training program based on the use of cloud computing as an independent variable in developing reflective teaching skills, and self-efficacy as variables belonging to the research sample group.

10. Research Tools and Materials

10.1. Preparing a List of Reflective Teaching Skills Needed for Mathematics Teachers

A list of reflective teaching skills for mathematics teachers, as follows:

1) Objective of the list is to determine the skills of reflective teaching needed for teachers of mathematics.
2) Sources of making the list: The reflective teaching skills were derived and identified from the following sources: mathematics teacher preparation standards projects, reviewing previous Arab and foreign research and studies that dealt with reflective teaching skills and reviewing Arab and foreign educational literature related to reflective teaching skills in general and mathematics in particular.
3) The initial picture of the list: It included (7) main skills and (57) sub-skills, which were presented to a group of (9) arbitrators specialized in the field of mathematics teaching, in order to express their opinions about its formulation and the appropriateness of the sub-skills for each main skill, as the Delete a sub skill due to its repetition within the main skill (communication with the community), and after making adjustments to the judges, the final picture was reached.
4) The final image of the list: After making the modifications, the list came to its final form, including (7) main skills and (56) sub-skills.

10.2. General Principles and Criteria for Designing a Training Program Based on Cloud Computing

The principles and bases necessary for designing a training program based on cloud computing were determined by reviewing previous research and studies that dealt with the foundations of designing mathematics teacher preparation programs. Additionally, the literature that dealt with the foundations of designing programs based on the use of cloud computing applications was tackled. A list of reflective teaching skills needed for mathematics teachers was made. In light of this, the objectives, program content and sessions, learning tools and resources, activities, cloud computing applications, evaluation, and organization of work for the program were determined.

1) The general objectives of the program are to develop reflective teaching skills and self-efficacy among mathematics teachers.
2) Program content and sessions: The content of the program was determined after reviewing many studies and educational literature that dealt with reflective teaching, its skills and tools, self-efficacy, and cloud computing applications. The duration of the training program was (26) training hours divided into (13) training sessions with Two hours per session, where the program included a variety of training and enrichment activities aimed at developing reflective teaching skills and improving self-efficacy.
3) Learning aids and resources: The behavioral objectives were linked to the content and were simply designed.
4) Activities: are designed so that it is easy for the mathematics teacher to implement them during his training, and provide interaction between them.
5) Cloud computing applications were identified, including: (Google Drive) to provide scientific content for mathematics teachers on the cloud, file exchange, and (Adobe Captivate) application for making assessment questionnaires before, during and after applying the program, using (Google) service to design (Edmodo) to create mail Unified for the research sample community.
6) Assessment: is linked to the objectives, and it uses various tools, including a test to measure the cognitive aspects of reflective teaching skills, an observation card for mathematics teachers' performance of reflective teaching skills, and a self-efficacy scale for mathematics teachers.
7) Organization of the program: through which the research sample group for mathematics teachers is acquainted with the procedural steps from the researcher for implementing the activity.
8) The final picture of the program: After preparing the initial picture of the program, it was presented to a group of (9) arbitrators specialized in the field of mathematics teaching, in order to express their opinions on the formulation of the program's objectives and elements, and after making adjustments to the arbitrators, the final picture of the existing training program was reached. on cloud computing.

10.3. Preparing an Achievement Test for Reflective Teaching Skills

1) Objective of the test: The objective of the test is to measure the cognitive aspects related to the reflective thinking skills of mathematics teachers.
2) Formulation of test vocabulary: The test vocabulary was formulated from the Multiple Choice (MSQ) style, and the test was prepared to measure cognitive levels,

and the test vocabulary reached (28) items, and Table 1 Shows the specifications of the test in the final image.

Table 1. *Specifications of the Achievement Test for Reflective Teaching Skills (RTS).*

Learning Goals	remember	Comprehension	Application	Sensitivity for Problems	Total Sum
Items	1, 4, 18	3, 9, 12, 19, 22	2, 5, 8, 14, 15, 17, 21, 24, 27, 28	6, 7, 10, 11, 13, 16, 20, 23, 25, 26	28

3) Phrasing the test instructions: The test instructions are formulated in an initial form before the piloting the test.
4) Measuring the validity of the test: The validity of the test was verified as follows:
   a. The validity of the arbitrators: to ensure the validity of the test, it was presented to a group of (9) arbitrators specialized in the field of mathematics teaching, in order to ensure the integrity of its vocabulary, linguistically and scientifically, and the measured cognitive level, and some vocabulary was modified and reformulated based on the opinions of the arbitrators.
   b. Internal consistency: Pearson correlation coefficients were calculated between the items of the achievement test and the total score of the test. Table 2 shows the results as follows:

Table 2. *Correlation coefficients between the cognitive aspects of reflective teaching skills and the test as a whole.*

Main Skills for Reflective Teaching Skills	Correlation Coefficient
Planning	0.798
Implementation	0.78
Evaluation	0.889
Professionalism Ethics	0.873
Colleague Community	0.749
Communicative Interaction	0.813
Parents Interaction	0.819

Table 2 showed that Pearson's correlation coefficients between the skills and the total score of the test are statistically significant at the level (0.01), and this means that the test's internal consistency is verified.

Piloting the test: The pilot study was conducted on a sample of (15) teachers, and the general objective of that was the following:

a. Measuring the test reliability coefficient: Cronbach's alpha coefficient was used, and the reliability coefficient was (0.891), which is a high and acceptable coefficient.
b. Test time: The test time was calculated by calculating the average time between the first and last time from which the answer to the test ends.
c. Ensuring the clarity of the test instructions: ensuring the test instructions and the integrity of the items linguistically and scientifically. Thus, the test became a high degree of honesty, stability and applicability.
d. Measuring Ease and Difficulty Coefficients: Ease coefficient was calculated for each item separately, in order to delete items with ease coefficient less than (0.1) and greater than (0.90), and the corrected ease equation was used to measure the effect of guess.
e. Grading Scale: The test scores were determined by giving one point for the correct answer from among the alternatives for each question, and zero below that. Thus, the final test score became (28) degrees.

10.4. An Observation Checklist for the Skill Aspects of Reflective Teaching Skills for Mathematics Teachers

1) The objective of the checklist: is to identify the performance of mathematics teachers in reflective teaching skills through their actual practice of mathematics teaching, in order to answer the third research question.
2) Preparing the checklist: After reviewing the educational research and literature in the field of reflective teaching in general and the field of mathematics teaching in particular, the list of reflective teaching skills, the items of the checklist were formulated in the form of procedural phrases.
3) The initial form of the observation checklist: In light of the content of the program based on cloud computing, the checklist was initially built, and it included (7) main skills and (56) sub-skills.
4) Phrasing the instructions for the checklist: the instructions for the checklist were formulated, taking into account the accuracy and clarity, and included clarifying the purpose and nature of them, and how to record the notes in them, so as to facilitate the observation of the observer correctly without difficulty.
5) Measuring the validity of the observation checklist: To ensure the validity of the card, it was presented to a group of (9) arbitrators specialized in the field of mathematics teaching, in order to express their opinion on its vocabulary. 51) Skill.
6) Measuring the real ability of the observation checklist: The method of percentage agreement of the observers was used, in conjunction with a colleague in the field of mathematics teaching, where the checklist was applied to a sample of mathematics teachers at the intermediate stage in some middle schools in Makkah Al-Mukarramah for the second semester 2020/2021 AD. It consisted of (15) Teachers in Three consecutive weeks, and the percentage of agreement was measured through Cooper's equation. It was found that the average percentage of agreement reached (87.09%), and this is an acceptable percentage and indicates the high stability of the checklist used to measure the level of teachers' performance of reflective teaching skills in Math.
7) The quantitative scale of the observation checklist for estimating grades of performance: The method of recording observation and estimating performance grades was determined, as (4) boxes were selected for each sub-skill that represents the degree of performance

achievement quantified quantitatively, namely: (3): if the teacher achieved performance in a significant degree Completely, (2): if the teacher achieves a moderate degree of performance, (1) if the teacher achieves an acceptable level, and (zero): if the teacher does not perform reflective teaching skills at all.

10.5. Preparing the Self-Efficacy Scale

1) The Objective of the scale: is to identify the mathematics teachers' beliefs about themselves and their confidence in them during teaching performance, through their responses to the scale's items.
2) Phrasing the items of the scale: The items of the scale were (13), which are: the teacher's confidence in himself and his ability to deal with others, efficiency in facing problems and problematic situations during teaching, efficiency in stimulating thinking, efficiency in class management and organization, efficiency in using various activities and aids, competence in using cloud computing applications, communication strategies with others, planning, implementation of mathematics lessons, dealing with learners' individual differences, evaluation, feedback, and dealing with difficulties. These main axes were divided into sub-items that represent specific situations that the mathematics teacher passes through during the teaching situation, and the number of the scale's items reached (50).
3) Scale correction: The researcher used a five-point Likert scale (5, 4, 3, 2, 1). The scale consists of (50) items, the highest score that can be obtained is (250) degrees, and the lowest score is (50).
4) Calculating the validity of the scale: The scale was presented in its initial form to a group of (9) arbitrators who specialize in the field of mathematics teaching, to express their opinions about the validity of the vocabulary of the scale, linguistically and scientifically, and the degree of belonging to its axis, and some vocabulary was modified in the light of their opinions, and it was reached from Through the indications of the validity of the scale by applying it to a sample of (15) teachers, the correlation coefficient of each item with the total score of the scale was extracted. - 0.838), which is acceptable and high for the validity of the scale.
5) Measuring the validity of the scale: Cronbach's alpha equation was used, and the reliability coefficient was (0.821), which is high and acceptable.

10.6. Experimental Research Procedures

1) The application of the observation card, the cognitive achievement test for reflective teaching skills, and the self-efficacy scale on the mathematics teachers of the research sample group to determine the actual level before the experiment.
2) Meeting with the research sample group to explain the purpose of the experiment, training them on the prerequisites for studying the cloud-based program, and defining the tasks required of them, starting from the stage of defining the program objectives, content, the means and activities used, communication and participation tools, learning strategies, evaluation, and finally the stages Organization of work for the program.
3) Applying the research tools posteriorly to the research sample group, and processing its results statistically, and discussing and interpreting them in the light of the results.

11. Results

The results related to the first question and its hypothesis, which reads: "There is a statistically significant difference at the level ($\alpha \leq 0.01$) between the mean ranks of the research sample's scores in the pre and post applications of the achievement test related to the cognitive aspects of reflective teaching skills in favor of the post application." For this hypothesis, the mean ranks were compared between the scores of the experimental group members in the two applications, before and after, and the (Z) value was calculated, as well as calculating the adjusted earning percentage, and Table 3 Shows the following.

Table 3. *The results of the Wilcoxon test for the significance of differences in the pre and post application of the achievement test related to the cognitive aspects of reflective teaching skills of the research sample.*

The Sample	Arithmetic mean	standard deviation	Ranks distribution Pre/Post	(N) Ranks	Mean Ranks	Total Ranks	The Value of (Z)	Sig. (0.01)	Percentage of Modified Achievement
Pre	8.00	2.84	Negative ranks	0					
			positive ranks	20	10.5	210	3.921	Sig.	1.49
Post	25.40	1.98	tied ranks	0					
			Total	20					

It is noticed from Table 3 that the value of the calculated "Z" rate (3.921) increased at the level of significance ($\alpha \leq 0.01$), which confirms that it has statistical significance and therefore there is a statistically significant difference at the level ($\alpha \leq 0.01$) between the average ranks of the research sample in The pre and post applications of the cognitive achievement test related to the training program for reflective teaching skills in favor of the post application, and the adjusted gain ratio is (1.49) which is higher than (1,2) which indicates the extent of the variation (effect size) in the dependent variable which is due to the future variable i.e. the effectiveness of the program In developing the cognitive aspect associated with the reflective teaching skills training program, and this is explained by the fact that the applications included in the

training program helped increase the teachers' performance gain rate. Thus, the program achieved its effectiveness in developing the cognitive aspect associated with the training program for reflective teaching skills, which the researcher attributes to the fact that training teachers using the program based on cloud computing applications has allowed the actual application of the steps they have taken, allowing procedures to be simplified and consolidated in the minds of teachers. Mathematics teachers in a comprehensive, lively, interesting and interactive way that led to the growth of the cognitive aspect associated with the training program for reflective teaching skills, This result is consistent with the study [38] on the need to focus on the results of teaching practices and the factors that affect them, the study [19] emphasizes the reliance on the evidence and evidence collected by the teacher from various sources to judge teaching performance according to clear and accurate scientific standards.

The results related to the second question and its hypothesis, which reads: "There is a statistically significant difference at the level ($\alpha \leq 0.01$) between the mean ranks of the research sample's scores in the pre and post applications of a note card related to reflective teaching skills in favor of the post application." To verify the validity of this hypothesis was A comparison of the average ranks between the scores of the research sample members in the two applications, the pre and post, and the (Z) value was calculated, as well as the calculation of the adjusted gain percentage, and table 4 Shows the following.

Table 4. *The results of the Wilcoxon test for the significance of differences in the pre and post application of the Reflective Teaching Skills Note Card for the research sample.*

The Sample	Arithmetic mean	standard deviation	Ranks distribution Pre/Post	(N) Ranks	Mean Ranks	Total Ranks	The Value of (Z)	Sig. (0.01)	Percentage of Modified Achievement
Pre	48.80	14.64	Negative ranks	0					
			positive ranks	20	10.5	210	3.92	Sig.	1.51
Post	142.35	11.11	tied ranks	0					
			Total	20					

It is noticed from Table 4 that the value of the calculated "Z" rate (3.92) increased at the level of significance ($\alpha \leq 0.01$), which confirms that it has a statistical significance and therefore there is a statistically significant difference at the level ($\alpha \leq 0.01$) between the average ranks of the research sample in The pre and post applications of the reflective teaching skills observation card in favor of the post application, and the adjusted gain ratio (1.51) which is higher than (1.2), which indicates the extent of variation (effect size) in the dependent variable, which is due to the future variable i.e. the effectiveness of the program in developing the skill side of reflective teaching skills, The variance in performance on the observation card for reflective teaching skills associated with the training program is attributed to the effect of processing using the cloud-based training program. Which the researcher attributes to the fact that the program provided the training needed by teachers, as well as the scientific steps of cloud computing, which gave them sufficient experience and skill in the skill aspect of reflective teaching skills, and the interaction of mathematics teachers with the program using cloud computing made it possible to provide adequate explanation for each skill from The skills of reflective teaching were accurately and planned in advance, which contributed to the high performance through the observation card, and this result is consistent with the study [38] in the use of a program based on meta-cognitive theory to develop reflective teaching skills, a study [57] which confirmed However, the high level of contemplative practices is due to the high efficiency of the teaching self.

Results related to the third question and its hypothesis, which reads: "There is a statistically significant difference at the level ($\alpha \leq 0.01$) between the mean ranks of the research sample's scores in the pre and post applications of the self-efficacy scale in favor of the post application." To verify the validity of this hypothesis, the average ranks were compared. Among the scores of the experimental group members in the two applications, before and after, the (Z) value was also calculated, as well as calculating the adjusted earning percentage, and Table 5 Shows the following.

Table 5. *The results of the Wilcoxon test to calculate the difference between the mean ranks (before - after) in the self-efficacy scale for the research sample.*

The Sample	Arithmetic mean	standard deviation	Ranks distribution Pre/Post	(N) Ranks	Mean Ranks	Total Ranks	The Value of (Z)	Sig. (0.01)	Percentage of Modified Achievement
Pre	130.90	37.01	Negative ranks	0					
			positive ranks	20	10.5	210	3.921	Sig.	1.31
Post	236.55	9.08	tied ranks	0					
			Total	20					

It is noticed from Table 5 that the value of the calculated "Z" rate increased (3.921) at the significance level (0.01), which confirms that it has a statistical significance and therefore there is a statistically significant difference at the level ($\alpha \leq 0.01$) between the mean ranks of the research sample scores in the two tribal applications. And the dimensionality of the measure of self-efficacy in favor of the dimensional application, and the average gain ratio is (1.31) which is higher than (1.2), which indicates the extent of the variance (effect size) in the dependent variable, which is due to the independent variable i.e. the effectiveness of the program in developing self-efficacy, and the researcher

attributes to the teachers' enjoyment With the scientific content provided by the training program based on cloud computing applications, the activities and alternatives were varied and feedback was used, allowing them to choose what suits them during the learning process.

12. Recommendations

1) Training in-service mathematics teachers on reflective teaching practices and the application of its tools.
2) Develop programs for preparation and professional development for mathematics teachers before and during service in light of reflective teaching practices and skills.
3) Evaluating current programs for preparing and developing mathematics teachers in the light of reflective teaching practices, and applying distance learning programs and strategies to improve them.
4) Attention to the development of self-efficacy among mathematics teachers, through the use of reflective teaching tools and the activation of contemplative practices.
5) Attention to the development of self-efficacy among mathematics teachers, through the use of reflective teaching tools and the activation of contemplative practices.
6) Using the note card that was prepared to evaluate the performance of the student's mathematics teacher for reflective teaching skills.
7) The interest of faculty members in faculties of education in the diversity of teaching strategies, educational activities, learning resources, and technical equipment necessary to teach the various academic courses in order to achieve a good preparation for the student teacher.

13. Suggestions

1) A program based on cloud computing applications in developing meta-cognitive skills among mathematics teachers in faculties of education.
2) A training program to develop self-teaching skills and improve self-efficacy in light of the standards for preparing a mathematics teacher.
3) The effectiveness of a program based on the Cognitive Semantic Web (Web 3.0) for developing technical teaching skills and self-efficacy for mathematics teachers.
4) A program based on cloud computing applications in developing the creative teaching skills of mathematics teachers before and during the service.

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