

The impact of virtual professional learning communities on the academic achievement of tenth grade students at Asiyah Bint Muzahim School in the subject of science in the light of online learning

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Abstract

The study aimed to identify the impact of Virtual professional learning communities on the academic achievement of tenth grade female students in the science course at Asiya Bint Muzahim School for Basic Education in light of online learning in the first semester of the academic year 2020-2021. The study sample consisted of (49) female students; (26) students as an experimental group, and (23) students as a control group. To achieve the objectives of the study, pre and post experimental tests were developed in the science course. Stability and validity of the tests were verified. The results showed impact of virtual professional learning communities on the academic achievement of the study sample. The results also showed that the students of the experimental group who studied using a program based on virtual professional learning communities excelled the control group in Postgraduate achievement test. Virtual professional learning communities also showed a significant impact on the students' achievement. Based on these results, the study recommended the need to pay attention to establishing virtual professional learning communities within educational institutions, especially in light of the continuous spread of the Covid-19 pandemic, as this application has great impact on the exchange of experiences, beside its contribution to the sustainability of students' learning, which will result in raising their achievement level.

Introduction

Contemporary educational systems seek to develop their educational institutions at all levels. Schools are responsible for preparing generations of students who possess knowledge, experience and skills that enable them to face challenges and benefit from available learning opportunities in light of the tremendous development and spread of technology, which made the world a small village (Mohammed and Moosa, 2017).

As educational institutions are in a continuous state of keeping up with educational developments to invest them in improving school performance and developing the outcomes of educational institutions, the emergence of the concept of virtual professional learning communities is considered a qualitative shift in educational institutions towards purposeful and organized change (Al-Masrouri, Al-Mashaikhi, and Al-Maj'iliyah, 2020).

Virtual professional learning communities mean changing the school traditional patterns of learning and teaching into an educational organization that works on sharing responsibility and cooperation among teachers, with the aim of providing and developing a purposeful and advanced

education that can be reflected on students' achievement by encouraging creative ideas (Hassan, 2019). Virtual professional learning communities among the same team means finding a vision, a mission, and common values and goals based on providing education that can be reflected on the level of students, and can provide the best ways that are based on the processes of cooperation, improvement and development; considering students as the center of the educational process. This would improve students' achievement and raise the quality of their performance for the better (Al-Osaili, 2019).

(Sun et al., 2016) showed that one of the important results that are reflected on the students' performance is the presence of a holistic view of specialized individuals who are capable of reaching for the formulation of new ideas and visions to develop learning and teaching processes through their efforts to form professional learning communities.

By looking at the results of previous studies, it becomes clear that virtual professional learning communities have a significant and effective impact on educational process and students' achievement, which can be added to their role in developing the reality of educational institutions, A study of Chen and others(2016) showed that focus on participative leadership, collective cooperation, and joint visions are the most important factors that support the development of educational institutions. Matthews (2014) confirmed that applying virtual professional learning communities contributed significantly to improving the level of students by changing the roles of teachers in the educational process and orienting them towards more interaction with students.

Al-Mahdi (2016) showed that the availability of virtual professional learning communities at the school level can support the educational process and develop the level of students' achievement results. Atwa (2016) pointed out that establishing a culture of professional learning communities means achieving quality and mastery; because the existence of these societies would provide solutions to many of the problems and challenges facing educational institutions.

The spread of the Covid-19 virus forced educational systems to carry out many changes to confront it, and overcome the problems resulting from it. There was a big need to confront it in order to maintain the educational process by developing teachers' skills and knowledge, and raising the quality of their performance by relying on a number of integrated programs and activities within the frameworks of professional learning communities. (Ibrahim and Marzouki, 2018).

Based on the above-mentioned views, it is clear that virtual professional learning communities are considered good means to support the professional growth of teachers, develop their skills, and enable them to acquire new experiences and knowledge in light of the Corona pandemic. It is necessary that the educational process should adopt the idea of virtual professional learning communities to develop the level of the educational process, which can be reflected positively on the achievement level of students.

Research Problem

As an assistant manager, the researcher noticed a problem which lurked in weakness in the performance of tenth grade students in the English language and science. This weakness was apparent through the analyses of the results of the first semester of the academic year 2020-2021, despite the use of new teaching techniques and methodology by the school teachers. The researcher noted that some female teachers had distinct and unique experiences, but those teachers did not involve their colleagues in those experiences to benefit from them, and they did not publicize them to other teachers. Consequently, there was information gap that constituted an obstacle to address school girls of low achievement in English and science courses.

With the spread of the COVID-19 pandemic, which resulted in blended education, the need to establish a virtual professional learning community emerged to improve educational practices and

benefit from the experiences of others, and simulate successful educational experiences in this context, which will raise the achievement level of female students. Although the researcher has reviewed a number of previous studies in order to benefit from them, such as Al-Zahrani and Al-Ahmadi study of (2015), and the Salhia study of (2018), which dealt with professional learning societies and their role in raising the level of achievement, but the researcher did not find a specialized study that dealt with virtual professional learning communities in a way that can be used to solve the problem of poor achievement in a radical way, and address poor achievement of female students. For all of this, it was necessary to conduct a scientific study based on a clear methodology that can address poor achievement, develop solutions, and recommend effective procedures that female teachers can benefit from in class sessions. Accordingly, the diagnosis of the problem of the study lies in the following main question: What is the impact of virtual professional learning communities on the academic achievement of tenth grade students at Asiyah Bint Muzahim School in the science course in the light of online learning? Moreover, the following sub-questions emerged from the main question:

1. What is the impact of virtual professional learning communities on the academic achievement of tenth grade students in science in the light of online learning?
2. Are there statistically significant differences between the average score of the control group and the experimental group in applying the post-test among tenth grade female students at Asiyah Bint Muzahim School in the subject of science in the light of online learning?
3. What is the level of impact of virtual professional learning communities on the academic achievement of tenth grade students at Asiyah Bint Muzahim School in science in the light of online learning?

Research Objectives

The research objectives attempt to:

1. Identify the impact of virtual professional learning communities on raising the academic achievement of tenth grade students at Asiyah Bint Muzahim School in science in the light of online learning.
2. Explore the differences between the average scores of the control and experimental groups regarding the impact of virtual professional learning communities on the academic achievement of tenth grade students at Asiyah Bint Muzahim School in the subject of science through online learning in the post-test.
3. Identify the impact of virtual professional learning communities on the academic achievement of tenth grade female students at Asiyah Bint Muzahim School in science in the light of online learning.

Research importance:

The importance of the research lies in considering virtual professional learning communities as an important entry point to support the concept of learning in educational institutions.

A- Theoretical importance:

1. Clarifying the dialectic of the importance of virtual professional learning communities on enhancing the educational process, and the importance of cooperation and exchange of experiences between teachers of the same specialization to provide creative ideas that support the level of student achievement.
2. Adopting new methods aiming at achieving integration between virtual professional learning communities and teaching planning in all academic subjects to raise the level of students' achievement.

3. Considering the results of the study as a nucleus and a cornerstone for presenting other research that can deal with new variables that may positively and clearly affect students' achievement, and enhance theoretical knowledge of the Arabic library in general and the Omani library in particular.
4. Increasing the orientation of educational institutions towards establishing virtual educational professional communities in the Sultanate in light of online learning.
5. Developing the competence of male and female teachers by providing them with the necessary knowledge and skills to establish effective professional learning societies through the exchange of experiences and cooperation between male and female teachers to establish these effective communities.
6. Drawing the attention of schools principals to the importance of virtual professional learning communities to highly qualify the professionalism of their teachers to achieve the school's vision and its endeavor to raise the level of its students' achievement.

B- Practical importance:

1. Helping educational planners and policy makers to take the necessary decisions to support the efforts of dealing with professional learning communities.
2. The results of the study will contribute to identify the impact of virtual professional learning communities on the academic achievement of students in light of online learning. It is hoped that the Ministry of Education and schools leaders will benefit from the results of this study for the purpose of activating the mechanisms of professional learning communities and increasing achievement in all schools.

Research frameworks:

Objective framework: approaching the impact of virtual professional learning communities on the academic achievement of tenth grade female students at Asiyah Bint Muzahim School in science in the light of online learning. Time framework: The study was conducted during the first semester of the academic year 2020/2021. Human framework: Tenth grade students at Asiyah Bint Muzahim School for Basic Education for Girls (5-12). Spatial framework: The study was carried out in Asiya Bint Muzahim School for Basic Education for Girls (5-12) in South Al Batinah Governorate.

Research terminology:

First: Virtual Professional Learning Communities: Cormier (2009, 19) defines virtual professional learning communities as: “a group of individuals who form a team, and collaborate together for continuous improvement to meet the needs of the learner through a common vision that focuses on the curriculum.” Whereas, procedurally, it was defined as a group of teachers within the school working as one team through virtual communication applications, with the aim of exchanging experiences and publicizing best practices to improve the students' learning process.

Second: Academic achievement: Al-Hammouri (2010, p 190) defines academic achievement as: “the set of grades that a student obtains in school achievement tests.” Procedurally, it is defined as the degree which a student obtains in the achievement test prepared by the researcher in the science course.

Theoretical literature and previous studies:

Virtual professional learning communities are a group of teams or working groups responsible for cognitive leadership, research, investigation, analysis, creativity, innovation and development, with the aim of improving students' teaching and learning processes in schools. Besides, they are interested in building collaborative activities, effective communication networks and integrated roles, as well as participation in decision-making, and assuming responsibilities.

The first topic: virtual professional learning communities.

Virtual professional learning communities play a key role in teachers' professional development programs all over the world due to their positive impact on developing teachers' abilities and competence, increasing students' academic achievement and focusing on cooperation efforts and a shared vision among teachers (Al-Mutairi, 2018). Virtual professional learning communities are based on the idea that learning adds advantages and gives meaning to the lives of teachers and students, and then society; where teachers, administrators, parents, students, and support staff work together to create an environment which can enable all elements of the educational process to meet their needs to communicate with others, gain achievements and create distinguished choices at work (Al-Qahtani and Toheri, 2020).

Virtual professional learning communities aim to foster collaboration among school personnel by creating a collaborative professional culture that helps teachers become more effective in their work with students by focusing on learning and results, with commitment to support their colleagues. Virtual Learning communities also help teachers to build strong desire to reshape school culture, and be interested in professional practices, criticize them and have feedback which aims at improving and supporting meetings on a regular basis, as well as incorporation into cooperative programs and activities (Al-Salha and Al-Hashimi, 2018).

Accordingly, virtual professional learning communities are a qualitative leap in educational institutions because of the great role they play in strengthening means and mechanisms of the educational process in all institutions, in addition to their positive impact on improving the level of students' achievement.

The concept of virtual professional learning communities:

A number of researchers studied the concept of virtual professional learning communities. Al-Sanani (2020, P.226) defined it as: "a team work consisting of female teachers who work in an organized and cooperative manner to exchange experiences and skills to raise their efficiency and achieve better results for their students." Mohammad (2019, p.65) defined it as: "All work, tasks and activities which are carried out by teachers to develop their abilities, skills and professional practices to achieve the goals of the educational process, and raise the achievement level of students." Markel defined it as: "A group of people who interact with each other through chat rooms, and who exchange topics of common interest which concern the education sector with its different specializations", (Caputa, 2017, 32). Al-Fejlaoui (2009, P.9) defines it as: "The social groups in the Internet, where users have the ability to identify and create discussions to form collective awareness and personal relationships in the virtual space.

Based on what was quoted, it is clear that the concept of virtual professional learning communities includes small groups of teachers who come together as a team to help each other improve students' learning, where they share their professional practices and personal experiences. Moreover, they observe and evaluate each other's practices, and learn and apply research and best practices together. We conclude from the previous definitions that virtual professional learning communities in this research mean.

Professional practices based on methodological foundations, with the aim of building a common framework of values, visions and goals that ensure continuity of the process of development and

improvement of professional performance through teamwork of members of the school community to raise the achievement level of students, and acquire qualitative education.

Importance of Virtual Professional Learning Communities:

The importance of virtual professional learning communities appears in the great role they play after adopting these communities as an essential element in improving and developing the educational processes and institutions in an effective manner. Mohammad (2019) indicated that its importance lies in the improvement of the quality of educational process, and the adoption of innovation, research and investigation, with the aim of benefiting from the experiences of experts in adopting a policy of shared responsibility.

Naseef (2012) stated that their importance comes out from the big role they have in the process of reform and development to solve different educational issues. Mahroos(2015) clarified that these communities provide a stimulating and motivating educational environment in the process of development. Eley(2017) showed that they largely contribute to the processes of teachers' professional development which will reflect on the students' achievement. Finch(2017)confirmed that the importance of these communities lurks in improving educational performance, and increasing focus on teaching students without following the traditional patterns of teaching.

It is noticed that in light of the circumstances facing the world, especially the educational sector, these communities should work on developing the methodology they adopt to improve educational processes and increase cooperation with different educational institutions to achieve the same goal of raising the level of the students' achievement in all courses.

Objectives of Virtual Professional Learning Communities:

Professional learning communities are considered a systematic way to improve teaching and learning performance and spread positive school culture. By designing virtual professional learning communities, the educational institution seeks to overcome the culture of isolation in the work of individual teachers. The role of these communities is pivotal in achieving the goals that the educational institution seeks to attain in light of the challenges it faces, especially the challenges resulting from the Corona pandemic. Virtual professional learning communities provide the opportunity to exchange experiences and maintain professional dialogue among teachers (High, 2019). Al-Osaili (2019) adds that the virtual professional learning community is still evolving. Among the most important goals that the professional learning community seeks to achieve are the following:

First: School reform and development: The school development process is a comprehensive process that includes working in more than one direction, and dealing with all parties of the school community, including teachers, school leadership and parents; where their desires meet when working on developing the mechanisms of school roles. Therefore, the professional learning community is an opportunity to participate in the process of development. The findings of Bryk and colleagues (Bryk et al., 1999) showed the important role of the professional learning community in the process of educational change, development and reform, and the creation of a participatory environment that would help learning.

Second: Creating a supportive and stimulating school environment for learning. Diversity of experiences that teachers acquire in the professional learning community is an opportunity to develop learning mechanisms to create a stimulating learning environment in the learning process, and build a collaborative environment for exchanging experiences among teachers.

Third: developing a sense of collective personality: Virtual professional learning communities represent a collective environment that works as one entity with the aim of exchanging information among teachers based on their specializations, which will provide a strong opportunity to enhance learning processes and encourage teamwork among teachers in one or several schools.

Fourth: developing Students' and teachers' experiences and Skills: The professional learning community seeks to develop skills, knowledge, and enrich social, academic and professional experiences of all members of the school community. This development will be presented to students by members of the professional community, who are distinguished and skilled; and have experiences and distinct ways of thinking to transfer these experiences to the students by applying scientific research in performing their tasks.

Fifth: raising the level of academic performance in professional learning communities: improving the academic performance of teachers is a valuable opportunity acquired through professional learning communities. This improvement will be reflected in raising the level and performance of the school, and will increase students' awareness of the importance of raising their school achievement. Schools that adopt the professional community system constantly maintain high achievement rates for their students.

Louis (2008) showed that the school that establishes professional learning societies for teachers constantly contributes to raising the levels of achievement of its students. Wong (2010) stated that individual student achievement is positively associated with the high level of learning in the school, which is the result of establishing these learning communities. Virtual professional learning communities are distinguished from other learning activities in that they apply group learning. Morrissey (2000) drew attention to the relationship between individual learning and group learning. Old learning model began to decline for a long time, especially with the spread of technological media, and the emergence of new teaching strategies, such as active learning, cooperative learning, learning teams, and student-centered learning, which made old learning models secluded. The new learning models applied in the learning process achieve the following merits:

1. Students undertake the process of discovery, research and expansion of knowledge, using expressive sentences and paragraphs.
2. Students depend on themselves in modern learning process, because the nature of learning requires the employment of students' previous experiences in the educational environment.
3. Teachers attempt to develop students' competence and talents so that they can practice more efforts that show their talents and competence.
4. Work on developing the teacher's performance and professional development to contribute more effectively to the school improvement process.

It is noted from the above that the professional learning community is a springboard towards teamwork, which will contribute to the development of the educational process, the development of teachers' skills and knowledge, and will obtain feedback through sharing ideas that will improve the educational process, increase teachers' loyalty to the school, and enrich students' interest in the learning process.

Principles of Virtual Professional Learning Communities:

The principles of virtual professional learning communities represent a requirement in light of the spread of technology, and the ease of forming virtual groups that can communicate and exchange experiences around the clock. Learning community can predict future problems, pay attention to the external learning environment for the sake of improvement and development (Al-Daoud et al., 2019). Shehab (2019), stated that the process of building virtual professional learning communities is effective, and will be successful; as they focus on the continuous improvement of the educational environment. Hord (1997) and Hillel (2014) identified a number of characteristics

and conditions for building an effective and constructive professional learning community as follows:

First: the existence of a Supportive participatory leadership: Virtual professional learning communities work on exchanging information between the school principal and school workers (administrators and teachers), where the principal shares authority and power with them, and works on sharing ideas to reach some necessary information and appropriate educational methods.

Second: vision and shared values: virtual professional learning communities contribute to achieve the general vision of the learning process, where these communities seek to assume responsibility in the learning process, and develop this responsibility to serve the education environment, and achieve its values and educational vision.

Third: Collective Creativity: One of the main features of virtual professional learning communities is that they work collectively, where their members exchange information to enhance the learning processes, provide an appropriate learning environment, and have access to new innovative methods used in the learning process.

In view of the foregoing, it can be said that a school is a professional learning community whose function is based mainly on building and developing the capabilities of the individuals who work sufficiently to perform various activities and leadership roles, and establish cooperation between the school leadership and teachers in order to raise the efficiency and performance of the school. This participatory relationship will support the process of building administrative skills of teachers, and the transfer and exchange of knowledge among them, which will lead to the improvement of their educational practices.

The second topic: Academic achievement:

The development of life in general has become a major concern that requires us to get to know how these developments will affect education. These latest developments of life have made the individual always seek to learn and reveal the facts of science. Entering school has become a priority and an inevitable necessity, and has become an integrative part of the individual's life; where the primary mission of the school lies in education. However, sometimes we find students who are unable to pass the level of the educational stage as a result of lacking the necessary skills needed to achieve this. Some experts attribute students' inability to pass their educational stage to the school's failure in carrying out its educational mission, which will lead to students' failure. Schools should consider the so-called difficulties that might hinder the occurrence of adequate learning acquisition. Some students struggle to comprehend basic skills of reading comprehension, using written and spoken language, and noticing disturbances in thinking, reading, spelling and arithmetic, which require achievement abilities that commensurate with the students' abilities (Fadil, 2020). Academic achievement in any subject is one of the main tasks of psychologists and educators, and a key test of what students can achieve in the future, where schools give great importance to students' grades (Nawfal, 2015). Academic achievement is nothing but what the student acquires in terms of knowledge, skills, ways of thinking and problem-solving abilities that are gained through courses.

Concept of academic achievement:

Many researchers have discussed the concept of academic achievement. Here are some of them: Ahmed (2010) defines academic achievement as: "educational achievement of a certain subject, to acquire a certain level of information and perform the required skills. This is usually determined by standardized tests, or teachers' reports, or by both." Al-Jalali(2011) defined achievement as: "The knowledge that the individual obtains through a school program or a course. This concept is limited to what the student obtains. This student is more adapted to the social environment to which he belongs, and needs to be prepared to adapt to the school environment in

general ". Al-Maamari (2014) defined it as follows: "Achievement is a specific level of performance or efficiency in an academic work, which is assessed by teachers or through standardized tests, or by both.

We conclude that academic achievement refers to a set of educational goals that are achieved by the student, and is closely related to the person's mental ability, which expresses the student's ability to accomplish a specific work through sensory, mental and innate actions. This ability varies from one student to another, where the teacher has a basic role in the process of the students' achievement.

Importance of academic achievement in the educational process:

Academic achievement is one of the most important educational outcomes that students attempt to achieve. It is one of the important areas that have attracted the attention of parents and educators, as it is one of the educational goals that provide the individual with science and knowledge that will develop his perceptions, and open the way for his personality to grow in the correct manner. Academic achievement aims at getting the information that will be the indicator of the students' ranking in experience in relation to his peers and groups. Academic achievement satisfies one of the psychological needs that students seek to satisfy, like excellence, distinction, and love of leadership.

Academic achievement is one of the topics that are commonly used in the field of education and educational psychology in particular because of its importance in evaluating the student's academic performance. It is seen as a basic test in light of which the student's academic level can be determined, and the volume of educational production is judged quantitatively and qualitatively (Al-Rashidi, 2012).

Many educational scholars have discussed the concept of academic achievement in different ways. Perhaps, one of the most prominent trends in defining this concept is linking it to the concept of school learning. Achievement tests are used to determine what the individual has learned after he has been exposed to a specific type of pre-planned education, that is, after he has studied a particular course or attended a specific educational program. The degree obtained by the student is the level of achievement that the student was able to reach, and which the teacher approved during a period of the student's education.

The problem of low school achievement among students is one of the most difficult problems faced by educational institutions, regardless of the students' social or economic conditions. The severity of this problem is due to the fact that it causes some students to lose a lot of educational and pedagogical skills, which forms the beginning of students' dropping out of school towards deviant groups. This problem has become clearly prevalent due to the increase in the number of students in schools which suffer from lack of resources and capabilities to accommodate these large numbers of students, especially when some families do not follow up or keep eye on their son's learning development in schools, and when the teachers do not have sufficient skills and appropriate tools to provide qualitative education to students.

Researchers in the field of psychology have been interested in studying the relationship between the level of academic achievement and some students' personality traits. They concluded that high or low degree of achievement is an educational phenomenon from which we can draw conclusions that reinforce the correct positive attitudes in students' behavior (Ahmed, 2010).

Based on the foregoing, it is clear that the importance of academic achievement is very great, especially in light of the educational conditions in schools, and the fierce competition of students to achieve grades that make their dreams come true, and satisfy their aspirations in higher academic achievement, which is a criterion in classifying students and dividing them to enroll in important university majors, and an important indicator of the students' progression in the level of intelligence.

Factors affecting academic achievement:

A student is classified as weak in academic achievement if his school achievement is less than his peers of the same age. Weakness in school achievement may be due to subjective reasons, or social reasons arising from the family or environmental conditions surrounding the student, or because of the companions he selects.

The subjective causes are those related to the physical aspects of the individual himself, like suffering from a hearing or vision deficiency that hinders him from following up what is taught to him; or when he suffers from a disorder in the glands or in the central nervous system, or a mental weakness that does not reach the level of dullness or dementia, which was not diagnosed or treated; and thus he learns in public schools like normal people and is considered to be at a lower level in terms of the level of intelligence.

That is why some workers in the educational sectors imagine that poor achievement can be identified by measuring the level of intelligence. It is well known that measuring intelligence requires recognizing both mental and chronological age; where the mental age is calculated through standardized tests for each age separately, and the IQ is extracted by dividing the mental age by the chronological age and multiplying the result by one hundred. A child whose chronological age is ten years, for example, and whose mental age is twelve years, obtains an IQ of (120) (Al-Jalali, 2011). The level of achievement does not reflect the existence of a positive relationship with the level of intelligence. It does not reflect the presence or lack of certain abilities or talents; as the level of achievement is usually calculated on the basis of the total of a test scores alone. These results do not, in fact, form a method capable of estimating the degree of understanding and comprehension, even if it refers to the amount of achievement only (Al-Jaghab, 2009).

Examining the academic achievement process with an analytical view, with all the factors associated with it, is a matter of an utmost importance. By knowing the factors affecting academic achievement, it is possible to identify the elements that hinder this process. Accordingly, we study the appropriate methods to avoid these obstacles and raise the academic achievement to the best extent. There are social factors represented in the student's family and its educational and economic status, and other environmental factors that are related to the status of the school. Al-Bahriya (2015) clarified some of these as follows:

First: School related factors: The information and experiences that the student obtains through his study programs in different stages of education is a means to prepare him to exercise his functional roles for which he strives.

Second: Factors related to the learner: The researchers confirm that some personal aspects of the student play an important role in the student's academic delay. They include emotional factors such as low self-confidence, anxiety, turmoil, disturbances in the emotional balance, and lethargy that prevent the student from participating in the classroom.

Third: factors related to the surrounding environment and the family: The family has the primary role in the process of socialization; It shares the process of socialization with the school, and it strongly influences the student's positive attitude to the school.

It is noted from the foregoing that the factors that affect the students' achievement are many that cannot be summarized in one item. The environment surrounding the student in general has a direct impact, but the biggest obstacle to achievement falls on the educational institution, because it bears the responsibility of teaching students according to scientific bases that aim in its content to increase the cognitive and scientific level, which affect the level of the student achievement.

Previous studies:

Many researchers have studied virtual professional learning communities and academic achievement. Previous studies related to this study were divided into two parts: the first included studies that were applied in the field of virtual professional learning communities, and the second part dealt with studies of academic achievement. These studies were sorted out starting from the most recent to the oldest.

First: Studies in the field of virtual professional learning communities:

The study of Al- Masroi , Al-Mashaikhi, and Al-Majalia (2020) aimed at revealing the degree of availability of the requirements of applying the dimensions of virtual professional learning communities from the point of view of educational supervisors in public schools in the Sultanate of Oman, as well as knowing the impact of the variables of academic qualification and supervisory experience. To achieve the study objectives, they used the descriptive method, where they prepared a questionnaire of (43) phrases divided into (5) axes as follows:

Values and shared vision; supportive participatory leadership; learning teams and cooperative learning; supportive conditions; and personal and professional traits. After verifying the validity and stability of the tools of the study, it was applied to a study sample consisting of (55) male/ female supervisors from the educational supervisors in the Directorate General of Education in the Governorate of South Al-Batina. The results showed that the degree of availability of the requirements of applying the dimensions of virtual professional learning communities in the Sultanate government schools was moderate. The results also showed that there were no statistically significant differences between males and females in the variable of levels of years of supervisory experience and the variable of educational qualification in all axes.

Hassan (2019) conducted a study which aimed to identify the requirements of building virtual professional learning communities in public education schools and their role in improving their academic performance. The study used the descriptive method. A questionnaire of (47) phrases was applied to a sample of (789) male/ female teachers in the primary, intermediate and secondary stages in the governorates of Al-Dammam, Al- Khobar, and Al- Dhahran in the Kingdom of Saudi Arabia.

The study reached several results; the most important of which is the agreement of the sample members on the need to provide the requirements of building virtual professional learning communities in public education schools, and also agreed on the role of virtual professional learning communities in improving academic performance. The study showed statistically significant differences between the responses of the sample of teachers in the axis of the requirements of building learning communities and the role of education communities in improving academic performance for the benefit of teachers. Besides, there were statistically significant differences between the responses of the study sample groups according to the variable of the educational stage in the axis of the requirements of building virtual professional learning communities for the benefit of teachers in the primary and secondary stages. There are no statistically significant differences between the responses of the study sample groups in the axis of the role of virtual professional learning communities in improving academic performance, and there were no differences between the responses of the study sample groups according to the variable of years of experience in the axis of requirements of building professional learning communities, The study also showed statistically significant differences in the axis of The role of virtual professional learning communities in improving academic performance for the benefit of teachers who have less than 5 years of experience. The study ended with developing a proposed vision for activating virtual professional learning

communities in public education schools in the Kingdom of Saudi Arabia to improve their academic performance and solve all the problems they are suffering from.

Al-Salhiya and Al-Hashem (2018) conducted a study which aimed to reveal the possibility of employing professional learning communities and show their role in raising the achievement level of students. They tried to come up with certain proposals to activate the professional practices of teachers to implement professional learning communities. The study also aimed to find out whether there were statistically significant differences at the level of (0.05) among the estimates of the research sample members, which are related to the following variables: (educational stage, gender, educational qualification, and years of experience). To achieve those goals, the theoretical literature related to the subject of the research was analyzed, and the research tool was built. A three-axis questionnaire consisting of (45) items was distributed to (127) teachers of the second and third cycles (post-primary education). Based on the teachers' viewpoint, the research found that professional practices in the educational field open the way for the possibility of applying professional learning communities to serve academic achievement. The research found that there were statistically significant differences at the significance level of (0.05) in the estimates of the sample members. In light of the analysis of the results of the research, a number of proposals and recommendations were reached, which will help implement professional learning communities to develop professional practices of teachers and school management to raise the achievement level of students. These recommendations include employing the strategy of the professional learning communities to support the process of continuous improvement of the school.

Rebecca and others (2015) conducted a study which aimed to describe how primary school teachers evaluated virtual professional learning communities concerning their ability to determine the impact of general principles on the academic level of students. The study applied quantitative research to explore the extent of interrelationship between teachers training at the principles of professional learning communities and the realistic application of these principles and the achievement level of students. The results indicated positive correlations between the teacher's cultural level of observing peers and the level of education and feedback about educational practices.

Al-Mawlid (2014) carried out a study to identify the possibility of applying administrative virtual professional learning communities in secondary schools. The researcher used the descriptive approach. One of the most prominent results of the study was that the total average of the possibility of applying virtual professional learning communities obtained a large degree. The study also found that there were no statistically significant differences between the averages of the responses of the study sample related to the educational qualification variable; whereas there were differences related to the variable of the type of secondary school in favor of the course system, and the variable of experience of those with 15 years of experience or more.

Second: Studies related to academic achievement:

Fadel (2020) had a study that aimed to verify the effect of cognitive acceleration strategy on the achievement of second-grade female students, and the development of their scientific thinking. To achieve the goal of the research, the researcher formulated three null hypotheses, and chose the experimental method with two equal groups, the post test of achievement, and the pre and posttests of the scientific thinking. The research experiment was applied in the first semester of the academic year (2018-2019). The research sample consisted of randomly chosen (61) students; (31) female students for the experimental group and (30) female students for the control group. The two research groups were classified according to the following variables (the chronological age of the students in months, intelligence, scientific thinking scale, and parents' academic achievement level). The researcher prepared two tools for research: the achievement test and the scientific thinking scale. The achievement test consisted of (40) objective paragraphs of the type of multiple choice with four alternatives. The results of the research showed a statistically significant difference between the average scores of the experimental group students who studied according to the cognitive acceleration strategy, and the scores of the control group students who studied according

to the usual method in the achievement test in geography. The difference was in favor of the average of the experimental group. The study also found a statistically significant difference between the average scores of the experimental group students who studied according to the cognitive acceleration strategy and the scores of the control group students who studied according to the usual method in the scientific thinking scale in favor of the average of the experimental group. Also there was a statistically significant difference between the average scores of the experimental group students before and after the experiment in the scientific thinking scale in favor of the post test average.

Nofal (2015) conducted a study aimed at clarifying the relationship between good academic preparation and qualification of the teacher, and that of improving the level of academic achievement of the student; where academically qualified teachers possess the capabilities that enable them to give lessons effectively. A well-qualified teacher is academically familiar with teaching methods. He/she knows how to deal with students, and is familiar with educational material. A good teacher uses appropriate technology and teaching aids that enable him/her to develop his/her students well; as the teacher's frequent use of the same educational aids in one class may distract the students, and keep their thinking confined to these aids. Using educational aids appropriately helps the student learn better. Besides, the reinforcement that teachers provide to students has a role in encouraging students to improve their academic achievement level. There is a close relationship between the cooperation method and the students' academic achievement level. Respectful cooperation reflects good relations between teachers; between teachers and students; and even between students themselves. It was noted that there is a significant difference between the use of technology and means of development and computers in the presence of the teacher, and their use without the presence of the teacher; as the teacher's use of computers in education may increase students' enthusiasm for education.

Comments on previous studies and their relation with the current study:

It is noted from the presentation of some of the previous studies that there are many studies that dealt with virtual professional learning communities, which indicates the importance of these communities in educational institutions. These studies varied concerning how they look at learning communities. They attempted to find out the degree of availability of the requirements of applying dimensions of virtual professional learning communities from the point of view of educational supervisors in public schools in the Sultanate of Oman, and the impact of educational qualification variables and supervisory experience.

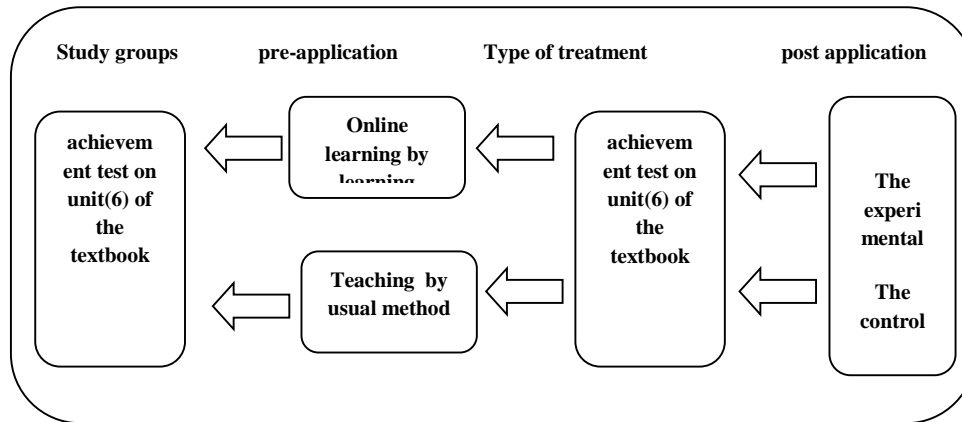
Hassan's study (2019) is similar to the previous studies. He discussed the requirements of building virtual professional learning communities in general education schools, and their role in improving academic performance in these schools. Al-Mawlid's study (2014) aimed to identify the possibility of applying administrative virtual professional learning communities in secondary schools. As for the study of Rebecca et al. (2015), it referred to the evaluation of primary school teachers' description of virtual professional learning communities, to determine the impact of practicing general principles on students' academic level.

Regarding the studies related to achievement, a study conducted by Fadel (2020) examined the effect of the cognitive acceleration strategy on the achievement of second-grade female students regarding the development of their scientific thinking. Nofal's study (2015) attempted to clarify the relationship between good academic preparation and qualifications of the teacher in relation to the improvement of the student's academic achievement level.

The study communities varied between students and teachers. Besides, the tools used by previous studies also varied between questionnaires and tests. This study applied a test to measure the impact of virtual professional learning communities on academic achievement.

Research Methodology and design:

The semi experimental method was applied to both the experimental and the control groups . Figure (1) clarifies this.



Figure(1) Methodology design

Study population:

The study population consisted of tenth grade students in Asiya Bint Muzahim School for Basic Education for Girls in South Al Batinah Governorate in the academic year 2020/2021. The number of the sample is (144), taken from the statistics issued by the Department of Educational Statistics in the Directorate General of Planning and Educational information.

The study sample:

The study sample consisted of (49) female students from the tenth grad. It was divided into two groups: an experimental group consisting of (23) female students; and a control group consisting of (26) female students. The section (tenth 4) represented the experimental group, and was taught by virtual professional learning communities. The section (tenth 5) represented the control group and was taught by the usual way. Table (1) shows the distribution of the study sample:

Table (1) Distribution of the study sample

Section	Group	Teaching strategy	No of students	total
10/4	Experimental	Learning communities	23	49
10/5	Control	The usual way	26	

Research variables:

- A. The independent variable: It is represented by the teaching method, which is of two levels:
 1. Teaching the experimental group using the professional learning communities approach.
 2. Teaching the control group using the usual method.
- B. The dependent variables are: A training program based on virtual professional learning communities to raise the achievement level of tenth grade in unit (6) of the science textbook.
- C. The intervening variables are the variables that have been controlled by unifying them in the research so as not to affect the results, namely:
 1. The teacher: one teacher was chosen to teach both groups: the experimental and the control group; to exclude the influence of the teacher in the research results.
 2. Chronological age of the study members: This variable was adjusted by selecting students of the same academic level (tenth grade).
 3. Academic content: This variable was controlled by teaching the same unit to both groups.
 4. Teaching time: teaching the unit was at the same period of time, which amounted to two weeks based on the study plan of the unit.

Research material and tools:

The current study adopted the achievement test as a tool to measure the academic achievement of tenth grade in unit(6) of the science textbook. To achieve the objectives of the study, an achievement test was set by a number of science teachers in the school.

Authenticity of the research tool:

To verify the authenticity of the research tool, the program and the achievement test (pre- and post-test), were submitted in the initial form to (4) of the specialized arbitrators (female teachers and educational supervisors in the Directorate General of Education in South Al Batinah Governorate) to express their opinions and observations about the suitability and the clarity of the test paragraphs, which were meant to measure the level of academic achievement, Annex (B) represents a list of the arbitrators' names for both of the study tools. Based on the arbitrators' observations and opinions, some paragraphs of the achievement test were modified.

Stability of the research tool:

To verify the stability of the study tool, the test was applied to an exploratory random sample of (10) female students of tenth grade at Asiyah Bint Muzahim School for Basic Education. The exploratory sample was taken from outside of the study sample. The stability was calculated using Couder Richardson equation (20), where it was equal to (000), which is a value indicating the stability of the test. Clarity of the test instructions was confirmed by:

1. Recognizing the validity of the test items.
2. Calculating the stability of the test.
3. Calculating the difficulty factor of the test items.

Applying the test to the exploratory sample showed clarity of the test instructions, the integrity of its items, and the absence of any need to make any modifications to its wording. The following is a summary of calculating the stability of choice and the coefficient difficulty for each of its items.

Equivalence of the two groups:

The equivalence of the two groups was verified by using the (T-test) for the samples on the pre-test. Table (2) shows the results.

Table (2) Equivalence of the two groups according to the pre-test

Group	no	Arithmetic mean	Standard deviation	T-value	Degrees of freedom	Level of significance
Control	26	3.31	2.035	0.1170	47	0.800
Experimental	23	3.39	1.27			

Table (2) shows that there are no statistically significant differences between the averages of the experimental group and the averages of the control group. This indicates that the two groups are equivalent for the purpose of conducting the study.

Research procedures:

After reviewing the educational literature and defining the research problem with its questions and variables, the following procedures were taken to answer the question that identified the research problem.

1. Re-formulating unit (6) in the science textbook in light of the input of virtual professional learning communities in terms of objectives, content, activities and quizzes.
2. Designing audio clips, infographic videos, pdf files, and motivational electronic games and various applications and programs in online learning based on virtual professional learning communities for the content of the unit to be taught, such as the Class Dego application, virtual laboratories in chemistry and others. Moreover, adding interactive PowerPoint programs, and activating strategies and methods that need critical thinking, such as problem solving, electronic maps, and electronic discussions.
3. Submitting the study tools (the achievement test and the program of the entrance of virtual professional learning communities) to a group of arbitrators to benefit from their opinions and observations.
4. Setting the final image of the study tools in the light of the arbitrators' opinions and observations.
5. Dividing the sample randomly into an experimental group that will be taught by using virtual professional learning communities, and a control group to be taught in the usual way.
6. Subjecting the experimental and control groups to a pre-test application to make sure that the groups are equal and identical.
7. Verifying the stability of the test by applying it to a random sample of tenth grade students from outside the study sample; where the reliability coefficient was calculated using Couder-Richardson equation.
8. Applying the program which is based on virtual professional learning communities to the students of the experimental group for a period of two weeks, while the students of the control group remain studying in the usual way.
9. Identifying the impact of professional learning societies on students achievement by (ETA value), which shows: 0.01 (weak); 0.06 indicates medium effect; and greater than (0.14) shows significant effect.
10. Subjecting the experimental and control groups to the post-application test to ensure the effectiveness of the educational program (Virtual Professional Learning Communities).
11. Correcting the test and collecting the data.
12. processing the data statistically by using the statistical program SPSS, and scoring the grades.
13. Analyzing, discussing and interpreting the results of the study, and submitting recommendations and proposals in light of the results of the study.

Statistical manipulations:

1. The test reliability coefficient was calculated using Couder-Richardson equation.
2. The equivalence of the experimental and the control groups was confirmed before starting the study by calculating the arithmetic means and standard deviations. The independent-sample T-test was used to calculate the significance of the differences between the scores of the experimental group students in the post-application of the achievement test in the science course.
3. Calculating the effect of the independent variable of the research using the ETA value to identify the impact of professional learning communities on student achievement.

Results of the study:

The first question: What is the effect of virtual professional learning communities on the academic achievement of the experimental and the control groups of the study sample of tenth

grade students in light of online learning? To answer the question, a (T-test) was applied to the independent samples. Table (3) shows the results.

Table (3) Results of (T-test) of the independent groups on the post scale

Group	No	Arithmetic means	Standard deviation	T-value	Freedom degrees	Level of significance
Control	23	5.26	2.09	3.37	47	.001*
Experimental	26	7.11	1.81			

Table (3) shows that there are statistically significant differences between the scores average of the experimental and the control groups, where the significance level was (0.001 *), which is of statistically significant value at the significance level (0.05); the differences were in favor of the experimental group. The arithmetic mean of the control group reached (5,25) and the standard deviation was (2.09); the arithmetic mean of the experimental group was (7.11). The researchers attribute this to the effect of virtual professional learning communities on the achievement of students who learned through professional learning communities because they were aware of the methods used by the group to enhance their level of education, which had a positive impact on their achievement. This indicates that learning communities had a positive impact on students' achievement, as these communities established a dimension in the field of change and the development of technology-based teaching methods in order to communicate and discuss educational issues that would improve educational methods and increase the level of the students' achievement.

Although there is no previous study that measures the role of virtual professional learning communities on student achievement, the studies quoted indicated that there is a role or impact of virtual professional learning communities on the performance or motivation of teachers. The study agreed with the results of the study of Rebecca (2015) and others, which stated that there were positive correlations between the teacher's cultural level regarding peer observation, and the level of education and the feedback on educational practices.

The results of Fadel's study (2020) indicated that there was an effect of using the cognitive acceleration strategy, which represents an analysis of virtual professional learning communities. The results of the study of Al-Salhia and Al-Hashem (2018) indicated that there was impact of virtual professional learning communities on raising the achievement level of students. The results of the Nofal study (2015) stated that there was a close relationship between the method of cooperation and the level of academic achievement of students.

The second question: Are there statistically significant differences at the level ($\alpha \leq 0.05$) between the scores average of the experimental group in the post and pre-tests? To answer the question, a (T-test) was used for the samples. Table (4) shows the results.

Table(4) Results of T-test of the experimental group in pre- and post- tests

Group	No	Arithmetic mean	Standard deviation	T- Value	Freedom degree	Significance level
Pre-test	26	3.30	2.03	7.114	50	.000*
Post-test	23	7.11	1.81			

Table (4) shows that there are statistically significant differences between the scores average of the experimental group in the pre-test and the post-test; where the significance level is (0.000*), which is statistically significant at the significance level (0.05) in favor of the post-test; the arithmetic mean in the pre-test is (3.30) and the standard deviation is (2.03), The average of the post-test is (7.11) and the standard deviation is (1.81); this shows the influence of teaching through the use of virtual professional learning communities on the performance of the experimental group in the post-test. This confirms that employing virtual professional learning communities in the achievement field has a positive effect that contributes to increasing students' achievement in the courses to which the strategy was applied. This is why educational institutions stress the need to work on providing the best ways and methods that will improve the educational process and

develop the output of Educational institutions, and raise students' achievement in the subjects they study. It is recommended that the educational environment be a dynamic environment which believes in the processes of change in light of international conditions and requirements.

The third question: What is the level of impact of virtual professional learning communities on the academic achievement of tenth grade female students at Asiyah Bint Muzahim School in science in the light of online education? To answer this question, the ETA coefficient was calculated to find out this impact. Table (5) shows the results.

Table (5) The effect of virtual professional leaning communities on students' achievement

The type	ETA value	Significance level	Effect size
Total level	0.442	0.01	Large

It is noted from this table that the value of (ETA) is equal to (0.442); a value which shows that there is significant impact of professional learning communities on students achievement, because of the experiences gained by both parties: students and teachers. These communities support learning and teaching processes, and provide a great ground for students to acquire new knowledge that contributes to the addition of modern educational methods in line with the requirements of the educational environment.

It is remarked from previous studies that there is no study that dealt with the impact of professional learning communities on students' achievement. However, the theoretical literature confirmed that professional learning communities have a significant impact on the educational process. Mohammad (2019) stated that the importance of learning communities lies in the improvement of the quality of the educational process. Finch (2017) emphasized the importance of virtual professional learning communities in improving educational performance and increasing focus on students learning. Al-Osaili (2019) emphasized that virtual professional learning communities have the ability to create an educational environment that motivates learning.

Analyzing and discussing the results:

Analysis of the results of the first question:

The endeavor of educational institutions to keep up with new teaching theories that will improve the performance of educational institutions and those in charge of them (leaders, teachers, students or parents) will lead to outputs that have a significant impact on students' performance and achievement. Transforming the school into a professional learning community depends on the availability of a successful leadership which will work on improving capabilities of the employees, and allow them to be part of the processes of decision making by distributing leadership activities among them. Besides, the school leadership's attempt to provide a broad ground which aims at cooperation and interdependence with the elements of the educational process will move educational institutions to the forefront of development; because one of the most important pillars on which the professional learning community in the school is based is the availability of trust among workers at all levels.

Analyzing results of the second question:

These results indicate that virtual professional learning communities affect the academic achievement of students, because the school leadership and the team of virtual professional learning communities in the school overcame the difficulties and challenges, depending on these learning communities, which undoubtedly contributed greatly to increasing the speed of teachers' responses

to development due to the Corona pandemic and what has resulted from its spread which resulted in blended education. This indicates that virtual professional learning communities represent a qualitative leap in enhancing the role of educational institutions and improving the level of performance, which is reflected on the education of students and the improvement of their achievement level. Therefore, much work is required to activate these communities in all educational institutions in accordance with the age of students. Professional learning communities are systematic means of improving teaching and learning performance and school culture. Designing virtual professional learning communities is an attempt to overcome cultures of isolation and fragmentation of teachers' and individuals' work. Studies show that building strong professional learning communities that focus on improving teaching, curricula and assessment will increase teachers' collaboration and participation, as well as the use of effective teaching practices in the classroom. All of these attempts and procedures will lead to improve students' achievement.

Analyzing the results of the third question:

It is clear from the results that virtual professional learning communities play a major role in improving students' academic achievement. This might be due to the experience gained by teachers and students in the interaction process, and the diversity of the sources of acquiring information and scientific knowledge, which would further consolidate scientific information among Student, and which will be verified through academic tests. Virtual professional learning communities can be applied to work on developing the professional practices of teachers, which will be directly reflected on the improvement of the achievement level of students.

Recommendations:

1. The need to pay attention to building virtual professional learning communities within educational institutions, especially in light of the ongoing Corona pandemic.
2. The exchange of experiences which will contribute to the sustainability of learning among teachers in the same specialization to raise the achievement level of students.
3. Increasing cooperation between different parts of the educational process (school leadership, teachers, and parents) to enhance students' achievement.
4. Conducting new studies that measure the impact of professional learning communities on many variables.

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Sultanate of Oman
Ministry of Education
The General Directorate of Education in South Al Batinah Governorate
Asiya Bint Muzahim School for Basic Education for Girls (5-12)

Honorable esteemed Teacher

Greetings:

We would like to inform you that the school's research team intends to conduct a procedural research entitled "The Impact of Virtual Professional Learning Communities on the Academic Achievement of Tenth Grade Students at Asiyah Bint Muzahim School for Basic Education in the science course in light of online education for the academic year 2020/2021.

Since you have distinguished scientific experience in this field, we would like you to kindly read the paragraphs of the achievement test and express your opinion and observations on its suitability and the soundness of the language, and add any notes or modifications that you deem appropriate to enrich this research.

Thanking you for your kind cooperation in the service of scientific research

With our best regards,

The School research team

(A)

Distribution of students and sections based on classes

Page no:1

Sultanate of Oman

Ministry of Education

Directorate General of Planning and educational information

Department of Educational statistics

Date: 22/01/2021

Time:

Students distribution based on sections

رقم الصفحة : 1
التاريخ : 2021/01/22
الساعة : 8:28:19ص



سلطنة عُمان
وزارة التربية والتعليم
برية العامة للتخطيط والمعلومات التربوية
دائرة الإحصاء التربوي

(B)
Names of
the study
tool
Arbitrators

برية العامة/إدارة التربية والتعليم محافظة جنوب الباطنة
اسم الولاية : وادي العاقل

اسم المدرسة : اسية بنت مزاحم للتعليم الاساسي للبنات الصفوف (5-12) رمز المدرسة : 3502
نوع التعليم : أساسي
للعام الدراسي : 2021/2020

توزيع الطلبة والشعب حسب الصف

الطلبة	الشعب				الصف		
	جملة	إناث	ذكور	جملة	مشارك	إناث	ذكور
115	115	0	3	0	3	0	الخامس
94	94	0	3	0	3	0	السادس
67	67	0	2	0	2	0	السابع
89	89	0	3	0	3	0	الثامن
97	97	0	3	0	3	0	التاسع
144	144	0	5	0	5	0	العاشر
155	155	0	5	0	5	0	الحادي عشر
130	130	0	4	0	4	0	الثاني عشر
891	891	0	28	0	28	0	اجمالي المدرسة

طبع بواسطة : جوخه حمود محمد المعولية

Directorate/dept/ School	Post	Name	Ser.no
Directorate General of Education in South Al-Batina Governorate/Dept of Applied Science	Chemistry supervisor	Seham Bint Omar Al- Zedjalia	1
Directorate General of Education in South Al-Batina Governorate/Dept of Applied Science	Chemistry supervisor	Badriya Bint Saleh Al- Blooshi	2
Asiya Bint Muzahim School for Basic Education for Girls (5-12)	Chemistry first teacher	Mawzah bint Ali Al- Yahmadiya	3
Asiya Bint Muzahim School for Basic Education for Girls (5-12)	Chemistry Teacher	Samiya bint Suleiman Al-Saririyah	4

Annex (C)

Pre- and post- Tests

<https://docs.google.com/forms/d/1usZhXa0MKA8FTGHHzLEN8B2ag4rB2WaMk5QmP UXWNNw/edit>

<https://docs.google.com/forms/d/19ptxh1b3Bo64lmBuZ91PV56fmbVx27akW8bmexAD Xwc/edit>

Annex D

Team of preparing the program of the entry of virtual professional learning communities, which was applied to the experimental group

Post	Name of teacher	No
Science first teacher	Mawzah Al-Yahmadiyah	1
Science teacher	mayyasah Al-Jabiriyah	2
IT teacher	Fatima Al-Hadhramiyah	3
IT teacher	Munirah Al-Harrasiyah	4
Learning difficulties teacher	Khalisah Al-Blooshiyah	5
Chemistry teacher	Samiyah Al-Sariri	6

