

# **Utilizing e-Communities of Practice for Enhanced Teacher Professional Development**

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**Abstract:**

Online platforms are increasingly crucial for collaborative learning and knowledge sharing among educators, making the e-community of practices a crucial aspect of professional development for teachers to adapt to evolving educational needs. This study investigates the role of an e-community of practice (e-CoP) in facilitating the professional development of Saudi science and mathematics teachers through informal online groups. The study employs a mixed method approach, using surveys for quantitative data collection and observational methods for qualitative data acquisition. The study has utilised a purposive sampling approach where 10 teachers from 2 groups (5 each from the science and math's groups) were recruited for data collection. Observations reveal active participation in e-CoPs and collaborative exchange of best practices, while surveys show successful communication channels despite time constraints, contributing to skill improvement on the platform. Collegial associations among teachers are often insufficient for meeting professional requirements. Research shows that e-CoPs practitioners have better understanding of content and teaching methods, stay informed about trends, and enable continuous learning. This enhances teachers' professional skills, enabling them to implement priority reforms like STEM (Science, Technology, Engineering and Math's) integration and critical thinking development, making them relevant for career longevity and continuing professional development.

**Keywords:** Community of practice, Teachers, Professional Development, Telegram, Saudi Arabia.

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## توظيف مجتمعات الممارسة الإلكترونية في تعزيز التطوير المهني للمعلمين

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### المستخلص:

اكتسبت المنصات الإلكترونية عبر الإنترنت أهمية متزايدة كأحد صور التعلم التعاوني وتبادل المعرفة بين المعلمين، بما يشير إلى دور مجتمع الممارسات الإلكترونية ودوره الحاسم في التطوير المهني للمعلمين للتكيف مع الاحتياجات التعليمية المتطورة، ويتناول البحث الحالي دور مجتمع الممارسة الإلكترونية (e-CoP) في تسهيل التطوير المهني لمعلمي العلوم والرياضيات السعوديين من خلال مجموعات العمل غير الرسمية عبر الإنترنت، ولقد تبنت الدراسة الحالية المنهج الكمي، وذلك باستخدام الدراسات الاستقصائية لجمع البيانات الكمية وطرق الرصد للحصول على البيانات النوعية، كما استخدمت الدراسة عينة قصدية حيث تم اختيار 10 معلمين من مجموعتين (5 من كل من مجموعتي العلوم والرياضيات) لجمع البيانات، وكشفت الملاحظات التي تم إجراؤها عن المشاركة النشطة في مؤتمرات الأطراف الإلكترونية والتبادل التعاوني لأفضل الممارسات، في حين أظهرت الدراسات الاستقصائية وجود قنوات اتصال ناجحة على الرغم من ضيق الوقت، مما يسهم في تحسين المهارات على المنصة، وغالبًا ما تكون الارتباطات الجماعية بين المعلمين غير كافية لتلبية المتطلبات المهنية، وتظهر الأبحاث أن المشاركين لديهم فهم أفضل للمحتوى وطرق التدريس، وهم على اطلاع بالاتجاهات، ويمكنهم من التعلم المستمر بما يعزز المهارات المهنية للمعلمين، ويمكنهم من تنفيذ الإصلاحات ذات الأولوية مثل تكامل العلوم والتكنولوجيا والهندسة والرياضيات (STEM) وتطوير التفكير النقدي، مما يجعلها ذات صلة بالعمر الوظيفي والتطوير المهني المستمر.

**الكلمات المفتاحية:** مجتمع الممارسة، المعلمون، التطوير المهني، منصة التليجرام، المملكة العربية السعودية.

## 1. Introduction:

In the context of professional development, Communities of Practice (CoP) have arisen as a transformative structure for the implementation of collective activities, the sharing of expertise, and the cultivation of common learning among people with similar interests or aims as per Wenger-Trayner (Eddy et al., 2022). CoPs are groups of people, sharing a common purpose, with a desire to learn deeper knowledge and to contribute to a specific topic (Väätäjä, 2023). Though the use of CoPs is predominantly correlated with business enterprises, it has gradually involved many other sectors including healthcare and education (Noar et al., 2023). In this context, the rapid advance of digital technologies has resulted in the emergence of e-communities of practice that provide educators with a virtual environment for collaborative professional development. With an emphasis on the teaching methods and communication styles of educators, this research looks at how e-communities of practice are tailored to meet their requirements. The ultimate goal is to help educators improve their professional development through these online communities.

The adoption of e-Communities of Practice (e-CoPs) bears a potential to revolutionise professional development of educators, who have been struggling to utilize various traditional approaches to learning for a long time. Traditional professional development faces some barriers such as a social and geographical division which proves difficult to educators who are not nearby or resources they require (Smith & Gillespie, 2023). The e-CoPs evade the obstacles of distance and diversity by the use of digital platforms. In turn, everyone can have a safe space and exchange their ideas regardless of the location or background that they come from. This paradigm shift emphasizes the urgent need for alternative approaches to professional development that will by correspondence create more suitable structures for educators in a world where people constantly interact and evolve rapidly in line with the fast-changing technology.

Collaborative learning is an indispensable attribute of e-CoPs, it can be accomplished by trust, mutual help and sharing expertise. With a network of peers from a diverse range of settings, teachers can update their viewpoints, revise their assumptions and use their time efficiently. Moreover, e-CoPs generate a safe environment for creative learning, encouraging teachers to search for new sources of knowledge and enable them to comprehend complex matters profoundly (Alshamsi & Abdelaziz; Maroukias et al., 2023). E-learning through e-CoPs has the potential to significantly transform education, impacting not only individual development but also institutional development (Rakic et al., 2020). Collectively, e-CoP members generate information that shapes policies, curriculum, and organizational development, fostering a culture of balanced learning, leadership, and improvement (Grabusts & Teilans, 2021).

The need for professional development is vital and ongoing if teaching methods are to stay up to date in the current diverse and complex educational environment. The concentration on Saudi teachers' professional development has deepened due to the

current reforms (Alhammadi, 2018). E-CoPs represent a virtual forum where various educators participate in a community action aimed at teaching excellence through the exchange of best practices (Bernard et al., 2018; Harvey et al., 2021). Such virtual communities eliminate geographical boundaries and in certain situations, enable communication of data possibly on a global scale. In Saudi Arabia, CoPs present a new teaching platform that could be of great help for the teachers to acquire learner-centred teaching skills and strategies (Walabe, 2020).

E-CoPs serve as a platform for improving teaching and professional development, as they provide opportunities for teachers' interaction, mutual learning and life-long learning (Benians & Terry, 2020). In addition, e-CoPs provide different learning opportunities that can be adjusted to fit different learner needs and proficiencies. A teacher development programme that fits into the existing teacher's preferences and classroom requirements has the potential for a more significant impact on teaching and learning outcomes. The increasing role of education reform and innovation in the Saudi government prioritizes the expansion of e-CoPs, which serve as a useful tool for improving teachers' professional growth (Mohiuddin et al., 2023; Singh et al., 2022). Through providing a means for sharing knowledge, cooperating and continuing to learn, they support the development of innovative teaching approaches, the adoption of modern pedagogies, and the reaching of the educational targets of Vision 2030 (Mohiuddin et al., 2023).

The last few years have witnessed a remarkable rise of e-community of practices (e-CoPs) between teachers, in WhatsApp and Telegram primarily as an innovative means of giving teacher professional development in Saudi Arabia (Al-Asmari & Rabb Khan, 2014; Alshwaier et al., 2012). These informal online groups serve as a platform for teachers where learning and sharing of knowledge takes place while receiving support from the peers. The study utilized informal online groups for their dynamic nature, allowing teachers to engage in collaborative learning, knowledge sharing, and peer support, prioritizing flexibility and inclusivity over structured constraints in formal settings. By employing a mixed-methods approach to this study, the study will examine the processes of communication within such e-CoPs and explore the learning experiences and knowledge exchange, as well as the professional development outcomes among the participants.

## **2. Literature Review:**

### ***2.1 E-Communities of Practice in Education:***

E-communities of Practice (e-CoPs) are seen as a major milestone in the way educators come together, learn and use different teaching methods. The virtual communities that are based on the basic concepts of the distinguished theorists like Etienne Wenger and Jean Lave go further than the conventional CoPs by employing digital channels to promote communication and collaboration while bringing together people from different geographical regions (Corcoran & Duane, 2019; Gijbels et al., 2021). A 2019

Saudi Arabian study revealed that Communities of Practice (CoPs) between surgical and medical units at King Khalid hospital are vital for problem-solving and knowledge sharing, but limited participation due to schedules and lack of positive experience (Alsayed et al., 2019).

(Chen et al., 2022) highlights the role communities of practice (CoPs) that play in the development of education, particularly in time of crisis such as the current worldwide pandemic and social instability. The author also emphasizes that CoPs provide structure and assistance to address difficult problems while promoting professional growth, social cohesion, and the transfer of information. e-CoPs are virtual spaces where teachers, researchers, and policymakers share expertise, resources, and address common challenges. These communities are structured around three main elements: domain, community, and practice. (Bergan et al., 2021). The domain can be a specific area of interest, like pedagogy or educational technology, or a broad area where members share a collective identity and commitment towards teaching (Darling-Hammond, 2021). The communal aspect of education involves regular student participation, fostering relationships, and achieving professional goals through shared resources, instruction processes, and innovative ideas, thereby fostering a sense of community and collective abilities (Hairon, 2018).

On top of that, the asynchronous communication feature that makes these platforms possible also allows instructors to relate to the community any time that would suit their schedules (Belt & Lowenthal, 2023). Therefore, extremely busy schedules do not become an impediment to deeper and more reflective participation (Eriksen et al., 2021). The extended availability and support increase involvement and improve the quality of discussion within the community, ultimately making e-CoPs a highly responsive and interactive support groups for educators. Furthermore, e-CoPs prove to be a significant factor in continuing professional development. Additionally, the communication network of e-CoPs takes much of the burden caused by professional isolation and promote professional satisfaction as educators are able to interact and engage with like-minded colleagues who are facing the same challenges (Hollinshead et al., 2015).

In accordance with (González-Anta et al., 2023) and (Ziegler, 2019), it is shown that involvement in virtual communities of practice (VCoPs) has a positive effect on faculty members' knowledge contribution, knowledge seeking and knowledge repository creation. Thus, the results underscore the ability of VCoPs to serve as significant networks for the transfer of knowledge among academic communities. The intention to join VCoPs is determined by technological, personal and motivational factors, where interactivity, self-efficacy, and identification are closely interrelated with participation intention. These studies highlight the key role of community design and management in creation of sustainable VCoPs and the necessity of further probing into sustainability

elements. e-CoPs features a flexible basis that can be changed to meet the requirements of the participants and cope with educational standards, technological progress, and teaching methods (Nortvig et al., 2018). They act as databases of gathered up knowledge, leading to new solutions to old problems, making better job for teachers and better scores for students

### ***2.2 Informal Learning and Knowledge Sharing in Online Communities:***

E-CoPs eliminate geographical location issues, making learning spaces more inclusive and accessible for educators, especially in marginalized areas (Efriana, 2021). Digital tools like Telegram and WhatsApp allow real-time interaction, sharing materials, and supporting each other (Mohammed et al., 2024; Singh, 2018). Not only does this type of contact help to overcome the existing educational problems, but it also provides for the educators own professional growth and enables them to find out about new strategies and make use of them effectively. This approach not only addresses existing educational issues but also fosters professional growth for educators by teaching new strategies and promoting collaboration among teachers and students, ultimately overcoming existing challenges and enhancing overall educational outcomes.

Online communities have emerged as the places that enable casual learning and knowledge exchange, with the growing number of teachers learning to upgrade their professional skills and abilities becoming a solid proof of this (O'Dowd & Dooly, 2022; Sullivan et al., 2018). Today, the role of digital networking in education is increasingly important. Conventional professional development programs for the teachers may sometimes be not that effective due to one-size-fits-all approach, relevance pertinence, as well as some logistical constraints (Hiew, 2022). The internet, social media platforms, and online networks have enhanced digital networking. This enables a community of learning that is dynamic and thriving, ultimately lead to better student learning outcomes (Haleem et al., 2022).

Informal learning excels in online communities because of their limited restrictions or burdens including rigid timetables and consistent educational requirements (Taylor et al., 2023). Educators can participate in discussions, share information and seek advice by just logging in at their own convenience from the comfort of their own location. WhatsApp and Telegram, with their instant messaging characters, facilitate immediate communication, ensure the sharing of ideas and insights instantaneously. The informality of these systems serves as a vehicle for friendships among the educators, thereby encouraging discussion and working together (Ismail, 2018).

Additionally, through online communities, knowledge sharing becomes richer via the correspondences of experiences, improved practices and incorporating creative strategies in teaching. Educators utilize these platforms by sharing lesson plans, class activities and other educational resources to enable the transformation of the way they teach from the traditional method (Haleem et al., 2022; Mishra et al., 2020). WhatsApp



and Telegram include multimedia functions, which help teachers share the videos, images, links and documents openly with students reaching new levels of information richness (AlAwadhi & Dashti, 2021). Teachers can participate in the groups that they want by joining groups for certain subjects, class grades and teaching methodologies, thus interacting with their colleagues from all over the world. These groups bring in professionals who become essential sources of different practices and experiences that teachers use to expand their own knowledge (Prestridge, 2019).

### ***2.3 Teacher Professional Development in Saudi Arabia:***

Professional development in the educational sector of Saudi Arabia plays a vital role in responding not only to the changing needs of the education system, but also to those of educators themselves. Studies have documented distinct approaches, as well as various hurdles, toward the improvement of the teacher effectiveness in Saudi educational setting. A study conducted for professional development of higher education teachers suggested the need for personalized training programmes so that teachers can be able to enhance teaching skills and could overcome the hurdles faced by them (Sancar et al., 2021). The results were gathered by conducting face-to-face interviews to identify the factors that affected performance and the need for autonomy in effective professional learning. This study confirms the increasingly necessitating character of targeted approaches to implement the changing educators' needs (Alshehry, 2018).

Moreover, the study on the impact of online professional development (OPD) courses underscore the significance of synchronizing the programme offerings with teachers' preferences and removing the impediments that suppress successful learning (Alzahrani & Althaqafi, 2020). STEM education has come to the forefront as an area of development for teachers and the aim is to cultivate the students' critical thinking and innovation. A study on how Saudi science and mathematics teachers look on STEM integration through professional development classes was reflected in how they viewed challenges and what kind of confidence their instructed them (Aldahmash, Alamri, et al., 2019). Nevertheless, a systematic approach that would allow to improve teachers' attitudes from various aspects suggest the importance of extended planned PD programmes (Aldahmash, Alshamrani, et al., 2019; Alzahrani & Althaqafi, 2020).

More attention has been given by Saudi Ministry of Higher Education to continuous professional development (CPD) initiatives which aim to emphasize pedagogical content knowledge (PCK) and inquiry learning (Al Mutlaq, 2018; Almadi, 2022). The growth of CPD programmes represents determined efforts to improve teaching effectiveness and to be aligned with new ways of thinking about education. Moreover, teacher training should be in accordance with Saudi Arabia's Economic Vision 2030, which emphasizes teacher certification and the relevant teaching skills (Asiri, 2020). Teacher training that makes critical thinking an integral component is seen as a means of supporting the nation's dreams of economic diversification and knowledge-based development (Nganga, 2019).

### **3 Methodology:**

#### ***3.1 Study Design:***

This study deploys a mixed method approach to understand the behaviour and professional development of teachers in online platforms. The method aims to analyse the challenges, collaboration, communication, satisfaction and professional growth of the teachers occurred during e-community of practice. The qualitative data involves using observational method where the conversation of teachers on online platforms (Telegram) were analysed to determine the collaboration and resource sharing between each teacher. The conversation between the teachers were from two groups (Math's and Science) which has showed the disparity among the teacher and their collaborative understanding.

The study also adopts the quantitative approach to analyse the understanding of e-community of practice that helps in the professional development of teachers. A survey was constructed based on 5 variables (challenges, collaboration, communication, satisfaction and professional growth) to achieve a solid response from the teachers. The participants were sought through purposive sampling utilizing the existing relationship and networks mostly within Telegram groups focused on professional development and growth. Since the researcher is one of the members of these groups, recruitment occurred through a direct messaging to the potential participants who are active in these platforms and who were invited to be part of the research. Through this way participants will have an interest on the topic and they will be actively involved in virtual communities of practice which are relevant to the study goals.

This study was performed with a total of 10 secondary teachers' who were selected from mathematics and science subjects. Every section of the group was consisted of the same number of secondary teachers, having 5 persons each. A smaller sample size enables more in-depth qualitative analysis, which yields greater insights into teacher opinions and experiences. The method and sample size were selected to increase the depth and breadth of insights about teachers' professional development experiences via online platforms. The participants for these Telegram topics were chosen from the groups which focus on career improvement. Inclusion criteria ensured that all the participants were actively involved in the online platform. Participants being the members of those groups were intentionally brought in the study so that the experience of using the sites for professional development could be explored.

#### ***3.2 Data Collection:***

The data collection process for this study was carried out using a mixed methods approach which is focused on gathering comprehensive information related to teacher's online behaviours and professional development. The qualitative data was collected through a form of observation, the analysis of conversations on Telegram as a typical tool to evaluate collaboration and resources sharing among those in Maths and Science groups. At the same time, the study used a quantitative approach by creating a survey

that covers the challenges, collaboration, communication, satisfaction and growth professionally in order to get the deep response. As for the participants, they were recruited by means of purposeful sampling via the professional development chat groups on Telegram, so that they would be actively engaged with their groups.

### **3.4 Data Analysis:**

In the analysis of the data, both qualitative and quantitative methodologies were applied to more thoroughly explore patterns in the actions and professional developments of teachers in online platforms. Qualitative data that was collected through observational method underwent thorough scrutiny to figure out all details related to share resources, collaboration as well as other related aspects of teachers' interactions in Maths and science group on Telegram. Furthermore, the SPSS program was used to obtain quantitative data from the survey questionnaire, and analytical technique such as T-test was employed in order to identify relationships and trends related to the e-CoPs. This dual methodology allowed the in-depth exploration of teachers' personal experiences and opinions within e-CoPs, enabling adequately holistic understanding of their professional growth in online platforms.

## **4 Findings:**

An examination of online discussion groups provides significant fresh understanding about how e-communities might support teacher professional development.

In order to improve understanding and retention, teachers actively participate in practical tasks and methods. They emphasize the value of deconstructing ideas, using examples, and using a variety of learning resources. Figure 1 illustrates an online group conversation highlighting the e-community's role in enhancing teacher professional development. Teachers are participating with practical activities and strategies that break down into simplified understandable concepts. Using examples frequently and reinforcing math concepts across the topics instead of just in one can boost retention and increase applicability to the real world. The use of learning tools like manipulatives and scaffolding difficulties, which accommodate various learning styles, are the ways to impart this knowledge. Collaboration provides the ability to share best practices to have a steady growth of teaching quality. Online community therefore becomes the most helpful tool to come up with new explanations, interactive learning activities and consult each other while enhancing the students' understanding of the topic.

## Science Group:

I'm introducing cells to my 7th grade students. Do you have any engaging hands-on activities to start our unit?

Using hands-on activities like building paper models, students learn about cell structures by engaging with tactile materials and visual diagrams, making the learning process interactive and memorable.

How do you approach explaining chemical reactions to beginners? Any tips are appreciated.

I find modeling reactions with manipulatives helps make the concept more concrete. Using objects to represent atoms and molecules, students can see how they rearrange during synthesis or decomposition.

My students struggle with decimals. Any tricks that have helped reinforce place value at this level?

Place value mats with base ten blocks solidified decimals for students by allowing them to build out decimals, observe patterns, and compare amounts, fostering intuition through hands-on exploration.

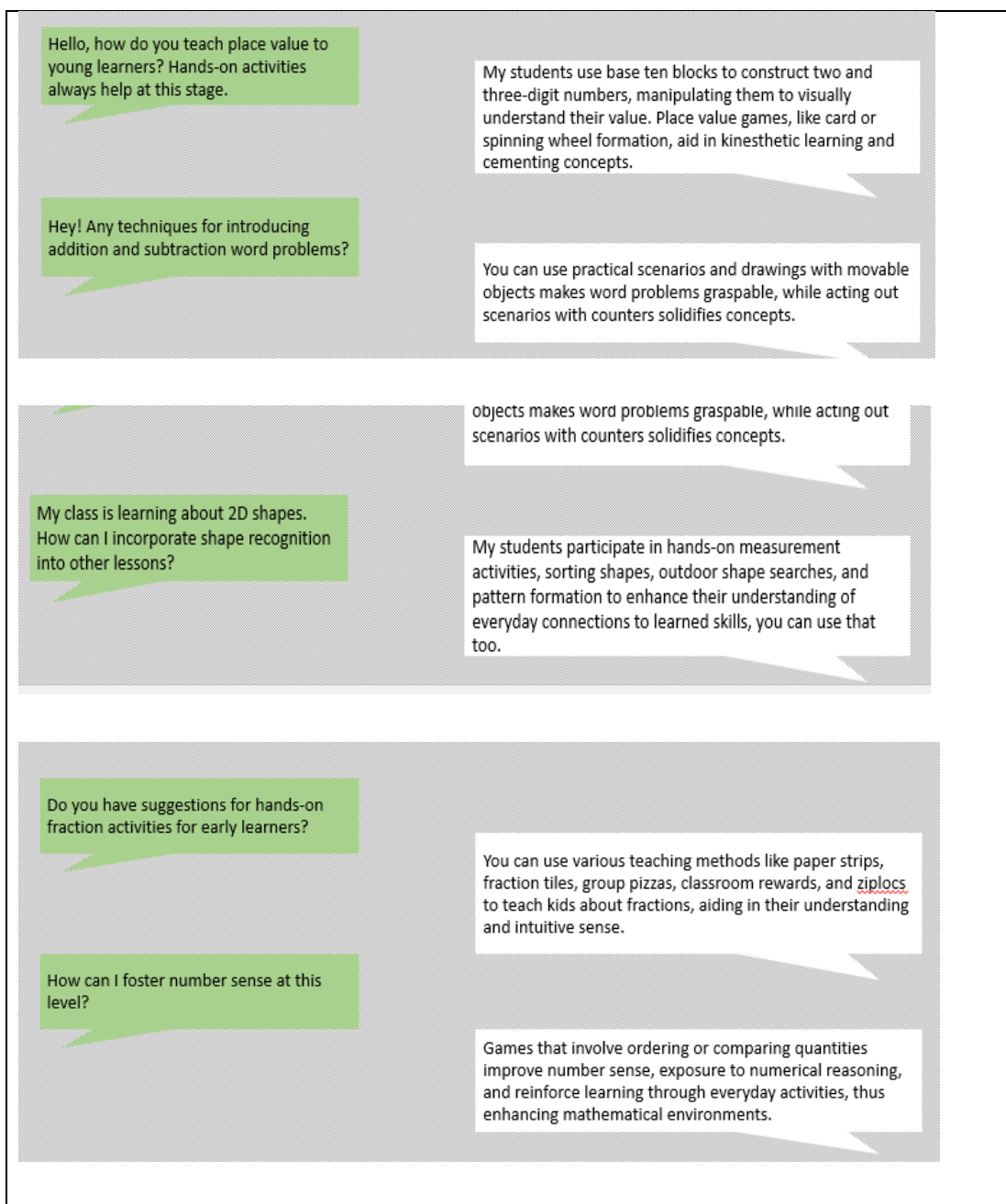
How can I incorporate more inquiry based lessons into our intro astronomy unit?

Encouraging student exploration, I facilitate group work on phenomena like moon phases and eclipses. With minimal explanation, they track observations over time, generate questions, and seek answers from relevant resources, fostering natural curiosity and inquiry-based learning.

Any engaging experiments you recommend to introduce properties of matter?

Student discovery through hands-on learning through simple observations, predictions, investigations, and classifying kitchen items by state of matter, fostering understanding and allowing for questions and mistakes.

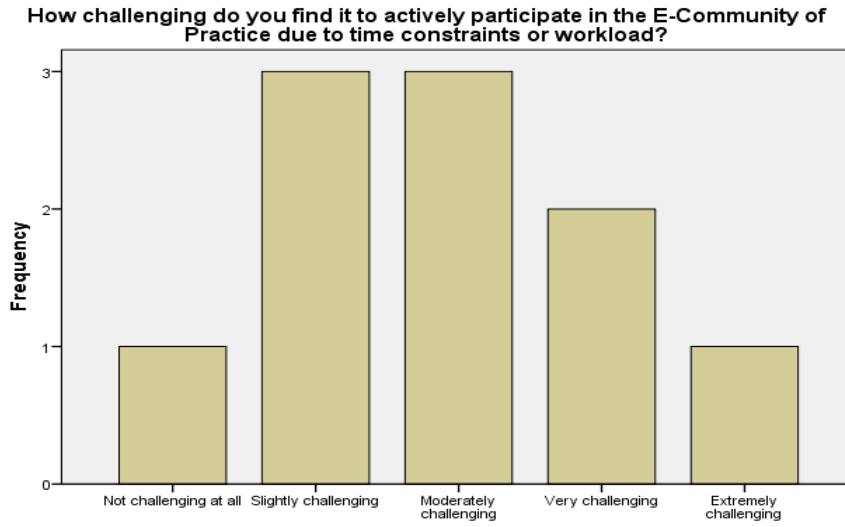
## Math's Group:



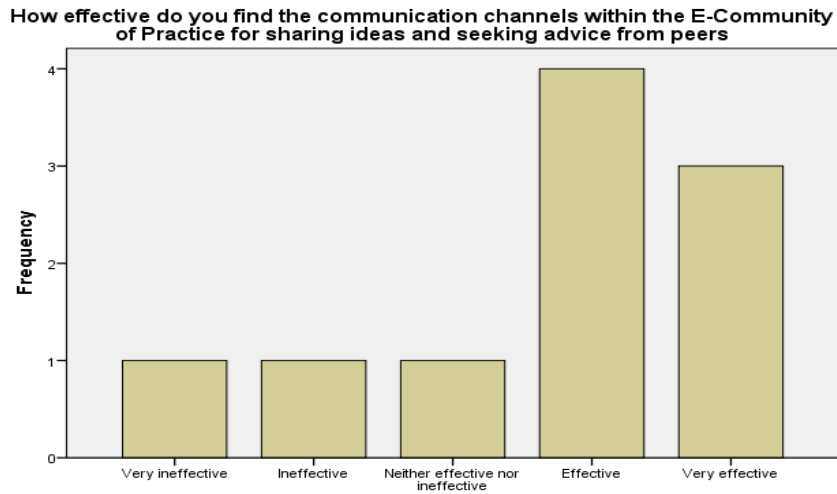
**Figure 1: Conversation of Science and Math's Groups Teachers**

The responses from Figure 2 shows the communication channels in the E-Community of Practice (Telegram) are very useful for sharing ideas and getting advice with 40% answering effective and 30% saying very effective. Nevertheless, the majority of respondents (30%) pointed out some challenges faced during e-CoPs such as time

constraints or excessive workload to which participation become less possible. 40% of teachers claim collaborative work as an occasional aspect in E-CoPs. The 70% of the respondents say that they have either moderately or completely gain from their involvement in professional growth. The platform has been well received by the people, where 30% were satisfactory, 30% neutral and 20% were very satisfied with the platform. 30% of respondents reported a neutral opinion about a platform, maybe owing to usability concerns, apparent lack of relevance, technological limitations, low involvement, or comparisons to other platforms. Nonetheless, the limitations on the fuller participation are seen as adding worth to this forum of E-Community by participating teachers in their development. Because it brings contributory elements to their skills as well as observing reasonably good communication process although they still find that most of their peers collaborate infrequently.



**How challenging do you find it to actively participate in the E-Community of Practice due to time constraints or workload?**



**How effective do you find the communication channels within the E-Community of Practice for sharing ideas and seeking advice from peers**

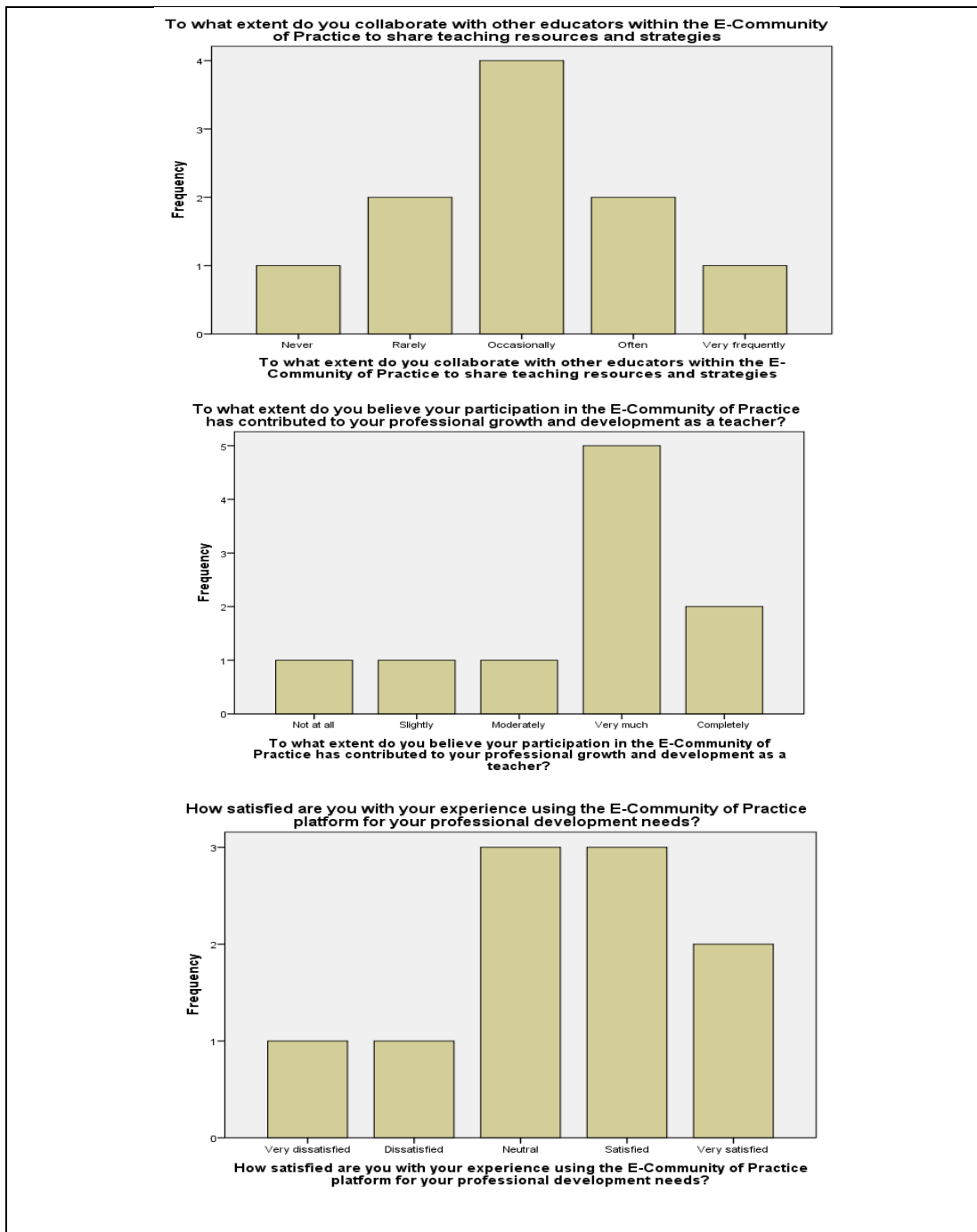


Figure 2: Survey Questions and Responses from teachers



**Table 1: One sample T test**

	Test Value = 0					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
How effective do you find the communication channels within the E-Community of Practice for sharing ideas and seeking advice from peers	8.748	9	.000	3.70000	2.7432	4.6568
To what extent do you collaborate with other educators within the E-Community of Practice to share teaching resources and strategies	8.216	9	.000	3.00000	2.1740	3.8260
How challenging do you find it to actively participate in the E-Community of Practice due to time constraints or workload?	7.660	9	.000	2.90000	2.0436	3.7564
To what extent do you believe your participation in the E-Community of Practice has contributed to your professional growth and development as a teacher?	9.000	9	.000	3.60000	2.6951	4.5049
How satisfied are you with your experience using the E-Community of Practice platform for your professional development needs?	8.500	9	.000	3.40000	2.4951	4.3049

The One-sample T test as per Table 1 shows participants' perceptions of the different aspects constituting the e-Community of Practice (e-CoP) comparing the results to the test value of 0. Participants' scores across all dimensions proved to be significantly higher than the neutral benchmark. Communication channels for exchanging thoughts and seeking advice were of particular interest to the respondents and received a statistically significant mean difference of 3.70 ( $t(9) = 8.748, p < 0.001$ ), thus showing a high level of success. Peers' collaboration within the e-CoP was also recorded as highly positively evaluated by a mean value of 3.00 ( $t(9) = 8.216, p < 0.001$ ). Although the respondents admitted having some constraints of time and workload, they all indicated to the active participation in the e-CoP valuable process as reflected in a 2.90 ( $t(9) = 7.660, p < 0.001$ ) difference. Besides, members declared that they believed the e-CoP positively influenced their professional development, the mean difference being 3.60 ( $t(9) = 9.000, p < 0.001$ ). Having mentioned that, the level of satisfaction from e-CoP platform in professional development is considerably high (BD: MC = 3.40,  $t(9) = 8.500, P < 0.001$ ). This shows that these characteristics can play an important positive role for teachers by reinforce perception and values of participation in the e-CoP, even

if they were faced with difficulties. The One-sample T test results show that participants evaluate numerous components of the e-Community of Practice (e-CoP) positively, showing its usefulness in promoting professional development despite barriers.

## **5 Discussion**

The responses as seen in the findings section indicate how e-communities of practice (e-CoPs) have the potential for aligning with the demands of the changing world and hence, supporting Saudi teachers in their continuous professional development. Through experience sharing, strategies and resources exchange, teachers enhance their own and other teachers' professional skills and knowledge. For example, the extracts show how effective teaching strategies such as stimulating hands-on activities like building paper models of cell structures or using manipulatives to model chemical reactions were suggested. Teachers of e-community get ideas about innovative teaching methods and turn them in new instructional practices by communicating their experience and difficulties in trying them out.

Sharing experience and strategies for tackling common schooling issues creates a collaborative culture and an atmosphere of continuous improvement for teachers (Day et al., 2020). Teachers can draw on each other's creativity and implement modifications to their lessons based on successful methods used by other teachers. The detailing of hands-on, inquiry-based curriculum in the responses shows that there is a transition towards student-centred teaching, where students are engaged in exploring, questioning and discovering knowledge. Teachers can take part in e-communities of practice where they can become acquainted with the most recent educational trends, academic research results and teaching strategies. Through participating in discussion boards, attending webinars, and accessing materials offered by fellow instructors, teachers are able to increase their knowledge bases about trends and the recent innovations in their field (Batunan et al., 2023).

E-CoPs are a new approach to professional development that promotes lifelong learning and collaboration among teachers. They create a space for sharing ideas and experiences, fostering a system of joint learning and continuous development. Teachers gain motivation by meeting diverse individuals and learning about new teaching methodologies (Whitaker & Valtierra, 2018). Traditional professional development methods can be hindered by social and geographical barriers, but e-CoPs can eliminate these barriers. By drawing from each other's experiences, divergent views are generated, challenging conventional assumptions. This leads to the development of creative and effective approaches through joint problem-posing and thinking. E-CoPs can transform professional development from passive training to an active inquiry-based process through collaboration. By collaborating with teachers, they can improve their knowledge and skills, ultimately benefiting students through the ongoing evolution of better teaching practices.

The E-Community of Practice (E-CoP) is a platform that aims to facilitate professional development among teachers. However, many teachers face time and workload constraints, affecting their participation as seen in Figure 2. 70% of respondents reported medium to extreme challenges, consistent with previous studies. The platform's communication effectiveness is rated as either effective or very effective, indicating its effectiveness in sharing ideas and advice among peers. The extent of cooperation among teachers varies, with 40% indicating seldom collaboration and 20% indicating rare or frequent collaboration. Approximately 80% of participants experienced professional growth, highlighting the e-CoP's importance in teacher development. Despite these challenges, about 50% of customers had neutral to dissatisfied opinions about the platform.

The result of the One-sample T test as per Table 1 represents that the e-Community of Practice (e-CoP) significantly contributes to teachers' professional development. The research demonstrates the role of online tools for mutual learning and knowledge sharing nowadays in the field of education. e-CoP facilitates the sharing of insights and learning materials among various educators that strengthen the teaching skills and teaching methods. The study findings are consistent with the past research on the role of online communities in teachers' professional learning and development as Wenger's concept of communities of practice characterizes how collaboration in networks enhances the ability to become competent professional and form a professional identity (Hajisoteriou et al., 2018; Mavri et al., 2023; Slagoski, 2019). The results also correlate with social constructivism conceptions which imply a paramount role of social interaction and peer learning in knowledge creation (Machumu & Zhu, 2017).

High participation rates in the e-CoP platform suggest it effectively meets teachers' professional competence needs. It suggests creating a conducive online learning space for educators in their respective fields. This information can be used to design effective professional development programs that utilize virtual communities for teacher learning and collaboration, benefiting educational stakeholders.

A lot of the teachers resort to the e-Communities of Practice (e-CoP) s instead of the professional development programs offered by the Ministry of Education because they are driven by various reasons. These include fixed, irrelevance of developed curricula by centralised professional development initiatives and demanding times of training schedules for teachers. Such an outcome can lead to low turnout and hence reduced involvement in professional development activities. Consequently, when such creative teachers are missing, it is the skills of the mediocre ones and their pedagogical approaches that are not enhanced. On the one hand, e-CoPs are great for the same reasons (ease of use, access and peer support) but on the other hand, they have the same disadvantages: usability, access and peer support (Bornschlegl & Caltabiano, 2022). Unlike most formal structures, however, the informal manner of e-CoPs may be

conducive to the spread of inaccurate or unchecked information and may result in the poor and indeterminable quality of resources and support.

## **6 Conclusion:**

E-CoPs of community practice (e-CoPs) are considered as a cornerstone of teacher professional development via offering spaces for collaboration, resources sharing, innovative teaching methods, and so on. Although these challenges entail the lack of time and work overload, e-CoP members actively participate in these group discussions, which is an indicator of their perceived value and benefits. E-CoPs communication channels provide the most effective medium so far for sharing ideas and seeking help, so in turn, development of professional teachers dramatically increases. The high degrees of satisfaction of the participants attest to the positive impact of this project on the learning and collaboration of the teachers. e-CoPs not only become the hubs of continuous informal learning and knowledge sharing that facilitate the development of personally growing culture of training all time among educators. Through cooperation and exchange teachers increase their expertise in sorts of modern teaching methods, models of everyday practices, and creative ideas, and thus improve the quality of their performance. The e-CoPs provide flexible, convenient, and collaborative platforms for teachers to widen their knowledge, exchange teaching strategies, and server the community by benefiting from the community support. E-CoPs, although, can have a number of disadvantages such as rapid and widespread information distortion and lack of proper advice.

## **Future recommendations:**

Educational stakeholders should invest in sustainable e-CoPs, focusing on user-friendly interfaces, relevant content, and technical support. Further research is needed to explore sustainability elements. Policymakers and institutions should integrate e-CoPs into professional development programs, encouraging teachers to use digital networking tools for global knowledge expansion.

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**Ethical approval:** Not required.

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