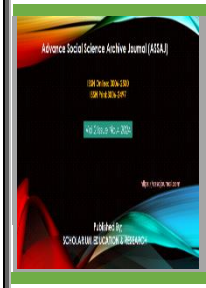

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SIGNIFICANCE OF DIGITAL COLLABORATION AND SKILLS FOR EFFECTIVE LEARNING OUTCOMES: A STUDY OF TEACHERS' PERSPECTIVES

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ABSTRACT
The study examines teachers' perceptions towards the significance of digital competencies and skills for effective learning outcomes. The study was quantitative and based on the questionnaire conducted by 200 teachers to evaluate their opinions on the value of diverse digital tools such as communication applications, educational applications, multimedia applications, and online collaboration platforms. The questionnaire was adopted from the study of Mena-Guacas et al. (2024) and consisted of twenty-four questions. The questions were modified and put before the teachers and the data was collected from 200 teachers teaching at the secondary level in District Lahore Pakistan. The data was analyzed through SPSS version 23 and frequencies, percentages and mean values were calculated. The results showed that a strong consensus exists about teachers having to be proficient in the usage of email, social networks, wikis, blogs, search engines and educational websites, in turn, placing special emphasis on content creation interactive and multimedia: podcasts and videocast. Teachers are excited about digital tools for conversing with others and developing content, but their descriptions of potential approaches like syndication systems and tagging/bookmarks indicate less enthusiasm and possible gaps in awareness and/or experience. They view that professional development programs should target improved digital literacies, particularly in emerging educational technologies. The data indicate potential interest in personalized training and improved institutional support to help educators better embed digital tools into their teaching practices. Future studies could focus on the challenges of technology adoption, the implications of digital tools for student learning, and the influence of demographics on teachers' digital competence.
Keywords: Digital Collaboration, Skills, Effective Learning Outcomes.

Introduction

The emergence of new information and communication technologies has given birth to effectively continuing the education process and digital collaboration (Scherer**,** et. 2019). New technologies not only continue the education process but also make the learning process more effective (López-Meneses, 2020). Digital technologies provide

opportunities for teachers and learners to collaborate in learning opportunities despite different geographical and space settings (Fullan, 2020). There emerges the redesigning of the learning, teaching, technology, collaboration and application of technology (Wang et, al., 2020). With the emergence of new technologies, the change of paradigm or inclusion of technology in educational paradigm has become a social need (Giel et al., 2020).

Teaching and learning through the digital sphere is cost-effective and sustainable sphere for education activity. The emergence of COVID-19 also emphasized the online learning and teaching needs (Xiado et al., 2024). Digital tools and platforms are emerging constantly and they strengthen collaboration and learning efficiency (Xiado et al., 2024). Collaboration ability is an emerging skill of the 21st century which also emphasizes the adoption of the digital tools associated with the culture (Sobko, 2020).

In Pakistan, the realm of digital collaboration and education has undergone a transformative journey, driven by the forces of technology and the crucial imperative of bridging educational gaps. This transformation is marked by several initiatives to use digital tools to increase access to education in a country with 22.8 million out-of-school children (Dawn, 2024).

The digital education need has been highlighted by the COVID-19 crisis, which required students to move to online learning platforms. This transition did reveal the stark disparities between digital accessibility in public and private as well as rural and urban schools, where private schools had a clear advantage in terms of infrastructure and connectivity (Digital Rights Monitor, 2022). However, this time also led to the provision of innovative solutions that opened micro schools operating on digital learning software to reach students in remote areas (The Borgen Project, 2024).

Pakistan is a developing country and digital collaboration is necessary due to the difficult circumstances, and environment for learning and professional development. Present study is conducted to understand the digital collaboration needs and skills attained for effective learning.

Statement of the Problem

Digital collaboration can have a positive impact on teaching, learning and management of educational activities. The emergence of new technologies has made education more effective and result-orientated. Quick reply to queries and concern by a teacher can make the teaching, learning and management process effective. By adopting the digital tools competency, there can be more effective result-oriented education at the secondary level in Pakistan.

Research Objectives

- To understand the significance of digital collaboration and skills for teachers in the age of digitalization.
- To investigate the perceived effectiveness of digital collaboration and skills development in the changing landscape of education.
- To propose different strategies to equip the teachers with skills so that the digital collaboration for effective teaching and learning processes in Pakistan could be achieved.

Research Questions

1. What is the significance of digital collaboration for teachers in the age of technology in Pakistan?
2. How digital collaboration can make learning effective in the changing landscape of Education?
3. What strategies should be adopted for digital collaboration for effective learning process?

Significance of the Study

The present study helps to understand the significance of Digital Collaboration in the Pakistani educational system. The study can also help to understand the dimensions of Digital spheres and their role in educational growth. This study also helps to understand different strategies which can be implemented in the education system for effective results.

Literature Review

2.1 Collaboration and its Importance in Education Process

Collaboration in an educational context means working together with teachers, students, parents and sometimes the wider community to achieve better learning results. Such cooperation can take on many forms, such as teacher-and-student cooperation, peer instruction, multi-disciplinary group teaching, and engagement with the external community (Smith & Jones, 2020).

2.1.1 Students and Teachers Collaboration

A primary form of collaboration in education is the relationship that exists between teachers and learners. This relationship is essential to establishing a culture of learning where students can express their opinions and feel appreciated. As Vygotsky social constructivists put it, learning is a social activity and students learn through social

interactions with others (Vygotsky, 1978). Collaborative learners achieve better outcomes in the classrooms because teachers are able to develop more appropriate curricula to suit the different students in the classroom thus promoting inclusive education (Lave & Wenger, 1991).

2.1.2 Peer Learning

Peer learning or cooperative learning embraces groups of students working towards the solution of a problem or fulfilling a task. In addition to helping understand subjects better, it also helps in the development of communication, leadership and problem solving skills (Johnson & Johnson, 1999). Engaging in peer learning exercises suggests students typically perform better on various cognitive and metacognitive developmental tasks (Slavin, 1996).

2.1.3 Interdisciplinary Team Teaching

Education in various academic subjects helps to eliminate the gaps that exist among them. Interdisciplinary teaching involves teaching students relationships between subjects, and consequently nurturing their critical and imaginative skills (Fogarty, 1991). This method calls for teachers from different subject fields to jointly prepare and teach as a way of promoting integration of the curriculum and providing students with a broader perspective of the education system.

2.1.3 Community and Parental Involvement

Learning is not restricted to the four walls of the classroom. The participation of parents and the community can greatly enhance a pupil's success. For example, parental engagement has been reported to increase students' motivation and attendance and improve academic performance (Henderson & Mapp, 2002). Partnerships from the community help put academic concepts into practice through experiences such as internships, mentoring and community service.

2.2 The Need for Collaboration

Collaboration in Education is necessitated by a range of social and educational factors:

Diverse Learner Needs

2.2.1 Students in classrooms nowadays are more diverse than ever which means teachers need to change their styles of teaching to match how students learn as well as their cultures and abilities (Tomlinson, 2001).

2.2.2 Technological Advances

Changes in technology use in education require new ways of teaching as well as learning about the different tools and platforms that need to be utilized (Prensky, 2001).

2.2.3 Globalization

With the world becoming more connected, there is a greater demand for skills such as cultural sensitivity and global awareness which can only be developed in collaborative environments (spring, 2008).

2.2.4 Complex Problem Solving

The issues that plague the 21st century is intricate and multidimensional in nature. This is similar to the nature of education that deals with these problems. It is an interdisciplinary field which is why deep-rooted issues can surface in the field (National Research Council, 2012).

2.3 Digital Collaboration and Its Significance

Digital cooperation incorporates the use of digital devices and online collaborative platforms for communication, management, and any project related activities irrespective of the geographical location of users. Modern technologies combined with how we work, study, and engage with people has shifted tremendously with the popularity of remote work and online education not forgetting schooling in general.

2.3.1 Tools of Digital Collaboration

2.3.1.1 Communication Platforms

These include Slack, Microsoft Teams, and Zoom among others allowing real time interaction which is essential during team exercises and consultations (Grudin, 2000).

2.3.1.2 Management Tools

Some of the platforms available are Trello, Asana way along with Pension as perfect marketing management software almost similar to beautiful marketing Canva. They are highly effective in organizing work such as to-do management lists, Gantt scheduling, and even project tracking (Schwarz & Schweiger, 2016).

2.3.1.3 Document Management

Documents, spreadsheets and computer presentations can now be created by several users and worked on simultaneously through Google Docs or Microsoft Office 365 among other tools (Thompson, 2008).

2.3.1.4 Easier Coding

GitHub and GitLab are two platforms that give software developers the ability to work collaboratively by managing different editions of software coding (Spinellis, 2005).

2.3.2 Need of Digital Collaboration

2.3.2.1 Expansion of Opportunities Services and Telecommuting

Due to the expansion of globalization marketing, every company's goal is to break even in all countries thus the requirement to digitally market across different zones and borders. Digital gadgets and devices allow one to work remotely. There exist no restrictions to where work can be done (Friedman, 2005).

2.3.2.2 Flexibility and Efficiency

As collaboration mostly happens online, the need for travelling is greatly reduced which allows for a more effective use of time and resources. This also permits a better balance between working and personal life as well as higher productivity (Cascio, 2000).

2.3.2.3 Increased Communication

Digital platforms often provide better documentation of discussions, decisions, and changes, which may help eliminate misunderstandings and enhance project visibility (Gibson & Gibbs, 2006).

2.3.2.4 Multicultural Innovation

It is possible to integrate multicultural teams, making collaboration more digital which studies preferred over by Page (2007), as it is more likely to bring out innovative solutions from the variety of perspectives involved.

2.3.2.5 Pedagogy and Development

Within the context of education, collaborative digital tools have made an impact in the way students learn, collaborate on coursework, interact with educational content and engage in peer learning as well as global educational resources (Dillenbourg, 1999).

2.3.2.6 Emergency Response Management

The digital collaboration tools are put to test while addressing global events, such as pandemics, and it has been seen that they are great for ensuring continuity in education and business operations (Lund et. al, 2020).

2.4 Challenges in Digital Collaboration

Although digital collaboration is very helpful, it also bears some challenges:

2.4.1 Security and Privacy

There is a risk in sharing information that is sensitive over a digital platform unless proper security measures have been put in place to guard against data breaches (Kampf, 2017).

It is important to note that technology is not readily available to every person. This detrimental lack of access can detract from the ability of certain nations or communities to work together (Warschauer, 2003).

2.4.2 Lack of non-verbal Communication

The lack of non-verbal communication alongside a difference in time zones may lead to a miscommunication or misunderstanding between people (Hinds & Kiesler, 2002).

2.4.3 Informal overload

With too many tools or too much information, a person can suffer from burnout or what is referred to as 'information overload' (Edmunds, 2017).

2.5 Digital Collaboration and its Effectiveness for Work Ease in the Educational System of Pakistan

Constructing effective digital collaboration in Pakistan's education system can help cut down the frequency of educational processes like administration and even learning and teaching. This is how it can be effectively used:

2.5.1 Improving School Management

2.5.1.1 Automated Processes

Administrative tasks such as registering students, fee collection, class attendance, and record keeping can be automated using digital tools. Software applications for management of schools like, as Smith and Jones (2021), have written can perform all these functions, reducing the chances of errors and freeing up time spent on manual processes. This will enable teachers to focus on their jobs.

2.5.1.2 Communication

School management together with teachers, students, and parents can use emails, instant messages, or even educational apps that allow for better communication. This will enable everyone and everything to be informed well in time about changes like schedules and events (Ali & Ahmed, 2019).

2.5.2 Improvement of Education

2.5.2.1 Resource Sharing

One of the most tedious tasks for many teachers is preparing lessons, and by cooperating with other teachers in a school, such materials can be co-produced and even used in online classes, which will improve the standard of education (Khan et al., 2020).

2.5.2.2 Professional Development

Online platforms provide teachers with opportunities for webinars and new courses, enabling them to practice continuously while remaining within the boundaries of their schedules (Rana & Ahmed, 2022).

2.5.2.3 Virtual Classrooms

Google Classroom or Microsoft Teams enable teachers to create a virtual classroom to facilitate and manage assignments, share resources, and conduct assessments which is extremely beneficial in times of adverse conditions such as extreme weather or pandemics (Hussain et al, 2021).

2.5.3 Improving Learning Experience

2.5.3.1 Interactive Learning

Such tools allow collaborative and interactive learning to take to the next level, allowing students to create quizzes, polls, and even group projects making learning a lot more interesting and engaging (Yousafzai & Khan, 2020).

2.5.3.2 Personalized Learning

Adaptive Learning Technologies allows for educational content to be developed tailored to the needs of individual students, thus addressing the problem of the varying pace and styles in which students learn (Shafiq & Rehman, 2018).

2.5.4 Facilitating Collaboration Among Students

2.5.4.1 Peer-to-Peer Learning

Students are now able to combine their efforts in groups for projects or assignments over the internet due to digital platforms, this promotes collaboration and communication that the students will need in their careers (Zaman, 2019).

2.5.4.2 Access to Global Peers

Students today can interact with peers of various countries and cultures, this enables them to gain a different perspective in terms of education, and broadens their view towards the world and enables them to learn much more (Ahmed & Ali, 2021).

2.5.5 Crisis Management

The continuity of education through the aid of digital tools ensures that education can proceed amidst crises from natural disasters to pandemics, keeping academic schedules and learning loss at bay (Khan & Hussain, 2021).

2.6 Challenges & considerations in Digital Collaboration in Pakistan

2.6.1 Digital Divide

To lessen the technology gap for vulnerable communities, more resources must be allocated to ensuring equitable access to technology (Raza, 2020).

2.6.2 Teacher Training

Proper training programs and pedagogies need to be implemented in order for teachers to take advantage of the digital tools available to them (Khan & Malik, 2019).

2.6.3 Cultural Adaptation

For digital education to be utilized in a more effective manner in Pakistan, it has to be more culturally sensitive and locally available in diverse languages (Qureshi & Saeed, 2022).

Efforts to infuse modern forms of collaboration would benefit the Pakistani educational system for a myriad of reasons from easing the burden of teachers and increasing engagement of students with incorporating technology into the administration. Clearly, there are plenty of opportunities to leverage, but challenges exist which will require great efforts to overcome.

2.7 Related Studies

Pakistan has experienced transformative shifts in digital collaboration and education, driven by the necessity to overcome educational gaps and improve learning experiences through technology. With the unprecedented number of out-of-school children in the world, there has been increasing focus on the use of digital to reach these untapped populations in the country (Ahmed, 2013). Policies like Digital Pakistan are being introduced to make sure that technology is not only available but also integrated into the education system through various plans focusing on the importance of key areas of technology access and use (Memon, 2007)

Bakar (2018) explores the potential for digital tools to create collaborative learning environments that facilitate student interaction and educational outcomes despite existing connectivity challenges. The importance of digital collaboration for engagement as part of e-learning has been elevated, particularly in the wake of the COVID-19 pandemic and the transition to remote classes. Rasool (2022) explores how digital collaboration platforms are effective for higher education and finds strong correlations between digital literacy and students' outcomes at higher education levels in Pakistan.

Ahmad (2014) examined university-industry R&D collaboration. The study noted how the benefits of digital collaboration extend beyond education to help foster innovation and economic development. There is a wealth of evidence citing the challenges around certain facets of digital education systems, the design, infrastructure and policy required to adopt those systems. Siddiqui et al. (2023) discuss the barriers to effective

online learning, highlighting the importance of well-structured policies and teacher professional development to drive sustainable online learning initiatives.

Collaborative digital settings have been reviewed for their capacity to democratize learning. Study by Fakir Mohammad et al. (2023) explores ways to make digital education in Pakistan, translating it better to engage with Pakistani students to contribute to better learning outcomes. Abbas (2019) 's study focusing on the impact of digital literacy on higher education students indicated that if on the surface, digital tools significantly improve students' communication, research and confidence, its direct influence on academic outcomes such as results (CGPA) is quite low, hinting that there is a complex relationship between digital literacy and academic performance.

Research Methodology

The present study is quantitative based on the numerical description. Quantitative study elaborates the facts in the numeric form (Gay, et al., 2012). The study is designed to understand the perception of the teachers teaching at the secondary level in Pakistan.

Sample of the Study

A sample is the representative part of the population ((Shorten & Moorley, 2014). District Lahore is selected as the population of the study while the sample is selected from 200 teachers teaching in different institutes. The sample is selected through a convenient sampling process (Bhardwaj, 2019).

Tool of Data Collection and Analysis Process

The questionnaire is used as the tool of data collection in the present study. The study has adopted the questionnaire from the study of Mena-Guacas et al. (2024) consisting of twenty-four questions. The questions are modified and made on the Likert scale.

Data is analyzed through SPSS version 23 and the frequencies, percentages and mean values are extracted to know the perception of the teachers.

Data Analysis

Table No. 1

		Strongly Agree	Agree	Undefined	Disagree	Strongly Disagree	Total	Mean Value
1	F	54	63	35	28	20	200	3.52
	%	27.00%	31.50%	17.50%	14.00%	10.00%	100%	
2	F	56	61	27	23	33	200	3.42
	%	28.00%	30.50%	13.50%	11.50%	16.50%	100%	
3	F	43	75	25	39	18	200	3.43

	%	21.50%	37.50%	12.50%	19.50%	9.00%	100%	
4	F	55	96	19	19	11	200	3.83
	%	27.50%	48.00%	9.50%	9.50%	5.50%	100%	
5	F	76	87	14	18	5	200	4.06
	%	38.00%	43.50%	7.00%	9.00%	2.50%	100%	
6	F	68	55	20	29	28	200	3.53
	%	34.00%	27.50%	10.00%	14.50%	14.00%	100%	
7	F	66	77	19	18	20	200	3.76
	%	33.00%	38.50%	9.50%	9.00%	10.00%	100%	
8	F	87	57	21	15	20	200	3.88
	%	43.50%	28.50%	10.50%	7.50%	10.00%	100%	
9	F	54	66	32	29	19	200	3.54
	%	27.00%	33.00%	16.00%	14.50%	9.50%	100%	
10	F	82	69	21	18	10	200	3.98
	%	41.00%	34.50%	10.50%	9.00%	5.00%	100%	
11	F	67	58	10	30	35	200	3.46
	%	33.50%	29.00%	5.00%	15.00%	17.50%	100%	
12	F	56	68	15	26	35	200	3.42
	%	28.00%	34.00%	7.50%	13.00%	17.50%	100%	
13	F	77	69	12	24	18	200	3.82
	%	38.50%	34.50%	6.00%	12.00%	9.00%	100%	
14	F	75	72	18	20	15	200	3.86
	%	37.50%	36.00%	9.00%	10.00%	7.50%	100%	
15	F	92	66	12	16	14	200	4.03
	%	46.00%	33.00%	6.00%	8.00%	7.00%	100%	
16	F	78	80	18	16	8	200	4.02
	%	39.00%	40.00%	9.00%	8.00%	4.00%	100%	
17	F	62	90	18	21	9	200	3.88
	%	31.00%	45.00%	9.00%	10.50%	4.50%	100%	
18	F	77	74	14	14	21	200	3.86
	%	38.50%	37.00%	7.00%	7.00%	10.50%	100%	
19	F	78	81	8	14	19	200	3.93
	%	39.00%	40.50%	4.00%	7.00%	9.50%	100%	
20	F	56	79	26	21	18	200	3.67
	%	28.00%	39.50%	13.00%	10.50%	9.00%	100%	
21	F	77	79	14	13	17	200	3.93
	%	38.50%	39.50%	7.00%	6.50%	8.50%	100%	
22	F	80	81	15	12	12	200	4.03
	%	40.00%	40.50%	7.50%	6.00%	6.00%	100%	
23	F	66	82	9	19	24	200	3.74
	%	33.00%	41.00%	4.50%	9.50%	12.00%	100%	
24	F	88	65	16	17	14	200	3.98
	%	44.00%	32.50%	8.00%	8.50%	7.00%	100%	

Analysis

Question No. 1: "A teacher should be able to communicate with others by email."

By asking the questions, it was found that most of the respondents as 58.50% agreed or strongly agreed that teachers should be allowed to email. For email writing in a formal teaching context, the mean is 3.52, indicating an overall tendency towards a moderate but unambiguous preference towards the professional usage of email communication. Only 24% disagree or strongly disagree, meaning email is overall viewed as a relevant and valuable mode of communication. Overall, email was seen as a critical communication tool with strong support but also some differences in opinion.

Q. 2: "Teachers should be able to converse with other people through quick chats reply.

The obtained results as shown in Table No. 1 indicate strong support and is only slightly less supportive than communicating by chat. 58.50% respondents are agree or strongly agree with the statement that teachers can chat with others, implying that people appreciate real-time communication as mean value is 3.42. Still, 28%% of respondents either disagree or strongly disagree, meaning that some could have misgivings, perhaps because they fear it would prove distracting or undermine professionalism.

Question No. 3: "A teacher must have the ability to instant message with others."

The question is asked to the participants to know their perception. The overall mean value 3.43 indicates a favourable perception towards instant messaging (IM) with 59% of people either not agreeing or agreeing respectively. But 28.50% disagree or disagree strongly, an opposition rate higher than for email and chat. It could also mean that instant messaging is a less formal or jarring means of communication than other mediums, particularly in an educational setting. The 12.50% of undefined responses might mean that some of the respondents are not familiar with the use of IM tools in professional places or their relevance. Although IM is largely associated with benefits, its limited use has a lower acceptability rating due to etiquette' in professional communications.

Q. 4: "A teacher must be able to communicate through social networks with others.

Such a question received significant consensus, as reflected in the high mean of 3.83; 75.50% of the respondents' viewed agree or strongly agree, showing that communication through social networks is appreciated by teachers. The positive response might reflect the fact that social media is becoming more embedded not only in all kinds of work but also in private life that even educational settings are not excluded.

No. 5: "An operating professional network should be able to create a teacher.

This question had the most support among the items, with a mean of 4.06. Combined, the vast majority of respondents as 81.50% agreed or strongly agreed, indicating

networking among professionals is very valued. Teachers seem aware that building bridges inside and outside the education system is critical for collaboration, access to resources and sharing expertise. But only a small percentage as 11.50% disagree or strongly disagree, indicating little opposition to the notion. Only 7% of responses are undefined, which is evidence that a professional network is perceived as an instrument of own development, both professionally and personally. There is broad agreement on the necessity of networking for teachers.

Question No. 6: "Teacher should be capable of taking part in blog discussions.

The mean of 3.53, and majority 61.50% suggest that such a result can be interpreted to fall on the moderate support for the role of teachers in blog discussions. However, 28.50% said they either disagreed or strongly disagreed with this statement, thus indicating that this type of professional socialization is not perceived favourably by some. Teachers use blogs to share knowledge and connect with peers, but lower agreement than the other tools suggests that blogs are potentially time-consuming or lack relevance, or that the informal nature of blogs is less accepted. In educating everyone about the advantages of blogs, the 10%, where no response is taken, as neutral, maybe those in this group are not yet convinced about the merit blogs would provide in the educational area. In short, though there's strong support, the mixed response suggests it's not a universally welcomed measure.

Question No. 7: "A teacher should be able to be active in forums.

A mean of 3.76 indicated that forums were seen as a useful tool for teachers by most of the respondents as are 71.50%. Forums allow for professional conversation, connections, and sharing of ideas. Only 19% of them strongly disagreed and disagreed that it is considered appropriate and useful for educational purposes to use a forum. The 9.50% of undefined responses indicate some uncertainty, perhaps because of uncritical experience or lack of knowledge of how forums can be made available for teacher use. Evidence suggests that these institutions are early within them for-sale trajectory, and many participants remain skeptical or lack experience with forums in general.

Q. No. 8: "A teacher should be able to create blogs."

This question was widely endorsed as mean value is 3.88): 43.50% strongly agreed, and 28.50% agreed. A significant majority of respondents believe that creating blogs is an important skill for teachers. Blogging becomes a way for those educators to push out their knowledge to the world. The percentage who disagreed or strongly disagreed with the process, 17.50% was relatively low, suggesting little pushback. 10.50% responses may indicate that some survey participants do not see the merit or utility of blogs in their workplaces. There was overall agreement that blogs were valuable to education.

Question No. 9: "A teacher should know how to create and amend blogs.

As a mean of 3.54, it indicates a moderate level of support for designing and manipulating blogs for teachers. So, although 60% agree/strongly agree, 24% disagree/strongly disagree with a response which likely contains fears over the technical skills needed for designing/maintaining blogs. The technical knowledge required could be off-putting for some teachers, particularly those less comfortable with tools intended for web designers. 16% also indicated undefined responses, which may reflect ambiguity about whether or not designing a blog is essential or relevant to their teaching. There is a strong desire to create blogs, but a willingness to be creative as far as the technical side of designing and changing blogs seems less universal.

Question No. 10: "A teacher must be able to use wikis."

The Wikis were rated highly, showing strong support, with the mean value 3.98. This indicates the usefulness of wikis in collaborative work, project management, and in a learning framework of sharing educational content, as 75.50% of the respondents agreed or strongly agreed. Only 14% said they disagreed or strongly disagreed, indicating little pushback. The low percentage of undefined as 10.50% also additionally reaffirms the acceptance of wikis in teaching. Wikis are considered excellent collaboration tools in which teachers and students can create and edit content collaboratively. This positive response suggests an appreciation for the collaborative, open-source aspect of wikis within the educational setting.

Question No. 11: "A teacher should know how to use a syndication system."

Claim 3: Teachers have a mean value of, as mean value is 3.46, moderate support for teaching through syndication systems. Having syndication/having followed educational content comes across as a good mechanism to keep the readers informed with relevant content, which is evident through agreement on the question at 62.50% of the answers. Yet more than one-third of respondents who either disagree or strongly disagree represent significant bifurcation among the crowd, one that may be suspecting the practical implementation or applicability of those systems. Neutral/Undefined is 5% which means that they are not aware or not familiar with syndication systems. Some people have accepted syndication, but it's pretty clear that it doesn't have the mass appeal of other technologies like email or wikis. On the other hand, disagreeing and strongly disagreeing attitude is observed by 32.50% teachers.

Q12: "A teacher should be able to use tagging and bookmarks"

The average of 3.42 shows that the use of tagging and bookmarks has moderate approval sentiment among the respondents so 62% respondents are agree or strongly agree with the statment. LiteG and Ingram libraries are useful in organizing and

categorizing information, allowing the sleuth to retrieve resources quickly. However, the 30.50% who disagree or strongly disagree indicate some reluctance, perhaps rooted in unfamiliarity or perception of usefulness. The 7.50% responses suggest that some teachers may not yet see how these tools could support and enhance their work. So basically, while tagging and bookmarking are indeed helpful for resource organization, their actual usability might be obscure or not universally accepted by educators.

Q. 13: "A teacher must know how to utilize educational platforms.

This item exhibits a strong agreement (mean value: 3.82, 73% of respondents agreed or strongly agreed) towards the use of educational platforms. Educational platforms are considered critical for teaching and learning because they provide a one-stop resource for a variety of information, collaboration, and communication opportunities. The 21% who agreed or strongly disagreed questioned the need or the efficacy of such platforms. Just 6% were on the fence, further proving the overwhelming consensus for educational platforms. These platforms are considered essential for even modern teaching, allowing teachers to manage and deliver content efficiently.

Question No. 14: "A teacher should know how to use the internet in various browsers."

The 3.86 mean reflects strong support that teachers should be able to navigate the internet by using multiple browsers, with 73.50% of respondents agreeing or strongly agreeing. The ability to maximize all the resources and tools on the web is considered a must-have skill for educators today. The 17.50% who disagreed or strongly disagreed may reflect concern about browser compatibility issues or the need to keep multiple browsers. But most seem to agree that teachers should be tech-savvy enough to get around different browsers to get the best educational experience. The fact that this inflexibility was "undefined" for 9% of participants indicates a small minority either do not feel the need for such flexibility or are not even clear on what such a benefit entails. In conclusion, the data suggest that browser versatility is considered an essential skill set among teachers.

Question No. 15: "A teacher should be able to use different search engines."

This question resulted in one of the three highest mean values as mean value is 4.03 and reflected the view that teachers should be proficient in using different search engines. People feel searching well across engines is a vital skill as 79% of respondents agree or strongly agree. Only 15% of the participants disagreed and strongly disagreed indicating most of the educators understand the need of searching for educational articles and resources effectively over the different search engines. 6% of the participants remain with no particular opinion.

Question 16: "A teacher has to be able to tap some digital programs to find places.

Over half of respondents agree or strongly agree with this statement, which receives a mean of 4.02. Digital mapping tools are everywhere important in education, assisting educators to be present in the real world, plan a lesson, or even explore a virtual world. 79% participants thin the statement with affirmation. The data shows that respondents consider this an important skill and only 12% disagreed. As expected, the relatively small percentage of 9% undefined suggests that most people are familiar with some kind of mapping, but some of the educational applications may not be well-known. That underlines how, across the board, being able to use all kinds of digital mapping tools is a valuable skill amongst teachers, aiding information search, and helping with planning and administration.

Question No. 17: "A teacher should be able to plan the new study program.

This question had a mean value of 3.88, indicating high support. A combined 76% of those taking the survey agree or strongly agree that teachers should be allowed to plan new programs of study. This means that the majority of teachers hold the opinion that the capability to develop and arrange curricula is an essential professional skill. The numbers reflect the fact that the majority do indeed see curriculum planning as fundamentally tied to a teacher's job, with only 15% of respondents disagreeing or strongly disagreeing. The 9% with undefined responses may be indicative of some uncertainty about curriculum planning, or some ambivalence about its importance.

Question No. 18: "Teacher should be able to work on documents on various networks.

This question received a high value as mean value is 3.86, and with 75.5% of respondents are agreeing or strongly agreeing that teachers should be able to work on documents from multiple networks. Collaborative document editing solutions, such as cloud-based tools, are becoming increasingly important because of their effectiveness in education fields where these two features enable better communication and coordination for students working together on research and academic papers. The remaining 17.50%% that disagreed or strongly disagreed may indicate those who are less familiar with cloud computing, or who have security or compatibility concerns. Some worry about actually applying this skill as is evident from the 7% undefined responses. Overall, data indicates that cross-network document cooperation is an important skill for modern teachers.

Answer No. 19: "A teacher should be able to organize, analyze and synthesize the information through concept mapping and software.

The item valued even higher with a mean value of 3.93, with 79.50% of respondents agreeing or strongly agreeing. Concept mapping and its corresponding software are used more extensively in the educational setting to help both teachers and students organize and analyze information visually. The very high level of support also suggests that respondents view this as an important zone of influence for teachers, guiding

lesson design, assisting in the organization of knowledge and assisting students in understanding complex concepts. Only 61.50% disagreed or strongly disagreed, a low figure. On the other hand, undefined are 4%

Question No. 20: "The teacher should be able to publish the interactive presentation on the internet."

The mean value of 3.67 indicates that 67.50% respondents agree or strongly agree with the need for teachers to share interactive presentations online. This comes in handy as it continues navigating online or hybrid classrooms, where to provide compelling content that the students will resonate with. These, along with the 19.50% who disagreed or strongly disagreed, may have concerns about whether there are appropriate platforms to share content and the practicalities of sharing educational content this way. The 13% undefined responses could also suggest that the respondents are not familiar with interactive presentation tools, or they are unsure of their role in teaching.

Question No. 21: "To analyze and navigate the content, a teacher must be able to operate social software.

The mean value 3.93 reflects high support to allow teachers to use social software to assess and understand educational content. 78% of respondents agreed or strongly agreed social software is a platform for teachers to be able to pick up, analyze and share educational sources. The 15% who disagreed or strongly disagreed may still be keenly aware of the complexity or time needed to master such software. 7% are with no opinion in the retrieved data.

Q 22: "A teacher must be able to create new images and concepts through software tools and applications.

This question also had an extremely strong overall response with mean value 4.03. 80.50% of respondents agreed or strongly agreed that teachers should have the ability to use software tools to generate new pictures and ideas. This demonstrates the increasing importance of multimedia and creative technologies in education, with teachers being prompted to generate creative content. So, in other words, while 12% disagreed or strongly disagreed. 7.50% of those who participated were undefined, which further emphasizes how diverse skills were well-received.

Question No. 23: "A teacher must be able to use podcasts and videocasts.

Podcasts and videocasts are powerful teaching tools as mean value is 3.74. The questions received strong support so majority as 74% suggesting that podcasts and video casts are an effective tool for teaching. These media types, which develop this way, are gaining popularity in education, as they provide versatile, simplified

information transmission. 21.50% are disagreed or strongly disagreed with the claim suggesting that this may indicate that some people do not need this type of media or this type of teaching. These 4.50% undefined responses indicate that some of the participants might not have a good understanding of the advantages of podcasts and videocasts, or might be uncertain about their effective application.

Question No. 24: "A teacher should be able to create new content on podcasts and videocasts.

This question is nearly identical to Question No. 23, but it garnered even more support: a mean of 3.98 suggests that 76.50% of respondents "agree" or "strongly agree" with the use of podcasts and videocasts for teaching purposes. While still teaching content digitally, many are aware of the versatility of these tools for content delivery. The 15.50% who disagreed or strongly disagreed might find these media less effective or appropriate in their teaching styles. That compensates a bit for the relatively low percentage of undefined answers, which suggests that the vast majority know these tools while 8% remain with undefined attitude.

Conclusion

The analyzed data shows that there is a significant interest and need for digital programs/tools for the advancement of the teaching profession. In general, teachers realize they need to be tech-savvy, and they focus on communication tools, especially email, chat, social networks, or instant messaging. Survey respondents exhibit a strong belief that modern teachers must be proficient in using digital tools like blogs, wikis, search engines, mapping tools, and educational platforms. There is also large support for interactive authoring, social software collaboration, and multimedia tools (podcasts, videocasts, etc.) Nevertheless, the responses also indicate that, whilst agreement on the overall view of the importance of digital competence in education is widely held, the extent to which teachers embraced all individual tools, was not universal, with differing levels of exposure, comfort and applicability to teaching practice emerging.

Findings

- Consensus among teachers is that they need to communicate via email (mean = 3.52) but social networks get the vote (mean = 3.83). But real-time communication tools like chat (mean = 3.42) and instant messaging (mean = 3.43) have less enthusiasm. Social networks (48% agree) and wikis (41% strongly agree) are also seen as significant for educational collaboration and content sharing.
- There was strong agreement on using educational platforms (mean = 3.82), digital programs (mean = 4.02) and concept mapping tools (mean = 3.93) for organizing, analyzing, and synthesizing information. Both the ability to work on

documents on any network (mean = 3.86) and search engines (mean = 4.03) are also important to respondents.

- These include multimedia tools like podcasts, videocasts, interactive presentation tools (mean = 3.67 ~ 3.98), etc. That mean is quite high for creating and modifying blogs (mean = 3.54) and for wiki use (mean = 3.98).
- Designing new study programs is considered one of the essential responsibilities (mean = 3.88). Nevertheless, designing blogs and modifying the design of blogs (mean = 3.54) as well as posting and commenting on blog discussions (mean = 3.53) are receiving slightly less support, which indicates that teachers may be slightly hesitant regarding content production, which includes technical aspects.
- Notably, a significant number of participants expressed uncertainty or disagreement about particular tools, like syndication systems (mean = 3.46), social software to analyze content (mean = 3.93), and using tagging/bookmarks (mean = 3.42) – even almost agree on their general value. This suggests barriers around unfamiliarity or perceived complexity.

Recommendations

- There is a clear lack of professional development programs with a focus on improving digital skills in teachers. Though many teachers are already comfortable with email and simple communication tools, basic blogs and social software, and turning on and off overhead projectors, more use of targeted workshops and courses could help teachers get the tools they need to use them in the classroom.
- Schools and educational institutions are responsible for integrating the use of digital tools and platforms in their curricula for students as well as for educators. Providing experiential opportunities with things such as wikis, concept mapping software, or interactive presentations at workshops will allow teachers to see their value and gain confidence in using them in a classroom setting.
- As evidenced by the data, there are areas of disparity in enthusiasm for digital tools, and therefore educators must be empowered to select and adopt the tools that perform at the intersection of their instruction and accommodate their learners. Empowering teachers will mean providing them with resources to help realize alternative tools available and to choose the most appropriate ones.
- Online spaces for sharing and collaboration between teachers to present their experiences, new digital tools to use in the teaching-learning process, and strategies for distance learning. This would create a space for teachers to learn from one another without the hindrance of fear or hesitance toward new technologies.

Gap for Future Research

For teaching and learning effectiveness, long-term longitudinal studies on digital competence can be conducted. Longitudinal studies can also be conducted that follow the adoption and use of these tools would yield deeper insight into their longer-term value. Further research can also be conducted on factors hindering the adoption of digital technologies (such as insufficient training, time limitations or technical issues) should inform how to overcome these barriers.

More studies can also be conducted on the effect of specific digital tools (e.g., blogs, podcasts, and wikis) on student engagement, learning outcomes, and academic performance. Insights into how these tools affect teaching efficacy may help shape future pedagogy and tool choices.

The research can also be conducted based on demographic factors like age, years of teaching experience and technological proficiency impact teachers' perception of and engagement with digital tools would be beneficial.

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