Training Needs of Teachers in the Acceptance and Use of WhatsApp in Online Teaching

Jorge Joe Guti érrez Chara, Fabian Hugo Rucano Paucar, Diego Antonio Urdanivia Alarcon*, and Fabiola Talavera–Mendoza

Abstract—**Mobile learning has generated high expectations in education and is being embraced as a powerful tool to enhance pedagogical interactions. This study aims to: (i) analyze the level of usage and acceptance of WhatsApp as a tool for online learning among teachers during the COVID-19 pandemic, based on age, gender, and employment status; (ii) explain the benefits of online learning that contract teachers have over those appointed in the use of WhatsApp; and (iii) identify the role of teachers and the necessary preparation required for effective use and management of WhatsApp in online learning. This study utilizes a mixed-methods approach, including a quantitative component consisting of an online questionnaire. Our findings indicate that WhatsApp is widely accepted and used among teachers for online learning, with contract teachers exhibiting a greater need for training compared to their appointed counterparts. In order to promote digital literacy in managing hybrid environments, instructional design models are necessary. The unidirectional nature of teacher intervention through WhatsApp also highlights the need to develop more collaborative and interactive teaching strategies.**

Index Terms—**Social networking, perception, online teaching, teachers, technological integration**

I. INTRODUCTION

As a consequence of the lockdown, teachers have been required to work remotely and organize their teaching activities [1]. Many of them, without prior experience, have tackled this challenge by utilizing social networks, platforms, gamified tools, and others, which have helped to facilitate the teaching-learning process based on their context and learning requirements [2, 3]. To overcome socioeconomic disparities and gaps in internet access, the majority have resorted to using the WhatsApp social network as a means of virtual teaching [2]. Despite their lack of familiarity with technology, teachers have experimented and innovated with their practices, resulting in the development of effective online pedagogical approaches [1, 4]. However, limitations regarding the design, implementation, strategies, opportunities, and sustainability of these approaches exist [5], particularly in terms of mastering and utilizing them. It has been two years since the lockdown in Peru, and it is crucial to understand the strengths and weaknesses of this mode of work from the teaching experience, acceptance, and use of WhatsApp, as well as its effectiveness in online learning, to enhance their training requirements. The most significant variable in predicting the levels of Pedagogical

Technological Knowledge of the Content (TPACK) of teachers was found to be their self-efficacy in technological integration [6].

There have been several studies investigating the effectiveness of WhatsApp in English language teaching, which have shown a significant and positive impact on the teaching-learning process, resulting in increased acceptance, utility, and attitude towards the tool [1, 3, 7, 8]. On the other hand, the use of mobile learning (m-learning) has been shown to be highly sustainable in education, with a strong connection to learning, supported by indicators of perceived usefulness, availability of learning support, motivation, and quick connection [9, 10]. According to Mangundu [11], social networks integrated into the teaching-learning process encourage students to advance technologically, while also promoting the development of Information and Communication Technology (ICT) pedagogical integration skills in future teachers.

Currently, there is a lack of sufficient information on the impact of the transition to online learning on learning outcomes [3]. Furthermore, a more comprehensive understanding of teaching experiences with a qualitative approach to learning about teacher interactions in the classroom is also needed [8]. However, Social Network Analysis (SNA) can facilitate research and interpretation of communication phenomena, providing insights into how individuals interact with one another. As pointed out by Yoshida [12], networks represent relational data, making their study important in the context of education.

A. WhatsApp as a Learning Tool

WhatsApp is a social networking application that enables instant communication through voice and video calls, as well as the exchange of images and videos for teaching and learning activities [3, 8, 13]. Therefore, it is essential to explore factors related to teachers, including their qualifications in Information and Communication Technology (ICT), their use of ICT, and their use of social networking, which are crucial for integrating technology in education [6]. Due to the COVID-19 pandemic, WhatsApp has been used as an educational tool for the past two years, facilitating (a) the review of course materials anytime and anywhere, (b) collaboration and sharing of study materials, and (c) student-teacher interaction [13]. The effective use of WhatsApp as a tool involves aligning student needs and abilities with didactic materials and specific assessments, coupled with timely feedback, to create a secure environment for dialogue and discussion between teachers and students [3, 14]. WhatsApp offers several useful features, including (a) messages, (b) voice and video calls, (c) document sharing, (d) group chat, (e) synchronization of WhatsApp on the Web and Desktop with mobile phones, and

(f) voice messages [15]. These versatile tools have high levels of acceptability in the teaching-learning process [1, 3, 7, 8].

B. The Use of WhatsApp in Online Teaching

Experiencing personalized learning on mobile devices through M-learning is directly related to the Technology Acceptance Model (TAM) proposed by [16] and adapted from the studies of [9, 10]. This model provides a theoretical basis for explaining and predicting the relationship between perceived ease of use, perceived usefulness, attitudes, behavioral intention, and actual use of the system [17]. These factors are the central variables of this study. Perceived behavioral control is adjusted to: (i) perceived utility, which is based on beliefs in the use of technology that favors learning; (ii) ease of use, which depicts the degree of familiarity with the application without physical and mental effort, leading to satisfaction [9]; (iii) perceived delight, which leads to the feeling of enjoyment and pleasure from being highly motivated in the application [10]; (iv) connectivity in learning, which refers to the frequency and accessibility of the user without limitations of time or place [4]; (v) attitude, which is related to the degree of positive and negative emotions of acceptance [1]; and (vi) technological acceptance. In summary, teachers play an integral role in the teaching-learning process.

They must stimulate students' interest with attractive topics, encouraging them to be active by asking questions, answering, or expressing opinions. Otherwise, students feel bored and disengaged [18]. That is why teachers use various tools such as WhatsApp as a learning medium, which is highly dynamic. Students actively ask questions orally and in writing [19]. Likewise, mobile learning with WhatsApp has been shown to increase student interest and make students more enthusiastic about the learning process [20]. It was found that WhatsApp has many potential benefits for teacher development [21]. However, it is important to keep in mind that "the use of WhatsApp as an educational resource implies that teachers must be up-to-date and familiar with the functions of the application" [22]. Digital instant messaging tools such as WhatsApp can be used as an effective learning environment to foster a positive teacher-student relationship [23].

C. Benefits of Using WhatsApp for Online Teaching

The use of WhatsApp to support online learning requires careful planning before implementing online learning practices. This includes ensuring ease of content creation, management, access, and sharing [24], as well as pre-structuring resources to promote communication and interaction in various contexts, through concise lessons [10, 14]. Applying instructional processes that include introduction, main activity [25], and closure can generate positive behaviors and emotions of enthusiasm and happiness when interacting with instructional videos [26], making the intervention effective and efficient [1].

WhatsApp offers multiple benefits, fostering appropriate and timely communication among stakeholders in education. "WhatsApp allows communication between students, teachers, school administrators, parents, and even among parents themselves. The WhatsApp group chat feature facilitates these various types of communication" [27]. A study conducted by Afzal and Abdullah [28] found that teaching using WhatsApp produced efficient results in continuing the educational process in schools. Additionally, Molina [29] states that satisfactory results are obtained with WhatsApp and Telegram activities that promote adequate levels of participation.

When considering the implementation of WhatsApp as a pedagogical tool, three models can be utilized: (a) The Dick and Carey Model, which focuses on the presentation of material and student responses with a focus on skills and knowledge; (b) The Gagné Model, which employs stimulus and response models to activate prior knowledge and process information [30]; and (c) The ADDIE Model, which allows for interaction in each phase: analysis (assessment of the students' environment), design (program with a pedagogical approach), development (production of content and materials), implementation (execution of the training action), and evaluation with emphasis on mental processes and feedback [30]. In the context of mobile learning (M-learning), the goal is to foster autonomous and collaborative learning [31]. "All reports and recommendations show that an established infrastructure and the availability of information technology and computer networks for the training of facilitators, managers, and students (e.g., students of education outside the campus) are of decisive importance" [32].

Considering these pedagogical challenges, we propose a survey of teachers to assess their acceptance and use of WhatsApp, the benefits of online learning, and three open-ended questions to determine the difficulties and advantages of its application, as well as the methodology used to support the success or failure of online learning. The present study aims to:

1) Explore the utilization and acceptance of WhatsApp as a tool for online learning among educators during the COVID-19 pandemic, taking into account factors such as age, gender, and employment status.
2) Examine the distinct advantages of online learning for contracted teachers compared to other groups, with a specific focus on the context of WhatsApp usage.
3) Investigate the evolving role of teachers and the requisite preparation for effectively employing WhatsApp in online learning.

II. METHODOLOGY

This paper presents a mixed-method study that uses an exploratory and descriptive approach, employing a cross-sectional design to investigate the variables of perceived behavioral control and benefits of online learning through the use of WhatsApp. For the qualitative aspect of the study, semi-structured interviews were used as an instrument and analyzed through discourse categorization with the use of "NVivo" software program used for qualitative and mixed methods research.

A. Hypothesis

The following hypotheses were proposed.

H1: There is a statistically significant positive relationship

between the ease of use and teachers' acceptance of the WhatsApp tool for online learning.

H2: There are differences in self-perceived training needs regarding the use and acceptance of technologies in the classroom based on gender.

H3: Contracted teachers are less aware of the benefits of WhatsApp in online learning than appointed teachers.

B. Participants

The study employed a quota sampling method to select participants for the research. The population was divided into strata or quota controls based on the relevance of the research topic. This sampling approach aimed to achieve results equivalent to probabilistic sampling methods [33].

The sample consisted of participants with diverse sociodemographic characteristics. Among the participants, 50.6% were male, and 49.4% were female. The age range of the participants varied from 20 to 51 years and beyond. All the participants worked in the public sector, and the majority (86.0%) were secondary education teachers. Regarding the geographical distribution, 75.0% of the sample were affiliated with urban educational institutions, while 25.0% were associated with rural institutions. In terms of specific locations, 38.3% of the teachers worked in Arequipa, 51.9% in Cusco, 2.5% in Puno, and 7.4% were located in other departments.

C. Procedure

The research process involved three main steps. Firstly, a two-part questionnaire was utilized in the initial quantitative phase. The first part captured demographic information such as age, years of service, employment status, and gender of the participating teachers. The second part focused on assessing perceived behavioral control and benefits of online learning. To adapt the questionnaire to the online learning experience during the COVID-19 emergency, 29 items were modified.

Secondly, the questionnaire was distributed to teachers in the southern region of Peru, primarily through social networks, with a particular emphasis on using WhatsApp. The questionnaire was made available for response from January 16, 2022, to April 24, 2022. Out of the 95 participants, 81 of them completed the questionnaire.

Lastly, individual semi-structured interviews were conducted as part of the qualitative study. The interviews were recorded digitally, and the complete interviews were transcribed and analyzed using NVivo software. The analysis involved three stages: a) open coding, b) axial coding to establish connections between categories and subcategories, and c) selective coding, which refined categories, provided additional descriptions, and identified a central category.

D. Instruments

The Perceived Behavioral Control questionnaire was administered using a Likert scale ranging from strongly agree (score 5) to strongly disagree (score 1). It comprises 22 items across six dimensions, including four items for Perceived Utility (PU), four items for Perceived Ease of Use (PEU), three items for Perceived Happiness (PH), four items for Connectedness in Learning (CL), four attitude items (ATT), and three items for Technological Acceptance (TA). This questionnaire was adapted from the authors [8, 10]. Initially,

demographic questions such as sex, age, years of service, and modality were included. The online questionnaire was distributed through social media platforms and was available from January to April 2022, see Table I.

TABLE I: PERCEIVED BEHAVIORAL CONTROL QUESTIONNAIRE IN THE USE OF WHATSAPP ADAPTED FROM FARID & IKA LESTARI DAMAYANTI [8] AND MULYONO *ET AL.* [10]

Perceived Utility (PU)	- Using WhatsApp helps me to obtain information related to online learning tasks and activities. - Using WhatsApp helps me to communicate with other students during online learning. -WhatsApp is an enjoyable means of learning. -I find WhatsApp useful to support online learning.
Ease of use (EOU)	- I find it easy to use WhatsApp to support online learning. - I do not find any difficulty in communicating with other students using WhatsApp. - I do not find any difficulty in using the features available in WhatsApp. -I can find information about homework and online learning activities easily on WhatsApp.
Perceived Happiness (PH)	- I am pleased to use WhatsApp to support online learning. - I spend my free time looking for various strategies to program in WhatsApp. - Using WhatsApp encourages me to search many learning resources related to my subject.
Connectivity with learning (CL)	- I feel that WhatsApp can help you connect with the students in my class. - I feel that WhatsApp is suitable for forming groups and students can meet each other and work. - I feel that sharing learning activities incorporating: video files, audio files, PowerPoint presentations, homework and online tests generates greater effectiveness. - During online teaching and learning, I used all the features of WhatsApp.
Attitude (ATT)	- I am satisfied with WhatsApp features to support online learning. - I am satisfied with the quality of online learning supported by WhatsApp. - I give necessary information related to online learning using WhatsApp. - I am satisfied with the support of using WhatsApp for online learning interaction.
Technological acceptance (TA)	- I am pleased to accept the use of WhatsApp to support online learning. - I will be to using WhatsApp to support online learning for the following few months. - I recommend and share experiences of using WhatsApp to my colleagues for online learning.

In the same questionnaire, seven questions about the use of the benefits of WhatsApp in online teaching were incorporated with the same scale, adapted from the advantages of online learning [8], see Table II.

The qualitative approach involved conducting semi-structured interviews with predetermined questions, allowing the interviewees to provide free-form responses without the constraint of choosing predefined answers. The interview data was then transferred to the NVivo program to create categories and nodes for analysis. Additionally, word frequencies were used to synthesize the data.

TABLE II: BENEFITS OF ONLINE LEARNING ADAPTED FROM FARID & IKA LESTARI DAMAYANTI [8]

	(OL1) I have enough knowledge to use WhatsApp tools and applications, which allows me to effectively and efficiently support distance learning.
	(OL2) I use different tools and applications and incorporate them through WhatsApp, to make learning more effective.
	(OL3) I explain the lesson materials on WhatsApp sending a video related to the lesson.
Online Learning (OL) (Damayanti & Sibarani, 2021)	(OL4) I incorporate through WhatsApp the creation of closed groups, so it is safe environment, where you can argue, discuss and ponder and exchange information.
	(OL5) I use emoticons in the texts which I reply to express emotions.
	(OL6) I explain the lesson materials on WhatsApp sending only voice messages accompanied by pictures.
	(OL7) I can monitor and feedback student participation anytime anywhere through WhatsApp.

Out of the 81 interviewees, a total of 62 online interviews were analyzed. The aim was to gain insight and understanding into the approach used and identify the training needs of in-service teachers. The analysis of the interviews aimed to delve deeper into the experiences and perspectives of the participants, see Table III.

TABLE III: TEACHER CATEGORIES ABOUT THEIR OWN PRACTICE ADAPTED FROM (VILLAFUERTE *ET AL.*, 2020) [34]

Categories	Subcategories	Questions
Teaching role	Teacher performance in times of pandemic (socio-emotional and/or academic).	What difficulties has caused you the WhatsApp educational tool for online learning?
Teacher training	Modifications and/or learning that a teacher acquires and that facilitate the teaching process.	How have you ensured the quality of WhatsApp-supported online learning? What phases or moments has your online learning activity through WhatsApp?

Source: Perception of teachers in the face of the Covid 19 crisis.

E. Statistical Analysis

The survey data was used to create a data matrix for descriptive statistical analysis, which included measures such as frequency, percentage, mean, and standard deviation. The independent samples t-test was conducted using Pearson's correlation method to examine relationships between variables. These statistical procedures were performed using SPSS 25 software. In addition, the qualitative data obtained from the interviews was analyzed using NVivo software. The data was categorized into nodes, allowing for a systematic organization and analysis of the qualitative findings. NVivo facilitated the coding and exploration of themes and patterns within the interview data.

F. Instrument's Reliability

For assessing the reliability of the instrument, 29 items were gathered, and a pilot test was conducted, which revealed that it had internal consistency (McDonald's Omega = 0.955). Each dimension, namely Perceived Usefulness, Ease of Use, Perceived Joy, Connectivity with Learning, Attitude, Technology Acceptance, and Online Learning, showed a high level of reliability greater than (McDonald's Omega > 0.7).

G. Ethical Aspects

The study ensured the anonymity, confidentiality, and voluntary nature of online participation through the use of Google Forms. Informed consent was obtained by providing participants with a form that included a mandatory acceptance item before proceeding with the questionnaire.

III. RESULTS

A. Quantitative Phase

TABLE IV: MEANS IN THE LEVEL OF USE AND ACCEPTANCE OF WHATSAPP AS A TOOL FOR ONLINE LEARNING BY TEACHERS

Age	Labor Condition	Gender	n (%)	PU	EOU	PH	CL	ATT	TA
20 to40 Years old	N.	M.	2 (2.5%)	3.62	3.50	3.33	3.50	3.63	3.66
		F.	4 (4.9%)	3.94	3.69	3.08	3.81	3.50	3.92
	C.	M.	12 (14.8%)	3.36	3.36	3.25	3.50	3.33	3.33
		F.	21 (25.9%)	3.82	3.73	3.65	3.71	3.40	3.64
41 years old onward	N.	M.	14 (17.2%)	4.09	3.80	3.62	3.82	3.70	3.93
		F.	8 (9.8%)	3.87	3.88	3.59	3.63	3.57	3.54
	C.	M.	13(16%)	3.92	3.92	3.56	4.16	3.79	3.92
		F.	7 (8.9%)	3.61	3.68	3.38	3.64	3.68	3.62

N = Appointed, C = Contracted --- M = Male F = Female
PU = Perceived utility, EOU = Ease of use, PH = Perceived happiness, CL = Connectivity with learning, ATT = Attitude, TA = Technological Acceptance.

In the behavioral control perceived as an advantage, it can be seen in Table IV high levels of use by appointed teachers aged 41 onward of male and female gender, in perceived utility and ease of use of the WhatsApp application.

Regarding with acceptance, it can be seen that the assessment of perceived joy, connectivity in learning, attitude and technological acceptance has a better mean for appointed and contracted teachers of both genders aged 41 onward and strategies that promote joy still need to be generated, attitude and technological acceptance when interacting with the tool. In that respect, it can be noted that there is a greater need for training in contracted male teachers, especially between the ages of 20 and 40.

TABLE V. MEANS FOR EACH ITEM OF THE ONLINE LEARNING DIMENSION

Labor Condition	n (%)	OL1	OL2	OL3	OL4	OL5	OL6	OL7	Total
N.	28(34.6%.)	3.57	3.50	3.68	3.64	3.82	3.46	3.46	3.59
C.	53(65.4%.)	3.74	3.77	3.60	3.74	3.72	3.47	3.62	3.67
Total	81(100%.)	3.68	3.68	3.63	3.70	3.75	3.47	3.57	3.63

N = Appointed, C = Contracted, AL = Online Learning.

In Table V, online learning in the appointed teachers shows that they have a low average in the explanation of materials, as well as the monitoring and feedback that they carry out to the students, in comparison to the contracted teachers. Likewise, it is observed that the appointed teachers show a better mean in the use of emoticons while the contracted teachers have an acceptable mean in the use of different tools. Therefore, the appointed teachers 28 (34.6%.) have an average of 3.59 as well as the contracted teachers 53 (65.4%.) have an average of 3.67 in other words, both have an acceptable group average in relation to to the benefits of WhatsApp.

B. Hypothesis Testing

H1: There is a statistically significant positive relationship between the ease of use and teachers' acceptance of the WhatsApp tool for online learning.

As can be seen in Table VI, the Pearson correlation coefficient indicates that there is a relationship between the variables (r = 0.593 p = 0.000).

In terms of how easy it is to use the WhatsApp application, we found a positive correlation with technological acceptance, with a Pearson correlation value of .593. The p-value was 0.000, indicating a 95% level of confidence in the correlation and only a 5% chance that it is false. This suggests that the more user-friendly the WhatsApp application is, the more likely people are to accept and use it.

TABLE VI: CORRELATION BETWEEN EASE OF USE AND TECHNOLOGICAL ACCEPTANCE

	Technological Acceptance	
	r	p
Ease of use	0.593	0.000

H2: There are differences in self-perceived training needs regarding the use and acceptance of technologies in the classroom based on gender.

Table VII shows us that there are no significant differences between male and female teachers in terms of how easy they find it to use WhatsApp and their acceptance of the technology (t = −325 and 614, df = 79, p > 0.05). The average values suggest that both male and female teachers find WhatsApp equally easy to use and accept the technology at similar levels.

TABLE VII: COMPARISON OF MEDIAS IN THE EASE OF USE AND TECHNOLOGICAL ACCEPTANCE ACCORDING TO THE MALE AND FEMALE GENDER

Gender	n	Media	t	df	p
		Ease of Use			
Male	41	14.78	−0.325	79	0.746
Female	40	14.98			
		Technological Acceptance			
Male	41	11.22	0.614	79	0.541
Female	40	10.93			

H3: Contracted teachers are less aware of the benefits of WhatsApp in online learning than appointed teachers.

Table VIII permits us appreciate that there are no significant differences between the online learning presented by appointed teachers compared to contracted teachers (t = −0.532. df = 79, p > 0.05). The mean values indicate that online learning in the use of WhatsApp in teachers is similar between appointed and contracted.

TABLE VIII: COMPARISON OF MEANS IN ONLINE LEARNING ACCORDING TO LABOR CONDITION

Labor Condition	n	Media	DS	t	df	p
Appointed	28	25.14	3.440	−0.532	79	0.596
Contracted	53	25.66	4.493			

C. Qualitative Phase

1) Role of the teacher category: What difficulties have you encountered with the WhatsApp application as an educational tool for online learning?

Table IX presents the details of the qualitative analysis, in which 37 teachers reported initially finding it challenging to use the application. As a result, they had to undergo self-training to become familiar with the application, which required spending more than 8 hours on weekdays due to internet access saturation and extended usage.

TABLE IX: DIFFICULTIES CAUSED BY THE WHATSAPP EDUCATIONAL TOOL

Codes	Number of coding references
Ignorance of the use of technological resources	37
Lack of motivation and strategies to develop creative tuition	8
Limitation of technology to mobile phones in terms of internet access	14
Extended use at inopportune hours	3
TOTAL	62

Regarding the comments made by participating teachers, the following codes were identified and supported: P(1) "I felt overwhelmed when students sent their work through WhatsApp and also used text messages to contact me outside of work hours." P(6) "It took me some time to find the right strategies for the session's goals." P(10) "It required effort and support for me to learn how to use and apply WhatsApp as an educational tool." P(16) "I had to train myself in the

various uses of WhatsApp to create engaging and interactive activities that aligned with the educational proposal."

2) Teacher preparation category: How have you ensured the quality of WhatsApp-supported online learning?

Teachers have shown interest in integrating the WhatsApp tool into their instructional planning. They have utilized compatible and easily accessible applications that promote collaboration and facilitate interaction among them. These applications encompass written communication, video calls, and the capacity to provide feedback and monitor their students' progress, as illustrated in Fig. 1.

Fig. 1. Word cloud of the quality of online learning through WhatsApp.

In their feedback, the teachers mentioned: P(5) "I have been utilizing a variety of resources and support, giving appropriate and timely feedback to students through messages and sometimes video calls," P(9) "I have been attempting to use as many tools as possible: group calls, videos, slides, files, audios, etc., depending on the needs of the learning session, trying to mix up activities to avoid monotony," P(41) "I believe that the quality of learning is ensured through dialogue and the use of audiovisual materials for teaching. However, there have been challenges such as poor compliance with activities, lack of parental support, limited knowledge of parents to assist their children, financial problems, among others, which have resulted in disadvantages."

3) Teacher preparation category: What phases or moments has your online learning activity through WhatsApp?

Regarding the methodological approach to educational intervention, it is evident that the majority of teachers follow the stages of Introduction, Process, and Conclusion in their teaching activities. A minority adopts an instructional model similar to ADDIE in their planning, while an equal number of teachers are unaware of the specific model they use. From the teachers' perspective, the phases or processes during the period of remote learning were described as follows: P(3) "I start by engaging with the students, providing a warm greeting, socio-emotional support, introducing the activity, evaluating the criteria, sharing images or videos, and providing feedback," P(40) "I begin with an introduction to the topic, sharing materials, assigning tasks, and providing feedback based on asynchronous learning," P(60) "I focus on motivating and activating prior knowledge, guiding students in research and knowledge construction, applying what they have learned, self-assessment, evaluation, and feedback, see Fig. 2.

Fig. 2. Word cloud of the Phases or moments that your online learning activity has had.

IV. DISCUSSION

In relation to the extent of usage and acceptance of WhatsApp as an online learning tool among teachers during the COVID-19 pandemic, it is noticeable that the ease of using the WhatsApp application is directly related to the level of technological acceptance for its utilization. Additionally, it is evident that the mobile application positively contributes to learning outcomes and serves as a suitable and widely accessible supplementary approach [35]. It enables the integration of audiovisual materials, targeted assessments, and timely feedback [3], thereby enhancing online learning and academic performance [36].

Regarding the advantages and training needs that determine the use of WhatsApp for teaching and learning in schools based on age, gender, years of service, and employment status, it is evident that male contracted teachers have more training needs compared to appointed teachers. Contrary to the findings of this study, the results reveal that there has been a significant improvement in students' academic performance in a hybrid learning environment using WhatsApp, with higher average scores among male students than among female students. This suggests that hybrid learning contributes significantly to male students' academic performance [36]. Among the perceived behavioral control advantages, high levels of acceptance of the appointed teachers can be seen in the perceived usefulness and assessment of acceptance, which allows for timely and ubiquitous interaction from anywhere and at any time.

However, contracted teachers seem to be unaware of the benefits of online learning compared to appointed teachers.

The qualitative reports reveal that teachers in online learning have training needs in the use and management of WhatsApp, as it has required them time and effort to transition from their traditional classrooms to online work and develop digital skills in a short time to design their learning sessions. Additionally, teachers have felt a sense of invasion of privacy due to assignments being submitted at the wrong time and parents and students requesting consultations, leading to overwhelm and anxiety.

The findings of the study emphasize the significance of infusing teachers with emotions and enjoyment when utilizing WhatsApp as an instructional tool, which can be accomplished through an alternative approach [14]. Another finding is the limited knowledge among teachers regarding the application of instructional design models to plan their pedagogical interventions, confining their practices to the

initiation, development, and conclusion of sessions as outlined by the Ministry of Education of Peru. This approach leads to unidirectional learning with a singular intervention model of delivering materials and online assignments, thereby constraining the development of higher-order cognitive skills [5]. However, the utilization of cognitive instructional videos for flipped learning has exhibited positive outcomes for student training [26], as well as the implementation of the social cognitive model through instructional videos employing Gagné's principles, which has enhanced learning outcomes in mathematics [14].

Based on these findings, it is recommended that local governments prioritize the development of digital literacy skills and establish a repository of region-specific audiovisual teaching resources tailored to the needs and interests of students and societal demands. These pedagogical activities should ensure the success of online learning and provide effective support for the integration of a hybrid learning model into daily instruction [26]. To achieve this, teachers need to receive extensive training and possess a strong command of basic digital literacy skills in order to effectively incorporate technology in their teaching, including the use of mobile learning in the teaching and learning processes [31]. Therefore, there is a need for updating processes for teachers to strengthen instructional design models that allow for a better educational offering. Digital training processes are also required to harness the potential of educational stakeholders, systematizing their experiences for professional growth [37].

The results of this study are relevant and significant as they allow for a constructive evaluation of the forms of teacher intervention in virtual work, highlighting the need for continuous training opportunities to specialize teachers and not miss out on progress with digital inclusion, enabling new hybrid learning scenarios. Instructional models can be used to generate a personalized approach to content delivery, catering to the needs and interests of students. While there are numerous studies on the effects of technology on motivation, satisfaction, usage, acceptance, attitude, and other factors, there is still a gap in understanding the training needs and levels of technology implementation in the classroom context, as well as its effectiveness in learning. This is particularly relevant after two years of remote learning.

V. Conclusions

Based on the findings of this study, it is evident that the teachers who were hired and appointed displayed a level of technological acceptance towards using WhatsApp and online learning. However, it is essential to establish a sustainable virtual work environment through a flexible educational model that empowers teachers with continuous training and digital skills in the use of instructional models. This will enable them to revitalize the educational landscape and demonstrate the added value of virtuality in introducing new teaching approaches.

As a result of these adaptations, teachers have expressed the need for self-training and increased hours of connectivity. They have carried out a saturated virtual workload, which is unpaid and unnoticed, necessitating new configurations of the roles of teachers and students in virtual teaching and learning environments. This includes the modes of communication, resources, activities, and production of digital content for the transition from virtual to face-to-face instruction. Additionally, the training needs were highlighted due to the unidirectional educational intervention proposals by teachers through WhatsApp.

Finally, qualitative interventions are necessary to analyze whether the transition from virtual to face-to-face modality is effectively promoted, with innovative proposals to ensure effective learning. It is also crucial to examine how teachers redefine their profession after a post-pandemic period and how they reinvent themselves after virtual instruction.

Conflict of Interest

The authors declare no conflict of interest.

Author Contributions

All authors contributed to the writing of the article, read and approved the final version of the manuscript.

References

[1] N. O. Bonsu, B. Bervell, J. K. Armah, S. P. K. Aheto, and V. Arkorful, "WhatsApp use in teaching and learning during COVID-19 pandemic period: Investigating the initial attitudes and acceptance of students," *Library Philosophy and Practice*, 2021.

[2] B. Azhari and I. Fajri, "Distance learning during the COVID-19 pandemic: School closure in Indonesia," *International Journal of Mathematical Education in Science and Technology*, pp. 1–21, Feb. 2021, doi: https://doi.org/10.1080/0020739x.2021.1875072.

[3] L. Budianto and Y. Arifani, "Utilizing WhatsApp-driven learning during covid-19 outbreak: Efl users' perceptions and practices," *CALL-EJ*, pp. 264–281, 2021.

[4] A. P. Aguilera-Hermida, A. Quiroga-Garza, S. Gómez-Mendoza, C. A. Villanueva, B. A. Alecchi, and D. Avci, "Comparison of students' use and acceptance of emergency online learning due to COVID-19 in the USA, Mexico, Peru, and Turkey," *Education and Information Technologies*, Apr. 2021, doi: https://doi.org/10.1007/s10639-021-10473-8.

[5] S. Iqbal and S. Sohail, "Challenges of Learning during the COVID-19 pandemic," *Journal of Gandhara Medical and Dental Science*, vol. 8, no. 2, p. 1, Apr. 2021, doi: https://doi.org/10.37762/jgmds.8-2.215.

[6] H. Y. Durak, "Modeling of relations between K-12 teachers' TPACK levels and their technology integration self-efficacy, technology literacy levels, attitudes toward technology and usage objectives of social networks," *Interactive Learning Environments*, pp. 1–27, May 2019, doi: https://doi.org/10.1080/10494820.2019.1619591.

[7] A. Nihayati and L. Indriani, "EFL students' perspective on WhatsApp as media of online teaching and learning in COVID-19 pandemic," *Journal of Research on Language Education*, vol. 2, no. 1, p. 44, Jan. 2021, doi: https://doi.org/10.33365/jorle.v2i1.898.

[8] A. Farid and I. L. Damayanti, "The implementation of school from home in english for young learners' classrooms," vol. 22, no. 2, pp. 119–134, Aug. 2022, doi: https://doi.org/10.17509/jpp.v22i2.49062.

[9] A. M. Al-Rahmi, W. M. Al-Rahmi, U. Alturki, A. Aldraiweesh, S. Almutairy, and A. S. Al-Adwan, "Exploring the factors affecting mobile learning for sustainability in higher education," *Sustainability*, vol. 13, no. 14, p. 7893, Jul. 2021, doi: https://doi.org/10.3390/su13147893.

[10] H. Mulyono, G. Suryoputro, and S. R. Jamil, "The application of WhatsApp to support online learning during the COVID-19 pandemic in Indonesia," *Heliyon*, vol. 7, no. 8, p. e07853, Aug. 2021, doi: https://doi.org/10.1016/j.heliyon.2021.e07853.

[11] J. Mangundu, "Social media for teaching and learning: a technology acceptance model analysis of preservice teachers' perceptions during the COVID-19 pandemic," *International Journal of Learning, Teaching and Educational Research*, vol. 21, no. 5, pp. 182–203, May 2022, doi: https://doi.org/10.26803/ijlter.21.5.10.

[12] M. Yoshida, "Network analysis of gratitude messages in the learning community," *International Journal of Educational Technology in Higher Education*, vol. 19, no. 1, Sep. 2022, doi: https://doi.org/10.1186/s41239-022-00352-8.

[13] S. Gon and A. Rawekar, "Effectivity of e-learning through WhatsApp as a teaching learning tool," *MVP Journal of Medical Sciences*, pp. 19–25, May 2017, doi: https://doi.org/10.18311/mvpjms.v4i1.8454.

[14] C. Maria, M. Valery, F. Talavera-Mendoza, and R. Serrano-Rodriguez, "Interactive and ubiquitous audiovisual media in solving verbal arithmetic problems," Sep. 2021, doi: https://doi.org/10.1109/jicv53222.2021.9600421.

[15] D. Jasrial, "Utilizing WhatsApp application for teaching english language: Why and how?" *International Seminar and Annual Meeting BKS-PTN Wilayah Barat*, vol. 1, no. 1, 2018, Accessed: Jan. 26, 2020.

[16] F. D. Davis, "Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology," MIS Quarterly, vol. 13, no. 3, pp. 319–340, Sep. 1989, doi: https://doi.org/10.2307/249008.

[17] H. A. Alfadda and H. S. Mahdi, "Measuring students' use of zoom application in language course based on the Technology Acceptance Model (TAM)," *Journal of Psycholinguistic Research*, Jan. 2021, doi: https://doi.org/10.1007/s10936-020-09752-1.

[18] S. H. Fahrudin, R. Winarni, and Winarno, "Analysis of learning speaking skills using the WhatsApp application in elementary schools," *Journal of Physics: Conference Series*, vol. 1808, no. 1, p. 012033, Mar. 2021, doi: https://doi.org/10.1088/1742-6596/1808/1/012033.

[19] L. Sulistyo and Kartono, "Guided discovery learning model with the teacher-student active learning approach, assisted by the WhatsApp solution alternative application on the COVID-19 pandemic," *Journal of Physics: Conference Series*, vol. 1918, no. 4, p. 042052, Jun. 2021, doi: https://doi.org/10.1088/1742-6596/1918/4/042052.

[20] R. W. Hikmah, B. Soepeno, R. P. N. Puji, and Sugiyanto, "The effectiveness of WhatsApp mobile learning shows the existence of kamal historical site towards student interest," *IOP Conference Series: Earth and Environmental Science*, vol. 747, no. 1, p. 012073, May 2021, doi: https://doi.org/10.1088/1755-1315/747/1/012073.

[21] Z. Scherz, A. Salman, G. Alexandron, and Y. Shwartz, "WhatsApp discourse throughout COVID-19: Towards computerized evaluation of the development of a STEM teachers professional learning community," *International Journal of Artificial Intelligence in Education*, Dec. 2022, doi: https://doi.org/10.1007/s40593-022-00320-3.

[22] B. Suárez-Lantarón, Y. Deocano-Ruíz, N. García-Perales, and I. S. Castillo-Reche, "The educational use of WhatsApp," *Sustainability*, vol. 14, no. 17, p. 10510, Aug. 2022, doi: https://doi.org/10.3390/su141710510.

[23] A. Durgungoz and F. C. Durgungoz, "'We are much closer here': Exploring the use of WhatsApp as a learning environment in a secondary school mathematics class," *Learning Environments Research*, Jun. 2021, doi: https://doi.org/10.1007/s10984-021-09371-0.

[24] M. A. Allela, B. O. Ogange, M. I. Junaid, and P. B. Charles, "Effectiveness of multimodal microlearning for in-service teacher training," *Journal of Learning for Development*, vol. 7, no. 3, pp. 384–398, Nov. 2020, doi: https://doi.org/10.56059/jl4d.v7i3.387.

[25] H. Herwin, A. Hastomo, B. Saptono, A. R. Ardiansyah, and S. E. Wibowo, "How elementary school teachers organized online learning during the Covid-19 Pandemic?" *World Journal on Educational Technology: Current Issues*, vol. 13, no. 3, pp. 437–449, Jul. 2021, doi: https://doi.org/10.18844/wjet.v13i3.5952.

[26] F. Talavera-Mendoza, F. Hugo, R. L. Delgado, and M. Rodríguez, "Emotional response in the interaction of instructional video as teaching support for teachers in initial training," Jun. 2021, doi: https://doi.org/10.1145/3477282.3477291.

[27] D. Lyken-Segosebe, G. Gamariel, and K. Bagai, "Boundary crossing for education continuity: Exploring WhatsApp's potential in Botswana during and beyond the pandemic," *Int. J. Interact. Mob. Technol.*, vol. 16, Art. no. 2, 2022.

[28] I. Afzal and N. A. Abdullah, "Role of WhatsApp in teaching and learning process in schools in Pakistan," *Journal of Educators Online*, vol. 19, no. 3, Sep. 2022.

[29] O. E. Molina, "The effects of WhatsApp and telegram on student engagement: An analysis from the mixed-methods approach," *Education Research International*, vol. 2022, pp. 1–14, Jul. 2022, doi: https://doi.org/10.1155/2022/2881404.

[30] G. Mateos *et al.*, "diseño instruccional: Ruta necesaria en la educación virtual: Instructional design: a necessary path into virtual education," *Rev. Cient. ECOCIENCIA*, vol. 8, pp. 65–78, 2021.

[31] G. Lotero-Echeverri, "Capacidades de los docentes para la incorporación de estrategias m-learning en sus procesos de enseñanza y aprendizaje. Estudio de un caso colombiano," *Saber, Ciencia y Libertad*, vol. 16, no. 1, Jun. 2021, doi: https://doi.org/10.18041/2382-3240/saber.2021v16n1.7529.

[32] C. D. Toit-Brits, "Challenges experienced in implementing Information and Communication Technology for Setswana speaking Advanced Certificate in Education (ACE) off-campus students at the North West University," *Tydskrif vir Geesteswetenskappe*, vol. 55, no. 3, pp. 469–489, 2015, doi: https://doi.org/10.17159/2224-7912/2015/v55n3a10.

[33] K. Yang and A. Banamah, "Quota Sampling as an alternative to probability sampling? An experimental study," *Sociological Research Online*, vol. 19, no. 1, pp. 1–11, Feb. 2014, doi: https://doi.org/10.5153/sro.3199.

[34] J. Villafuerte, J. A. Bello, Y. P. Cevallos, and J. O. B. Vidal, "Rol de los docentes ante la crisis del covid-19, una mirada desde el enfoque humano," *REFCalE: Revista Electrónica Formación y Calidad Educativa*, vol. 8, no. 1, pp. 134–150, Apr. 2020.

[35] B. Klimova, "Impact of mobile learning on students' achievement results," *Education Sciences*, vol. 9, no. 2, p. 90, Apr. 2019, doi: https://doi.org/10.3390/educsci9020090.

[36] A. T. Alsharif, B. Alsharif, L. Alsharif, N. Althagafi, Z. S. Natto, and S. Kassim, "Effectiveness of WhatsApp as a part of a hybrid learning environment: An opportunity for post-COVID-19 pandemic pedagogy," *The Journal of Contemporary Dental Practice*, vol. 21, no. 12, pp. 1331–1336, Dec. 2020.

[37] D. G/Tsadik *et al.*, "No 主観的健康感を中心とした在宅高齢者における 健康関連指標に関する共分散構造分析Title," *International Journal of Hypertension*, vol. 1, no. 1, pp. 1–171, 2020.