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Distance training of preservice science teachers in the Covid-19 era

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Abstract

This study aimed to assess the experience of distance training in the Department of Life and Earth Sciences at the Regional Centre for Careers Education and Training, Marrakesh-Safi (Morocco), to ensure pedagogical continuity, during the COVID-19 confinement period. The study used the analytical descriptive approach and involved trainers and teacher trainees of Life and Earth Sciences, with a sample of 116. To answer the study questions a questionnaire was developed and introduced to participants. Findings showed that a set of information and communication technology (ICT) tools and distance training models were implemented to ensure training for teacher trainees, despite the poor theoretical and practical training in ICT use in remote education. Faced challenges included weak interactivity and difficulties in assessing trainees' achievements during the virtual sessions. The researchers recommend that teachers should be trained in ICT use in distance education, and high-quality numerical tools should be developed and made available for training and education purposes.

Keywords: COVID-19 confinement; distance training; pedagogical continuity; preservice teachers.

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1. INTRODUCTION

The rapid spread of COVID-19 has urged the closure of schools, institutes, colleges, and universities worldwide (Murad et al., 2021). Closures of learning spaces affected 94 percent of the world's school-age population, and up to 99 percent in low and lower-middle-income countries (UNSDG, 2020). In response to the global pandemic, many countries have resorted to distance education to ensure continued learning for all age groups (Annamalai et al., 2022). In Morocco, the Ministry of National Education (MoNE) has decided to launch a distance learning program since March 16th, 2020, to deliver instruction to students from primary to higher education, through national TV channels, national education portals, social media, and interactive and online platforms (MoNE, 2020a). In this context, some Moroccan institutions of higher education have continued to deliver courses at a distance solely; other institutions have opted for a blended format in course delivery; and others have resumed face-to-face classes (Jebbour, 2022). To ensure proper pedagogical management of the training year 2019-2020 within the Regional Centres of Carriers in Education and Training (RCCET) (MoNE, 2020b) has established a schedule specifying all operations aimed at completing training programs and organizing required examinations during COVID-19 pandemic. Based on various ministerial notes and decisions issued, a regional plan of distance training for the benefit of trainees at the Regional Centre for Careers in Education and Training, Marrakesh-Safi (RCCET-MS), was established.

Accordingly, to ensure pedagogical continuity for teachers' qualification, the Department of Life and Earth Sciences (LES) at the RCCET in Marrakesh has endeavored to take a set of pedagogical measures to secure the time of "distance learning", for the benefit of 108 trainee teachers, during the period of confinement. Faced with the uncertainty of when the Covid-19 confinement will end, or when new waves of the virus may emerge, "distance learning" has become a mandatory alternative and has been an emergency change in the training process, raising many questions about the post-COVID-19 pandemic training scheme. Will things return to normal? Is there an urgent need for a comprehensive evaluation and review of the training and education process? Should we prepare for any new emergency? Should we remote to distance training to adapt to the changing health situation due to the pandemic? Is the experience of distance learning, during the confinement period, an opportunity to reconsider the training process at the level of RCCETs in Morocco? To answer the aforementioned issues and predict the future of "distance learning", it was necessary to investigate the challenges and constraints that impeded this experience within the department of LES in the RCCET-MS. This can be achieved by investigating participants involved in the training program during this period. The raised questions include:

- Which modules were taught remotely?
- What were the different digital media that have been used?
- What instructional activities were conducted during the confinement period?
- What are the constraints and challenges encountered during distance training?

Several studies have investigated the effect of distance learning on students (Argarin & Argarin 2022; Cicha et al., 2022; Clark et al., 2021; Dani et al., 2022; Elfirdoussi et al., 2020; Iglesias-Pradas et al., 2021; OECD, 2020; Spencer & Temple, 2021; Vaillancourt et al., 2022). However, there are very few studies that have examined the learning and training of student teachers by distance learning before and during the pandemic, especially in LES (Boumaaize et al., 2021; Kamalov et al., 2022; Murad et al., 2021; Nafidi et al., 2015; Slimani & Qasserras, 2022). Life and Earth Sciences are not taught as often in a distance-based setting,

probably due to concerns about the effectiveness of distance learning, and issues specific to LES education (Kennepohl & Shaw, 2010).

1.1. Purpose of study

Therefore, the current study aimed to shed light on distance learning approaches among trainee teachers of LES, with the main focus on the status of information and communication technology (ICT) and distance training use before and during the COVID-19 lock-in. The study also investigated the effort engaged, trainee's engagement, interaction, and performances, as well as constraints and challenges encountered during distance training implementation. The study findings serve as a basis for the improvement of the distance training process within the pre-service teachers' training institutions.

2. METHODS AND MATERIALS

2.1. Research design

The methodology adopted consisted of evaluating the experience of distance learning within the Department of LES at the RCCET-MS, Morocco, during the period of confinement related to the COVID-19 pandemic. This could make possible the assessment and appreciation of gains, of this local experience, during the period from March to July 2020. The exploration of its evolution and determining factors may help to anticipate the challenges and issues that the current educational training system has to face. Thus, it may contribute to the establishment of an appropriate pedagogical approach that would include "distance learning" in the educational policy of Morocco, with the integration of different forms of training (face-to-face, self-training, and remote training).

2.2. Participants

The study involved teachers, with teaching experience ranging from 7 to more than 20 years, and trainee teachers of LES (N=116) belonging to the RCCET-MS, Morocco. The taught modules during the study period (2019-2020) consisted of Learning Management, Learning Assessment, Basic Biology Reinforcement, Basic Geology Reinforcement, Didactic Production, Analysis of Classroom Practices, School Life, and School legislation and professional ethics.

2.3. Data collection tool

An electronic questionnaire was developed. The questionnaire items consisted of multiple-choice questions and short-answer questions, specifically focused on the respondents' experience, attitudes, opinions, and preferences, toward distance training practices (Appendix). The participants were informed about the goals of the research, given specific instructions about filling out the questionnaire, and guaranteed anonymity. Consent was sought from the study participants.

The investigated teachers were allowed to mark more than one choice in responding to the questions on the survey. To ensure the validity of the data collection tool, opinions and comments were taken from specialized educational experts, regarding the clarity of items and the relevance and adequacy of paragraphs. All of the experts' comments were taken into consideration and all required changes were made. The questionnaire, in its final form, sent to the targeted teachers as a Google Forms link, was composed of 18 questions covering the following paragraphs:

- The training of trainers in the use of modern technology;

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- The degree of preparedness of the trainers for remote training;
- The devices, means, and platforms used;
- The digital supports used and their quality;
- The activities carried out remotely;
- The constraints and challenges encountered during the distance training process.

2.4. data analysis

The survey data were analyzed using descriptive statistical analysis techniques (calculating percentages and counting frequencies) (Loeb et al., 2017). All data were treated using Excel and Social Statistics Pack for Social Sciences (SPSS 17) software (Chicago, IL, USA).

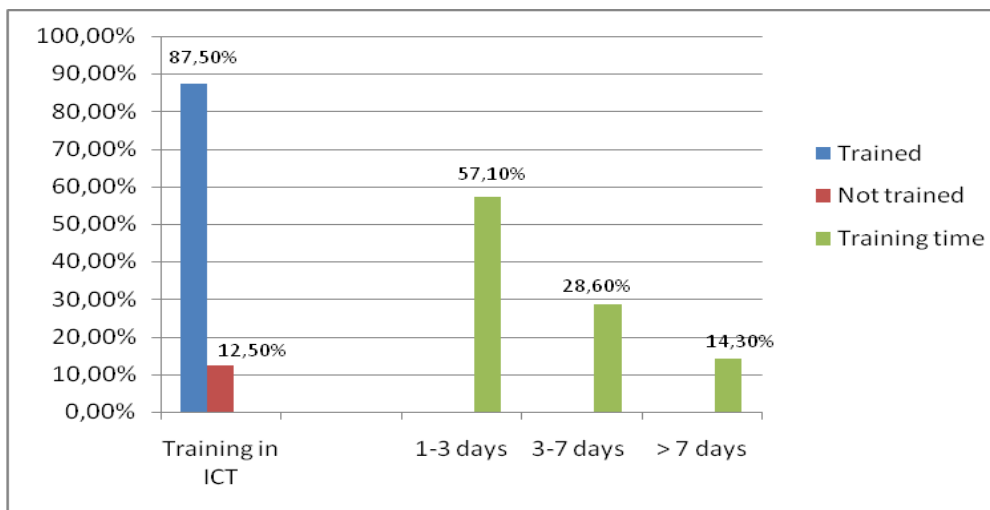
3. RESULTS

3.1. Training in Information and Communication Technologies before confinement (Covid-19)

Based on Figure 1, a high percentage (87.5%) of the participants had received training in information and communication technologies (ICT) before the period of confinement (COVID-19). In this context, 57.5% of them reported that the duration of the training attended was between one and three days. This finding may be related to several measures and programs established and implemented by the Ministry of National Education targeting approximately 266,000 teachers anterior to the COVID-19 pandemic (1990-2019) (Laaziz, 2016). These aimed to train pedagogical staff and generalize the integration of ICT in the educational system to improve the quality of education and training in Morocco, bringing it into line with international standards (MoNE,2014). However, the Higher Council for Education, Training and Scientific Research (HCETSR, 2021) reported that most of the teachers at the secondary school level have a moderate mastery of ICT. Moreover, according to the same report, more than 85% of teachers raised the need for training in using ICT in education. It has also been reported that lower ICT proficiency among teachers is strongly linked to their misjudgment of the impact of distance learners on learners. Thus, training is considered a challenge for education officials to ensure better distance education services.

Figure 1

The proportion of participants trained to ICT use in Education and their distribution by the length of time they were trained to use ICT before the COVID-19 confinement period.

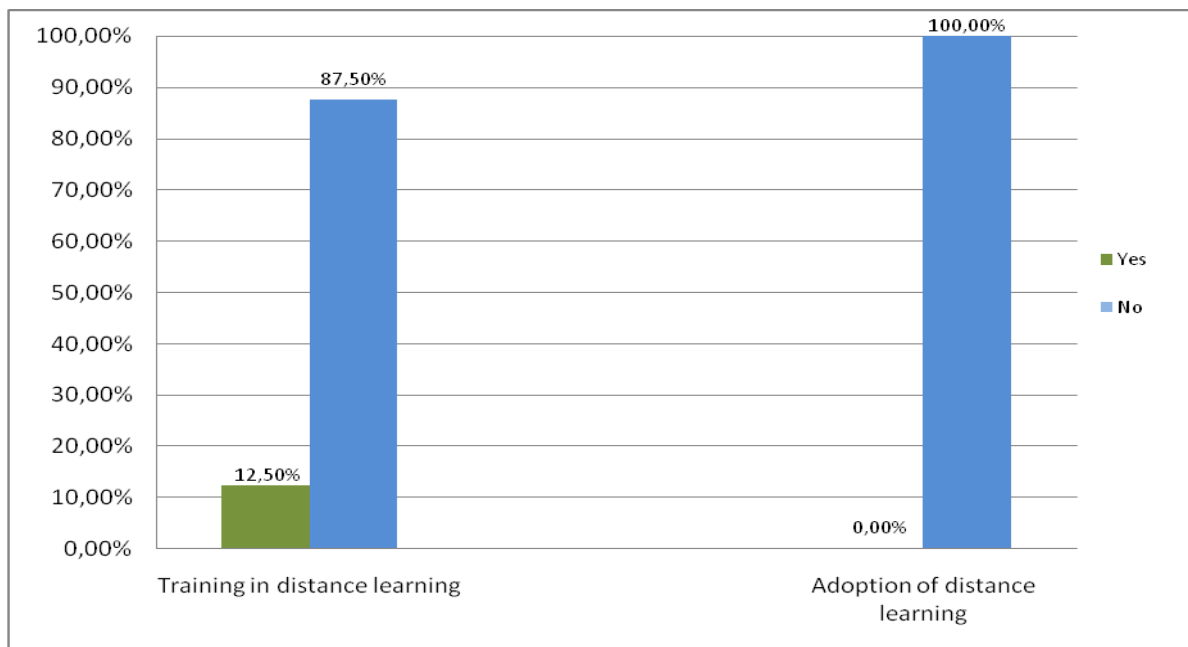


3.2. Training in distance education and Distance Learning status before the COVID-19 confinement period

The analysis of the results showed that a significant percentage, 87.5% of the investigated group, had never received training in the field of distance education (Figure 2), despite the discourse on distance education in a set of official documents of the supervisory ministry (National Charter of Education and Training, Strategic Vision 2015-2030 and others ...). However, most of the training programs offered before were mainly focused on integrating ICT into education, while distance training practices and programs were scarce/not addressed. Moreover, the implementation of the new strategic vision for education and training 2015-2030, has stressed the requirement to generalize information and communication technologies in education with the encouragement of innovative educational practices, and ensuring equal access to training for beneficiaries. Teacher trainers have also attended other activities, such as seminars, symposiums, and workshops, around ICT use in education and training (CTICMEF17; MoNE, 2016a; MoNE, 2018). However, very few programs via distance training have been conducted (MoNE, 2019), through setting up online platforms where they can register to have access to the main training modules taught in the RCCET-MS (MoNE, 2017b).

Figure 2

Proportion of participants trained on distance training practices, and participants' use of distance training before the COVID-19 confinement period.



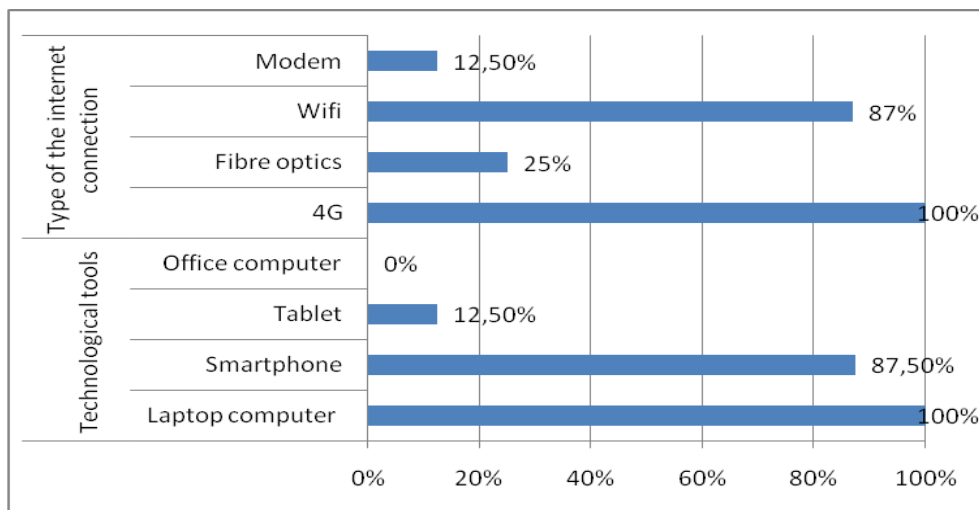
Based on the study results (Figure 2), all the participants (100%) reported that they had never experienced distance training during their professional practices before the COVID-19 pandemic confinement. The main practice was limited to using ICT to share teaching materials and course summaries in digital format with trainee teachers, via several digital channels (e-mail, Facebook, WhatsApp, ...).

3.3. Type of internet connection and technologies adopted in distance training during the confinement period

All the actors in the education and training sector, including teacher trainers and trainees, have endeavored to intensify efforts to ensure pedagogical continuity, during the imposed confinement period. This occurred through the adoption of a new pedagogy based on a distance learning approach to ensure the academic success of all trainee teachers via the E-taking platform, social networking pages, as well as digital and audio-visual resources. In this regard, The RCCET has also begun to adopt a rigorous strategy that consists of distance education, and the development of regional plans for its implementation. Therefore, the teacher trainers and trainees in the department of LES within the RCCET-MS were highly engaged in the success of this educational model, using the usual social networks (Facebook, WhatsApp, ...), with activation of virtual classes, and sharing audio-visual lessons. In this context, the Internet has become indispensable in all homes and workplaces as well. Furthermore, sufficient internet speed was a crucial requirement for trainers and trainees meeting, using ADSL service, fiber optics, or other services (Figure 3).

Figure 3

Distribution of the study participants according to internet connection type and technological tools used for distance training during the COVID-19 confinement period.



As shown in Figure 3, during the distance training process, the investigated group used more than one technological tool.

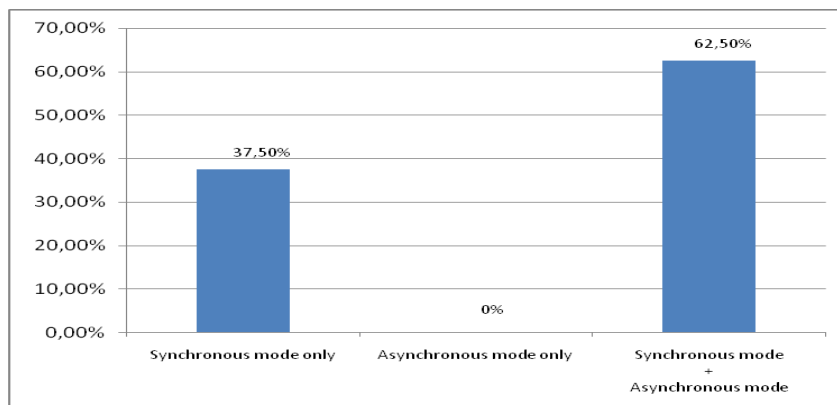
3.4. Types of distance training adopted by trainers in confinement

According to the study results (Figure 4), 37.5% of the trainers used the synchronous mode as the only distance training method, while 62.5% stated using both (synchronous and asynchronous modes). However, none of the participants used the asynchronous mode only. Synchronous distance training takes place in the physical presence of both the teacher and the trainee teachers, offering the possibility of interaction in real-time between both parts, as well as among trainees. In contrast, asynchronous training occurs via online channels without interaction between the teachers and trainee teachers in real-time through video conferencing, live chat, and virtual classrooms, the lives...

Asynchronous distance training refers to the idea that teacher trainees receive training at different times and places. During the distance training period, trainers provide learning materials for reading, presentations, assignments, and assessment activities. In this case, teacher trainees have the opportunity to access these materials and complete the required tasks within a flexible time frame. In addition, the asynchronous distance training mode includes the sharing of self-directed courses, dissemination of content through video, and exchange via discussion forums or social media platforms. The researchers emphasize that the use of ICTs should be compatible with the pedagogical approach followed by the teachers, with the most striking effects being observed among teachers who used ICTs in their professional practices for a long period.

Figure 4

Distance training types (synchronous/asynchronous) participants were used during the confinement period.

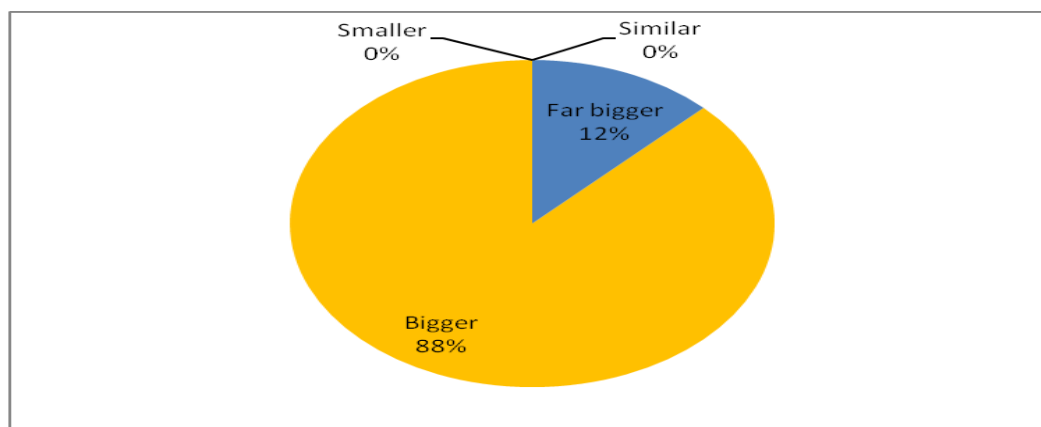


3.5. Assessment of effort engaged in synchronous distance training setting

According to the study results, 88% of the participants stated that the effort engaged to carry out during synchronous training sessions far exceeded that of face-to-face sessions (Figure 5).

Figure 5

Assessment of the effort participants put in synchronous distance training during the COVID-19 confinement period compared to face-to-face education.



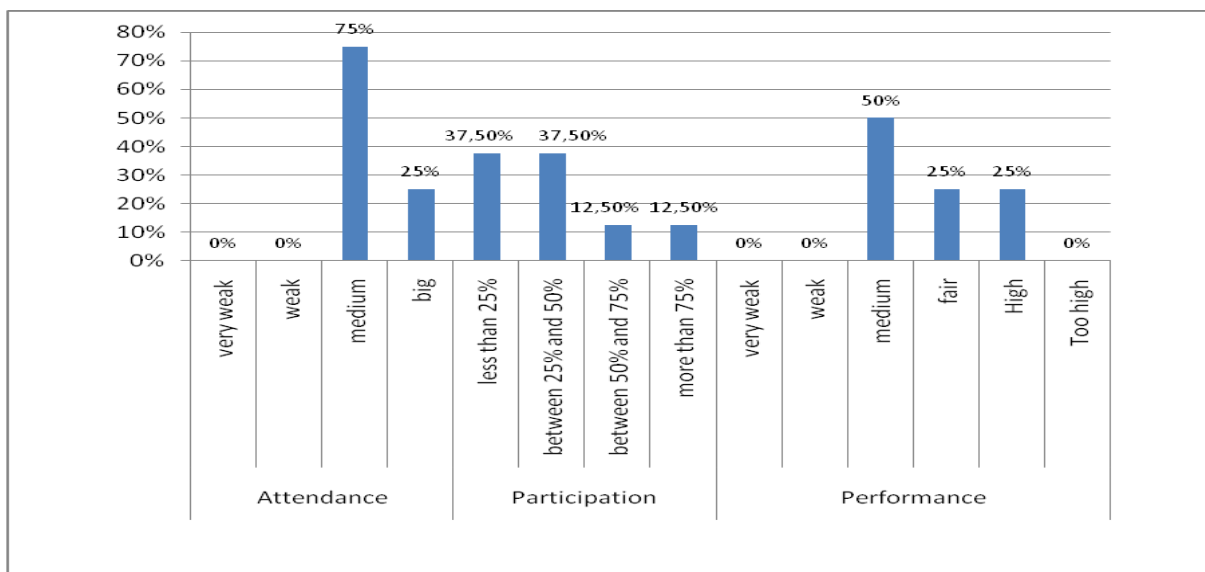
Indeed, during the synchronous sessions, the trainer performs a multitude of tasks at the same time. These include explaining the parts of the course presenting difficulties to the trainee teachers and correcting possible mistakes in the trainees' presentations. The trainers have also to give instant feedback to the questions asked, live or on the chat part, and manage the interactions of the trainee teachers. Other trainers' tasks consist of organizing the group work, managing the evaluation activities, and controlling the technical problems that may occasionally arise from time to time (Brante, 2009; Fernandez et al., 2022). The mission becomes much heavier considering the number of trainee teachers involved, and the time allocated to each synchronous session, exacerbated by the stressful conditions experienced by all the participants (trainers and trainee teachers) during the confinement period (Fernandez et al., 2022; Ozamiz-Etxebarria et al., 2021).

3.6. Attendance, participation rate, and performance of trainee teachers in distance training activities and sessions during the COVID-19 confinement period.

Attendance is considered the most accurate known predictor of academic performance and has long been linked to success in distance training programs (Finlay et al., 2022; Kassarnig et al., 2017). In compliance with the pedagogical rules adopted, to attend distance training synchronous sessions, trainees are called to be connected to the Internet at a specific time following a schedule (day and time) established by the LES department. The study results indicated that attendance to distance training (synchronous) sessions was considered as average by 75% of the participants, while 25% stated to be high (Figure 6).

Figure 6

Attendance level, percentage of participation, and performance of trainees and achievements in distance training activities and sessions during the COVID-19 confinement period.



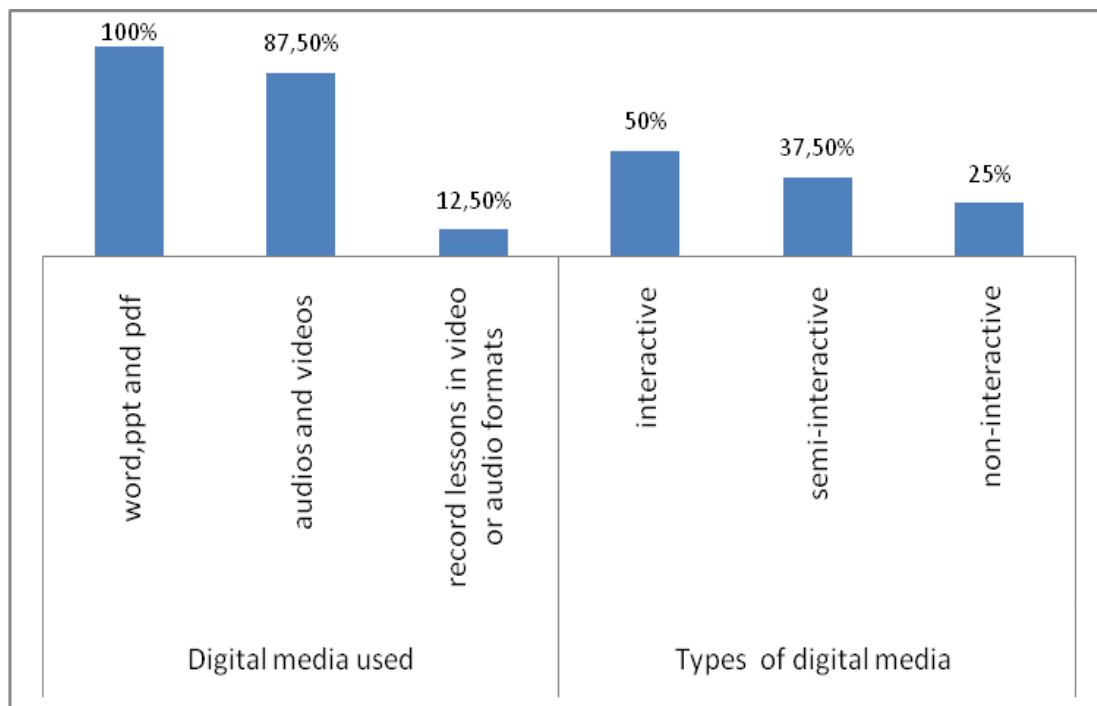
3.7. Digital media was used for distance training during the confinement period.

The study findings showed a diversification of the media types adopted to ensure continuity of training during the confinement period during 2019-2020 (Figure 7). A set of different office applications were combined, such as (Word), (PPT), and (PDF), which are widely used by trainers (100%), followed by audio and video type of media (87.5%), while 12.5% of the participants opted for recording audio-visual lessons during the confinement period.

It is worth noting that other applications may be used such as WPS Office, a very small application (less than 35 MB), which combines a suite of integrated office functions on Smartphones and tablets running Android (Word, PDF, memo, scanner...) and compatible with Microsoft Word, Excel, PowerPoint, Google Doc, and Adobe PDF file formats. WPS Office provides a wide range of office tools with its easy-to-use interface design allowing you to enjoy the best mobile office experience.

Figure 7

Rate of use of some digital media and their utilization (interactive, semi-interactive, and non-interactive) by the study participants in distance training activities and sessions during the COVID-19 confinement period.



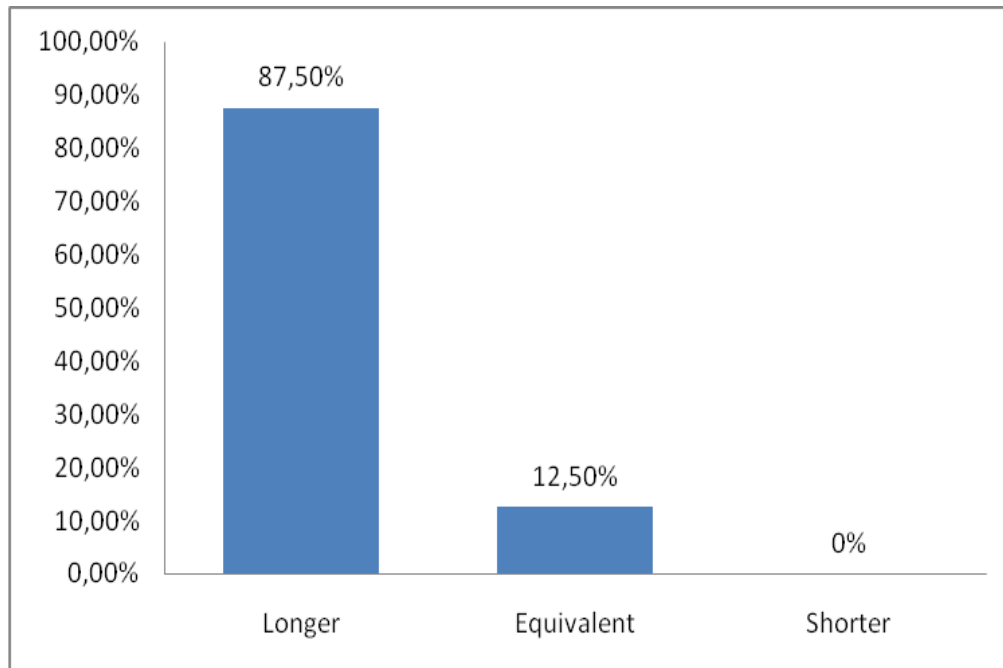
In general, modern technology allows for direct and regular communication, with the provision of information by taking advantage of the transmission of images and sounds at the same time. This made it possible to generate communication, facilitating continuous interaction during the different stages of distance training. Consequently, using different digital technological supports offers many options for modules' content delivery, and provides trainee teachers with many stimuli that address their different senses. So, they can interact in the same training situation through different types of information (image, audio, written text). In this regard, it has been reported that the extent to which student trainees retain intended information, significantly increased with active participation in the training process. This is especially relevant if the presentation method adopted by the trainer requires the trainee teacher to use all his senses and be fully engaged in the training process (Gao et al., 2020). Thus, the trainee teacher's deep understanding and increased performance necessitate the integration of knowledge, experience, and practical application (Zeitoune, 2004).

3.8. Assessment of time required to prepare distance training courses

According to the study conducted a large proportion of the participants (87.5%) stated that the time required to prepare for distance education courses far exceeds that required to prepare for face-to-face courses (Figure 8).

Figure 8

Length of time participants allocated to preparing courses for distance training during the COVID-19 confinement period, compared to face-to-face education.



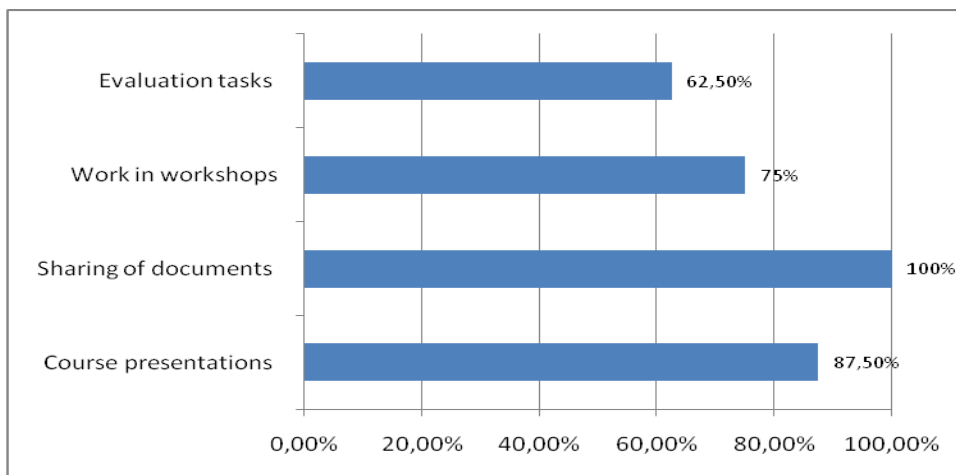
3.9. Types of activities carried out during distance training

To ensure the "distance training" during the period of confinement imposed by the Ministry of Education, the trainers of the Department of Life Sciences and Earth Sciences have carried out various activities (Figure 9). These include course presentations (87%), sharing of documents (100%), workshops (75%), and evaluation tasks (62.5%). The development and implementation of the aforementioned activities complied with the guidelines and training guides approved and prescribed by the Ministry of National Education. However, a few participants used official digital resources designed and provided by the Ministry (MoNE, 2017d). Trainers also worked to carry out required assessments of trainees' professional knowledge and skills adopted in face-to-face training, taking into consideration the context of distance training.

The Ministry of Education has endeavored to provide digital resources for distance training that have been produced by educational actors, through the portal of the Ministry or the websites of the RCCETs, their pages on social networks, as well as via phone applications.

Figure 9

Types of activities teacher trainees carried out during distance training sessions, over the COVID-19 confinement period.

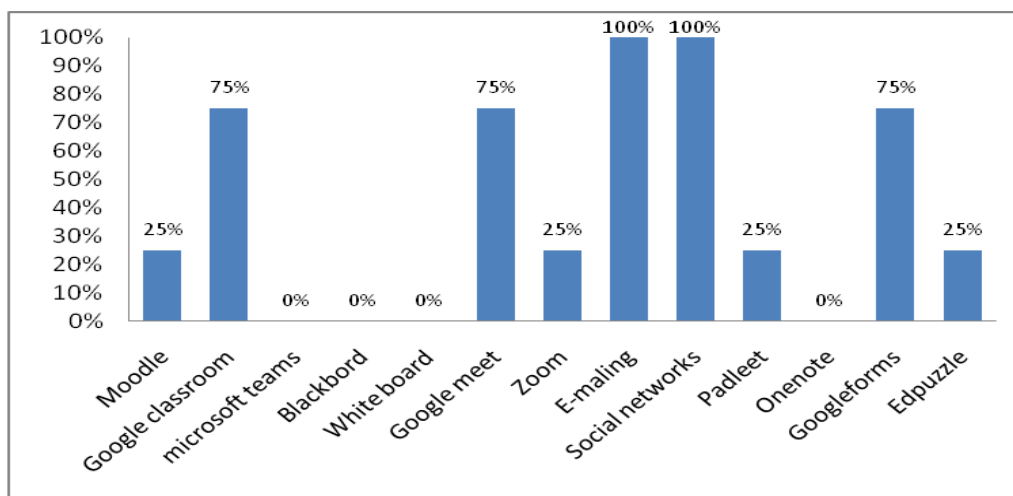


3.10. Platforms and tools teacher trainers used for distance training, over the COVID-19 confinement period

Within the LES Department at the RCET-MS, "distance training" took place using several platforms and digital tools to communicate and coach the trainee teachers, and assess their cognitive and academic achievements. The results obtained (Figure 10) showed the diversity of techniques and means adopted by the teachers to ensure the continuation of the training, we mention, among others, the electronic platforms such as (Google Meet), (Google Classroom) and (Padlet). In addition to using email communication and relying on audio and video recordings. Social media has been a widely adopted medium in distance training during this exceptional circumstance.

Figure 10

Platforms and tools teacher trainers used for distance training, over the COVID-19confinement period.



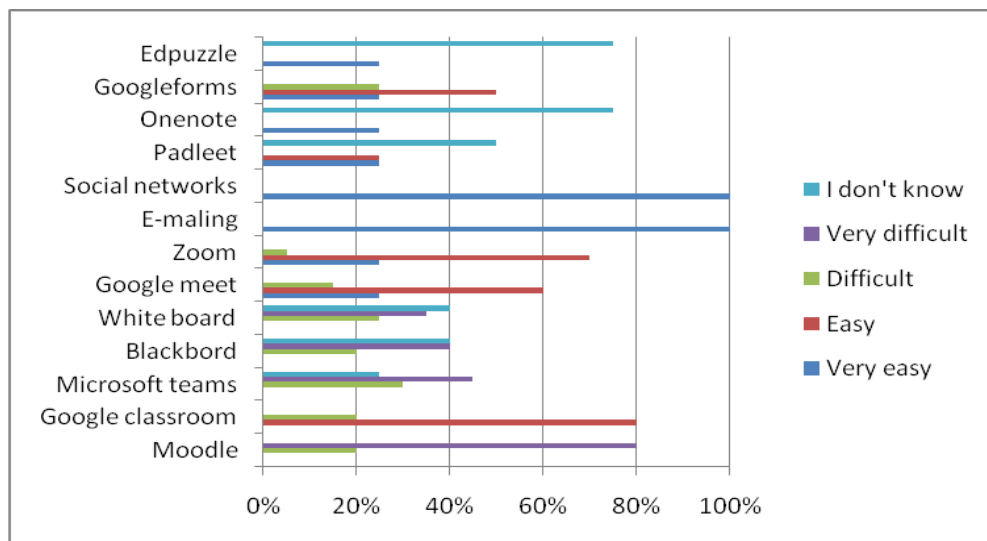
3.11. The degree of difficulty or ease of the methods and platforms adopted in distance training

The degree of difficulty or ease varies depending on the platform and tool used (Figure 11). The trainers declare that social networks and email are the easiest tools to use, while they stated that Moodle is the most

difficult platform to handle. In general reasons for using an ICT method among others and how is integrated into the distance training process are based on the trainer’s pedagogical vision, preferences, experience, and competence in the field of ICT use, as well as on trainees’ needs. However, it is noteworthy that educational practices are influenced by a combination of personal characteristics, disciplinary affiliation, institutional context, social and cultural environment, and the perception of the constraints and affordances related to a specific problem or task situation (Thompson et al., 2021; Woolner & Uline, 2019). While it is expected that training outcomes be influenced by teaching practices, perceived and actual training outcomes influence the teacher's subsequent educational decisions. Thus, influencing factors may need to be modified or transformed to fit the expected or actual impact of educational practices on targeted trainees (UNESCO, 2009).

Figure 11

The difficulty or ease level of platforms and tools the participants used for distance training during the COVID-19 confinement period.



Continuous training in the field of "distance education" should be provided for trainers and teacher trainees, whether in the classroom or at a distance, particularly in the preparation and development of digital resources and their use in classroom or distance training practices. UNESCO's principles on ICT use in education suggested that it would not be possible to meet the needs of professional training without virtual classrooms, and virtual laboratories (UNESCO, 2009). This also requires the adaptation of curricula, reference materials, and training modules around the integration of ICT, in addition to the development or acquisition of digital training content, with quality-assured pedagogical software.

3.12. Field training during the COVID-19 confinement period

Within the scope of the school training activities, according to the study results, they were partially accomplished (100% of cases). The preservice teachers had the opportunity to observe schools, class activities, and lesson demonstrations, within assigned locations, only during the weeks they could go face-to-face. The closure of testing schools due to the COVID-19 lockdown has disrupted field training activities. These should be continued during the second training year. Reports indicated field experiences are crucial to

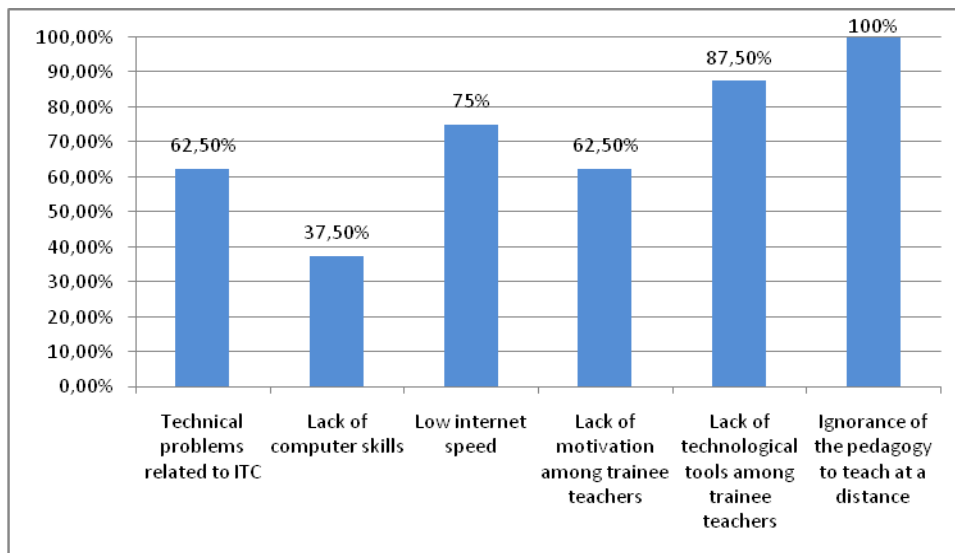
preparing future teachers suggesting that more experience practice teaching in actual classrooms is beneficial (Mulkeen et al., 2007; Mukeredzi, 2014). Field training is valuable for improving pre-service teachers' teaching skills, allowing them to bridge the potential gap between theory and teaching practices in real classroom environments (Jin, 2022; Hamilton & Margot, 2019; Sahlab et al., 2020). In most field training programs, pre-service teachers spend earlier experiences observing supervisor teachers and the remainder practicing how to teach (Mukeredzi, 2014; Onbaşıllı & Şeker, 2021). The quality of field training experience may depend on its duration, structure, sequence, and quality supervision by teacher trainers (Hill, 2021).

3.13. Constraints and challenges to distance training

The "distance training" style of training has ensured pedagogical continuity for the benefit of preservice teachers at the LES Department, during the confinement period, through the involvement of the department's trainers. However, the trainers have encountered several constraints and challenges during distance training implementation (Figure 12). In 100% of cases, constraints were related to the ignorance of approaches adopted in distance training, while in 87.5% of statements it was attributed to the lack of technical means among the trainee teachers, 75% for low Internet speed, versus 62.5% for technical problems related to the electronic devices used during distance training. The low motivation of the trainee teachers towards this new mode of professional training was reported in 62.5% of cases, while the frequency of 37.5% was recorded for lack of mastery and proper use of modern technology is a constraint for ICT use. Furthermore, by its nature, LES training involves laboratory activities. Providing laboratory work is challenging in distance-based training (Kennepohl & Shaw, 2010; Seilkhan et al., 2022). To fill these gaps virtual laboratories can be regarded as alternatives to real laboratories and field experience.

Figure 12

Constraints and challenges to distance training practice in the confinement period.



4. DISCUSSION

However, with the adoption of the new strategy for teachers' recruitment (2016-2017) (MoNE, 2017a), the Moroccan Ministry of National Education has developed a self-training program at a distance designed for teacher trainees. It aimed to develop the trainees' knowledge and professional skills, to fully meet the qualifications and abilities required to carry the teaching tasks /missions, according to the pedagogical and didactic approaches prescribed by the Ministry of Education, and curricula requirements (MoNE, 2016b). For this purpose, teacher trainers within the RCCET had the responsibility for preparing necessary training materials, and supervising and accompanying the target trainees, with the organization of intermittent face-to-face training sessions.

The pre-service teachers' training was carried out in three different and complementary ways: field-training, distance training, and face-to-face training. Considering the professional profile of the trainees, they have benefited from "distance training" through several modules to help them develop the basic skills required for teaching professional practices. This training mode has been provided through courses (MOOC) accessible on the Ministry's distance training portal (MoNE, 2017c). During the first phase of training, courses covered modules on planning for learning, management of learning, evaluation of learning, coaching, legislation, and professional ethics. The second phase modules included school life, methodology of action research, and ICT use in education. The "Distance Learning" portal also offered the possibility of downloading a set of reference materials, tools, courses, and presentations in didactics and educational sciences. The implementation of this platform was based on the guide for teachers' training, a reference document describing different forms of training, as well as the roles of the trainers involved in coaching, follow-up, and evaluation (MoNE, 2016b).

Regarding connectivity to the Internet, the study results showed that trainers within the Department of LES, used various and multiple methods to communicate with trainees (Figure 3), depending on their availability and ease of access. The 4th generation of cellular networks (4G) was the most used by the participants (100%), while the "WiFi", short for Wireless Fidelity, was used by 87% of the study participants. In contrast, modems and fibre optics users were relatively scarce ($\leq 25\%$). It is noteworthy, that using one of the aforementioned means of connection to the Internet may have advantages and repercussions on the quality of digital communication during the process of distance training, both for the teacher trainers and training beneficiaries. However, despite efforts furnished, regarding means of internet connection, the speed was very slow, with frequent interruptions of communication with the trainee teachers, impeding their attendance and active participation in training sessions. A high internet speed is very useful for video calls or meetings and for live learning, streaming video, and live streaming, as well as downloading videos, photos, and large files. Morocco has introduced fibre-optic internet to the country, but it has not been fully implemented and does not operate at maximum speed. However, it may be considered a promising technology for the implementation of distance training in higher institutes and universities.

All the trainers relied on the laptop computer as a technological mean for distance training (100%) and/or Smartphones (87.5%), while a lower proportion used tablets (12.5%), in line with previous reports (Ait El Moumen et al., 2022). All of these devices offer users access to the web worldwide. The significant advantage of tablets over smartphones is their large screen, allowing to watch videos in a fluid and clear way, with textual information being more suitable for viewing on the large screen. To improve the speed of

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the Internet connection, it is easier to establish the connection of the device to the (Wi-Fi). The smartphone is usually used when it is necessary to access the network outside the home or workplace because it is always within reach and easy to carry. Modern cell phones can be connected to the Internet by installing SIM cards, broadband connectivity is available almost everywhere, while Wi-Fi coverage may not be present everywhere. To work with text documents, both tools can work with different Office applications, allowing to make private operations and correspondences through email or chat; create, edit, and store documents, reports, etc. As per reference, UNESCO's principles on ICT use in education, have been summarized as follows: old and new technologies must be used in a balanced way. Direct broadcasting and audio recordings as well as television and offline video-based technology are still viable and cost-effective forms of education, as are virtual learning methods that rely on more interactive e-learning methods (UNESCO, 2009; Meccawy, 2023).

The available research on the use of synchronous e-learning to train preservice teachers to e-teach is limited (Sun et al., 2014). It has been reported that synchronous online training was the most used mode to deliver educational material during the COVID-19 period (Mahasneh et al., 2021). A previous study examining the effectiveness of an online synchronous platform used for training preservice teachers found that e-learning synchronous technology is an effective learning tool in enhancing preservice teachers' e-learning competency in subject matter, and information communication technology skills. However, it was reported that preservice teachers' competency to learn and implement e-learning for students is dependent on several conditions, including ease of use, psychologically safe environment, e-learning self-efficacy, and competency (Woodcock et al., 2015; Li & Peng 2024; Kadioğlu-Akbulut et al., 2023; Hammack et al., 2024).

Moreover, previous reports indicated that participants in the synchronous mode were more involved in task accomplishment than participants in the asynchronous mode (Burgoon et al., 2010). Thus, synchronous instruction may be well-suited to creating immediate social engagement and faster exchanges of information, helping to build a sense of community and clarify misconceptions (Dawson, 2006; Giesbers et al., 2013, Hrastinski et al., 2010). However, it requires scheduling shared times for trainees and trainers and is prone to technical challenges and accessibility limitations related to the strength of Wi-Fi. In contrast, asynchronous instruction is temporally more flexible. This both allows more time for trainees to explore and engage with the material and allows access to a wider range of students (Davidson-Shivers et al., 2001). On the other hand, students who studied mostly in synchronous contexts reported more peer-centred activities such as feedback, in comparison to students in mostly asynchronous settings. In contrast, teachers perceived fewer differences between teaching methods in synchronous and asynchronous contexts, especially regarding feedback activities. Further, students in mostly synchronous settings reported greater overall satisfaction, with more support for their basic psychological needs and competence, compared to trainees in asynchronous ones (Fabriz et al., 2021).

A variety of reasons may be responsible for teacher trainees' absenteeism from synchronous training courses, which can affect the trainees' understanding and performance. These may include, class schedules, training curriculum, content non-relevant, audio-visual equipment of the classes, lack of proper technology ...among others.

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The current study findings revealed discrepancies in the participation rates of the trainee teachers during distance education courses and activities (Figure 6). Although the preservice teachers can communicate directly with the trainer during synchronous sessions, for 75% of the investigated group, the participation rate of trainees did not exceed 50%, while 12.5% stated that the rate varied between 50% and 75%, versus 12.5% reporting that it was above 75%. In contrast, communication between trainees and trainers becomes limited during asynchronous sessions. Indeed, the answers to the trainee teachers' questions cannot be provided instantly in asynchronous sessions, they sometimes have to wait to get an answer by e-mail or via the comments of the virtual classroom... Sometimes this lack of interaction, both with the trainer and/or colleagues, leads the trainee to feel alone, resulting in weak motivation and lower involvement in activities carried out in scheduled distance training sessions. This type of training is centred on the trainee teacher, requiring a great deal of autonomy and engagement to complete all the activities of the distance training course. Other reports indicated that the ratio of the number of students who actively participated in online classes to the number of students participating in online classes varied from 30% to 64% (Mokhtari et al., 2021). The same authors suggested that in addition to improving the factors associated with students' attendance in classes, online education is a proper solution for reducing absenteeism in lecture classes and increasing students' active participation from the perspective of professors and students (Mokhtari et al., 2021).

As presented in Figure 6, the study results revealed that the performance of the teacher trainees, in terms of completing the required training activities, was considered average for 50% of participants, fair (25%), and high (25%). Through the use of computers in education, it was expected that ICT would lead to more productive learning. However, studies on the impact of ICT on educational outcomes are sparse. A previous meta-analysis resulted in optimistic conclusions suggesting that ICT use had positive impacts on students' academic achievement (Cox et al., 2004; Kulik, 2003). Moreover, evidence showed that distance education is often far less effective than face-to-face education (Ben Abid, 2000; Potshnick & Capper, 1998).

According to previous reports (UNESCO-UIS, 2006), achieving the international educational goals set requires huge investments in terms of structuring training institutions and qualifying teachers. This major challenge cannot be met by offering traditional face-to-face training but requires adapting the training programs and making them accessible and available to trainers and preservice teachers, with the great support of ICT use (UNESCO, 2009).

The rates of use of the different digital media by the study group are presented in Figure 7. Interactive and semi-interactive materials accounted for more than half (50%) of the materials prepared and used by the trainers of the LES department during the period face-to-face courses were suspended. It has been reported that interactive media have the advantage of improving student engagement and have the potential to provide active, experiential learning that includes social interaction with colleagues (Cherewicketal., 2021; Ürek, 2024). Non-interactive materials accounted for only 25% of the materials used. Reports indicated that students had positive attitudes towards the use of interactive technology as compared to non-interactive ones, as the latter did not allow them to give feedback to each other or discuss scheduled topics (Ordem, 2020).

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Studies reported that temporal factors like workload and lack of release time inhibit faculty participation in developing and teaching online courses (Lazarus, 2003). Trainers have a pivotal role in the implementation of the curricula through distance training with multiple tasks to be accomplished. They have to contextualize and customize the delivery of the content to ensure trainee achievement using appropriate methods and tools. Teachers build courses and choose the best appropriate techniques and tools to reach the goals. A wide variety of techniques and activities are used including whole-group instruction. Moreover, they need to plan for evaluation activities to assess trainees' achievements, according to the objectives set. They are also called to support the online engagement of the trainee teachers, with permanent supervision to ensure and maintain trainees' interaction throughout the distance training sessions. Other authors indicated that, overall, face-to-face teaching, required more time per student, but certain aspects of online teaching take considerably more time per student than in the face-to-face classroom (van de Vord & Pogue, 2012).

Other factors that challenged the trainers in this experience included the limited engagement of trainees in the process, and the assessment procedures of trainees' achievements being deeply impacted. Conducting assessments remotely during COVID-19 has posed extraordinary challenges for training institutions (Seilkhan et al., 2022). The main challenges identified in the remote assessment were academic dishonesty, infrastructure, coverage of learning outcomes, and commitment of students to submit assessments (Almeida & Monteiro, 2021; Douali et al., 2022; Guangul et al., 2020).

Based on all the aforementioned, the technological infrastructure needed to implement distance education is a real constraint. It cannot be assumed that the connection is available to all trainee teachers, as many remote or rural areas do not have access to the Internet. In addition, a lack of prior preparedness of trainers in the use of modern technological tools and applications in the field of education to accomplish all educational tasks via the Internet (Gulmira et al., 2022). Countries that are still in the early stages of integrating ICT into education differ from those that have more experience in the area. When introducing computers into education, for example, it is important that teachers and students have access to hardware and software, and that they acquire basic computer skills. For countries that have made great strides in the use of ICT in education, other priorities are at the forefront, such as managing educational innovation, adapting curricula, organizational change, sustainable technical support, and developing continuing education.

5. CONCLUSION

Based on the study results it has been found that distance training experience in LES during the COVID-19 confinement period demonstrated its benefits in ensuring the training continuity. A variety of ICT tools and digital media have been used. Both synchronous and asynchronous modes have been employed, with the synchronous type being predominant. Various activities have been carried out including, among others, course presentations, workshops, and evaluation tasks. However, the experience faced several challenges and constraints. These are mainly due to the lack of ICT means, technical problems related to the electronic devices used during distance training, and the lack of virtual laboratories. Other reported challenges were low motivation, limited attendance, and weak interactivity of trainee teachers.

Also, conducting assessments remotely was considered a challenging task for both trainers and preservice teachers. Despite these constraints and challenges distance training using ICT can be considered as a complementary and/or alternative form of training. It may also be integrated as a compulsory component

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within blended training programs. This can contribute to better training and qualifying of preservice teachers, through the provision of knowledge, and development of competencies, needed in real teaching practices.

The integration of the distance training model in the qualification of preservice teachers can play a crucial role in reforming traditional education systems, by improving the quality of training outcomes, developing technical skills, and supporting teacher training programs in the training centers. For this purpose, it is recommended:

- to enable trainee teachers to acquire new skills and abilities to effectively engage with the digital system in teaching and training; with the provision of required technologies.
- to create studios within the training centers, for the recording and production of high-quality audio-visual digital educational resources.
- to set up virtual laboratories allowing to perform LES experiments despite working remotely.

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Appendix **Questionnaire**

1- Have you ever received training in the field of ICT before the confinement?

- No
- Yes

If yes, please specify the total duration of the training:

- <3 days
- 3-7 days
- >7 days

2- Have you ever received training in distance learning?

- No
- Yes

3- Have you ever adopted distance learning before Covid19 confinement period?

- No
- Yes

4- What technological tools have you used?

- Laptop computer
- Smartphone
- Tablet
- Office computer

5- Specify the type of internet connection you have used

- 4G
- Fiber optics
- Wifi
- Modem

6- What type of distance learning have you conducted/performed?

- Synchronous mode only
- Asynchronous mode only
- Both Synchronous and asynchronous modes

7- How do you rate the effort engaged during the remote learning sessions as compared to face-to-face training?

- Far bigger
- Bigger
- Smaller

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Similar

8- How do you rate the attendance of trainee teachers during distance learning sessions?

- Very weak
- Weak
- Medium
- Big

9- How do you rate the participation of teacher trainees during distance training sessions?

- Less than 25%
- Between 25% and 50%
- Between 50% and 75%
- More than 75%

10- How do you rate the performance of teacher trainees during distance training sessions?

- Very weak
- Weak
- Medium
- Fair
- High
- Too high

11- what type of digital media did you use?

- Word, ppt, and pdf
- Audios and videos
- Record lessons in video or audio formats

12- Are your digital media?

- Interactive
- Semi-interactive
- Non-interactive

13- Compared to face-to-face courses, the preparation time for distance training courses was?

- Longer
- Equivalent
- Shorter

14- What were the types of activities carried out during distance training?

- Course presentations
- Sharing of documents
- Workshops
- Evaluation tasks

15- What platforms and tools have you used in distance training?

- Moodle
- Google Classroom
- Microsoft teams
- Blackboard
- Whiteboard

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- Google meet
- Zoom
- E-mailing
- Social networks
- Platelet
- Onenote
- Google forms
- Edpuzzle

16- What is the degree of difficulty or ease of platforms and tools adopted in distance training?

	Moodle	Google Classroom	Microsoft teams	Blackboard	Whiteboard	Google meet	Zoom	E-mailing	Social networks	Platelet	Onenote	Google forms	Edpuzzle
Very easy													
Easy													
Difficult													
Very difficult													
I don't know													

17- What was the level of field training accomplishment?

- Fully accomplished
- Partially accomplished
- Not Accomplished

18- What were the constraints and challenges to distance training?

- Technical problems related to ITC
- Lack of computer skills
- Low internet speed
- Lack of motivation among trainee teachers
- Lack of technological tools among trainee teachers
- Ignorance of the pedagogy to teach at a distance