

Analysis on the Actions of a Continuous Distance Training Session for Teachers and its Impact on Their Actual Practices

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Abstract—This paper analyses how a three-day distance training program for teachers, scheduled on short notice, can be used to develop the capacities in using the digital platform, the creation and management of digital resources, as well as the creation and management of a digital assessment, thus enabling them effective pedagogical continuity. Implementing this training methodology was recommended in the current emergency resulting from the global coronavirus Covid-19 pandemic. The outcome has been the closure of schools and other educational establishments, resulting in the implementation of new forms of learning from traditional face-to-face on-site to off-site distance learning in the year 2020 and beyond. This distance training, which mainly concerns schoolteachers, was necessary to develop their new teaching model. Based on the evaluation of several professional training programs available in the open literature, and the data collection tools used in this research, the results show a specific evolution in the conceptions of these teachers to revisit the objectives of this training by the teacher-trainers for its possible deployment.

Keywords—continuing education, distance education, technological competence, change, professionalization

1 Introduction

As part of the preventative measures taken by the Moroccan Government to contain the spread of the coronavirus (Covid-19), the Ministry of National Education for Training of Managers and Scientific Research had decided to suspend face-to-face lessons from March 16, 2020, and replace them with distance learning programs. All schools and universities in the public and private sectors were affected by this decision, but were they ready and well equipped to teach and train remotely?

During this initial period, the Moroccan Educational system was faced with mandatory changes to adopt new ways of learning to help deal with this exceptional situation that, incidentally, the whole world was also experiencing. In order to avoid the spread of the coronavirus epidemic and ensure the continuity of teaching during this period of confinement simultaneously, teachers were called to ensure the continuity of courses through lessons learned from previous distance learning programs for their students (e.g., SARS, H1N1) [1, 2 and 3]. Indeed, teachers do not always seem to have the technical skills necessary for innovative digital integration [4]. Thus, the need for the training of teachers under the current climate was paramount.

During this period of confinement, distance training was organized in specific provincial directorates in each regional academy of the Ministry of National for teachers in the use of the Microsoft (M.S.) TEAMS platform, the creation and management of digital resources with M.S. PowerPoint (PPT), and creating and managing a digital assessment in MS FORMS. This training aimed to develop the technical skills used for this type of teaching, thus utilizing them correctly into actual practices.

The recent increase in Information and Communication Technologies (I.C.T.) and increased reliance in today's society on Information and Knowledge have produced new challenges for educational institutions [5, 6]. Most education providers always see technologies as catalysts that can revamp teaching and learning [7, 8]. A growing body of evidence suggests that smart mobile devices—especially tablets—are being used by learners and educators worldwide to access information, streamline administration and facilitate learning in new and innovative ways [9, 10, 11].

In Morocco, during 2006–2013, a generalization of information technologies and communications in education through the GENIE program was implemented to train teachers in the effective use of I.C.T. tools in their teaching practices. The E3.P1 project of the strategic vision [12] aimed to place the new training system at the school education level; thus, distance learning was seen as an example of other training methodologies. The Framework Law for Education (August 19, 2019) aimed to develop new technologies in schools and universities. Article 33 of this text stipulated the need to develop distance learning, considered complementary to face-to-face on-site learning, and envisaged the integration of “electronic education” into a system with a view to its gradual generalization.

Several projects, which aimed to develop the use of I.C.T. within the Moroccan schools and which have impacted the training system, have emerged, in particular: T.V.I., Collab, e-takwine, ComPracTICE, and MOOC GenieTICE. However, until March 2020, e-learning was a far less common training tool for teachers in the national education department.

Quality and efficiency are essential for such training, whether in mode face-to-face or remotely. According to Gérard Ethier, “*The obligation of our system of education to achieve the highest possible quality cannot be done without its continual assessment; the logic of quality controls the logic of evaluation*” [13].

The initial training, whatever its quality, is never final in the face of changes in knowledge and techniques (Paré, 1983). Professional development remains unfinished at the end of initial training [14, 15, and 16]. The changing societal and school contexts led all teachers to constantly question themselves, update their practices, and develop in “a continuous, even endless process” [16].

The Bologna process emphasized “lifelong learning.” Continuous training allowed teachers to compete and improve their training to follow and adapt to the reforms in the educational system [17].

In addition, distance training appears to have a positive influence on the continuing training of teachers; It emphasizes accessibility [18], flexibility [19], and professional development of teachers, fostered by their participation in virtual communities [20].

To successfully introduce a change or an innovation, Kemp and Low (2008) [21] proposed to carry out three main activities to manage the change: training, innovation, and incentive actions in which the offer of face-to-face training towards distance learning had been poorly made without designing a plan to manage this change.

We believe that this new situation appeared unexpectedly and offered an opportunity to promote pedagogical continuity in other novel ways. However, it can also create discontinuities given the absence of reasonable distance training devices and tools that allows the school to promote pedagogical actions without returning unscathed to its former functioning.

The objective of this research study was to determine the effectiveness of distance training. The following were assessed:

- The pedagogical skills of the trainers;
- The characteristics of the beneficiary teachers;
- Working conditions;
- Training content that can influence the quality of this training;
- How the distance training lead to the development in the technological development of teachers;
- How this distance learning can be cascaded to their students; and
- Finally, how can the impact of the research results on teachers’ actual practices influence the change in practices?

Based on Maubant (2007) [22], the ambiguities of such an object of research are deduced from previous studies carried out on the analysis of teaching practices. It denotes that the analysis of effective teaching practices can make it possible to approach the multi-dimensional realities of teaching activity, whether face-to-face or remotely.

This research paper is made up of three parts and a conclusion with limitations of the study. The first part represents the theoretical framework of our research work. The second part describes our research methodology. The third part discusses the results obtained during this study; this part is made up of four sections: The first one examines the progress of the training, the second shows the reaction of the teachers towards distance learning, the third concerns the results of analysis of teachers’ learning at the end of this training, the fourth is devoted to the analysis of the behavior of teachers at the end of this training, which ends by establishing the place of the impact of the research process on the practices of trainers and practicing teachers.

We end our manuscript with a general conclusion, including the perspectives of the present work.

2 Theoretical framework

2.1 Issues of distance training for teachers

There are several issues related to distance training for teachers:

First, a strategic issue, linked to an apparent contradiction. Excessively neglecting the facet “Educated teacher” in the initial training risks giving reason to those who militate for a backward step: For example, leading to a sudden return to the situation before, leading to neglecting the facets [23] “reflective practitioner,” “Social actor,” “person,” etc. which are essential dimensions currently. Defending the place of the educated teacher in the initial training of teachers also helps defend the other facets that contribute to the professionalization of training.

This is followed by an operational issue where the facet of the profession remains before all other issues. Without it, the other issues are meaningless. It is a facet that allows and justifies the didactic dimension of the teaching process vs. learning [24]: the teacher can only guide the student openly and rigorously at the same time if he has a perfect mastery of the content. Teaching is a complex profession, and if mastered disciplinary knowledge is necessary, it is not sufficient to make a good teacher.

In the context of the evaluation of vocational training, it seems essential to us to establish as a principle that the evaluation of teacher training requires identifying beforehand the process of transforming the professional profiles to which corresponds the training actions [25].

The third issue allows teachers to express their point of view on their remote training, which includes clarifying the program, upstream connectivity, the training objectives involved, and other issues on how they will assess.

The final issue relates to the purpose of training evaluation. More than control or a check of what has been learned during the distance training, the interest of such evaluation relates to the regulation of the training system. The evaluation situated here includes the logic of piloting the system, the evaluation by the teachers being conceived as feedback to help the teaching, and the administrative team involved in adjusting the various training systems. In this case, collecting information is akin to providing valuable data for decision-making [26]. For example, it will be a “dynamic and involving” evaluation [27], which aims to help all training actors better evolve and adapt to improve the qualification of teachers in this teaching style.

2.2 Andragogical model of training for teachers

The training principles of the andragogical model as defined by Malcom Knowles (1990) [28] include:

- Self-concept (autonomy, self-assessment, and cooperation are necessary for adults who see themselves as mature persons)
- Experience (adults are constantly learning)
- Willingness to learn (adults particularly appreciate developmental tasks related to social roles)

- The orientation of learning (the adult aims for immediate use of knowledge, hence his interest in problem-solving)
- Motivation (crucial in the learning process).

Mucchielli (1991) [29] lists the characteristics of the adult training situation:

- Saturation (the adult's mind is saturated with learning; it becomes necessary to reassure adults by offering them the opportunity to learn differently, to capitalize on the knowledge acquired through their professional experiences)
- Threats (assessment and punishment traumatize adults by reminding them of the blockages due to the rigidity of the education system, while they want to learn without constraints)
- Inhibition (adults fear being judged; training should be a place of reflection and experimentation)
- Indeterminacy (long-term goals are rejected by adults who operate with an immediate objective or, failing that, in the medium term when they follow a training)
- Theory (adults give theory little credit, preferring practical behaviors in line with professional activity. The theory is tolerated when integrating new knowledge through a confrontation process of experiences and abstractions)

2.3 The Kirkpatrick model of distance training evaluation

Kirkpatrick's model was initially developed to assess the training process in organizations, but it is also applicable in the academic context [30]. Several studies have applied it in this context [31, 32]. This model has four levels: Reaction, Learning, Behavioral, and Results.

- **Reaction Level:** The reaction level can measure the satisfaction with the training materials, content, delivery methods, trainer, timing [33], trainees motivation to learn [34], trainee characteristics, and work environment [35].
- **Learning Level:** There are three aspects of learning outcomes: skill-based, cognitive, and attitudinal [36].
- **Behavioral Level:** The model explored how the participants applied what they learned during training to their work environment. Methods for evaluating this level include supervisor-based or objective indicators of performance [31, 37 and 38], observation, self-assessment, performance record review, and peer review [39, 40]. When evaluating training in the education sector, Kirkpatrick suggested combining quantitative and qualitative methods of investigation for this level [41].
- **Results Level:** This level focuses on measuring financial benefits, which cannot be done directly in the context of education [42]. Nevertheless, the results criteria in education might include a wide range of outcomes, such as alumni employment and succession in the workplace, admission to tertiary education, servicing of underprivileged groups, working to promote peace and justice, responsible citizenship, literary or artistic accomplishments, and personal and family stability—most of these results benefit both the individual and society [31].

2.4 The models used for the analysis of the effective practices of teachers

From the perspective of teacher training, we present the three main models used to analyze actual practices, according to Maubant (2007) [43]:

- The first model is that of the action sciences. It consists of understanding practices by defining them as transforming one reality into another reality requiring human intervention. This model aims to exploit the action sciences explicitly to help modify this intervention. There is a direct and alleged relationship between the project to identify and understand the professional practice and the expected training plan.
- The second model analyzes the teaching practice that is developed mainly around the question of the teacher effect. The aim is to assess the effects of a pedagogical intervention on the students, which we analyze in terms of school performance or observable behavior. The perspective on the teacher remains guided by the observation of what is happening at the student level and even by what happens in the interactions between the student and the teacher. In this model, the growing use of interaction is paramount. What do we observe when analyzing interactions? Therefore, it is essential to specify the meaning of such terms: approaches, strategies, devices, situations, knowledge, skills.
- The last model offers to help identify and understand the teaching activities by relying on theories borrowed from professional training. It helps to advance the description of the understanding of the teaching activity by recalling the complex nature of this activity and developing a reflection on the most appropriate methodologies to make professional practice intelligible. The starting point is a professional activity which is the subject of a reflection on the conditions favorable to teacher training. There is a double difficulty here: identifying the professional knowledge involved in professional action [44] and understanding the organizing principles of this activity [45], that is to say, updating the system settings that allow acting professionally.

3 Research methodology

3.1 Methodological choices

This research describes the efficiency of this type of formation in the context of this evolutionary change. Standard beneficial evaluation practices propose to use many questionnaires (survey) of satisfaction concerning the participants without being evident [46]. This study deals with the actual changes, considers teachers' professional practices and gives much importance to their professional development. However, it gives less importance to indicators of transformation about their activities.

There may be some problems in our methodology to precisely measure the formation's effects [47]. Should we evaluate a teacher's capacity during the formation, knowledge, and competencies acquired during this formation?

In our assessment, we considered a continuous formation professional, i.e., teachers of many disciplines and cycles of teaching (primary, college, and secondary schools), and treated this formation (distant formation) organized by the Casablanca-Settat region. This session took place during April 2020 for three days. It was headed by six

teacher-trainers who managed this workshop of formation in pairs for each session. Thirty-eight trainees had participated in the program.

These actions were initiated by the institutional orientations and professional experiences of a group of teacher-trainers in this field. In this sense, the fruit of the research is supported by this experience in order to allow the beneficiary teachers and teacher-trainers of this training, including the latest research in cognitive functioning, in particular, to seriously conceive the act of learning, which should be a priority concern compared to that of teaching.

The use of the training system has evolved from the successive assessments made by the teachers themselves and by the teacher-trainers, including the inclusion of recent research results in daily practices [48]. A collaborative working group made up of teacher-researchers, teacher-trainers, and teachers benefitting from this training, met just after completing this training during the period (April–October) to discuss, share, plan and improve training actions and their application in their teaching practices. The team of researchers supported this experiment by considering a broader debate on the relationship between scientific knowledge and experience gained, i.e., combining the complexity of the relationship that can be established between knowledge resulting from research and the professional knowledge of teachers.

3.2 Data collection tools

We used a number of different data collection tools to identify the necessary information on teacher training, including current and future needs and issues likely to receive support from the research team.

In order to examine the conduct of this training, a semi-structured interview was carried out with six teacher-trainers who provided this training. The questions were organized according to the three themes which form the basis of engineering training: the design, management, and evaluation of training, and a 4th theme according to which these trainers expressed the obstacles they encountered when carrying out the training. At the same time, we observed the management of this training from videos posted on YouTube of their interventions using an observation grid that we designed according to the principles of andragogy. This included the following criteria:

1. Pedagogical communication between trainers and teachers:
 - i. Meeting the needs of teachers in training.
 - ii. Valorization of the personal experience of teachers.
 - iii. Teacher accountability for training.
 - iv. Statement of training objectives.
 - v. Quality of the technical language used.
 - vi. Quality of the language of instruction.
2. Promotion of autonomy among teachers:
 - i. Involvement of teachers in the construction of their learning.
 - ii. Teachers' self-assessment.
3. Socialization of learning (a collaboration between teachers).

Then, we designed a questionnaire for those 38 teachers who agreed to respond in writing to the questions asked. The design and analysis of this questionnaire were made according to the first level of Kirkpatrick model: i.e., Teachers' reaction to the distance training. Its objective was to draw up an outline of the primary perceptions of distance training from the teachers concerned and allow teacher-trainers to identify the different dimensions of the problem in the training process.

This questionnaire was structured in several parts: identification of the characteristics of the sample, the primary motivation of the teachers towards the training, the measurements of the satisfaction of these teachers towards this training concerning the content, and the training schedule and the trainers, including the proposals and suggestions of the teachers to possibly improve this type of training.

In order to measure teachers' learning in terms of knowledge acquired and attitudes at the end of this training, we administered a knowledge assessment test to these teachers to meet the second level of Kirkpatrick: Apprenticeships. It was sent by e-mail a few days after carrying out this training to 12 randomly selected teachers among those who participated in the above questionnaire. This test was designed according to the objectives set for this training. It comprised of 26 questions graded according to a rating scale that varies between 0 and 4 points (grade 4 corresponds to a very satisfactory acquisition of knowledge, 3: satisfactory acquisition, 2: acquisition moderately satisfactory, 1: unsatisfactory acquisition, and 0: false answer).

In order to measure the transfer of learning among these teachers in their working environment, we employed the 3rd level of Kirkpatrick model, studying the effectiveness and continuity of applying knowledge, skills, and attitudes acquired in training [49]. To do this, we chose observation and interview as data collection tools because they were considered the most effective for this type of assessment [50]. After six months of the completion of the training, when teachers had been able to apply their new learning [50], we made a direct observation of the behavior of these 12 teachers during three sessions of their distance learning courses. An observation grid was designed based on the skills expected from this training by defining a set of weighted evaluation criteria according to their degree of importance. We then completed this grid according to this scale rating for each of these criteria: Very satisfactory (100%), satisfactory (80%), relatively satisfactory (60%), unsatisfactory (40%), and not achieved (0%).

A month later, we accompanied this observation by an interview with these 12 teachers measuring their motivation to apply their skills [51] consistently; to determine if the time available to them was sufficient [52]; and if the working environment was compatible with their new needs (technical support received and the means they have) [52].

3.3 Analysis method

In addition to the descriptive analysis (numbers, percentages, averages), which allow us to provide a general overview of the measurement of teachers' degree of satisfaction with the training provided, the following were also considered: (a) Elements of the quantitative analysis of the learning of teachers at the end of the training, (b) Qualitative analysis of the behavior of teachers and teacher-trainers at the end of this training, and (c) Content assessment to analyze the conduct of the actions of a distance

continuous training session for teachers, by combining the process of analyzing practices and evaluating the impact of this training on the actual practices of teachers.

In this study, by articulating the data from different collection tools, we emphasize in our research how the collaborative interactions between the members of a team of researchers, teacher-trainers, and beneficiary teachers enrich the training experiences to make more constructive the impact of research results on actual practice teachers, or how likely it can influence the change of practices in the field.

4 Results, analysis, and discussions

4.1 Distance learning engineering

In order to see the progress of this training closely, we interviewed, engaged, and observed with six trainers (5 women and one man) while at the same time, we observed its management abilities from videos broadcast on YouTube of their interventions according to the principles of andragogy.

Characteristics of the trainers for distance training: distance learning engineering. These trainers were all under 40, were computer science teachers (half of them were qualified secondary school teachers and the other half were college teachers), who had more than five years of experience training teachers under the GENIE program. More than half of them had a master's degree and had benefitted from a training day organized by the Provincial Directorate of National Education on the design of the two platforms Tilmid Tice and Compractice.

“Since adult, pedagogical training has its mechanisms, rules, and devices, it cannot be practiced without the prior training of those who will be involved in continuing education.” [53].

The mission of the continuing education of the educational and administrative executives of the Ministry of National Education Morocco had been assigned to the Regional Centers for Careers of Education and Training since 23/12/2011 according to Article 33 of Decree No. 2-11-672.

The concept of distance learning. To conceptualize this training, the content and timing of the training were communicated to these teacher-trainers following a remote meeting between them and the team responsible for training within the Directorate Provincial of National Education. In addition, all these teacher-trainer analyses of training needs were ignored regardless of the specificities of the target audience in terms of their prerequisites, their training needs, and their professional experiences.

To demonstrate practical training, one has to start with a question about the expectations and motivation of the participant, vis-à-vis, the training. According to Paquette (2002) [54]: “Saying that a person must know something or acquire this or that knowledge is not enough. We have to ask ourselves to what extent, in what way, in what context, for what use?”

The management of the distance learning. Most teacher-trainers told the researchers that they combined the two teaching modes, synchronous and asynchronous, regarding the management of this training. YouTube and M.S. Teams are the means most used by them. From our observations, as researchers accompanying this experience,

regarding the interventions of these teacher-trainers during this training (broadcast on YouTube), we deduced the following points:

- The training objectives were not declared during the training sessions. The learner needed to know the purpose of learning; otherwise, he or she was led to guess what was expected of him or her.
- This training was intended for teachers of different educational levels and specialties who are familiar with computer knowledge and master computer applications. However, the technical language used in this training had some degree of difficulty: the first part was relatively easy, while the other two were medium to difficult. These teachers required an advanced level of knowledge in computer science in order to continue this training easily.
- A mixture of the two languages of instruction, French and Arabic, appeared to be a learning barrier for science students in Morocco [55].
- The teachers were not consulted in advance of this training: they were not involved in building their learning or self-assessment. For the training to take place in good conditions, the interaction between trainee and trainer is paramount to the success of the training. The trainer does not pass on the knowledge to the participants; but instead, he directs them.
- There was no learning socialization: no cooperation between the various participants in the training (group work). The author of Theories and Pedagogical methods for teaching and learning [56] proposed a model based on active methods rooted in a context that makes sense, offering a variety of resources, based on the interaction between partners to achieve a production that mobilizes high-level skills: “Learning by solving problems, [...] cooperative learning, [...] The pedagogy of the project or by the project”.
- The experiences of teachers were not valued. The teachers accumulate experiences that must be valued [28] by asking them to share their experiences with their colleagues (Schön 1984, 1994). “The theories and reflections on adult learning have always attached great importance to the role of experience. The current of andragogy [...] had even made it the emblematic sign” [57].
- The training content was not negotiated between the teacher-trainers and the teachers, neither a priori nor the training time. However, the needs of the participants must be taken into consideration to respond to them as they arise during the training [28].
- The content of the training was the same for all teachers. Thus, the specificity of each subject was not respected.

Evaluation of the distance learning. All the teacher-trainers confirmed that they did not assess the prerequisites relating to the content of this training for these teachers and that their interactivity in the question/answer forum (synchronous mode) was too low for the discussions. They were provided on the WhatsApp group (synchronous and asynchronous mode) or via videos broadcast on YouTube (asynchronous mode). These teacher-trainers did not have any feedback to assess the level of learning of these teachers neither, during or at the end of the training, which makes the online support almost useless.

Feedback promotes learning through the support and monitoring of learners. Otherwise, the trainer plays a vital role in different training processes, mainly through sensitization-mobilization and follow-up [28].

However, half of the teacher-trainers appreciated the training they provided to the participants, while the other half found it to be average.

The latter expressed obstacles during this distance training.

We classified these obstacles into three types:

Technical obstacles linked to low internet connectivity speed among teachers and teacher-trainers created a disturbance or unnecessary distractions to them in order to ensure or follow the training in synchronous mode adequately.

Obstacles relating to the conditions for carrying out the training, *vis-à-vis*:

- The low supervision rate had influenced communication and interaction between teachers and teacher-trainers; Teacher-student or student-teacher interactions are essential for motivating learners and strengthening students' understanding of the material presented to them [58].
- The training schedule was not suitable for the availability of the teachers-trainers.
- The Provincial Directorate imposed the training content using the MS TEAMS platform, which was new for many of these teacher-trainers in the absence of adequate instructions. Similarly, the teachers expressed their dissatisfaction with the conditions for carrying out this training.

Obstacles relating to teachers:

- Their lack of computer knowledge.
- Their feeling of fear towards the use of new educational technologies.
- The non-attendance of most of them as well as a non-involvement in training.

4.2 Teachers' reaction to distance learning

This part aimed to collect the views of teachers who had benefitted from this distance training. Thus, the responses to the questionnaire were collected via Google-Form from a sample of 38 teachers (trained in synchronous mode).

Characteristics of the teachers that benefitted from the training. This sample was balanced between men and women, the majority of whom (80%) were under 40 years, heterogeneous in terms of the subject taught and the teaching level had seniority of more than five years, had a bachelor's degree or higher qualifications, and had a pedagogical training in training centers (CRMEF or C.P.R. or ENS or CFI).

All these teachers interviewed had never had the opportunity to work remotely. Most of them had not previously benefitted from support relating to the use of distance training platforms. In contrast, more than half (60%) of teachers declared an excellent mastery of new information and communication technologies (especially those who have done pedagogical training at CRMEF).

Therefore, while e-learning was new for all these teachers, at the same time, technology did not present any obstacles to these teachers in this training.

The motivation of teachers towards this distance training. At the start of the training, almost half of the teachers were not motivated to favorably join this training because of the psychological instability they experienced during this period of the pandemic. Technical and financial problems were related to the internet connection, including the lack of technical equipment available and their availability for the training schedule. Twenty-one percent of teachers could attend different parts of the training while 60% attended half of the training.

Through the training actions and interventions by the team of researchers from time to time, resistance to change had diminished, and average motivation of these teachers was established, so that teachers were committed to getting involved in this training, despite the constraints they experienced during this period.

Satisfaction of these teachers with distance training. Most teachers (76%) told us they were dissatisfied with the training conditions while half of the teachers were satisfied with the content of this training and the skills of trainers.

Teacher suggestions for improving this type of training. To improve this type of training, all these teachers provided their input: We classified them according to three dimensions:

1. Technical dimension: Provide adequate material resources to continue applying this training (P.C. and broadband connection).
2. Organizational dimension: Limit the number of teachers participating in each training session; increase the number of training sessions; organize follow-up and communication between teacher and trainer; set a more convenient schedule; and finally, schedule face-to-face sessions for this type of training because of the absence of practical workshops.
3. Pedagogical dimension of trainers: Produce a solid plan related to the training content, taking into account the I.T. level of the different teachers, prioritize the practical part and communicate more with the teachers.

4.3 Teachers' learning at the end of the distance training

In order to measure the learning achieved by these teachers in terms of the knowledge acquired at the end of this training, we carried out an on-the-spot evaluation of the learning achieved. We collected e-mail responses on 20 questions to a sample of 12 teachers (heterogeneous concerning the subject taught and the teaching level). The results show:

These teachers demonstrated a relatively satisfactory mastery (12/20) of knowledge relating to the first part of the training, i.e., use of the MS TEAMS platform; an unsatisfactory to moderately good mastery (10/20) of the second part, i.e., creation and management of digital resources with MS PPT; an unsatisfactory mastery (5.5/20) of

knowledge relating to the third part, i.e., creation and management of a digital assessment in MS FORMS.

In total, these teachers showed overall unsatisfactory to moderately good mastery (9.2/20) knowledge relating to this training.

4.4 Teachers' behavior at the end of the distance learning

This part aimed to measure the transfer of knowledge, skills, and/or attitudes [59]. It defined itself as the efficient and continuous application in the workplace knowledge, skills, and attitudes acquired in training [60, 61, and 62], and according to Ford (1992) [63], the environment is an essential factor influencing the transfer.

In-Situ observation of trained teachers. The results of observing the behavior of these teachers in their distance learning sessions are presented below.

- Figure 1 represents the percentage of teachers who have applied the training according to its three parts.

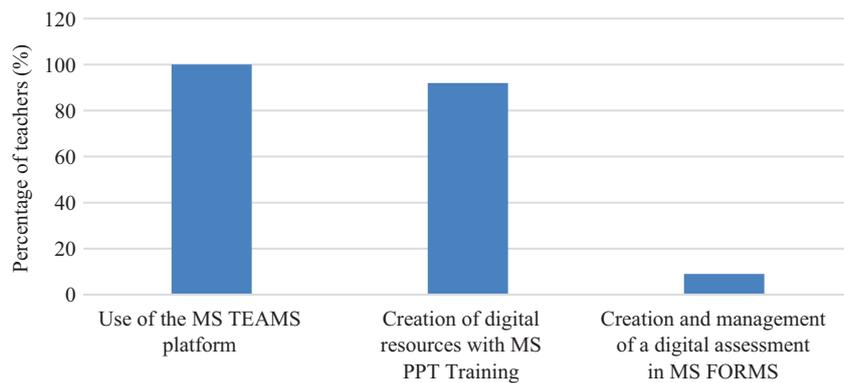


Fig. 1. Application of training

We noticed a complete application of the part in the “use of the MS TEAMS platform,” an almost complete application (91.5% of teachers) in the “Creation of Digital Resources with MS PPT and a weak application (8.5% of teachers) in “Creation and Management of a digital assessment in MS FORMS.”

A note that appeared on August 28, 2020, which required the organization of continuous controls in person, had probably demotivated these teachers to apply the part “Creation and management of a digital assessment in MS FORMS.” Figure 2 represents the percentage of teachers who showed satisfactory to very satisfactory mastery of the various elements of competence relating to the three parts of the training.

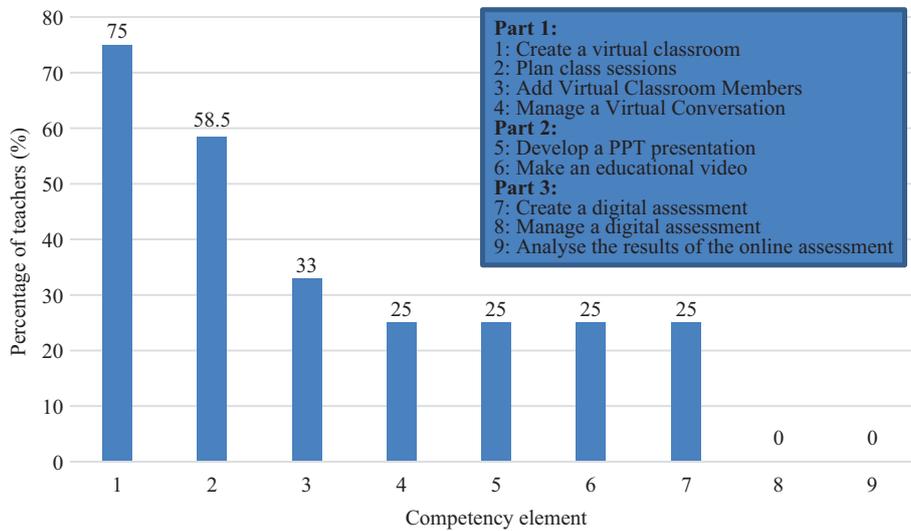


Fig. 2. Mastery of the skills elements resulting from the training

From these results, we deduced the following:

Failure to master the two skills elements “manage and analyze an online assessment” from the 3rd part of the training: “Creation and management of a digital assessment in MS FORMS.”

On the other hand, the majority of these teachers proved an excellent mastery of the two elements of skills: “Create a virtual classroom” and “Plan course sessions” relating to the first part of the training: “Use of the MS TEAMS platform.”

While a quarter of these teachers had mastered the skills related to the second part of the training on “Creating digital resources with M.S. PowerPoint.” The same applies to the two elements of competence linked to the first and the third part of the training and which are: “Design a digital evaluation,” “Manage a virtual conversation,” “Add members of virtual classes.”

- Regarding the achievement of the three skills relating to the three parts of the training, we observed the following:

A moderately satisfactory to satisfactory mastery (Average obtained: 14/20) of skills related to the first training: “Use of the MS TEAMS platform” to a moderately satisfactory to satisfactory mastery (The average obtained: 13/20) with the second part of the training “Creation of digital resources with MS PPT.” There was a broad failure to master the third part of the training, “Creation and management of a digital assessment in MS FORMS” (Average obtained: 1.6/20). Overall, an unsatisfactory to moderately good mastery (The average obtained: 9.6/20) of the expected competence of this training was obtained for “Being able to implement a distance training device.”

By crossing these results with those recorded in the learning evaluation test, we can see an increase in knowledge acquisition when it is transferred into practice in the first two parts of the training.

Continuity of the application of distance learning. From the analysis of the teachers' responses to the interview, we found that:

- The majority of teachers have adequate computer equipment (P.C., Connection), and they are aware of the technical supports relating to the application of this training (video conferences, video capsules, guides, etc.).
- Most teachers expressed their unavailability of time to practice distance learning because they taught all of their hourly workloads face-to-face since the end of October 2020. On the other hand, a minority took advantage of this training and worked remotely with their students to complete the annual program on time.

The Note which appeared on August 28, 2020, to organize teaching during the 2020–2021 school year, posed numerous challenges; At the time, it was necessary to fill the learning deficit of the previous year imposed by the Covid-19 and to optimize the learning time devoted to the students (who attended just half of the classroom sessions under normal teaching conditions) to complete the annual program on time. This required improved methods of learning in a short time and needed more commitment and technical-pedagogical skills of teachers to adopt teaching oriented towards the learner, thus promoting their participation in the construction of knowledge [64] as well as the involvement of all parties (ministry, parents of pupils, pupils, associations, etc.).

In addition, touchscreen technology offered a mode of interactive experience that mirrors the child's natural constructivist learning [65, 66]. Most teachers expressed their demotivation to use what they have learned from the training for the following reasons:

- The lack of attendance of their students and their modest ability to take distance learning courses. However, mobile technology is widely disseminating, many researchers and educators have addressed the possibility of using mobile technology as a learning tool [9, 10, and 67].
- The lack of encouragement from the ministry, which does not provide the I.T. resources necessary to make I.C.T. accessible to all (teachers, students).
- Most of these teachers use the old version of the MS TEAMS platform, yet the ministerial note number 039/20, which appeared in August 2020, stipulates using the new version of the MS TEAMS platform.

There was indeed an application of the training, especially at the “Use of the MS TEAMS platform” and “Creation, Management of digital resources with MS PPT,” but the internet transfer rate remains insufficient. In addition, the environment for the conduct of the training was not encouraging.

4.5 The impact of research results on the practices of trainers and teachers

The researchers' intervention supports this experience to allow the teachers benefiting from this training to know the latest research in terms of cognitive functioning, in

particular, to conceive the act of learning, which should be a priority concern compared to standard teaching methods. Furthermore, it allows trainers to appreciate the reduction in the gap between the distance training carried out, deemed as being insufficient, and the complex reality of the teacher's job.

The collaboration established between teachers, trainers, and researchers sought to join the concerns shared between the world of practice and that of research and to develop a skills-based intervention of the researcher and the practitioner concerning the knowledge to be co-constructed. We aimed to reveal how research results on teachers' actual practices can influence the change of practices in the field.

The training actions carried out in this experience demonstrated a significant asset in helping to establish a state of mind of coordination and information sharing, allowing teachers to foster an individual and collective dynamic in their qualification routes for the teaching profession. Trainers, whose practices are organized around theory/practice articulation, must model and then theorize the coherences in the professional practices that they shed light on from theoretical elements. They offer tools that guide preparation choices and those for analyzing the actual exercise. The teachers themselves are expected to build a professional identity based on knowledge, know-how, and professional gestures.

Our analysis of this collaboration between these actors fits well in a paradigm qualitative/interpretative [68]. This paradigm envisions the understanding of a complex phenomenon from within the process itself.

“The flexible and emerging approach of qualitative/interpretative research allows the researcher to understand, from the inside, the nature, and the complexity of the interactions of a specific environment, and to orient his data collection taking into account the dynamics interactive search site [68].”

The fruit of this collaboration has enabled us to consider these two points of view, of the researcher and the practitioner, in the construction of training and teaching situations by focusing on the resources mobilized on both sides [69].

We, therefore, sought to take into consideration both the point of view of educational research, knowledge available in the field of computer science and the point of view of practitioners and their knowledge of experience, students' difficulties, their strategies, their context of intervention, their interpretation and action routines, and their constraints, to construct situations that are not only fruitful but which echo the concerns of teachers.

This support has enabled us to change the conceptions of these teachers towards educational technologies and motivate them to apply the context of this training to revisit the training objectives for its possible deployment, taking into account their involvement. The same goes for these teacher-trainers who have not had training in andragogy; we explained the most effective pedagogical approach for this type of training and the interest of training engineering with its different stages from its design to its evaluation through its management in a correct way.

At the same time, we ensured their supervision to effectively assess the knowledge and skills of these adults, encourage them to follow up with these teachers, and intervene if necessary. This team has been transformed via an evolution of the acquisition of knowledge and transfer into practice in the first two parts of the training, although the environment for its conduct was not encouraging.

5 Conclusion and limitations of the study

This study aimed to determine the effectiveness of distance learning in this health crisis caused by the Covid 19 pandemic. We had opted for various data collection tools, namely, the questionnaire, the interview, and the test in situ. The study was carried out on a sample of 38 teachers who attended the training and the six teacher-trainers who supervised them.

From the analysis of the recorded data, several observations emerged. The pedagogical approach adopted by these teacher-trainers was purely transmissive, which mainly contributed to the demotivation of teachers towards this training as expressed by the decrease in the participation rate that we noticed, from one part to another of the training or a dropout in personnel. Deficiencies in the engineering of this training and applying the principles of andragogy were raised during our observation of its management from the videos broadcast on YouTube. The conditions for carrying out this training were unappreciated, neither by the teachers nor by the trainers, especially in terms of content and planning, which were imposed by the Provincial Directorate, regardless of their actual training needs. The same applies to the supervision rate, which had negatively influenced the educational communication between these two actors, without forgetting the insufficient time allocated to the continuous practice of this type of teaching.

Despite these educational and organizational constraints, in addition to the insufficient time allowed to adapt to this new mode of training, our intervention as researchers in accompanying this training had enabled us to reduce the resistance of these teachers to this unconventional change. This further enabled us to modify their conceptions towards educational technologies and motivate them to mobilize the content of this training and transfer their knowledge into actual practice, revisit the training objectives for its possible deployment, and take into account their involvement. The same goes for those trainers who do not have training in andragogy; we introduced them to the principles of assessing knowledge and skills in these adults by explaining to them the most effective pedagogical approach for this type of training, as well as the interest and the rationale for the engineering training.

In addition, training in andragogy, distance learning engineering, and reverse pedagogy are necessary for these teacher-trainers. A commitment and institutional investments are essential for the success of this type of training in order to guarantee the suitable environment to do it, as it is underlined in (50 years of human development and perspectives for 2025, 2006, p. 34): “In-service training for the teaching staff has not always had the place it deserves in educational development plans, as evidenced by the insignificant share reserved for it in the annual budgets.”

Thus, it is necessary to ensure sufficient supervision for teachers to follow them correctly throughout the learning process—before, during, and after the completion of the training. It is preferable to program alternating sessions between face-to-face and remote (training) to follow these teachers in practical workshops closely and provide them with the material resources and well-developed Internet infrastructures [70] and time to practice this kind of teaching. It is essential to strengthen the initial pedagogical training of these teachers in this type of teaching and finally program other continuing training courses on pedagogies relating to distance learning [71].

Among the challenges encountered during this study was to get the teachers receiving this training to adhere to our research, especially with the health conditions imposed by Covid 19 pandemic; Our mode of communication with them was just by phone. These teachers considered our research initially to be of no added value to the Moroccan education system and that our presence with the distance learning sessions was more of an inspection/monitoring or a value judgment of their way of teaching. Nonetheless, we were able to encompass a sample of 38 teachers in our survey.

The impact of our intervention in this training on the practices of these teacher-trainers and teachers could be more relevant if adequate support was available before this training was carried out. In this research, we considered the analysis of spontaneous practices that are part of a collaborative approach; the training-research contract established exactly on this use; however, we could not explain it further before starting this training.

The evaluation of learning was made by a written test sent via e-mail to these teachers, so we could not closely assess their skills acquired at the end of this training, limiting the results obtained from this test.

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