



Research Article

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## Evaluation of the Qualifying Training of New Teachers of Mathematics: Case of the Training of the CRMEF of Settât-Morocco

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### Abstract

*This research aims to measure the impact of training on the professional qualification of teacher-trainees in all the specifications, behaviors, skills and professional competence corresponding to the practice of the teaching profession by deploying the Kirkpatrick model. To do this, we sent a questionnaire to the mathematics teacher-trainees who benefited from the qualifying training in CRMEF-Settât (Promotion 2019). We, subsequently, conducted an interview with the majority of their trainers. This study allowed us to detect dysfunctions: At the organizational level: Mismatch between the specialty of the diploma obtained by the trainee teachers (physics, chemistry, computer science) and the subject they will be teaching (Mathematics), Lack of an adequate structure at the CRMEF likely to take care of the management and implementation of the MSP (the practical situations) and Insufficient time training. And at the educational level: Insufficient communication between trainers and teacher-trainees, and Lack of support for these teachers in internship places during the MSP period.*

**Keywords:** *Qualifying training, training evaluation, teacher-trainees, Kirkpatrick*

### 1. Introduction

The quality of education depends on several factors; teacher training is considered to be the foundation of the educational system (Senayah, 2016).

In the Moroccan education system; enhancing the quality of initial training and continuous training of teachers took their place in the 2015-2030 strategic vision according to lever 9 (CSEFRS, 2015).

In Morocco, qualifying training for teachers lasts two years, divided into two main phases, the

first phase lasts six months, it takes place in two complementary spaces, the Regional Center for Education and Training (CRMEF) and the school, at a rate of 11 weeks per year in the CRMEF and 2 weeks per year in the school. The second phase is devoted to the following missions: total responsibility for the class, benefit from field monitoring and face-to-face training, preparation of an interventional educational project under the supervision of a supervisor from the CRMEF, preparation and discussion of the personal portfolio. Trainee teachers will have to develop skills relating to consolidating their knowledge of concepts and notions, approaches and methods and the acquisition of didactic and pedagogical knowledge in terms of planning and evaluation of learning, implementation, analysis of student deficiencies to correct and manage the conduct of the class and taking into account the diversity of students: authority, pedagogical relationship and classroom management.

Evaluation plays an essential role in the training process since it makes it possible to trace the balance sheet of the added value provided by training and to identify inadequacies and unforeseen effects of training, thus it improves the quality of training (G. Richmond & N. Jones Salazar, 2019).

In this research, we conducted an evaluation of the first phase of qualifying training of trainee teachers in secondary school Mathematics in the Moroccan CRMEF in terms of the model of D. Kirkpatrick (Santos & Stuart, 2003) in the aim to seek its influence in training professionals capable of carrying out actions relating to professional skills related to the act of teaching.

## 2. Theoretical Framework

### 2.1 *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 (Kirkpatrick & Kirkpatrick, 2006). Several studies have applied it in this context (Praslova, 2010; Cahapay, 2021). 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 (Rown, 2007), trainees' motivation to learn (Phillips, 2003), trainee characteristics, and work environment (Aldwin & Ford, 1988).
- Learning Level: There are three aspects of learning outcomes: skill-based, cognitive, and attitudinal (Kraiger et al., 1993).
- Behavioral Level: At this level, the model explored what degree 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 (Praslova, 2010; Kraiger et al., 1993; Ruiz & Snoeck, 2018), observation, self-assessment, performance record review, and peer review (King et al., 2000; Saad & Mat, 2013). When evaluating training in the education sector, Kirkpatrick suggested combining quantitative and qualitative methods of investigation for this level (Warr et al., 1970).
- Results Level: This level focuses on the measurement of financial benefits, which cannot be done directly in the context of education (Mahmoodi et al., 2019). 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 (Praslova, 2010).

A Several studies (Biémar et al., 2016; Dufour et al., 2019; Leduc et al., 2014; Amathieu et al., 2018; Rasmy & Karsenti, 2016) discussed the questions of evaluation of teacher training at on either of these following levels: teachers' satisfaction, teacher motivation, learning and transfer of learning; but we find ourselves faced with an absence of research which address this issue in terms of the

interaction between these levels as well, there is a lack of studies in a Moroccan context.

### 3. Methodology

March 2020, we sent a questionnaire to all teacher-trainees of secondary mathematics (56 teachers) who benefited from the qualifying training which lasted six months within CRMEF-Settat (Promotion 2019) and a second questionnaire to their trainers, 38 teachers (68%) and 6 trainers (75 %) responded to our questionnaires. The teacher-trainee questionnaire consists of 38 questions (including 31 closed-ended questions and 7 open questions), which are divided into six parts: Identification of the study sample, evaluation of teachers' motivation, evaluation of their satisfaction, evaluation of their achievements, evaluation of the transfer of learning, and training improvement suggestions they carried out within the CRMEF –Settat.

Aware that the teacher-trainees do not perceive the training as a whole, these answers only show part of the reality of the training and deserve to be evaluated by the trainers who also have a partial vision of the training that they organize. This is why we decided to conduct a questionnaire survey from the perspective of trainers. These essential players in the training system, they bring to life the dynamics of the system in their diversity of statuses and places of practice. This survey addressed to trainers (8 trainers), 6 of whom responded to our survey, made up of four parts: the respondent profile, the professional practices of the trainers, evaluation of the satisfaction of the trainers with regard to the content, the teacher-trainees and the working conditions, and suggestions for improving the training. The analysis of the questionnaires was done with the software SPSS.20.

### 4. Results and Discussions

#### 4.1 Analysis and summary of the questionnaire addressed to teacher-trainees:

##### 4.1.1 Identification of the sample

The sample for our study is presented as follows:

- More than half of the trainee teachers questioned (60%) are women.
- The age group of teacher-trainees varies between 22 and 34 years old, while the majority (84%) who are under 30 years old; so, we are before a fairly young generation and freshly graduated teachers as outlined in the vision strategic in lever 9.
- Renovation of teaching and training and management: the first prerequisite for improving quality – that We are witnessing the transformation of the age structure of teachers towards the opening of a demographic window of progressive rejuvenation.
- Almost half of the teachers (44.8%) have a Bachelor degree in Physics and Chemistry when at 37% who have a Bachelor degree in Mathematics while 18% have a professional teaching Bachelor degree (13% have a mathematics education Bachelor degree , 2.7% have a professional Bachelor degree in Computer Science and 2.7% have a professional Bachelor degree from physical-chemistry education); ; this reflects a mismatch between the profiles of people recruited and the (school) subject that will teach. While the coordinated recruitment and training of teachers is a condition for ensuring quality education (UNESCO, 2015).
- Regarding the last diploma obtained, 26% of these teachers have a Master degree in addition to their Bachelor degree.

#### 4.1.2 Motivation of Teacher-Trainees to Training:

Motivation plays a crucial role in training and continuous professional development of teachers (Rown, 2007), it is seen as a source of energy, a direction or the perseverance that individuals experience in their actions and in their intentions (Deci & Ryan, 2000) and it is essential to accomplish tasks and learn new knowledge (Chekour et al., 2015).

Thus, we examined in this part the prior motivation of the trainee teachers regarding the training and we found that the majority of the teachers (71%) were motivated to attend the training and almost all (92%) among them were present throughout the training period because attendance was compulsory and the majority of them (82%) made a lot of effort to succeed in their apprenticeship.

#### 4.1.3 Teacher- trainee satisfaction with the training:

The purpose of this part is to visualize the degree of satisfaction of teacher-trainees according to the contents of the training, the trainers and the working conditions; it reflects the first level of Kirkpatrick model.

##### a. Satisfaction with the content of the training:

Based on the analysis of teachers' responses to their satisfaction with the content of the training, we raise that:

- Only a quarter of teachers were aware of the expected skills of the training and almost half (42%) are aware of the objectives of the modules studied.
- Only a quarter of teachers confirmed the consistency between the content studied and their objectives
- 34% of teachers believe that the training objectives helped them to be successful in their teaching assignments.
- Just 18% of teachers affirmed the relationship between the different modules. While a minority (5%) who are completely satisfied with the content of the training.

##### b. Satisfaction with trainers:

- Just 20% of teachers said that the distribution of course content on the number of weeks planned for the module is well done by the trainers as well for the planning of the course session when the satisfaction rate in relation to the trainers is 35%.

##### c. Satisfaction with working conditions:

Based on the analysis of teachers' responses to satisfaction with working conditions, we notice that:

- Just 31% of these teachers appreciated the duration of the training while those who considered it insufficient gave the following explanations:
  - Too many modules in a short period of time which is very tiring for them.
  - Predominance of theory over practice which is almost nil, which is in contradiction with what is prescribed in the description of teacher training (About 40% of course content is theory and 60% training practice in a school context (INESEFRS, 2014)).
  - For theoretical training; it's superficial (it was just a headline reading lessons).
  - Insufficient program: Classes are poorly planned, weak supervision of teachers during internships by trainers and weakness in internships.
  - Constraints faced by teachers who do not have a bachelor's degree in mathematics for the assimilation of disciplinary modules.
  - The majority of respondents said that the educational progress was not adapted to their level.
- Just 31% of teachers who confirmed that the time distribution of each module was appropriate.

Overall, only a quarter of teachers who are satisfied with the conditions of the training.

And finally, only 15% of those teachers who expressed their overall satisfaction with the training they did in CRMEF-Settat.

Thus, we notice that the trainee teachers are not satisfied with the training they have carried out within the CRMEF of Settat, which is probably explained by the lack of communication between these teachers and their trainers about the expected skills of the training and the objectives of the modules studied.

**Table 1:** Results of the assessment of the skills acquired by teacher-trainees.

Skills / Assessment	Good	Average	Low
A. Strengthening the knowledge of mathematical concepts and basic notions	24	37	40
B. Planning teaching-learning activities	42	34	24
C. Manage teaching-learning activities	29	45	16
D. Develop and use tools to evaluate learning and remedy any difficulties for a given group of learners	40	21	39
E. Acquire good social behavior and attitudes (punctuality, patience, acceptance of difference and relationship management)	47	29	24
F. Acquire the skills of use and rational mastery of information and communication technologies in one's professional practice?	23	16	60
G. Mastering research methodologies and carrying out educational projects	31	29	39
H. Conquer the legislative and pedagogical foundations and the foundations of school life and use them in daily professional practices	23	26	50
I. Master the laws and school regulations and apply them in daily practice and apply professional ethics in the school space?	27	34	39

We qualified the satisfaction of these teachers about the content of this training and the specialty of their bachelor degree and we found that all teachers with a Physics or Chemistry bachelor degree are dissatisfied with the content of the training.

#### 4.1.4 Evaluate training with regard to learning

This part presents the second level of Kirkpatrick's model, it allows teacher-trainees to evaluate themselves against the disciplinary knowledge and the professional skills they have acquired during this training according to the teacher qualification system within Regionals centers for education and training profession in Morocco (CRMEF: Centres Régionaux des Métiers de l'Education et de la Formation)", The results obtained are presented in the table 1 below:

By comparing the responses of teachers relating to the reinforcement of disciplinary skills with their basic training; we find that it is especially the teacher-trainees with a physics-chemistry bachelor degree who declare the weak reinforcement of their disciplinary knowledge during this training. The results of this step show that a majority of teacher-trainees perceive themselves to be competent to plan, manage teaching-learning activities and that they have acquired good behaviors and attitudes through this training followed by their skills in mastering the process of learning evaluation, research methodology and school laws and regulations as well as the application of professional ethics in the school environment.

Regarding the skills related to the acquisition of skills for use and rational mastery of information and communication technologies in professional practice, school life and the strengthening of basic mathematics skills, they are perceived as the most important skills. less mastered at the end of this training for these teachers.

#### 4.1.5 The evaluation of the transfer

The evaluation of the transfer makes it possible to measure the "degree of continuity between learning in the context of training and the resulting behaviors (Olian et al., 1998), it will consist in determining whether the participants actually apply the skills which they acquired in training, once they find themselves at their workplace (Gerard, 2001).

In this level; we assessed the extent to which the skills acquired in training are translated into professional behavior in real work situations. This part is composed of four questions; the results obtained are as follows:

- Almost half of teacher-trainees (44%) use the skills acquired in the training they carried out at CRMEF Settat.
- Just 34% of teachers have the necessary means to implement their theoretical knowledge in practice.
- According to the teachers, the constraints they encountered are as follows:
  - The lack of teaching and learning materials and tools for information and communication technology;
  - The low level of students;
  - The large number of students per class;
  - Insufficient number of hours to work with active methods.
- Half of the teacher-trainees succeeded in implementing new professional behavior at work (respect for the individuality of each child, develop self-confidence in students, be flexible and provide well planned activities);
- The majority of teachers (79%) often use active pedagogy; as:
  - The use of problem situations during the construction of a new concept among students.
  - Introducing lessons with activities so that the pupils produce themselves their lessons, interaction during answers to exercises, giving students the opportunity to ask questions and explain to each other.
  - The application of differentiated pedagogy.

Thus, we note that a large number of trainee teachers used the skills acquired in this training, implemented new professional behaviors and practiced active pedagogy in their classes despite the constraints they encountered (the lack of teaching and technological materials, the modest level of students and insufficient time).

#### 4.1.6 Suggestions for improving training:

The teacher-trainees made suggestions for improving the quality of the qualifying training of CRMEF-Settat. Most of them suggest that it should be more practice oriented, because they find that the courses are mostly theory oriented than practice oriented, they would have appreciated to focus on concrete and professional situations and by adopting the professional situation in schools alternating with training in the CRMEF. As concluded Portelance (2016) that "it is generally recognized that integrative work and training would help future teachers to smooth the transition from student to teacher status". For some, the duration of the training (six months) is insufficient to fully master the knowledge, teaching skills and professional aptitudes necessary for the exercise of the profession, hence the need to opt for continuing training leading to a qualification throughout professional life as indicated in lever 9 of the strategic vision (CSEFRS, 2015).

Some participants in this research suggest adding some communication courses in foreign languages, educational psychology and school adaptation due to the heterogeneity of classes in the Moroccan institutions and so that the training is closer to reality, they recommend that the knowledge to be taught (disciplinary knowledge) should be in connection with the educational needs of the school program in secondary (middle and high school)

In order to improve qualifying training, new teachers recommend the training of educational and scientific trainers and their accompaniments to help them develop their teaching and learning practices.

It is clear from the analysis of suggestions for improvement that new teachers claim the inadequacy of the practical training method, which was weak, knowing that the new division of the teacher qualification system program provided only 20% for the practice of these skills and 80% dedicated to theoretical courses while the former program devoted to MSP an hourly volume of 60% of the overall training time, as they suggest the integration of communication in foreign languages which seems very interesting due to the integration of the international course in the study of mathematics.

#### 4.2 Analysis and summary of the interview addressed to trainers

##### 4.2.1 Respondents profile analysis

The population of respondents consists of 8 trainers including 6 trainers who are in our survey, it includes 83% men, 17% women, 67% of trainers with a seniority of  $\geq 15$  years in teaching at CRMEF. 77% have status of a university professor; nearly 83% have been secondary school teachers before becoming a trainer. All targeted trainers surveyed were trained in pedagogy (100%).

##### 4.2.2 Professional practices of trainers

In this part, we have approached the professional practices of the following trainers: Course design and management, teaching strategies, teaching relationship, supervision, coaching, professional attitude.

###### 4.2.2.1 Course design and management

This practice allowed us to draw the following results:

- To prepare for their lessons; trainers can draw on the following documents: the training system, Framework Document and Guide to management procedures year 2019.
- The majority of them (83%) are based on the training system for 2012, half of these trainers referring to the 2019 Management Procedures Guide and a minority of 33% enriched the training through scientific research in didactics of mathematics and the results of recent research in daily practices.
- One of these trainers says that whatever the area of expertise, the internships in position of responsibility and accompanied practice are training devices that are systematically put forward by trainees as a contributor to the development of all professional skills. The importance of internships is even more important as the skills fall within the area of classroom management and the regulation of learning. This reflects heterogeneity in the use of basic standards for the design of the course.
- It seems that trainers have to respond to changing and increasing demands; they will be faced with a new role. It is important that the teacher training system enables teachers to develop knowledge and skills they need, so that student teachers also have access to the support they need throughout their careers.
- As pointed out (Caron, 2007) training systems represent all means implemented to achieve a specific goal
- 83% say that there is a lack of a repository of recent job skills. Yet the skills benchmark for the training of educational administration executives (translated in terms of skills, the exit profile established by the texts in force (ministerial decree, framework document, etc.). it

makes it possible to harmonize the design of the training course and the actions to be carried out for all stakeholders; open up concrete ways to the development of each competency and implement the skills assessment procedures according to a criterion-referenced approach and according to (Popkewtz & Novoa, 2001). The skills that teachers are supposed to acquire constitute 'systems of reason' which serve to regulate, govern and normalize."

- 83% of these trainers stated that they declare the objectives of their modules at the beginning of each school year, and half of them face difficulties and constraints likely to block and slow down their work, namely the level and specialty of student teachers which is heterogeneous, their high number and insufficient time to complete the program of the training modules.

#### 4.2.2.2 Teaching Strategies

This practice shows that 66% of the trainers bring out the important points of the course during their teaching, use teaching methods which make it possible to develop the skills targeted by the course, use teaching methods that promote learning, use teaching methods that foster interest, use teaching material that promotes the learning targeted by the course.

#### 4.2.2.3 Pedagogical relationship, supervision and support

A minority of 17% declared the problem of coordination and consultation between the actors of training (inspectors, trainers, pedagogical advisor, ...).

A fairly large percentage (50%) of these trainers do not accompany the new teachers in their internships as educational advisers because of the absence of laws organizing this accompaniment, insufficient internship duration, the lack of support actions for student teachers in internship sites during the MSP period (2 weeks per year in the school) which remains unresolved in addition to a lack of decrees that allow trainers to move in a work context other than their own one.

We can then conclude that, despite the presence of an accompanying guide which supervises the trainers; the latter neglect this function which remains very important in professional transition on one hand and professional integration on the other hand, would consist in "helping the learner to forge links between forms of experiential knowledge, action knowledge, theoretical knowledge and methodological knowledge, , to link personal, academic and professional situations and thus to work on the question of meaning in its three acceptances of direction, meaning and sensitivity (P. Roquet, 2009).

#### 4.2.2.4 Professional attitude

The analysis of the hourly volume dedicated to each trainer's module shows that it is moderately sufficient.

### 4.2.3 Trainers' satisfaction with the training

#### 4.2.3.1 Satisfaction with the training content

Based on the trainers' responses to the content of the training; we raised that:

- Half of the trainers declare a lack of articulation between the theoretical part and professional scenarios because the articulation can be effective when applying the "practice, theory, practice" paradigm. Something that is not done today with the migration of MSP to practical internships, which is far from the professionalization.



- 34% of trainers declared that disciplinary knowledge is consistent with the educational needs of the secondary school curriculum. It is interesting to note that trainers and new teachers agree on this point, which clearly indicates a declination of mathematical training modules with the secondary school curriculum.

#### 4.2.3.2 Satisfaction with the teacher-trainees

The results of the analysis on the satisfaction of trainers to new teachers made it possible to deduce that:

- 67% of trainers affirmed that the recruited profile is inadequate compared to the subject to teach, especially those who do not have a bachelor degree in mathematics, which makes training inadequate.
- 50% of trainers say that student-teachers are motivated to practice the teaching profession.
- 50% of trainers say that student-teachers do not have the knowledge and skills necessary to execute jobs. Since they do not have the disciplinary background necessary to easily enter the qualification route and for them to assimilate a didactic skill it is first necessary to master pure academic knowledge which is of course essential to the general culture of teachers. As (M. MRAYEH, 2010) underlined.

While the satisfaction rate of trainers compared to teacher-trainees is 50%.

#### 4.2.3.3 Satisfaction of the trainers towards the conditions of the training

The detailed analysis on the satisfaction of trainers to the conditions of the training shows that:

- Just 33% of trainers who are not satisfied with the volume of hours reserved for each module of this training. This minority emphasizes that the geometry module cannot be completed in 30 hours especially the student teachers are, for the most part, of physics origin, chemistry, biology.

Likewise, it is important to note that in the former 2012 training system, the hourly volume reserved for this module was 40 hours. Which means the minimization of the hourly workload dedicated to this module for reinforcing basic knowledge 1, as well as for other modules such as: module for reinforcing basic knowledge 2, the management of learning and the evaluation of learning.

This orientation clearly indicates that training management represents all educational practices used by the trainer to encourage in his teachers- trainees the development of autonomous learning and self-control. The number of hours depends on the quality of the incoming profiles and the degree of importance of the module taught.

- 34% of trainers found that the training duration on the theoretical side is insufficient.
- 50% of trainers mostly say that the duration of the training side of the professional situations (MSP) is insufficient.
- Over 50% of trainers said that overall, the duration of the training is insufficient. It should be noted that the use of responses from teacher-trainees concerning the duration of training on the theoretical side, indicate that they also affirmed the insufficiency of the duration of this training.

So, half of the trainers are not satisfied with the conditions of the training.

#### 4.2.4 Suggestions for improving the training

We considered it relevant to also collect suggestions from trainers to improve the quality of the qualifying training of CRMEF-Settat. The trainers expressed the following suggestions:

- Entrance to the training center must be directly after the baccalaureate for a duration of at

least 4 years.

- We need to renovate and adapt training engineering to current events.
- One year of training at CRMEF is insufficient.
- Carefully select trainees for the entrance exam.
- Integrate communication of foreign languages into training.
- Qualifying teaching training is designed and carried out with a view to bring trainees closer to the environment in which they will exercise their teaching profession. Mathematics didactics provides tools that make it possible, thanks to an epistemology of the concepts to be taught, to find the appropriate contexts for the learning of these concepts. This training will be supplemented by the work of researchers in didactics of mathematics and build structures that would offer training actors places for debate and reflection which leads to a progressive action plan to renovate and develop qualifying training at the CRMEF.

## 5. Conclusion

The results allowed us to reveal the dissatisfaction of these trainee teachers with the qualifying training they have carried out within the CRMEF-Settat; precisely with regard to the contents, the trainers and the conditions of the training. The majority of teachers underline a lack of competences on the basic knowledge of mathematics (especially those who have a basic training in physics / chemistry) which is compatible with the interviews carried out during the evaluation visit and the results of recent surveys of teachers which have raised that the level of academic skills of those seeking to enter the teaching profession is low (USAID, 2014). They also point out a poor mastery of the skills to use information and communication technologies in professional practice and the foundations of school life. While they perceive themselves competent for the planning and management of teaching-learning activities, the acquisition of good behavior and social attitudes, the evaluation of learning, the methodology of research and the mastery of laws and school regulations and the application of professional ethics in the school environment. However, when asked about their transfer of learning, a significant number of teachers consider themselves to have applied their skills in the field of work, despite the constraints they have encountered. After crossing the results of teacher-trainees and trainers, we raised organizational dysfunctions: the mismatch of the entry profiles with the subject to be taught, the lack of an adequate structure at the CRMEF capable of dealing with the management and implementation of MSP, insufficient duration of training. And educational level: lack of communication between trainers and trainees, teachers and lack of accompanying actions of trainees in internships' places during the period of MSP. Finally, the suggestions desired by the trainee teachers and their trainers to improve the training show that it would be relevant to attach great importance to the practical situation (MSP), the integration of communication in foreign languages, psychopedagogy and school adaptation, In this regard, (Van der Maren, 1993) considers that the tools of treatment and communication are important to intellectual culture of training and rational thinking of teachers as well as the good recruitment of profiles suitable for the subject of specification, moreover the articulation between the disciplinary knowledge with the pedagogical needs of the school program in the secondary, to renovate and adapt the training engineering to the news, the training of the pedagogical and scientific trainers and their close and remote accompaniments until new teachers have everything they need to succeed in their jobs.

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