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A Reflective Perspective on the Initial Training in Science for Primary School Teachers at CRMEFs in Morocco

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Abstract

In Morocco, the Regional Centers for Education and Training Professions (CRMEFs) have undergone an update of the training program for teaching staff in connection with Project No. 9 of Framework Law 51.17 [1]. The Professional Training Kit for bilingual primary education leaders has been renewed as part of the development engineering preparation, led by the Higher Education Partnership Program - Morocco (HEP-M). The Kit includes a module of "Support for Basic Science Training", the main focus of this research. It aims to strengthen scientific knowledge related to the scientific awakening program among future teachers. The present study corresponds to a concrete reflective vision concerning the implementation of the module in question to enhance the standard of science education in primary schools Its objectives include: inventorying the management modalities, determining the constraints of adopting the syllabus in the current situation, and suggesting alternatives and/or effective solutions to better manage its activities. The results are gathered from nine regions using an online questionnaire consisting of 23 questions, addressed to life and earth science as well as physical science teacher-trainers involved in teaching the module at various CRMEFs across Morocco kingdom. The obtained results support the partial adoption of the syllabus in question. These findings argue in favor of the implementation of the "Support for Basic Science Training" module, which relies on a wide range of concrete and digital resources. However, the surveyed teacher-trainers have shown limited emphasis on the flipped classroom approach. Similarly, limited attention has been given to practical work and supporting self-training due to several constraints. In this study, we present the following preliminary recommendations for effective activity management: Introduce MOOCs in sciences to streamline the incorporation of the flipped classroom approach and guarantee assistance for self-directed learning; Guide the self-training of aspiring teachers; Supply well-equipped laboratories to ensure the practical work's feasibility; Review the entry requirements for CRMEFs; Reduce class sizes, and Establish a platform for collaboration and communication among science educators on a national scale.

Keywords: *Morocco, Management Modalities, Sciences, CRMEFs, Professional Training Kit, Syllabus*

1. Introduction

Recently, Morocco has started a review of its education and training approaches following establishing the strategic vision 2015-2030, followed by framework law 51.17[1]. However, the teacher training programs underwent radical overhauls at the dawn of the 21st century [2]. Consolidation of training centers led to the creation of Regional Centers for Education and Training Professions (CRMEFs), following a prolonged period of institutional and training program dispersion [3]. the implementation of the creation of CRMEF made by the National Charter of 2000 [3-4], with the missions include, among others, qualifying trainee teaching staff, organizing continuing education, and promoting pedagogical research [5-6]. The CRMEFs have undergone an update of the training program for teaching staff in connection with Project No. 9 of Framework Law 51.17 [1]. This project focuses on the renewal of education and training professions and the upgrading of career path management. The Professional Training Kit for bilingual primary education leaders has been renewed as part of the development engineering preparation, led by the Higher Education Partnership Program - Morocco (HEP-M) [7]. The Kit includes eighteen modules and workshops, one of which is "Support for Basic Science Training", which serves as the focal point of this research. It aims to strengthen scientific knowledge related to the scientific

awakening program (Life and Earth Sciences and Physical Sciences) among future teachers. Within the framework of the development of interventional scientific research, the encouragement of innovation, renewal, and creativity, the present study corresponds to a concrete reflective vision concerning the implementation of the module in question to improve the standard of science education in primary schools. Its objectives are: inventorying the management modalities; determining the constraints of adopting the syllabus in the current situation, and suggesting alternatives and/or effective solutions to better manage its activities.

2. Methodology

Regarding methodology, our research is based on a survey providing a quantitative description, as extensively described by Creswell in 2014 [8]. Indeed, this study employed a quantitative approach utilizing a questionnaire to collect feedback from teacher trainers specializing in life and earth sciences, as well as physical sciences, who are involved in training bilingual primary education managers at the CRMEFs. To achieve the aforementioned objectives, a questionnaire on the management modalities of the 'Support for Basic Science training' module, consisting of 23 questions, was launched online in June 2023. It includes both closed and open-ended questions. In addition to personal inquiries, the questionnaire delves into various aspects such as the strategies for implementing the module based on the new syllabus, obstacles encountered in managing the module, suggestions from respondents for successful management, guidance provided to trainees for their independent learning, and opinions concerning the creation of MOOCs. Simple data processing through Excel allowed us to extract the results presented in the following paragraph.

3. Results and discussion

3.1. Results

The results are collected from nine regions of the Moroccan kingdom (Figure 1) and reflect the significant experience of teacher-trainers who participated in this study [9]. the majority of whom specialize in Life and Earth Sciences (65%) compared to Physical Sciences (35%). They have embraced the syllabus well during the two years of experimentation, with 55% of them being part of research and development groups that produced the syllabi for primary teacher qualification modules.

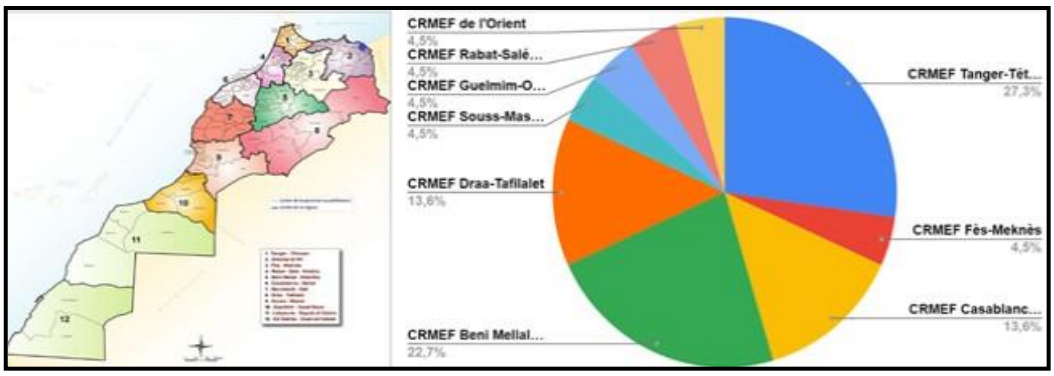

Figure 1: The distribution of teachers surveyed according to the regions of Morocco

The results obtained support the partial adoption of the module in question. Especially the first, second, and third axes in Life Sciences corresponding respectively to Concepts related to vital functions (68.5%), Ecosystem preservation (50%), and Synthesis of concepts related to reproduction (54.5%). For Physical Sciences, the axes adopted by the majority are, in order: organization of matter; electricity and magnetism; optics and vision; and mechanics. However, only 27% of respondents had tackled geology. The choice of these axes is based on the results of the diagnostic evaluation for 50% of the sample, while for 30% it is based on the order of the axes in the syllabus. These findings argue in favor of the implementation of the "Support for Basic Science Training" module, which relies on a wide range of concrete and digital resources. These include video sequences, simulations related to vital functions, flash animation, platforms (such as Ed puzzle, and E-takouine), websites like 'Eduscol,' the 'Crocodile Physics simulator, hands-on documents, and video conferences. Figure 2 illustrates the percentages of resource utilization in the management of the module studied by the interviewed trainers. They report that the workshops

yield more or less satisfactory to very satisfactory results. However, less attention has been given to the flipped classroom approach (adopted by only 35%), to practical work (45% without recourse to practical work during the two years of experimentation and 50% occasionally). Similarly, the percentage of support for the self-study of trainee teachers remains modest (40%) due to several constraints, despite the variety of suggested tools such as Classroom, WhatsApp, the Edpuzzle platform, integrated personal projects, and report correction.

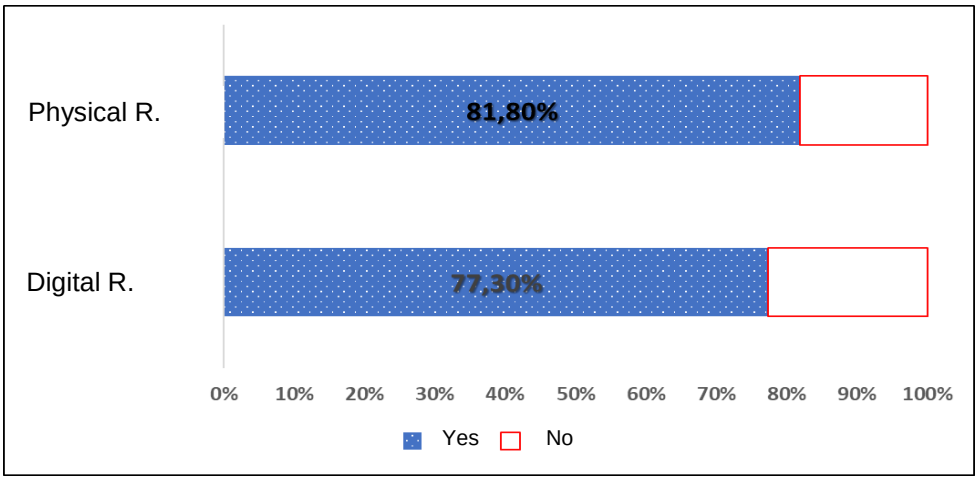

Figure 2: The percentage of resource utilization in module management

The adopted questionnaire allowed us to identify the various constraints of implementing the syllabus of the studied module, which represent challenges for teaching sciences at the CRMEFs. These include insufficient time allocated to the module, absence of equipped laboratories, heterogeneity of trainees, and classroom overload, the diversity of topics- The absence of a second intervener- Valuation Problem. The frequencies of these constraints are well represented in Figure 3 in descending order.

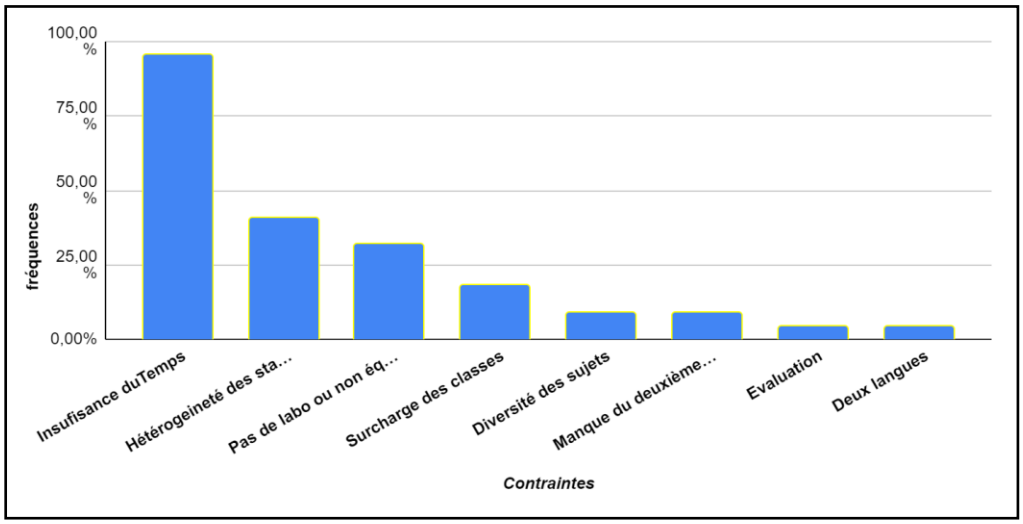

Figure 3: The frequencies of the inventoried constraints

Faced with the challenges of science teaching identified in this work, we have collected suggestions for the successful management of the module activities in question, namely:
- Increase the number of hours allocated to this module;
-Guiding the self-study of trainee teachers as needed;
- Reconsider the entry profile to CRMEFs aimed at the quality of trainee professors;
- Minimize class sizes to ensure the quality of science education;
- Provide laboratories equipped to ensure the feasibility of practical work;
- Need to set up MOOCs in science, to easily adopt the flipped classroom approach by trainers and to ensure the support of self-training;

- Make handouts available to facilitate support;
-and create a space for sharing and communication among science educators nationwide.

3.2. Discussion

Improving the quality of science education in primary schools and the acquisition of scientific knowledge by students in these institutions is closely linked to the quality of science education provided to future teachers during their qualifying training at CRMEFs.
As solutions, we propose some alternatives to improve the management of the module in the skills training of primary school teachers. In the hope of improving science education.
1- The first alternative is the production of a MOOC (Massive Open Online Course) concerning the Geology axis of the studied module; the least adopted by the interviewed trainers; for the initial training of primary school teachers. To address the challenges related to its management, the MOOC represents a platform that facilitates an innovative approach to distance education, fostering a revitalization of online pedagogical methods through encouraging authentic learner engagement [10-11]. The techno-pedagogical approach enhances educational practices and stimulates training initiatives [11-12]. We opt to use this MOOC to provide promotion of self-study at a distance, the production of digital teaching materials, the implementation of active teaching techniques (the flipped classroom), and basic content. The first session of the proposed MOOC is programmed for March 2024, titled "Elements of External Geodynamics". This session, spanning three weeks, comprises an introductory video, three video capsules, interactive activities, PDF documents, quizzes, and tests (Figure 4).

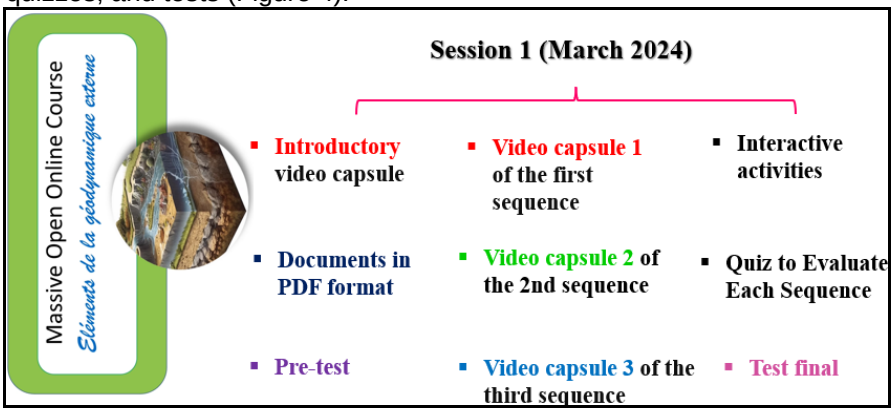

Figure 4: Planning of first session of the proposed MOOC

2-The second alternative is the Creation of a Platform for Sharing and Communication among Science teacher-trainers across the Moroccan kingdom (Moroccan Platform for Sharing and Communication between Science Educators). This is a Virtual professional community: Asynchronous discussion forum, Facebook group, WhatsApp group...whose exchange type is: question-answer, training materials (pdf, word, audio, video...), activities, assessments, successful practices, challenges...the members of this research team will be the facilitators of this platform. The target audience: Teacher-trainers in life, earth and physique sciences at the various CRMEFs in the kingdom. The platform is in the study phase.
3-The third alternative corresponds to Peer Mentoring face to the heterogeneity of the trainees' profiles (physics, biology, literature, economics and legal sciences, etc.). In fact, you have to train groups of trainee teachers with Mentor (Trainee who has a good command of the concepts to be taught) and Mentees (Trainees who are less advanced or have learning difficulties). In way that the mentor is responsible for helping mentees acquire the scientific concepts being taught.

4. Conclusion

This study advocates for the partial adoption of the syllabus of the module “Support for Basic Science Training” in CRMEFs in Morocco. The majority of teacher-trainers use diverse tangible and digital resources for the management of the module and workshops. The study points out several constraints as challenges for the teaching of science at CRMEFs in the current situation.
In this study, we present the following preliminary recommendations for effective activity management: Introduce MOOCs in sciences to streamline the incorporation of the flipped classroom approach and guarantee assistance for self-directed learning; Guide the self-training of aspiring teachers; Supply well-equipped laboratories to ensure the practical work's feasibility;

Review the entry requirements for CRMEFs; Reduce class sizes, and Establish a platform for collaboration and communication among science educators on a national scale. Tree alternatives we hope to develop in this training year. Namly, production of a MOOC titled "Elements of External Geodynamics"; establishment of Moroccan Platform for Sharing and Communication between Science Educators; and adoption of Peer Mentoring.

5. Perspectives

Looking ahead, we aim to develop the model "Optimization of the implementation of the studied module." We have decided to adopt a linear quantitative evaluation approach, drawing inspiration from a training evaluation model developed by Donald Kirkpatrick, which has been tailored to suit various educational and industrial settings [13]. This model encompasses four levels:

I. Participants' Reactions specifically those of trainee teachers in our study,
II. Achievements of participants,
III. The application of their achievements,
IV. Results: The training's impact.

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