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Supporting Reflective Practice in Initial Teacher Training for Mathematics Teachers Using the OCPSERA Tool

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Abstract: This study examines the contribution of the OCPSERA tool to lesson planning and the development of reflective practice among students in initial mathematics teacher training at the École normale supérieure (ENS) in Madagascar. Using a mixed-method approach, data were collected from 32 students through pre- and post-training questionnaires, analysis of lesson plans, and semi-structured interviews. The quantitative results show a significant change in the perception of lesson planning, which has evolved from a primarily administrative task to a reflective process that supports pedagogical decisions and the anticipation of student difficulties. The qualitative results confirm these findings, highlighting greater consistency between objectives, teaching activities, and assessment methods, as well as more in-depth reflection prior to teaching. The study suggests that the integration of structured planning tools such as OCPSERA into initial teacher training is a relevant lever for the development of reflective practice, particularly in resource-limited contexts.

Keywords: *Reflective Practice; Lesson Planning; Pre-Service Mathematics Teachers; Initial Teacher Education; OCPSERA.*

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I. INTRODUCTION

Numerous studies in educational science show that teaching practices, particularly in mathematics, tend to stabilize with experience when they are not supported by mechanisms that encourage professional reflection (Schön, 1983; Perrenoud, 2001) [1],[2]. This stabilization often leads to routine practices, characterized by the reproduction of content, methods, and pedagogical approaches from one year to the next, with little questioning.

Our experience as a mathematics teacher in high schools, then as a teacher trainer in Madagascar, has allowed us to observe that, for many teachers, lesson preparation is perceived as an administrative obligation rather than a lever for professional development. At the beginning of their careers, teachers generally make a significant effort to prepare, often inspired by the practices of experienced teachers or existing materials. However, over time, this preparation tends to become repetitive, relying on the reuse of previous worksheets and exercises (Rajaonarimanana, 2019) [3].

Several studies highlight that mathematics teaching remains largely dominated by transmissive practices, centered on lecturing and the mechanical application of procedures (Brousseau, 1998; Artigue, 2007) [4,5]. In this context, students play an essentially passive role and their initial conceptions are rarely taken into account (Vergnaud, 1990; Astolfi, 1997) [6],[7]. These practices contribute to student demotivation and persistently poor performance, particularly in resource-limited educational contexts (UNESCO, 2011) [8].

The literature highlights reflective practice as a key lever for teachers' professional development. According to Schön (1983) [1], reflective teachers are able to reflect in and on their actions in order to adapt their teaching choices to the situations they encounter. Perrenoud (2001) [2] emphasizes that this reflection cannot develop without concrete tools for analyzing practices, anticipating students' difficulties, and evaluating the effectiveness of teaching. From this perspective, educational planning is a valuable tool for professional reflection (Hameline, 1991) [9].

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In Madagascar, lesson preparation is an institutional requirement: every teacher must produce lesson plans that are checked by the school administration. However, in a context of limited resources and difficult working conditions (World Bank, 2024) [10], promoting reflective practice is a major challenge. Any pedagogical innovation must take into account the time, material, and institutional constraints to which teachers are subject (Maroy, 2001; Altet, 2012) [11],[12].

It is in this context that the present article is written. We hypothesize that the use of the OCPSERA tool contributes to transforming lesson planning into a structured support for reflective practice among teachers in initial training.

This article falls within the field of research on teacher professionalization and the development of reflective practice. It offers an original contribution by linking a theoretical framework developed by Perrenoud and Maroy with the design of an operational tool, OCPSERA, intended to support teacher reflexivity. Unlike essentially conceptual approaches, this study aims to operationalize reflective practice through a structured system that can be used as a tool for training and analyzing professional practices.

II. THEORETICAL FRAMEWORK: REFLECTIVE PRACTICE AND TEACHER PROFESSIONALIZATION

Education and training are major challenges for contemporary societies (Maroy, 2001) [11]. The sustainable improvement of education systems depends on the quality of initial and continuing training for teachers, who are central actors in the educational process (UNESCO, 2011) [8]. Teacher professionalization requires the development of reflective and operational skills that can be mobilized in and for teaching (Blanchard, 2002) [13].

The stance of a reflective practitioner involves the ability to analyze one's practices, question their foundations, and evaluate their effects on learning. Reflection is not limited to crisis situations but is part of a continuous process of professional development, supported by conceptual tools, theoretical knowledge, and peer exchanges (Perrenoud, 2011) [14].

The development of professional reflexivity therefore requires the provision of tools to structure the analysis of practices, clarify objectives, examine actions taken, and consider improvements. It is within this framework that the OCPSERA tool was designed.

III. THE OCPSERA TOOL: STRUCTURE AND COMPONENTS

The OCPSERA tool was designed as a framework for educational planning and a methodological support for reflection on teaching practices. It comprises seven dimensions: Objectives, Content, Prerequisites, Strategies, Assessment, Remediation, and Improvement, whose characteristics and impacts on reflexivity are reported in the following table.

Table 1. OCPSERA Components and their Characteristic Elements

Component	Definition/Objective	Theoretical Reference	Key Question for the Teacher	Impact on Reflexivity
O – Objectives	Define what the student must achieve in an observable and measurable way	Hameline (1991) [9]	What behaviors should the student display? Under what conditions and at what level of requirement?	Allows for analysis of the consistency between objectives and practices and for targeted planning
C – Content	Select and organize knowledge and skills in line with objectives	Piaget (1970) [15], Vygotsky (1978) [16]	What content is essential and appropriate for my students' level?	Encourages reflection on the relevance and logic of content
P – Prerequisites	Identify the knowledge necessary for new learning	Vygotsky (1978) [16]	What knowledge or skills should students already have?	Helps anticipate difficulties and adapt teaching strategies
S – Strategies	Plan actions and activities to achieve objectives	Meirieu (2017) [17]	What activities and teaching approaches can I use?	Encourages comparing different options and justifying teaching choices
E – Evaluation	Measuring the achievement of objectives through different types of evaluation	Maroy (2001) [11]	How can I check that the objectives have been achieved? ?	Allows you to take a step back and analyze the results of your teaching
R – Remediation	Adjust teaching in response to identified difficulties	Ovadiya (2025) [18]; Fletcher & Vaughn (2009). [19]	What interventions can I offer to correct errors and overcome obstacles?	Strengthens the reflective ability to regulate one's practice.

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Component	Definition/Objective	Theoretical Reference	Key Question for the Teacher	Impact on Reflexivity
A – Improvement	Analyze the sequence and identify areas for improvement.	Maroy (2001) [11]	What can I improve in my practices and sequences?	Encourages self-analysis and planning for continuous progress

IV. METHODOLOGY

➢ *Context and Participants*

The study was conducted at the ENS of the University of Antananarivo with 32 students enrolled in the third year of a bachelor's degree in mathematics, constituting a convenience sample.

➢ *Prerequisites and Conditions*

The students had already taken courses in mathematics education and had been introduced to the main learning trends, educational objectives, student representations, obstacles and errors, teaching approaches, assessment, and remediation.

➢ *Methodology and Approach*

The study combines quantitative and qualitative methods:

- Pre- and post-training questionnaires to assess changes in perceptions,
- Analysis of lesson plans to examine consistency and structure,
- Semi-structured interviews to explore reflections on the action.

➢ *Procedure*

Students were introduced to reflective practice and trained in OCPSERA, applying the tool to design, analyze, and improve their lesson plans.

➢ *Analysis*

- Questionnaires: simple descriptive analysis, pre/post comparison.
- Lesson plans: analysis of didactic consistency.
- Interviews: thematic analysis of forms of reflection.

V. RESULTS

A. Questionnaire Results

The questionnaires administered to the 32 participants aimed to assess the impact of the OCPSERA tool on students' perceptions and teaching practices. Two instruments were used: the first was based on a five-point Likert scale (Strongly agree: SA, Agree: A, Neutral: N, Disagree: DA, Strongly disagree: PTA) and the second on questions about feelings after using the tool.

➢ *Questionnaire 1: General Perception and Pedagogical Reflection*

The results of the first questionnaire (Table 2) show majority support for the OCPSERA tool and its effects on preparation and pedagogical reflection. More than three-quarters of participants agreed or strongly agreed with all items.

Table 2. Pre-Service Teachers' Perceptions of Preparation and Pedagogical Reflection with the OCPSERA Tool.

Items	SA	A	N	D	SD
Confidence in preparation	37,5 %	43,75 %	12,5 %	6,25 %	0 %
Course structure	40,6 %	46,9 %	9,4 %	3,1 %	0 %
Reflection before class	34,4 %	43,75 %	15,6 %	6,25 %	0 %
Reflection during the course	28,1 %	46,9 %	18,75 %	6,25 %	0 %
Reflection after the course	43,75 %	40,6 %	12,5 %	3,1 %	0 %

The item concerning lesson structure received the highest approval rating (87.5%), indicating that the tool provides an effective framework for lesson preparation. Similarly, post-lesson reflection received a rating of 84.35%, highlighting the impact of OCPSERA on the development of reflective practice. The items relating to reflection before and during the course also received high agreement rates, reflecting a gradual appropriation of reflection in teaching situations. Neutral responses were in the minority and disagreements were very few, with no participants expressing total rejection of the tool.

➢ *Questionnaire 2: Feelings After Using the OCPSERA Tool*

The second questionnaire explores students' perceptions of the tool's contribution to their professional development and teaching practice. The results are summarized below:

- *Areas of Contribution to Professional Development:*

✓ Development of professional attitude: 78%
✓ Improvement in classroom management and teaching interactions: 88%
✓ Support for planning and teaching decision-making: 100%
✓ Development of reflective analysis of teaching practices: 94%

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- *Contributions to Reflection on Professional Practices:*

✓ Optimization of preparation time: 91%
✓ Encouragement to seek new strategies and approaches: 99%
✓ Greater consideration of students' learning and needs: 78%

- *Support for Professional Practice:*

✓ Structuring of the lesson plan development process: 100%
✓ Strengthening of reflection on the teaching-learning process: 99%
✓ Challenging and evolving routine practices: 78%

- *Main Features of the Tool:*

✓ Practical and operational: 100%
✓ Promotes reflection on teaching practice: 99%

- *Impact on Teaching Practice:*

✓ Improvement in the quality of lesson plans: 100%
✓ Evolution of teaching attitudes during teaching: 78%
✓ Strengthening of reflection on teaching strategies: 95%

➢ *Interpretation*

The analysis of the data shows a generally very positive perception of the OCPSERA tool, both for the structuring of teaching planning and for the development of reflective practice. All pre-service teachers recognize the usefulness of the tool for organizing and planning lessons, while the majority emphasize its role in reflection before, during, and after teaching. These results indicate that OCPSERA is perceived not only as a technical tool, but also as a lever for professionalization and the evolution of teaching practices.

B. Results of Semi-Structured Interviews

Semi-structured interviews were conducted to gain a deeper understanding of the effects of the OCPSERA tool on students' perceptions and practices. Thematic analysis identified three main areas: changing perceptions of teaching planning, improving the consistency of lesson plans, and strengthening reflection before teaching.

➢ *Transformation of Perceptions of Lesson Planning*

Before the tool was introduced, lesson planning was mainly perceived as an administrative obligation with no direct link to improving teaching practices. Several participants expressed this view:

- *"Before, I mainly did the worksheet because it was required, not really to think about the lesson."* "
- *"The preparation was mainly for the sake of control, not for me."*

After adopting the OCPSERA tool, students report taking a reflective approach, viewing planning as a means of reflection and anticipation. They note that the tool helps them organize their ideas and justify their teaching choices:

- *"With OCPSERA, the worksheet helps me think before I go into class."*
- *"Now I see preparation as a tool for improving the course, not just a document to fill out."*

These testimonials illustrate the shift from an administrative approach to a reflective approach to educational planning.

➢ *Improved Consistency of Lesson Plans*

Analysis of the interviews highlights better structuring of lesson plans after using OCPSERA. Students note that their preparations are now aligned between objectives, content, strategies, assessment, and remediation, whereas previously they were often fragmented:

- *"Before, I chose exercises without really thinking about the objectives."*
- *"The activities were not always linked to assessment."*

After training, alignment and consistency are clearly felt:

- *"Now, I always start with the objectives and check if the activities match."*
- *"OCPSERA forces me to think about remediation as early as the preparation stage."*

This evolution reflects an awareness of the importance of didactic consistency for effective teaching.

➢ *Strengthening Reflection Before Teaching*

The interviews also reveal a strengthening of reflection before action, with a more questioning and proactive approach when preparing lessons. Students say they anticipate their pupils' difficulties and justify their teaching choices:

- *"I ask myself more questions about what the students already know."*
- *"I now think about possible mistakes before teaching the lesson."*
- *"OCPSERA pushes me to explain why I choose a particular method."*

The tool is perceived as a structuring support for professional questioning, promoting the transition from intuitive preparation to thoughtful and reasoned preparation. This evolution reflects the emergence of a reflective attitude, focused on analyzing learning conditions and adapting teaching practices to students' needs.

VI. DISCUSSIONS

Comparing the results of the questionnaires and interviews reveals a strong convergence between the quantitative and qualitative data, reinforcing the validity of the study's conclusions. While the questionnaires reveal widespread support for the OCPSERA tool and its perceived benefits in terms of structure and pedagogical reflection, the interviews provide insight into the profound changes in the representations and practices of future teachers.

The shift from an administrative approach to planning to a reflective approach is a key finding of this study. It confirms that pedagogical planning, when supported by a structured tool such as OCPSERA, can become a real lever for professional development. This development is in line

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with the work of Schön (1983) [1] and Perrenoud (2001) [2], who emphasize the importance of concrete supports in promoting reflection on and for action.

The improvement in the consistency of lesson plans observed in the interviews also confirms that the OCPSERA tool promotes a more conscious articulation between objectives, content, strategies, assessment, and remediation. This consistency appears to be an essential condition for the implementation of reflective and effective teaching, particularly in mathematics education, which is often characterized by transmissive practices.

However, the results show that certain dimensions, particularly reflection in teaching situations and changes in attitude during class, remain more difficult to mobilize. These findings suggest that reflexivity in action requires a longer period of appropriation and continuous pedagogical support. The OCPSERA tool thus seems to focus primarily on reflection before and after action, providing a solid foundation for the gradual development of reflection in the classroom.

VII. LIMITATIONS OF THE STUDY

Despite encouraging results, several limitations should be noted:

- *Sample Size and Nature:*
  The study was conducted with 32 students from a single institution (ENS of the University of Antananarivo), which limits the generalizability of the results to other contexts or fields of study.

- *Duration of the Intervention:*
  The period of training and use of the OCPSERA tool was relatively short. The long-term effects on reflective practice and the stabilization of professional behaviors remain to be evaluated.

- *Self-Assessment and Participant Bias:*
  The questionnaires and interviews are based on the students' perceptions, which may introduce self-assessment or social desirability biases.

- *Context Specific to Madagascar:*
  Institutional constraints and limited resources specific to the Malagasy context may influence the perception and effectiveness of the tool, limiting its direct transferability to other education systems.

These limitations suggest that the results should be interpreted with caution and that further studies in other contexts and with longitudinal follow-up would be relevant to confirm the effects of the OCPSERA tool.

VIII. GENERAL CONCLUSION

This study highlights the significant contribution of the OCPSERA tool to the development of reflective practice among students in initial training as mathematics teachers. The results show that the tool is widely perceived as a structuring framework for lesson planning, facilitating decision-making, consistency in lesson plans, and anticipation of student difficulties.

Beyond structuring, OCPSERA promotes a transformation in the professional attitude of future teachers, leading them to consider planning as a support for reflection and improvement of teaching practice. Its practical and operational nature appears to be a key factor in its adoption, particularly in a context of training and teaching with limited resources.

In conclusion, the integration of structured tools such as OCPSERA into initial teacher training is a relevant way to operationalize reflective practice and support teacher professionalization. Future research could further investigate its long-term effects, particularly on student learning and the stabilization of changes observed in teaching practices.

REFERENCES

[1]. Schön, D. A. (1983). The reflective practitioner: How professionals think in action. Basic Books.
[2]. Perrenoud, P. (2001). Developing reflective practice in the teaching profession. ESF.
[3]. Rajaonarimanana, E. H. (2019). Contribution of the study of conics to the improvement of mathematics teaching and learning in Madagascar (Doctoral thesis). University of Antananarivo, École Normale Supérieure.
[4]. Brousseau, G. (1998). Theory of didactic situations. La Pensée Sauvage.
[5]. Artigue, M. (2007). Didactic approaches in mathematics education. Educational Studies in Mathematics, 65(1), 5–25.
[6]. Vergnaud, G. (1990). The theory of conceptual fields. Research in mathematics education, 10(2/3), 133–170.
[7]. Astolfi, J.-P. (1997). Error, a tool for teaching. ESF.
[8]. UNESCO. (2011). The challenges of teaching mathematics in basic education. Paris: UNESCO.
[9]. Hameline, D. (1991). Educational objectives in continuing education. ESF.
[10]. World Bank. (2024). Madagascar: economic and social data. World Bank Group.
[11]. Maroy, C. (2001). The reflective practitioner model put to the test. Les Cahiers de recherche du GIRSEF, (12).
[12]. Altet, M. (2012). Training reflective teachers. ESF.
[13]. Blanchard, S. (2002). Review of P. Perrenoud's book, Developing reflective practice in the teaching profession. School and career guidance, 31(1).
[14]. Perrenoud, P. (2011). When school claims to prepare students for life... Developing skills or teaching other knowledge? ESF.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/25dec1654

[15]. Piaget, J. (1970). Psychology and pedagogy. Denoël.
[16]. Vygotsky, L. S. (1978). Mind in society: The development of higher psychological processes. Harvard University Press.
[17]. Meirieu, P. (2017). Pedagogy: from project to practice. ESF.
[18]. Ovadiya, T. (2025). Fostering reflection and attention to enhance struggling students' mathematical problem solving—A case study. Education Sciences, 15(11), 1538. https://doi.org/10.3390/educsci15111538