STRENGTHENING TEACHERS IN AN ENVIRONMENTAL EDUCATION FOR SUSTAINABLE DEVELOPMENT PROCESS

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ABSTRACT

The National Environmental Policy for Sustainable Development aligns with the Sustainable Development Goals, promoting sustainable resource management and a healthy environment. In Madagascar, schoolchildren and teachers are vital to Environmental Education for Sustainable Development (ErESD), which ensures access to quality education and fosters positive environmental behaviors among students. Approximately 75% of conservation NGOs in Madagascar implement ErESD through various awareness and educational programs in schools.

While strategies and tools are developed, they often focus on organizational objectives rather than addressing teachers' needs and attitudes. This gap raises questions about effective capacity-building practices that could enhance teachers' engagement.

The thesis proposes a standardized approach to address these challenges, emphasizing the importance of understanding teachers' expectations through needs assessments. Research indicates that over 40% of teachers are willing to participate in training sessions due to their interest in the subject matter. Furthermore, recognizing and adapting tools and modules to fit the local context has supported the implementation of ErESD activities, with schools conducting between 12 to 14 initiatives.

Ultimately, the active involvement of teachers is essential for the success of ErESD, highlighting the need for a more inclusive approach that considers their perspectives and contributes to the overarching goals of sustainable development.

Keyword : *Environnemental Education, teacher, school, valors, Durable Development*

1. INTRODUCTION

The primary objective of Environmental Education for Sustainable Development (ERD) is to enhance individual environmental awareness, equipping people with the knowledge, skills, and interpersonal abilities necessary for sustainable development. This initiative aims to cultivate responsible and engaged citizens committed

to acting both individually and collectively, fostering a harmonious environment that contributes to the nation's sustainable future (Decree No. 2013-880 of the MEDD's ERD Policy). ERD guarantees equal access to quality education for all and encourages lifelong learning opportunities.

Education serves as a cornerstone for achieving the Sustainable Development Goals (SDGs), empowering individuals to break the cycle of poverty while promoting social equity and gender equality. Through education, people can cultivate healthier, more sustainable lifestyles and foster a culture of tolerance, which is essential for building more peaceful societies—an integral part of the SDG 2030 agenda.

In the formal education sector, schools are pivotal in implementing Education for Sustainable Development (ESD), a framework established by UNESCO since 1972 for primary education. A variety of modules, textbooks, and teaching tools have been developed to enable educators to seamlessly integrate environmental themes into their curricula. Complementary extracurricular activities—such as school trips, nature classes, and environmental projects—have been implemented to further enrich the learning experience.

Numerous stakeholders, including 64 identified international NGOs and technical partners, have significantly contributed to this educational model, resulting in the creation of over 140 specialized tools. However, challenges such as duplication of efforts and the presence of non-complementary strategies have been observed (UNICEF, 2012).

Despite the advancements, the implementation of ESD at the school level remains a daunting task for many teachers, primarily due to limited capacity and skills. Although numerous tools and strategies exist, capacity-building initiatives often proceed without sufficient teacher involvement, focusing instead on project objectives aligned with donor expectations. This raises crucial questions: What capacity-building practices can effectively support teachers in implementing ESD? How can the impact of these practices be maximized during ESD implementation?

To address these questions, it is essential to identify effective variables and develop relevant approaches tailored specifically for teachers at the school level. Exploring these dimensions will create a more supportive framework for educators, ultimately leading to a more robust and effective implementation of ERD initiatives. This article aims to propose a targeted and effective method for strengthening teachers' skills, thereby enhancing the overall success and impact of Environmental Education for Sustainable Development initiatives.

1.1 Methodology

Various communication strategies and tools have been employed by stakeholders in Environmental Education for Sustainable Development (ERD). In one chapter of this thesis, a comparative analysis of the strategies implemented by these stakeholders revealed both positive and negative aspects. Notable achievements include the development and diversification of several tools, as well as the execution of awareness-raising and educational activities on environmental protection by donors and government ministries. Additionally, various training programs have been conducted by organizations such as UNICEF (2012).

The methodological analysis focused on teacher capacity building led to the formulation of five standardized stages, as illustrated in Figure 1. This approach, which emerged from the thesis research, has been rigorously tested and piloted in schools within the Itasy region. Through this process, valuable insights will enhance the effectiveness of ERD initiatives.

Chart -1 : The five stages of the ErEDD implementation method

These steps are explained as follows :

- Diagnosis: Conducting an on-site assessment to evaluate the overall condition of each establishment, identifying local environmental issues and behavioral challenges, and directly recognizing the needs and expectations of teachers for effectively implementing ErEDD activities.

- Preparation: Designing and developing or selecting educational and didactic modules and tools tailored to local issues to address gaps, and identifying approaches to encourage active participation of teachers during training.
- Capacity Building: Training on priority environmental topics and active methods for transferring knowledge and values to students. This includes field trips, green classes, and exchange visits among teachers.
- Implementation and Support: At the institutional level, environmental action plans are established, focusing on initiatives such as enhancing the exterior environment, maintaining cleanliness, and creating school gardens or composting programs. These activities are carried out in collaboration with local stakeholders, including the school principal, teachers, and parent representatives, particularly those from the "FEFFI" (Farimbon'Ezaka ho Fahombiazan'ny Fanabeazana Ifotony). The implementation is supported by providing educational and technical materials tailored to the needs identified in the Environmental Action Plans. Support primarily takes the form of technical assistance for students, teachers, school leaders, and parents involved in these initiatives.
- Monitoring and Evaluation: This phase involves adjusting and refining practices to ensure the effective execution of ErEDD activities.

Data collected throughout these stages of the standardized modality can be summarized in Table 1.

Table -1 : Objective of the data collection stages

Stages of the modality	Data collection methods	Objective
Diagnosis	Field trip to conduct interviews with teachers utilizing questionnaires and survey forms.	Proximity and icebreaker, Diagnosing needs and expectations, identifying problems arising during teaching and implementing ErEDD actions
Training	Use of evaluation sheets for teachers before and after training with the same questions	Evaluate the acquired knowledge at the time of training and in relation to expectations during the diagnostic phase
Accompaniement	Focus sampling or direct observation of teachers over a specific time interval (2 minutes)	Determine the activities and values transmitted from the teacher to the students through the use of teaching functions and their impact on the students
Assessment	Scan sampling: observation of the actions of groups of students over a period of time	Evaluate students' extramural activities to assess their acquisition of values related to ErEDD.

1.2 Study site

During the 2022-2023 school year, twenty institutions in the Itasy Region—comprising nine in the CISCO Arivonimamo and eleven in the CISCO Miarinarivo (see Table 1)—were evaluated using this standardized method. The Mad'ERE Kit, developed in collaboration with the CREE team and Planet Urgence, served as the primary tool for this experiment. These institutions were selected due to their proximity to the tapia area designated for preservation. Throughout the testing process, all classes underwent comprehensive diagnosis, training, and monitoring to ensure effective implementation of the method.

Table -2 : Number of teachers per establishment and per CISCO for testing the ErEDD modality.

CISCO	ESTABLISHEMENTS	Number of teachers		
		Men	Women	Total
MIARINARIVO II	EPC AMBODITANIMENA	4	2	6
MIARINARIVO II	EPP ANTSAHAMAINA	3	8	11
MIARINARIVO II	EP LOVASOA IGARABE	0	2	2
MIARINARIVO II	EPP MANAKASINA	1	5	6
MIARINARIVO II	EPP ANTSAHAVORY	1	2	3
MIARINARIVO II	EPP ANTANETIBE SUD	0	4	4
MIARINARIVO II	EPP ANDRANONAHOATRA	1	3	4
MIARINARIVO II	EPP MORARANOKELY	0	5	5
MIARINARIVO II	EPP ZOMABEALOKA	3	5	8
MIARINARIVO II	EPP ANDAVABATO	1	2	3
MIARINARIVO II	EPP ANALAKELY	1	5	6
ARIVONIMAMO II	EPP ANTABOAKA	0	6	6
ARIVONIMAMO II	EPP AMBY	0	6	6
ARIVONIMAMO II	EPP ANKALALAHANA	0	5	5
ARIVONIMAMO II	EPP ANTSAHAVORY AMPOHIPENO	1	3	4
ARIVONIMAMO II	EPP SAMBAIKOARIVO	2	2	4
ARIVONIMAMO II	EPP IALAROA	2	3	5
ARIVONIMAMO II	EPP KIANJANARIVO	3	4	7
ARIVONIMAMO II	EPP ANTANETIKELY	2	4	6
ARIVONIMAMO II	EPP VATOLAIVY	1	3	4
Total		**25**	**79**	**101**

These teachers have undergone training and have been equipped with the Mad'ErE Kit, which is currently being tested for its effectiveness. The Mad'ErE Kit utilizes three distinct approaches: Information, Education, and Communication/Community Capacity Building (IEC/CCC), a psychopedagogical approach, and a sensitive and artistic approach. This versatile tool is designed to align with the school curriculum, making it suitable for all subjects and grade levels. Its primary objective is to enhance the delivery of lessons by educators while effectively conveying important environmental messages.

It is structured around a three-part design model:

- Educational Component: Focuses on delivering curriculum-aligned teaching content.
- Environmental Component: Aims to communicate environmental messages to encourage behavior change in targeted audiences.
- Pedagogical Component: Enhances the appeal and engagement of lessons for learners, making them more captivating and interactive.

The Mad'ErE Kit comprises several key elements, including a durable storage bag made of robust canvas, featuring large handles and a removable pocket with multiple compartments. Inside, you'll find a reversible activity board and a blank map of Madagascar, designed for marking relief features, significant peaks, altitudes, and major cities. Additionally, the kit includes a colorful, laminated cardboard representation of landscape evolution, which is repositionable and removable. This visual aid encompasses a series of images depicting vegetation, fauna, human activities, habitats, resource pressure and utilization, climates, and environmental actions. Also included are sets of letters for constructing essential words and messages, a series of numbers, figurines, and a user guide (RABOTOVAO, 2007). This toolkit is employed during training sessions and the implementation of ErEDD activities.

2. RESULTS

2.1 Relationship between diagnosis and teacher training

The diagnostic phase allowed for the identification of themes requested by teachers during the interviews. These requests form the basis of the training program, which aims to strengthen the capacities and competencies of educators.

During the diagnostic phase, the following themes, challenges, and needs were highlighted by teachers to provide them with additional information and data for their instruction (see Figure 2):

- Basic knowledge on topics such as Environment, Sustainable Management of Natural Resources (SMNR), Sustainable Development (SD), Climate Change, and Climate Change Adaptation (48%);
- Practical techniques useful for schools relating to the Sustainable Management of Natural Resources (36%);
- Skills related to the Sustainable Management of Natural Resources (5%);
- Attitudes promoting well-being for students (11%).

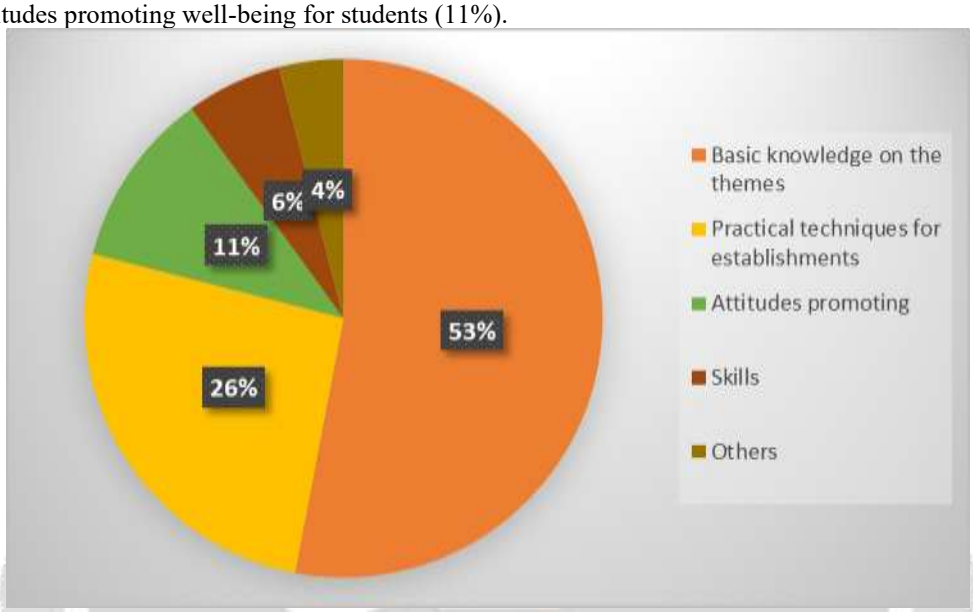


Chart -2 : The themes provided by teachers during the diagnostic phase

These aforementioned themes constitute the content of the training sessions. Subsections were necessary to develop these themes, which are represented to the right of the graph in Figure 3. The participation rate of teachers is represented according to the developed themes.

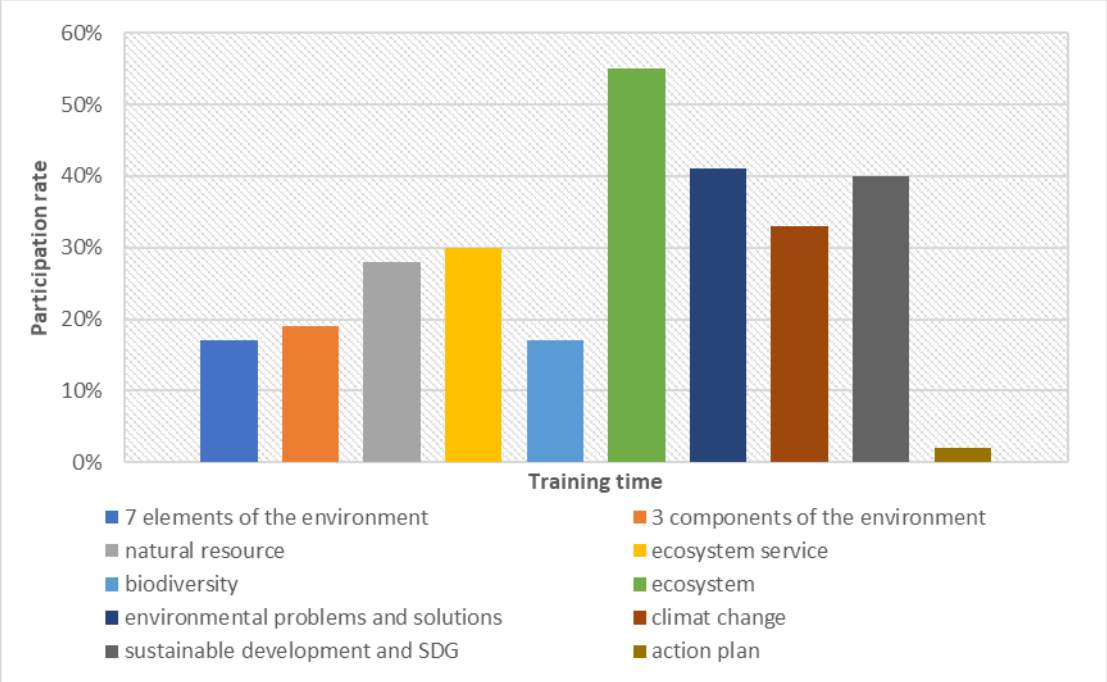


Chart -3 : The participation rate of teachers according to the training themes

In chart 3, teacher participation is most visible in the areas of ecosystems (55%), environmental issues and solutions (43%), and the concept of sustainable development and SDGs (40%). Other basic concepts, such as elements of the environment, natural resources, action plans, and biodiversity, are also noteworthy (ranging from 15% to 33%).

To assess teachers' understanding of the themes, their participation during the training is one of the key factors in knowledge acquisition. This participation is reflected in their questions, involvement in training activities, and responses to the trainers' questions.

From direct observations of the training, participants are most engaged during the ecosystem discussions, followed by topics on environmental elements and natural resources. Sessions related to the environment and ecosystems capture teachers' attention because they form the foundation of Education for Sustainable Development (ESD), and understanding these topics is crucial for passing on knowledge to students. Additionally, teachers have shown a strong interest in these themes.

Following this diagnostic phase, teachers were evaluated before and after the training to determine their skill acquisition, such as the definitions of 'environment' and 'sustainable development.' This evaluation helps standardize teachers' perspectives, for example, lhe table 3.

Table -3 : Acquisition of the concept of Sustainable Development by teachers

Answer of teachers	**pretraining**	**post-training**
knowledge-teaching-environment	55%	12%
environment-society-economic	20%	65%
environment-teaching-economic	20%	23%
no answer	5%	0%

Out of the 101 teachers, before the training, 55% of the responses were 'knowledge - teaching - environment.' For the responses 'Environment - society - economy' and 'Environment - teaching - economy,' the frequency of responses was equal. After the training, this response dropped to 12%, and the trend of responses significantly changed, as the most common response became 'Environment - society - economy,' at 65%. This reversal in response frequency confirms that teachers acquired knowledge about sustainable development during the training.

In summary, teachers' knowledge varied before and after the training. In chart 4, the orange line represents the scores after the training, while the blue line represents the scores before the training for the sampled teachers. The

scores for each teacher vary. Among the 17 teachers randomly chosen for data collection, on a scale of 10, the scores before the training ranged from 1 to 3, averaging 1.8 out of 10; after the training, the scores ranged from 1 to 6, averaging 3.9 out of 10. Fifteen out of the 17 teachers scored 3 or higher. Thus, 80% of the teachers saw an increase in their scores.

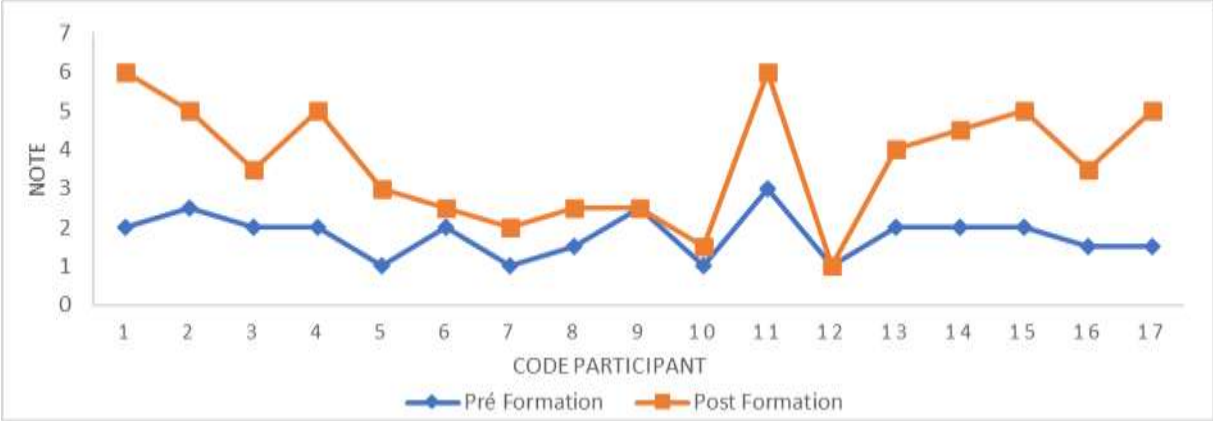


Chart -4 : Results of participants' knowledge assessment before and after training

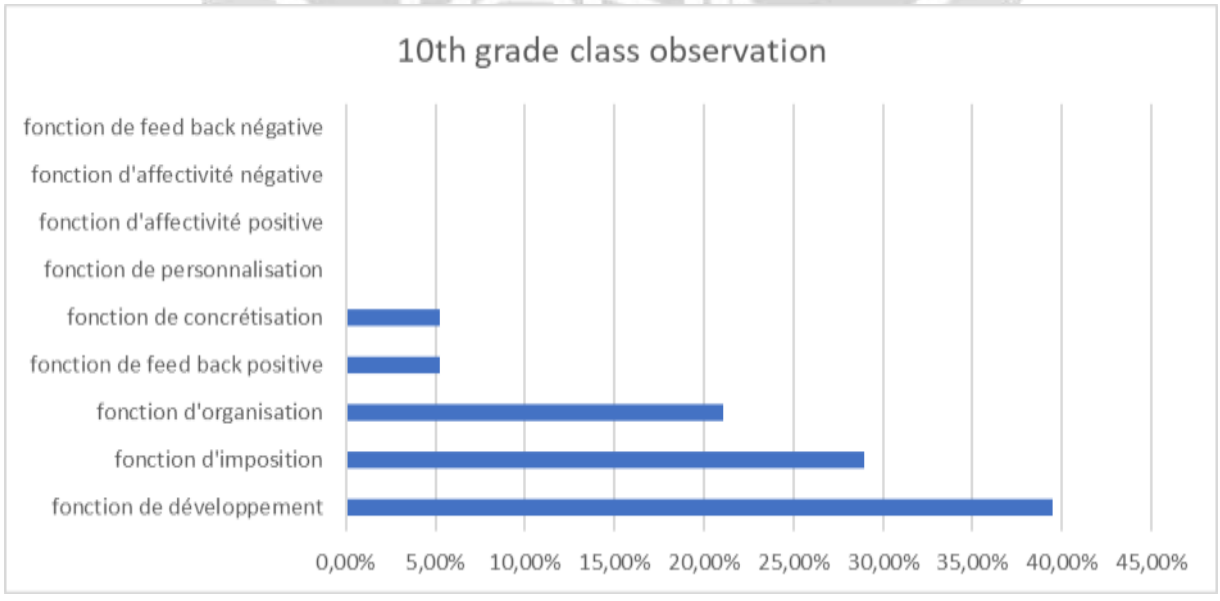
In summary, the evaluations conducted before and after the training are valuable and insightful. The responses provided are both precise and accurate, reflecting a clear understanding of key definitions among the sample of 17 teachers evaluated.

However, to fully realize the goals of Education for Sustainable Development (ESD), it is essential to consider additional phases of the methodology, particularly the connection between capacity building and the implementation of ESD activities

2.2 Sub Title-2 : Relationship between capacity building and implementation of ErEDD activities

Effective Use of Teaching Tools in Education

During the training sessions, a variety of active teaching techniques were implemented, and various tools were utilized. Continuous follow-ups and support were offered throughout the activities. To evaluate the impact of the teacher training, classroom observations were conducted at the school level to showcase the benefits. Additionally, studies on teaching practices provided insights into students' understanding of environmental concepts.



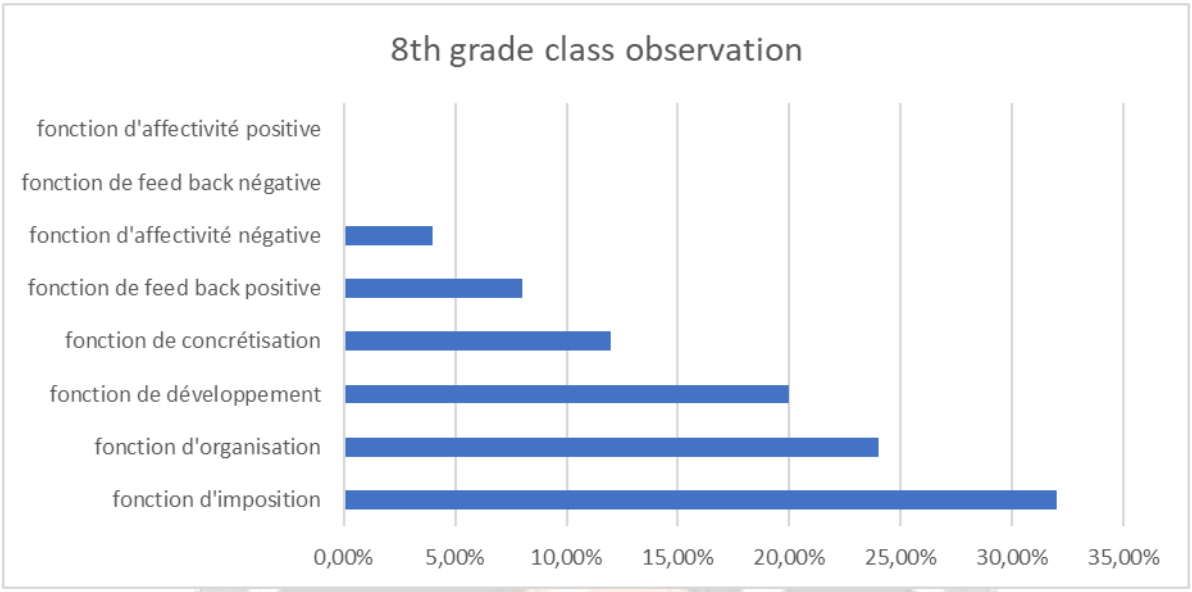


Chart -5 : Percentage of Utilization of Various Teaching Functions During Classroom Observations in 8th and 10th Grades

The three primary functions employed by teachers in each class are the development function, the imposition function, and the organization function. The imposition function represents approximately 30% of their usage, while the other two functions account for around 20% each. Other functions are infrequently utilized by teachers. Consequently, the teacher exhibits assertiveness and strong organizational skills, facilitating effective time management and maintaining a well-managed classroom.

Additionally, it's important to highlight that the implementation of development functions, along with positive feedback and positive affectivity, fosters active student participation during lessons.

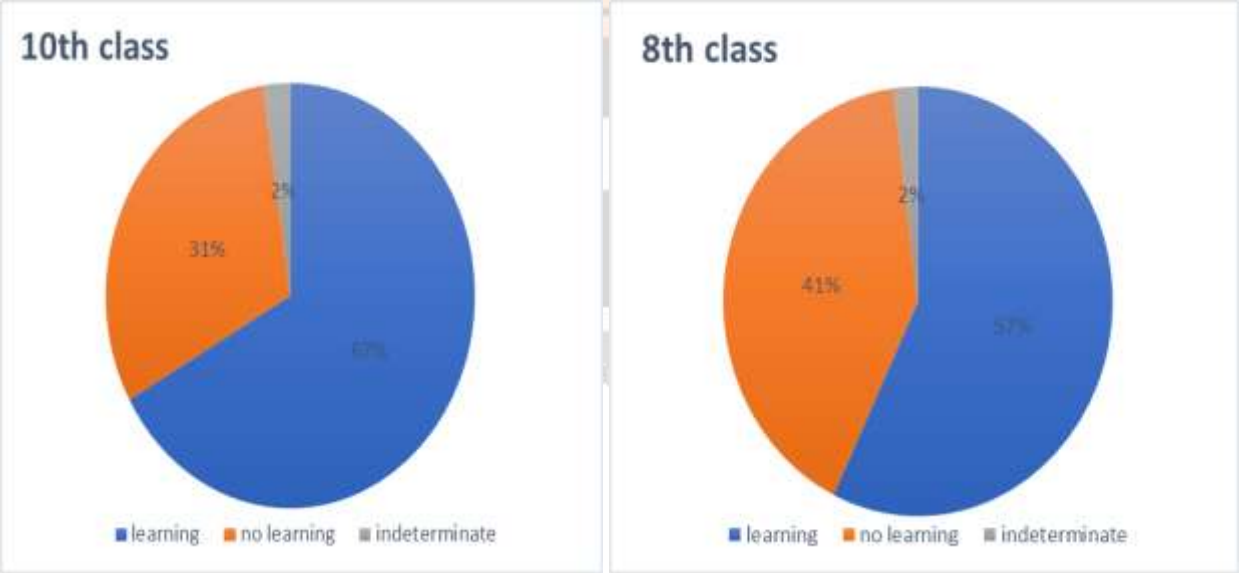


Chart -6 : Student learning rate according to the functions used by the teacher in grades 10 and 8

In Chart 6, student learning outcomes are highlighted: the 10th-grade class achieved a score of 66.86%, while the 8th-grade class scored 57.14%. This progress is evident in the successful completion of cleaning activities and the overall cleanliness of classrooms, as well as in initiatives like the creation of school gardens.

The training emphasized the development function, alongside the positive feedback and concretization functions. These approaches significantly enhance student participation in learning activities. Consequently, they positively influence students' engagement and completion of Education for Sustainable Development (ErEDD) activities, driven by their heightened interest and involvement.

Carrying out extramural activities

Direct observations of extracurricular activities during follow-ups were based on the findings from guided visits conducted by school staff around the school and within the school gardens. Two sampled institutions showed significant visibility: the school environment is well maintained, the cleanliness of the premises and classrooms is acceptable, and both school gardens and vegetable plots are present. However, improvements are still needed in children's cleanliness and the insufficient fencing. For extracurricular activities, raising parents' awareness regarding conservation efforts also requires further enhancement.

3. DISCUSSION

It is important to first recall that the hypothesis to be tested is that teacher involvement in a specific modality could have a positive influence on the implementation of Environmental Education and Sustainable Development (ErEDD) activities.

Discussion on the Proposed Modality

Initially, the results regarding the link between the diagnostic phase and the implementation of the training are highlighted. This initial phase proved crucial for identifying the topics to be explored during the training sessions. These themes form the fundamental basis for transmitting knowledge to students. As a result, teacher participation during the training was particularly noteworthy, as the topics discussed were both relevant and sought after. Thus, this diagnostic phase is essential for fostering teacher engagement.

In this regard, KASELE P. (2013) emphasizes that his research was based on the diagnostic phase to pinpoint the problems, expectations, and needs of both students and teachers, with the aim of subsequently developing systemic approaches related to the operation and coordination of ErEDD activities within schools. Furthermore, Martin Proulx (2020) asserts that diagnosis allows for anticipating problem areas, obtaining an accurate picture of the current situation, establishing a transformation strategy tailored to the organization's reality, accurately assessing the gap between the goals pursued and the actual situation on the ground, and identifying whether the proposed transformation aligns with the studied context.

According to KRAFT and his colleagues (2010), diagnosis and indication are key dimensions of quality. In the medical field, diagnosis constitutes an accurate assessment, a crucial step for a patient's treatment. By analogy, to train teachers in ErEDD, it is essential to deeply identify their competencies, which justifies the collection of information such as their degrees or civil servant status. It is also necessary to determine their expectations and needs, not only concerning ErEDD but also in their overall teaching practice, to contribute to the improvement of their teaching and, consequently, to ensure their involvement in the implementation of ErEDD activities.

Discussion on Strengthening Teachers and the Implementation of Activities

Secondly, the relationship between strengthening teachers' skills and the implementation of ErEDD activities remains paramount. The training has helped to update teachers' capabilities and to refocus them on participatory teaching methods. Technical and practical documents, such as the curriculum and the educational and didactic tools in ErEDD, support this approach. The acquisition of skills by teachers thus facilitates the implementation of activities by students. In this regard, MAUD (2018) highlights that active and participatory pedagogy increases students' interest, motivation, and engagement in completing assigned tasks. Indeed, according to UNESCO/UNEP in 1987, Education for Sustainable Development (ESD) is a process during which individuals and communities become aware of their environment and acquire the knowledge, principles, skills, experience, and determination needed to act individually and collectively to address current and future environmental challenges. This definition also emphasizes the teacher's interest in the subject to impart values to learners, enabling them to engage in ErEDD

activities. The emphasis on the functions of positive teaching positively influences this participation, as confirmed by research findings.

4. CONCLUSIONS

Following the experimentation of this modality, the proposal of these steps is very interesting because the model influences the acquisition of skills among teachers (12 out of 17 had an average of 1.8 before training, and after training, 15 out of 17 had an average above 3 out of 10). The diagnostic phase is crucial, as teachers' understanding of the topics translates into their interest and participation during the training, ranging from over 15% to 55% of teachers depending on the training themes. A relationship between diagnosis and training was observed through the transcription of student learning, which reached more than 57%.

The recommended approach during the training was the integration, reinforcement, and concrete illustration of themes related to Environmental Protection, Biodiversity Conservation, and Sustainable Resource Management. This requires both didactic and pedagogical skills, as illustrated by the Mad'ErE Kit. To facilitate this curricular approach, to assist and support teachers in their teaching process, and to also help students appropriate these contents, educational materials and resources have been designed and created to achieve the desired results. Student learning is reported to exceed 50%.

Teacher involvement is the foundation of the modality's effectiveness, hence the relationship between the strengthening of teachers' skills and the implementation of ErEDD activities by students. The active participation of teachers is a key factor for the success of ErEDD, whether it is in capacity building (training, green classroom, visits, and exchanges), teaching, or the implementation of activities.

Thus, our hypothesis is confirmed that teacher involvement in a modality of skill enhancement positively impacts the implementation of ErEDD activities. However, their dynamism and personality also constitute factors for the success of the activities, which is another object of study in our thesis."

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