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Enhancing critical thinking in Ugandan secondary school: Teacher professional development action research

Migliorare il pensiero critico nella scuola secondaria ugandese: Uno studio sullo sviluppo professionale degli insegnanti

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Abstract
Critical thinking is recognized as key in any society. However, the Ugandan system of education is not helping students to become critical thinkers; the education is superficial and uncritically based on rote learning. The main objective of this study was to investigate and document how Ugandan secondary school teachers could be supported in explicitly pursuing the goal of fostering students' critical thinking. This professional development action research showed that the instructional support coaching system contributed to enhancing the teachers' professional and pedagogical capacity, led them to transform their instructional planning process, and shifted their beliefs with regard to curricula and learning theories.

Keywords: Critical Thinking; Teacher Professional Development; Action Research; Instructional Design; Uganda.

Riassunto
Il pensiero critico è riconosciuto come fondamentale in ogni società. Tuttavia, il sistema educativo ugandese non aiuta gli studenti a diventare pensatori critici; l'educazione è superficiale e basata acriticamente sull'apprendimento meccanico. L'obiettivo principale di questo studio era indagare e documentare come gli insegnanti delle scuole secondarie ugandesi potessero essere supportati nel perseguire esplicitamente l'obiettivo di promuovere il pensiero critico degli studenti. Questo studio di ricerca-formazione ha dimostrato che il sistema di supporto didattico ha contribuito a migliorare la capacità professionale e pedagogica degli insegnanti, li ha portati a trasformare il loro processo di pianificazione didattica e ha cambiato le loro convinzioni in merito ai curricula e alle teorie dell'apprendimento.

Parole chiave: Pensiero Critico; Sviluppo Professionale Degli Insegnanti; Ricerca-Formazione; Pianificazione; Uganda.

Credit author statement

Conceptualization, M.G. and L.Z.; methodology, M.G. and L.Z.; validation, M.G., L.Z., and L.M.; formal analysis, M.G.; investigation, M.G.; resources, M.G.; data curation, M.G., L.Z., and L.M.; writing—original draft preparation, M.G., L.Z., and L.M.; writing—review and editing, M.G., L.Z., and L.M.; supervision, M.G.; project administration, M.G.; funding acquisition, M.G. All authors have read and agreed to the published version of the manuscript.

1. Introduction

Critical thinking is a key skill that is becoming increasingly vital in our modern society (Ahern et al., 2019; Davies & Barnett, 2015; Dominguez & Payan-Carreira, 2019; Dumitru et al., 2018; Liu et al., 2014). However, research in Western countries has found a dearth of critical thinking skills in the workforce (Davies & Barnett, 2015; Dumitru et al., 2018; Liu et al., 2014). Similarly, in the Ugandan context, the Ministry of Education and Sports (2004) highlighted the fact that students were not acquiring skills they needed to participate as active citizens and make informed decisions (NCDC, 2019).

It has been suggested that the methods of teaching used in Uganda do not foster deep understanding of the subject and do not help learners to understand the connection between the subject and their personal life; the education is superficial and uncritically based on mere rote learning (Allen et al., 2016; Mitana et al., 2018, 2021). Even though policymakers and educators in Uganda understand the importance of developing critical thinking in students, they seem to lack specific strategies to foster its growth and the tools to measure its effect on student learning (Giacomazzi, 2021). Therefore, it is relevant to investigate how critical thinking can be enhanced in students in the Ugandan context, and how teachers can be supported in incorporating critical thinking in their teaching objectives.

1.1 Teaching Critical Thinking

Embedding critical thinking in the school curricula is an excellent first step (Costa & Kallick, 2009; Dwyer et al., 2014). However, this might not suffice if teachers are not supported with adequate professional development opportunities (Perkins & Murphy, 2006; Stein & Haynes, 2011).

Fostering student critical thinking requires a shift from teacher-centred to learner-centred approaches (Ennis, 2018; Scriven & Blair, 2019), with a greater emphasis on cognitive and metacognitive factors, motivational and dispositional elements, and attention to social and individual learner differences (Murphy & Alexander, 2000). Such a pedagogical shift is a challenging and demanding experience for teachers (Ennis, 2018; Scriven & Blair, 2019), and requires a transformative and supportive learning environment and a school climate that encourages collaboration, self-reflection, and free expression of ideas (Fisher & Frey, 2015; Giannakopoulos & Buckley, 2009; Marin & Halpern, 2011; Woolfolk Hoy et al., 2013).

Moreover, research has shown the importance of furthering teachers' own ability to think critically, while also enhancing their capacity to model critical thinking and implement pedagogical practices aligned with this specific goal (Elder, 2012; Paul et al., 1990; Paul & Elder, 2005). Supporting teachers in discovering how critical thinking can be incorporated in lesson plans and providing the opportunity to visit classrooms where effective pedagogical practices are already implemented have proven to be useful professional development approaches (Aspfors & Fransson, 2015; Paul & Elder, 2005). Professional learning communities have also proven to be effective in fostering teacher collaboration and a move towards learner-centred approaches and instructional practices that can support reflection and analysis (Hipp et al., 2008).

Additional factors contributing to the success of teacher education programs aimed at enhancing students' critical thinking have recently been summarized in two systematic program reviews (Dunst et al., 2020; Lorencová et al., 2019); they can be organized into four main categories. The first set of factors, the most relevant for this study, relate to the structure of the professional development program: clarity about course content, the use of a mix of infusion and immersion approaches, and prolonging the duration of the program (well beyond the standard 10 weeks) were found to have the highest impact on fostering teachers' critical thinking (Dunst et al., 2020; Lorencová et al., 2019).

The second category includes factors that are linked to instructors' preparation and the strategies they use, such as the role of questioning in the instructional process, instructors' flexibility and responsiveness, and their ability, as learning coaches, to provide clear directions on how to collaborate with colleagues and how to effectively analyse their learning experience (Dunst et al., 2020).

The third category includes student-teacher-related factors such as their dispositions (e.g., willingness to engage in discussions, openness to criticism and to learning from others), self-confidence, and self-awareness (Lorencová et al., 2019).

The last category includes proactive approaches to supporting student-teacher involvement, such as a well-thought-out strategy mix that fosters collaboration among student-teachers and the incorporation of self-assessment strategies and metacognitive strategies (Lorencová et al., 2019).

1.2 The Ugandan Education System

Uganda's education system consists of seven years of primary education followed by a four-year lower secondary cycle and a two-year upper secondary cycle. On completing primary education, students can join lower secondary school, take a three-year craft course in a technical school, or pursue other options (Ministry of Education and Sports, 2017). Successful lower secondary graduates can enter upper secondary school, technical institutes, primary teacher colleges, or department training colleges. Upper secondary graduates can choose from universities, national teacher's colleges, technical colleges, or department training colleges, providing flexibility in course selection.

The education system in Uganda aims to eradicate illiteracy and equip individuals with basic skills and knowledge for self-development, better health, and continued learning. Various reform efforts have been made, but the Ministry of Education and Sports acknowledges that students lack the competences to contribute actively to society. In the context of these reforms, the role of teachers in shaping the quality of education is well-recognized, as reflected in various education policy documents (Ministry of Education and Sports, 2019).

In Uganda, there are five National Teacher Colleges owned and funded by the government, as well as 10 public and 41 private universities offering teacher education programs. The development of teacher education curricula is handled by different entities. Curricula for teacher education courses offered by other universities are developed by the respective institutions and accredited by the Uganda National Council of Higher Education.

Some studies have identified gaps in the implementation of teacher education curricula across all levels, emphasizing a greater focus on content over methodology in teacher colleges, insufficient attention to new subjects introduced in primary and secondary schools, limited use of learner-centered teaching techniques by graduates, inadequate knowledge of materials, and a lack of emphasis on specialization (Ministry of Education and Sports, 2020).

The new National Teacher Policy (Ministry of Education and Sports, 2019) proposes a vast reform in the teacher education and in teachers' continuous professional development. The policy establishes a National Institute of Teacher Education and promotes the integration of crosscutting concerns into teacher training, administration, and practice. These entities are tasked with coordinating key activities aimed at professionalizing the teaching profession in Uganda but the reform is still at its initial stages of implementation.

1.3 Background of the Study

This study originated from a request for support by the administration of a high school based in the suburbs of Kampala. At the start of the study in 2019, it was clear that Ugandan secondary schools were facing a momentous change. The National Curriculum Development Centre (NCDC) had just issued the new Lower Secondary School Framework, which introduced a competency-based curriculum for secondary school education (NCDC, 2019).

2. Research Problem, Objective, and Questions

Because teachers cannot teach what they do not possess (Applegate & Applegate, 2004), in order to foster students' critical thinking, it is paramount to first help teachers develop their capacity to think critically and appreciate its relevance to the teaching–learning process. How to teach and model critical thinking in the Ugandan or sub-Saharan classroom context is still unexplored by the research (Giacomazzi et al., 2022).

2.1 Research Objective

The main objective of this study was to investigate and document how Ugandan secondary school teachers can be supported in explicitly pursuing the goal of fostering student critical thinking. More specifically the research aimed to generate transformative learning (Mezirow, 1991) among secondary teachers to enhance their ability to design and implement lessons that develop critical thinking within specific subjects and to identify the main components of a sustained professional development model that could serve this purpose.

2.2 Research Questions

This study focused on the following research questions:

– What elements do teachers and researchers include when collaboratively constructing a professional development intervention to support secondary school teachers in developing critical thinking in their students?
– Was the professional development intervention effective in enhancing teachers' ability to foster students' capacity to think critically?

3. Methodology and Methods

This study adopted a qualitative research approach to understand the transformations in teachers' pedagogical practices while developing and implementing lesson plans designed to provoke and nurture critical thinking among their students. More specifically, it used participatory research and a *professional development action research* design (Prud'homme et al., 2011; Zecca, 2018).

The *professional development action research* model (*Recherche-Action-Formation*) is experientially-based and adopts a participatory framework, with practitioners and researchers working together to solve problems concerning the development of educational practice. It is a methodological approach apt for conducting research primarily and explicitly oriented towards training and transforming educational and pedagogical practice while promoting teacher reflexivity (Cardarello, 2018; Prud'homme et al., 2011; Vannini, 2018; Zecca, 2018).

3.1 Participants

Sixteen teachers at a secondary school in Kira, Wakiso District, Central Uganda participated in the study. The school has a population of 452 students and serves the most underprivileged communities of the slum areas in the suburbs of Kampala. It has a faculty of 35 teachers. Site selection was based on convenience (Patton, 1990), as the researcher and the school administrators and teachers had an established collaborative working relationship. The school administrators, in agreement with the researcher, purposefully selected (Creswell, 2007) teachers who specialized in three different subjects of instruction: English (5), mathematics (5), and history (6).

On average, the teachers were 32 years old (range 24-41) and had 8 years of teaching experience (range 2-17). One teacher had a master's degree, while the other 15 teachers had a bachelor's degree.

Further, 72 Senior-1 students (36 males, 36 females) were randomly selected among those who had participated to the lessons developed and implemented during the program, and provided their feedback on the experience. The students gave their written consent and the school administrator also had previously ensured the parents' consent.

Five school administrators participated in the research (3 males, 2 females). Three of them were also teachers and they participated in the professional development sessions.

The researcher was aided by five research assistants, who helped with data collection and data mana-

gement and participated in the coding of the data. The field work started in November 2019 and ended in May 2021.

3.2 Data Collection Methods and Tools

The following sources of data and tools were used to address the first research question:

i. Focus group discussions (FGDs): A FGD guide was developed and used during the discussions at baseline and another one was developed and used at end-line. An average of seven additional FGDs were conducted during the iterative process of coaching. One additional FGD was conducted at baseline with the school administrators. All discussions were recorded.
ii. Teacher narratives: In order to explore the participants' perceptions of the program and support reflection on their experiences, the teachers were encouraged to reflect in writing on what they were discovering and learning about their profession.
iii. Researcher memos: The researcher recorded memos immediately after the FGDs to capture his observations and reflections on the methodology or the content of the discussions.

The following data collection methods and tools were used to investigate the second research question:

iv. Open-ended individual teacher interviews. Open-ended semi-structured interviews with teachers were conducted after the classroom implementation of the planned lessons to get an in-depth response concerning their reactions, perceptions, thoughts, and knowledge acquired as a result of the experience. The researcher conducted seven interviews, which lasted an average of 22 minutes each.
v. Student FGDs: A total of 12 FGDs were conducted with Senior 1 students who had participated in the seven lessons that teachers implemented. The FGDs took place within one week from the lesson. These focus group discussions lasted 29 minutes, on average. An average of six students participated in each discussion.

Informed consent from all participants in the research was obtained. All the data were collected in English language. All recordings were stored in an online repository until they were transcribed. To enhance confirmability, every voice recording was transcribed and cross-checked by a second research assistant for accuracy. All recordings were then purged and identifiers in the transcripts were removed and replaced with pseudonyms that were kept in a secure separate file. Permission to access the datasets was granted only by the researcher.

3.3 Coding of Collected Data

ATLAS.ti (Version 8) software was used for the analysis.

Teacher narratives, transcripts of FGDs, interviews, and researcher memos were analysed using content analysis. The analysis followed a three-step process: the first step of the analysis (open coding) aimed at identifying the initial themes or concepts; the second (axial coding) created connections among the data and identified the main categories; finally, in the last stage (selective coding) the relationships that emerged were analysed and themes identified (Charmaz, 2008). To ensure confirmability, three research assistants, with experience in qualitative studies, independently coded a total of four interviews. Inter-rater agreement (Armstrong et al., 1997) was at 47% after the full coding of the first interview and at 81% after the fourth interview.

3.4 Trustworthiness

Trustworthiness of the findings of this study was established by assessing the credibility, transferability and dependability of the various data sources (Guba, 1981).

Regarding credibility, this study employed member checking, triangulation, thick descriptions and peer reviews to establish the validity of the conclusions (Creswell, 2007).

On transferability, though the size of the sample was small (Denscombe, 2014), the environmental conditions and social dynamics in the school that was selected for this study can be considered similar to other schools in the same context.

The consistency and similarity of the results across the sources related to the specific subjects chosen for this study helped in showing dependability of the findings (Guba, 1981).

4. Results

The findings of the study are organized according to the two research questions.

4.1 RQ1: Elements of the Co-constructed Professional Development Intervention

This section presents the elements that teachers and researchers included when collaboratively constructing a professional development intervention to support secondary school teachers in the development of students' critical thinking.

The Teachers' Challenges. Having a clear and shared common goal proved to be key to the success of the intervention. At the start of this study, the upcoming launch of the new Lower Secondary School Framework presented the school leaders and teachers with what was perceived as a very challenging situation. One administrator elaborated:

> This new curriculum has just come out but no one knows what it really is, meaning that there are the guidelines, but these guidelines are lacking a lot of content, they are lacking the methodology, they are lacking suggestions on how to face it and how to communicate this new curriculum to the students. (FGD-B-AD01)[1].

Further, the new curriculum asked teachers to implement pedagogical approaches that foster deep learning and understanding of the subject, implying that teachers needed to deepen their own knowledge of the subject they teach through personal research: "The lack of content in the teachers' guidelines can be a provocation, but it is a provocation if it is educating you on how to research" (FGD-B-AD01).

Setting the Study Objectives: A Shared Process. The objectives of this collaboration between the teachers, the researcher and his team of assistants/facilitators were co-constructed through a negotiated procedure that started from the teachers' need to face the challenges posed by the new curriculum. As a teacher shared: "I think the main focus of the research perhaps could [be] to try to understand how the critical thinking skill can be incorporated into the different lessons that we teach" (FGD-E-EN01). One administrator commented: "I can also put myself in the shoes of the teacher… for the way I am teaching, to help students to critically think, there is need for this creativity among the teachers" (FGD-B-AD01).

The Co-constructed Professional Development Methodology. Based on a process that included sustained interactions with the teachers, reflections among the research team members, and interactions with the school administrators, the professional development intervention was designed as having three main phases: the introductory training sessions, the instructional design coaching, and the implementation of the designed lessons.

1 Labels identify the data source category (e.g., FGD=Focus Group Discussion, MT=Metacognitive reflection, IN=Interview), the specific data source (e.g., B=Baseline, E=End-line), participant category (e.g., AD=Administrator, EN=English teachers, HT= History teachers, MT=Mathematics teachers), and the specific FGD or interview (e.g., 01)

Introductory Training Sessions. The project started with a 1½-day training session, where teachers were invited to participate in two short lessons that showcased subject-specific methodologies for enhancing critical thinking. Each lesson was followed by a metacognitive session aimed at helping the teachers reflect not only on the content of the lessons, but also mostly on how they learnt during the lesson and what kind of skills they felt they were developing in the process.

At this initial stage, teachers were not introduced either to a specific conceptualization of critical thinking or to the theoretical underpinning of the pedagogical strategies used, as suggested by an administrator who was also a teacher: "I think even these trainings should be in that, in that way, that they are provoking us to think, they are helping us to be creative, that we are not spoon-fed in an actual sense" (FGD-B-AD01).

Based on this introductory training, the teachers were asked to develop lesson plans that could help learners enhance their critical thinking skills. The first teacher-designed lesson plan made it apparent that the they were not guiding the students in the process of discovery; rather, students moved from one activity to the next without apparent logical connections. Thus, an operational definition of critical thinking was proposed by the researcher during a ½-day presentation, coupled with a detailed taxonomy of corresponding skills and dispositions fully aligned with those introduced by the new curriculum. The framework was based on an earlier contextualization study (Giacomazzi, 2021).

Instructional Design Coaching. During the remaining FGDs, the researcher proposed a constructivist approach to professional development, inviting teachers to choose a topic of their interest among those addressed in the first year of the new curriculum, carry out a basic online search of their topic while looking for suitable resources to be used in class, and develop a lesson plan. The goal was for teachers to formulate a key question for their lesson, identify the sources they would use, elaborate on the methods they would use, and identify the pedagogical strategies for introducing students to the topic.

Key components of the instructional design coaching were: the focus group discussions on the designed lesson plan, teachers' teamwork, presentation and sharing of lesson plans, microteaching, and metacognitive reflection.

FGDs on the Designed Lesson Plans. These meetings had a similar structure: teachers presented the lesson plans previously prepared, and the FGD participants would comment and propose suggestions for improvement. A round of positive feedback was followed by a round of suggestions for improvements. The team of researchers/facilitators added their contributions only after the teachers' round of feedback, encouraging deeper reflection on the designed plan. This encouraged teachers to follow the suggestions proposed by their colleagues. Apparently, their colleagues' input sounded less judgmental and more encouraging than comments coming from the research team. The more confident the teachers became in their own abilities to carry out the task, the more capable they were of giving constructive feedback to their colleagues.

Presentation and Sharing of Lesson Plans. The teachers and the research team met on a regular basis, once every 3 to 4 weeks. For the teachers, the main objective of each meeting was to present their lesson planning work to their colleagues and the research team for feedback and suggestions for improvement. For the research team, it was an opportunity for monitoring teachers' progress in lesson planning and advising them on how to improve their plans, but also for re-planning or re-focusing the professional development implementation strategy.

Microteaching. The microteaching was also an important component of the process. Each participating teacher had 20 minutes to teach a part of the planned lesson to their colleagues and the research team, involving them in one or more of the activities included in the lesson. The mini-lesson was meant to be comprehensive, with a clear introduction, development and conclusion.

Metacognitive Reflection. In the attempt to make teachers become more aware of their own progress, motives, task demands and cognitive resources, they were asked to reflect on how they learnt, at every step of the coaching activity. Further, they were encouraged to keep a personal journal and share it with the research team regularly. This was meant to discourage a surface approach to the learning process and, concurrently, to foster a self-directed learning approach: "I would sit and see what have I got from the entire discussion, like, what, what did I even get from writing this, from this lesson plan" (FGD-E-EN01).

Implementation of the Designed Lessons with Students. The instructional design process described above ended with the implementation of the lesson with the students. From the beginning, teachers envisaged

this moment as the test of whether the proposed approach would be effective or would require further refining. However, what the teachers and the research team experienced was an iterative journey where the finish line was not the lesson in itself, but rather the reflection and revision of the plan that followed. As one teacher said:

> If you come to my lesson, I may have prepared, we take a video. I may personally need your comments. We critique my lesson, maybe this will also give me a platform for future improvement. It may not necessarily stop at taking the record, but I would need your comments also. (FGD-E-MT01)

The Role of the Teachers as Co-Facilitators. The participation of the teachers in the coaching process as both participants and co-facilitators was crucial in the project, fostering the growth of a community of learners engaged in a process of transformative learning.

Synthesis of the Professional Development Methodology. Figure 1 below summarizes the steps of the professional development intervention that emerged from the collaboration between teachers, administrators, and researchers.

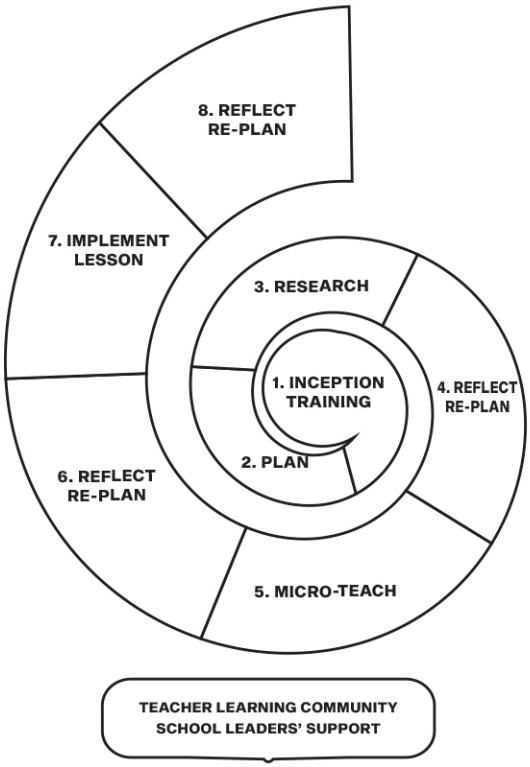

Figure 1: Outline of the Professional Development Process for Teachers' Implementation of the New Competency-based Curriculum

At inception (step 1), the process starts with a brief introduction to the competency-based curriculum, followed by a brief training (1 1/2 days) to introduce teachers to new approaches that foster deeper understanding of the content and critical thinking among learners. Teachers are then requested to design a simple lesson plan that, in their view, would enhance the learners' higher order cognitive skills. Next, participants are introduced to the critical thinking taxonomy and to the lesson plan template.

After the introductory training sessions, teachers in small subject-specific groups develop and discuss lesson plans that foster critical thinking (steps 2 and 3). Teachers are then invited to reflect on what they have learnt from the feedback received from the community of teachers and facilitators and from the suggestions given on their colleagues' lesson plans (step 4).

Once the lesson plan was considered to be ready by the teachers and the research team, teachers carry out microteaching (step 5). The practice lesson is then discussed and, if the expected outcome is not achieved, the lesson plan is revised and taught again (step 6).

After the process of lesson plan development and microteaching, the teacher implements the lesson in the class (step 7). Teachers are then requested to note down areas that need improvement for appropriate modification of the lesson plan (step 8).

Throughout the whole process, the role of the teachers in peer coaching and in facilitating the learning among their fellow faculty members, and the support of the school leaders are key elements in the process of teachers' transformation.

4.2 RQ2: Effectiveness of the Professional Development Model

This section addresses the second research question and describes the qualitative evidence for the effectiveness of the professional development model developed in the study in enhancing teacher ability to foster critical thinking in secondary students. The findings are presented according to three subthemes: 1) improvements related to instructional design; 2) perceived impact of the implemented lessons on student learning; 3) perceived impact of the professional development model on teachers' beliefs about the curriculum and the learning theories.

Improving Instructional Design. The critical thinking activation process helped the teachers to re-think how they planned for instruction. According to the participants, the coaching sessions helped them to be intentional in their lesson planning: "Going from that to being very particular and intentional and detailed in lesson planning. What I can say for now, we have been given the tools to do this" (FGD-E-EN02). Another teacher elaborated further on the reasons why lesson planning improved with the critical thinking approach, and on how this helped not only in being more prepared in front of the learners, but also in developing skills and values while deepening the content: "Being detailed… Adequate preparation, which I think has to do with research. But adequate preparation also has to be with being intentional… Go beyond content and using content as a tool, instead to develop skills and values." (FGD-E-EN01). The rest of this section articulates the lesson plan components especially impacted by participation in the project.

Improving the Setting of the Objectives. Before the intervention, teachers did not consider setting a clear aim for the lesson and clear objectives to be essential. By the end of the intervention, teachers emphasized the importance of learners' awareness of the lesson's objectives: "You [the student] must be knowing what my lesson is. I intend to teach this and my aim [for] the learners is this and you make it clear to them from the beginning of the lesson" (FGD-E-EN01).

Improving the Structure of the Activities. The support provided by the facilitators mainly regarded the development of activities for activating learner critical thinking within the specific subject. While the objectives of the lesson set the backbone of the whole lesson, it is crucial to "choose appropriate activities and methodology that can be able to help one achieve the lesson aim" (FGD-E-EN01).

Improving the Skills Development Component. It was quite difficult to help the teachers appreciate the difference between an activity that was engaging and an activity that, while capturing students' attention and having them participate, also developed critical thinking skills.

The taxonomy of critical thinking helped to facilitate this learning process: "It was hard for me to differentiate between the values, skills, knowledge, and so on and so forth. But with the introduction of the tool, that taxonomy that you provided, it made life quite easy for me" (FGD-E-HT02).

While elaborating on their own learning experience, the teachers also thought about how this process benefited their students: "I want to develop that skill [critical thinking] for these learners to have a clear judgement about the reasons they are presenting" (FGD-HT14).

Improving the Instructional Materials. The teachers engaged in research to find the most suitable materials for the activities they had planned. It was a challenging process, since many of them were not used to being so deliberate or elaborate in delivering lessons that would go beyond the transfer of factual knowledge, for which they had needed to simply display their personal notes on the blackboard: "We are able to choose better teaching materials and tools that are easy to understand and relate to the context of the learners we are handling and can keep them attentive" (M-EN-RN01).

Improving the Assessment Strategies. The formative assessment component was also a new element of discussion and consideration in designing the lesson plans. The activities carried out during the coaching process helped teachers improve their competencies for continually assessing students:

> Then another great improvement for me is how to do in-class assessment, what are some of the criteria or methods I can use to evaluate and assess the progress within the lesson, the progress of learners within the lesson. (FGD-E-EN01)

Perceived Impact of Lesson Implementation on Student Learning. Twelve FGDs with 72 students followed the implementation of seven lessons. We organized their contributions into three main themes: the knowledge and skills the students believed they acquired (what) and the way they acquired them (how).

What Students Learnt. According to the students, the methodology used by the teachers helped them to acquire self-confidence (mentioned in 8 comments): "I've learnt to be audible enough and to have like, I believe in myself and I've learnt that discussing with my members is good" (FGD-S-HT02).

Moreover, being asked to collaborate with peers whom they did not know well taught them cooperation skills (8 comments):

> It was maybe cooperation and friendship. For example, it can be when there is a part I don't know, my neighbour does not know also, but now there is one person, maybe every day I don't talk to him. We are just there as classmates, but we are not friends. So by force, I have to go to him and start befriending him so that he can help me. (FGD-S-MT02)

Discussing the tasks assigned by the teachers in groups or presenting the findings of the groupwork in front of the class contributed to the students' self-confidence and communication skills, including speaking (5 comments), listening to the teacher's and peers' contributions (2 comments), and presenting (3 comments).

The students also realized that these lessons urged them to use their cognitive skills. Though only one person mentioned critical thinking, others spoke of reasoning skills (2 comments), mental skills (3 comments), or thinking skills (4 comments): "From the lesson I understood how to critically think" (FGD-S-HT02).

Moreover, the students were helped to acquire research skills (4 comments), which included information gathering (1 comment) and writing or reporting (6 comments).

How Students Learnt. The learners realized the importance of the various instructional strategies that were implemented during the lessons. They appreciated the teachers' effort in guiding their groupwork activities (15 comments). Groupwork promoted the participation of every student, not only those who were more self-confident and already possessed good communications skills: "But if I was to be alone, I wouldn't be able to do all those things … But in groups, it made me able to be even comfortable with my friends" (FGD-S-EN01).

The students underscored the important benefits that these techniques fostered in terms of learning not only from the teacher but also from peers (15 comments).

Impacts on Teachers' Beliefs. The discussions with the teachers showed how their past experience influenced their personal knowledge and pedagogical strategies in the classroom. The formal educational system the teachers had navigated through themselves had a strong effect on their pedagogical values and beliefs. This section describes how the teachers' beliefs about curriculum and learning theories changed during the professional development program.

Teacher's Beliefs about the Curriculum. At the start of the study, the participating teachers repeatedly manifested their awareness of and disappointment regarding their own lack of creativity. This was mostly attributed to the formal educational system they had experienced:

> We still plan our lessons in that old way we were taught. We were given notes by our teachers; the same notes we somehow are using to give to our students. We are just giving them things; I can say we are just putting our own ideas among the students, not helping them to think deep in what they are trying to learn. (FGD-B-AD01)

The teachers realized that the new approach to instructional design empowered them in planning for skill enhancement in the students:

> In a sense that, literally, to say that this kind of lesson really has tangible results. I can really see that I prepared this kind of lesson looking at this kind of skill, value and so on. I can easily see whether I have helped my student develop these skills and values and so on, which was not the case previously. (FGD-E-HT01)

Teachers' Beliefs about Learning Theories. Introducing the teachers to a new way of designing instruction that would encompass the development of higher order cognitive skills impacted their understanding of how learning is fostered in adolescents. Notably, there was a progressive shift from prescriptive pedagogical approaches to a more constructivist vision of learning (Clegg et al., 2008; Zecca, 2019).

At the start of the study, the teachers clearly represented the learners as incapable of building knowledge for themselves, and in constant need of support and reinforcement. The teachers were clearly the owners of the knowledge and the students needed to be spoon-fed. This approach to education reduced the meaning of education to inculcation of factual knowledge: "We're just instilling, not bringing out", as an administrator said (FGD-B-AD01).

At the end of the program, the teachers realized the shift that the project had fostered by calling for a different kind of pedagogical practice, which moves teachers' support from "telling" students the content of what they should know to helping students in building their own knowledge (which implies a constructivist view of learning): "Looking at their level, I needed to tell them what to do. And to me, it was quite challenging that I would begin telling them what to do, instead of them thinking for themselves" (FGD-E-HT01).

5. Discussion

Research has underscored the effectiveness of teacher education approaches that focus not only on what works but also, and primarily, on why and how specific pedagogical practices are or are not effective (Bakkenes et al., 2010; Korthagen, 2017; Vermunt, 2014). The iterative nature of the process used in the study created a community of teachers who collaborated in reflecting on their own teaching practices and who openly and freely offered clear suggestions for improvement to their colleagues. The results of this participatory teacher professional development through lesson planning resulted in a high degree of teacher ownership of their work and their learning.

Though most of the time was dedicated to lesson designing, the focus was not on perfecting a plan, but on the impact the planned lesson had on the students. Thus, the teachers improved their ability to reflect on their teaching strategies in relation to their impact on learners' competencies and learning outcomes, and to evaluate the introduction of specific activities or learning materials in light of their potential contribution to student learning. This is a key factor for fostering actual improvement in students' outcomes and also for making the professional development process sustainable and self-correcting, by closely relating it to the monitoring and assessment of student learning (Fujii, 2014, 2016).

Alongside the importance of mastering pedagogical content knowledge (Kadir, 2017), the literature highlights the importance of explicitly clarifying the concept of critical thinking for teachers (Mpofu & Maphalala, 2017; Paul et al., 1989). The contextualized taxonomy of critical thinking helped the teachers to clearly identify different cognitive skills, the interactions between skills, dispositions and values, and the relation between specific activities and the skills learners were supposed to develop.

One of the main challenges in teaching critical thinking to students is the need for teachers to become critical thinkers themselves (Walsh & Paul, 1986). The professional development project enhanced the critical thinking abilities of the teachers, with a promising cascade effect on students (Applegate & Applegate, 2004; Elder, 2012; Elder & Paul, 1994). Alongside the reform of the competency-based curriculum, even the teacher education curriculum should be updated (Ministry of Education and Sports, 2020).

Teachers' shift from mere attention to achieving the curriculum objectives to concern for the students' learning and cognitive skills was a major result of this study. End-of-cycle examinations came to have undue influence on the teaching and learning experiences at the classroom level (Cheng & Curtis, 2004; Mitana et al., 2018). Moreover, teachers tended to conceive of their notes taken at the university as their only source of knowledge; the reduction of education to mere handing over of facts and rules fostered an

idea of students as empty vessels that teachers, as owner of knowledge, have to fill up (Freire, 1970). The intervention changed teachers' perspective on what should be taught in class and how, shifting their role to facilitators of students' learning, able to create powerful experiences, and to verify and modify them based on learners' feedback and results.

The coaching process contributed to the development of practical pedagogical expertise within a reflective framework, which resulted in the planning and delivery of lessons that were carefully and purposefully designed to facilitate students' critical thinking. Teachers' greatest challenge was to distinguish between instructional activities that are participatory and engage the learners and activities that both engage the learners and enhance their cognitive capacities (see also: Giacomazzi et al., 2023). This also led to a progressive shift from prescriptive behaviouristic pedagogical approaches to constructivist approaches (Clegg et al., 2008; Zecca, 2019). The change increased students' participation and their perceived acquisition of skills and knowledge (Skinner & Belmont, 1993).

Learners' engagement at the classroom level is also considered beneficial for the development of higher order thinking skills, such as problem solving (Murray & Lang, 1997) or critical thinking (Garside, 1996), and contributes to building the person's character (Kuh & Umbach, 2004). In the FGDs, students noted that their reasoning skills had improved. In the Ugandan context, where rote learning is common at all levels of education, participatory approaches can be considered to be a new experience for many of the teachers and the vast majority of students (Altinyelken, 2010; O'Sullivan, 2002).

6. Conclusions

This study confirmed the truth of the assumption (Applegate & Applegate, 2004) that, in order for teachers to foster critical thinking in the students, they first need to become critical thinkers themselves. Then, through a metacognitive process, they need to become aware of how these competencies were developed in their own personal experience and, concurrently, how they can be gradually, but systematically and purposefully, fostered in learners.

The co-constructed nature of the professional development model presented in this study makes its replication in other schools and similar contexts very promising, because its design offers the opportunity to localize the intervention by respecting the participants' background and the context. The on-going dialogue among stakeholders provided an opportunity to overcome challenges, concerns, and obstacles, and even to overcome the teachers' natural resistance to change (Duffy & Roebler, 1986; Labaree, 2000). Moreover, the growth of a community of learners among the teachers was one of the most useful outcomes of the process.

The instructional support coaching system, alongside the use of the developed tools, proved to be beneficial for enhancing the teachers' professional and pedagogical capacity, led them to transform their instructional planning process, and shifted their beliefs about curricula and learning theories (Mezirow, 1990, 1991, 1998, 2003).

We believe that the insights from the study can significantly contribute to educational reforms in Uganda. The newly reformed lower secondary competence-based curriculum (NCDC, 2019) presented the stakeholders with a great opportunity, despite the apparent lack of familiarity with critical thinking skills amongst students, teachers, and school leaders.

At the system level, government agencies and institutions of higher learning could assist in the process of cultural change by supporting innovative pedagogy and critical thinking enhancement as a key component of educational quality in schools. Providing regular continuing professional development training, as foreseen in the new Uganda National Teacher Policy 2019 (Ministry of Education and Sports, 2019), would be a minimum first step. Reform of the in-service training should also be accompanied by reform of the teacher education curricula. In addition, future research documenting effective educational practices that nurture student critical thinking skills might offer important insights that could result in a lasting change of Africa's educational systems.

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Conflict of interests

The authors declare no conflict of interest.

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