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Transforming Teachers' Instructional Design for Enhancing Critical Thinking in Ugandan Schools: Assessment through Rubric

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Abstract

The needs of our society are quickly evolving and soft or transferable skills are key to lifelong learning and the creation of an adaptable and resilient workforce. There is an ever-growing demand for individuals who can process data, evaluate concepts, and develop arguments; the development of critical thinking skills is crucial. This study shows the effectiveness of a professional development model that aimed at improving teachers' instructional design skills for nurturing critical thinking in the classroom. The study adopted a quantitative research approach in order to identify and assess the transformation in teachers' pedagogical practices while developing lesson plans designed to elicit and nurture critical thinking among their learners. This study focused on a sample of 16 teachers at a secondary school in Central Uganda. The researcher purposefully selected the teachers, who specialised in three different subjects: English (5), mathematics (5), and history (6). The teachers who participated in the study were on average 32 years old and had 8 years of teaching experience. To evaluate the effectiveness of the lesson plans that the participants designed, the researcher developed a contextualised rubric that was then validated by experts to assess the teachers' improvements in designing lessons for critical thinking enhancement. The findings confirmed that after the training intervention, the teachers showed a greater ability to differentiate between cognitive process and mere rote learning, helping them to elicit critical thinking in their students. At the end of the process, the lesson plans designed were clearer and more coherent, incorporating activities that could improve the learners' critical-thinking skills. This study provides an important contribution in terms of how to promote contextually appropriate and innovative pedagogical strategies.

Keywords: critical thinking; instructional design; teacher education; rubric; Uganda

1. Introduction

The needs of our society are quickly evolving and soft or transferable skills are key to lifelong learning and the creation of an adaptable and resilient workforce. There is an ever-growing demand for individuals who can process data, evaluate concepts, and develop arguments; that is, for individuals who possess the level of social understanding and critical-mindedness needed to make intelligent judgements about private and public issues (Fong et al., 2017; Gellin, 2003; Pascarella et al., 2004; Pascarella & Terenzini, 2009; Tsui, 2003). Critical-thinking skills are needed in all contexts and cultures. A well-functioning society is not only one in which people feel that their views can be freely expressed and are adequately represented, but also one in which those views are informed by reliable information, the critical appraisal of ideas, creative thinking, and open debate (Moseley et al., 2005).

Educating learners to improve their critical thinking skills is vital for the learners themselves and for society in general (Dunne, 2019; Ennis, 1964, 1984, 1992, 2013, 2018; Facione, 1990; Paul et al., 1989; Pun, 2013; Siegel, 2004, 1989). There is a growing opinion that the ability to be a critical thinker is a desirable human competence which should be fostered in schools. Critical thinking is vital for solving complex problems and facing challenging issues, and it is necessary for informed decision making and higher-order thinking in all domains of human action (Elder, 2012).

The challenges facing all societies in the 21st-century call for a shift in the quality of educational experiences that schools offer students. There is an urgent need to move beyond viewing learners as passive consumers of received knowledge and find pedagogical strategies that inspire them to actively seek out and carefully examine all knowledge claims (Halpern, 2001; Marin & Halpern, 2011). Students must learn that knowledge claims must be questioned, personally verified, and not blindly accepted (Beattie et al., 1997; Dunne, 2019; Niu et al., 2013). Educating students to be critical thinkers is vital for the students themselves and for society in general (Dunne, 2019; Ennis, 1964, 1984, 1992, 2013, 2018; Facione, 1990; Paul et al., 1989; Pun, 2013; Siegel, 2004, 1989).

This perception in Western countries of a dearth of critical-thinking skills in the workforce is reflected in sub-Saharan countries including Uganda (Giacomazzi, Fontana, et al., 2022). While different bodies and organisations, such as the Uganda National Examinations Board (UNEB), have tried to assess student learning outcomes at the secondary school level, the assessments have not given a complete picture of the learning outcomes especially in the area of higher order thinking skills (Mitana et al., 2019, 2021). At the same time, educators lack strategies to enhance critical thinking at the classroom level (Ministry of Education and Sports, 2020).

2. Review of the Literature

2.1. Teaching Critical Thinking in Sub-Saharan Africa

A recent systematic literature review (Giacomazzi, Fontana, et al., 2022), highlighted a dearth of contextualised studies that show how critical-thinking skills can be nurtured in the sub-Saharan cultural contexts. The vast majority of the studies presented in this systematic review clearly focus on methods and strategies for teaching critical thinking that build on the Western tradition without adapting to the local cultures.

Only Grosser and Lombard (2008) in South Africa and Madondo (2018) in Zimbabwe identify the unique features of the Ubuntu culture as an essential factor that should be considered when implementing pedagogical strategies that foster critical thinking in the African context. For instance, the Ubuntu culture's communitarian and altruistic perspective is cited as a possible hindrance to fostering such skills (Madondo, 2018) since aspects of Ubuntu culture are deemed contrary to the individualistic

Western worldview. Moreover, the way Westerners deal with conflicts and their rhetorical manner of participating in discussions are quite the opposite of an educational approach that promotes conflict avoidance and discourages adversarial argumentation (Grosser & Lombard, 2008). This also accords with the communitarian approach to life that encourages shared accountability and collective interdependence instead of an individualistic way of finding solutions to problems (Grosser & Lombard, 2008). African cultures express the value that the good of the individual is always in relation to the good of the society in which one lives. African culture is built on relationships and relies on an experience-based approach to building knowledge rather than an approach based on abstract logic and intellectual inferences (Grosser & Lombard, 2008).

These findings resonate in a recent study (Giacomazzi, 2021) that highlighted the specific characteristics and nuances that the concept of critical thinking has in the Ugandan culture. This grounded theory study has highlighted how critical thinking is associated with wisdom and aims to enhance the good of the person and society. As in the studies by Grosser and Lombard (2008) and Madondo (2018), the communitarian aspect strongly emerged in the Ugandan context, and the tendency to avoid conflict is another important factor to consider when planning for the nurturing of critical-thinking skills in formal school settings.

Teaching critical thinking in the Ugandan context might be even more challenging when classroom instruction reflects a dominative pattern wherein the teacher does most of the talking, explaining, and directing with little or no learner involvement (Mitana et al., 2021). This raises questions about the appropriateness of the current forms of teacher education and continuous professional development for teachers, lecturers, and educators (Giacomazzi, 2022). Reforms that envision upgrades to curricula without proper support for teachers and for the whole system will likely have little impact on the classroom environment and on students (Schendel, 2015).

2.2. Teaching Teachers

Teaching how to teach critical thinking in the Ugandan context is even more challenging when we consider that the in-service teachers, despite their academic experience, have never been exposed to methods that foster higher-order thinking skills, and they do not have a clear understanding of such constructs as critical-thinking skills (Giacomazzi, Fontana, et al., 2022; Onen, 2019). Thus, understanding how to teach Ugandan teachers how to nurture critical-thinking skills in their classrooms becomes an urgent and challenging endeavour.

Given the paucity of contextualised methods for teaching teachers about critical thinking, it is meaningful to draw lessons from Western literature. Teaching critical thinking is more effective when educators model critical thinking and deliberately incorporate elements of critical thinking in their lessons (Elder, 2012; Walsh & Paul, 1986). Regardless of the subject being taught, teachers should inspire learner curiosity and wonder through questioning and other strategies implemented for content delivery and acquisition (Facione, 1990; Hager & Kaye, 1992).

The assumption is that emphasizing critical thinking programmes for teacher education will have a waterfall effect on learners in schools who need to be prepared for academic and life challenges (Applegate & Applegate, 2004; Elder & Paul, 1994). In the late 1980s, Walsh and Paul (1986) had already decried one of the main challenges to teaching teachers to become critical thinkers: teacher education was replicating the outdated teaching strategies implemented at primary and secondary levels with heavy emphases on content and a lack of focus on strategies to foster critical thinking.

Several challenges teachers face must be addressed to ensure their maximum participation in implementing a critical thinking-augmented curriculum. The first of these is linked to shifting teachers'

attitude and mentality from traditional practices to learner-centred pedagogies (Woolfolk, 1998; Woolfolk Hoy et al., 2013); abandoning these acquired methods that teachers have relied on for decades requires a monumental effort. To achieve this goal, training institutions need to engage teacher trainees in the pedagogy of critical thinking in addition to embedding critical-thinking skills in course content.

For pre-service and in-service education, teaching critical thinking should be infused into the preparation programme at all levels and in every course unit. Prospective teachers must be exposed to methodologies that effectively incorporate strategies that foster critical-thinking skills (Elder, 2012; Paul & Elder, 2002). Teacher mentors should be skilled in teaching critical thinking, and teachers should be supported in their discovery of how critical thinking can be incorporated into lessons, while classroom visits should be promoted to showcase how colleagues are implementing effective strategies (Aspfors & Fransson, 2015; Paul & Elder, 2005; Walsh & Paul, 1986). Professional learning communities have proven to be an effective way of fostering teacher collaboration and improving teacher focus on learner-centred approaches; teacher collaboration influences the use of instructional practices that can foster reflection and analysis (Hipp et al., 2008).

2.3. Designing for Critical Thinking in the Classroom

Defining critical thinking and its dimensions is extremely useful as an entry point to the subject matter, but it is still insufficient. In an educational context, it is important to navigate the debate connected to the enhancement of critical-thinking skills. The debate swings between two views: those of the domain specifist and the generalist (Lipman, 1988; McPeck, 1990; Miller & Halpern, 2014; van Gelder, 2015). Supporters of the former view claim that critical thinkers need substantial domain-specific knowledge in order to be critical in specific disciplines (McPeck, 1990; Willingham, 2008). Conversely, generalists maintain that general critical-thinking skills are applicable across fields of enquiry (Gelder, 2005; Halpern, 1993, 2014; Lipman, 1988). Findings from meta-analysis studies (Abrami et al., 2008, 2015) reveal that the mixed approach produced the greatest effects out of all approaches to teaching critical thinking, while the immersion approach yielded the smallest. Moderate effects characterized both the general approach and the infusion approach. The smallest effects that were found in the immersion method were such because critical-thinking skills were not an explicit course objective. This is a significant finding for the design of courses, and it highlights the importance of making critical-thinking requirements clear and explicit.

Educators must act to make critical-thinking objectives explicit in courses and to include them in both pre-service and in-service training and faculty development. Researchers noticed that the programmes had a greater impact when instructors received specific training in preparation for teaching critical-thinking skills or when the administration extensively observed instructors' critical-thinking teaching practices. Conversely, impacts were smaller when there were no such efforts in terms of professional development or course design and implementation. This suggests that better outcomes can be obtained through active, purposeful training and teacher support at the pre-service and in-service levels. The results also demonstrate that peer collaboration seems to provide some advantage in developing critical-thinking skills; however, this effect is minor compared with other instructional study features (Garrison, 2016; Perkins & Murphy, 2006).

Given the complexity of critical-thinking skills, their development and enhancement require deliberate planning and attention. This calls for the purposeful designing of instruction for critical thinking, including the planning for a structural environment that aims at fostering these skills and appropriate choices related to the teaching-learning practice (Ngudgratoke, 2018; Shaughnessy, 2012).

Designing lessons to foster critical thinking presents several challenging aspects. One of the most relevant challenges is the process of striking a balance and promoting consistency among the various components of the design and plan for the learning process (van den Akker, 2007). According to Walker (2003) the three main elements in the planning process are: purpose, content, and organization of learning. These elements are further developed by Van den Akker (2007), who proposed a model that comprises ten main elements: rationale or vision (why are students learning?); aims and objectives (what objectives are they trying to achieve?); content (what are they learning?); learning activities (how are they learning?); teacher role (how is the teacher facilitating the learning?); materials and resources (with what are they learning?); grouping (with whom?); location (where?); time (when?); and assessment (how to track the leaning progress?). According to this model, the rationale describes the main mission of the plan, and it constitutes the most relevant focus in the whole designing process; it gives coherence and consistency to the other nine components. In the spider web model that the author developed, the components are held together by web of relationships that, nevertheless, are weak as the threads of a web. This is mostly to underscore the complexity of the interconnection among the various components of the instructional design process. Therefore, decisions related to assessment, for example, affect the way the teacher will operationalize the objectives and the specific learning activities.

The literature review, while presenting the importance of critical thinking for improved learning and life outcomes of every learner, also highlights the gap in sub-Saharan Africa on how critical thinking is conceptualised, nurtured, and assessed. This article suggests that to foster critical thinking at the classroom level, it is not only relevant to have a curriculum that values and underscores the contribution of critical thinking to the learning process, but it also advocates for a comprehensive instructional design model that could help teachers find effective ways of transferring these skills to the learners. This study shows a professional development model's effectiveness in improving teachers' instructional design skills for nurturing critical thinking in the classroom.

2.4. Operational Definition of Critical Thinking

The researcher elaborated the definition of critical thinking used in this study by analysing the results of a grounded theory study implemented in Uganda (Giacomazzi, 2021) and comparing them with foundational theories offered in the literature (Ennis, 2018; Facione, 1990, 2009). After also obtaining input from international experts in critical thinking and local educationists, the definition reads:

> Critical thinking is skilful, comprehensive, self-reflective thinking involved in knowing and seeking to understand the deep meaning of things based on a reasonable ('good') judgement that relies on appropriate criteria and is sensitive to context. As such, critical thinking facilitates solving problems, formulating inferences, pondering consequences, and making decisions. It promotes awareness about the self, others and the world.

3. Background of the Study

This research study was implemented in a secondary school in Kampala (Uganda) suburbs in 2021. The school serves children from two of the most densely populated slums in the capital. This intervention is intertwined with the recent reform introduced by Uganda's Ministry of Education and Sports. In 2019, the National Curriculum Development Centre (NCDC) issued a new Lower Secondary School Framework, introducing a competency-based secondary school education curriculum (NCDC, 2019). It was notably the most important reform of the secondary school education system since the introduction of formal education by the British at the start of the previous century.

The school administration asked the research team (consisting of a principal investigator and 6 research assistants) to develop a professional development programme in collaboration with the school

administrator to help the teachers design lesson plans to enhance students' critical thinking. The professional development methodology is detailed in Giacomazzi, Zecca, et al. (2022), and its implementation steps are summarised in the following Figure 1.

FIGURE 1. OUTLINE OF THE PROFESSIONAL DEVELOPMENT PROCESS FOR TEACHERS' IMPLEMENTATION OF THE NEW COMPETENCY-BASED CURRICULUM
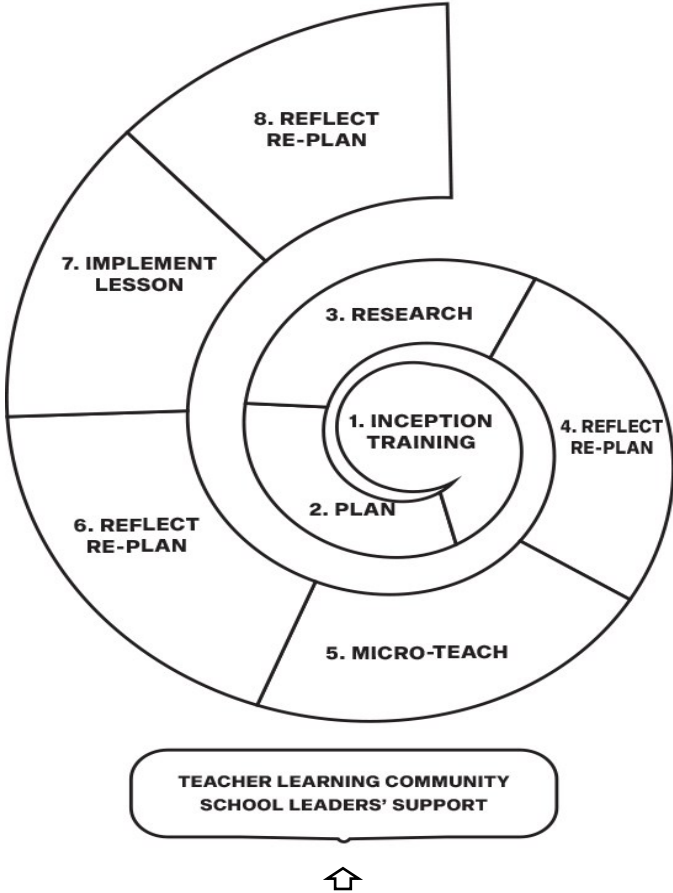
Source: Own compilation, 2023

The professional development process started with a brief introduction to the competency-based curriculum (step 1), followed by a day and a half of training to introduce the teachers to approaches that foster critical thinking among students. Next, the teachers were introduced to the taxonomy of critical thinking and to the lesson plan template.

After this introductory session, the teachers in subject-specific groups developed and discussed the lesson plans they prepared (steps 2 and 3). Then, the teachers metacognitively reflected on what they had learnt from the feedback received from the community of teachers and facilitators on their lesson plans (step 4). This stage was followed by a microteaching session (step 5) after which the teachers were asked to identify the strengths and weaknesses of their lesson plans and improve on the presented lesson plans (step 6). Finally, the teachers implemented the lessons in their classrooms (step 7) and were invited to modify their lesson plans if needed (step 8).

In this process, the teacher community and the school leadership played a crucial role in facilitating the iterative and reflective process of designing and redesigning the lessons.

To investigate the model's effectiveness, an in-depth qualitative study (Giacomazzi, Zecca, et al., 2022) documented the perceived effectiveness of this approach capturing the views of the teachers, administrators, and students who participated. This study instead documents the impact by measuring—through an expert-validated tool—the improvement of teachers' instructional design competencies.

4. Research Objective and Question

The main objective of this study was to assess the effectiveness of a professional development methodology that aimed at enhancing the teachers' skills in designing lesson plans for the development of domain-specific critical thinking within the various subjects.

This study seeks to answer the following research question: How effective is the proposed professional development methodology at improving teachers' instructional design to enhance learners' critical-thinking skills?

5. Research Design and Methods

This study adopted a quantitative research approach to identify and assess the transformation in teachers' pedagogical practices while developing lesson plans designed to provoke and nurture critical thinking among their learners.

5.1. Sampling

This study focused on a sample of 16 teachers at a secondary school in Kira, Wakiso District, Central Uganda. The school administrators and the lead researcher had a long-standing working relationship and collaboration to enhance the teaching faculty's professionalism continuously. The site selection was based on convenience (Patton, 1990). The researcher, in agreement with the school administrators, purposefully selected (Creswell, 2007) the teachers, who specialised in three different subjects: English (5), mathematics (5), and history (6). The goal was to represent both the subject areas of arts and sciences. Moreover, English and mathematics are considered foundational subjects in the secondary school curriculum. History was added, since in the past the teachers of this subject had attempted some pedagogical experimentation and wanted to continue to expand this work.

The teachers who participated in the study were on average 32 years old (range 24–41) and had 8 years of teaching experience (range 2–17).

5.2. Data Collection: Tool Validation Process

Two tools were developed and adopted in this study to investigate the proposed research question. The first is the lesson plan template, which was used to design critical-thinking lessons. The template was developed in collaboration with the teachers and as part of the research process. It included the following: identification of key objectives; curricular skills and values targeted by the lesson; description of actions to be implemented by the teachers during the lesson; actions to be completed by the students during the lesson; specific knowledge, skills, and values the students would develop as a result of the lesson; the expected output of each student activity; and the assessment strategy to be used for the evaluation of student output. Participants were required to include materials and appropriate extensions to be used in the lesson.

To evaluate the effectiveness of the lesson plan designed by the participants, a contextualised rubric was developed and validated by experts to assess the teachers' improvements in designing for critical-thinking enhancement. The lesson plan evaluation rubric was developed in collaboration with a team of five subject-matter experts. A bottom-up approach was adopted to construct a rubric closely aligned

with the aspects of the critical thinking enhancement fostered by the teacher professional development process. The development of the rubric went through the following stages:

- *Stage 1: Clustering*. The experts divided themselves into three groups of two based on their specialisation subjects (i.e., English, mathematics, and history). The lesson plans to be evaluated (69 in total) were clustered into four groups; the subject-matter experts identified the groups based on the quality of the various lesson plans. The only criterion for this initial clustering was the extent to which the lesson plan contributed to developing critical-thinking skills in learners. Ultimately, the lesson plans with activities that could contribute little to the development of critical-thinking skills (high-level cognitive skills) or that contributed primarily to the development of low-level cognitive skills were placed in group 4 (lowest level of quality), and those that could contribute much to the development of critical-thinking skills were placed in group 1 (highest level of quality). Next, the experts reread all lesson plans in each group to identify the main characteristics of the various elements in the lesson plan that could describe the quality of the plans. The elements they considered included: preliminary information (theme, topic, competence, learning outcomes, generic skills, values, crosscutting issues, and the key learning outcomes); activity aim; learning materials; activities; outputs; knowledge, skills and values; and assessment strategies.
- *Stage 2: Aligning the characteristics for each group*. After categorizing the lesson plans and identifying the characteristics that described the elements at the subject level, the experts engaged in a discussion that aimed at reaching a consensus that would result in a harmonious description that unified the characteristics of the elements. During the alignment, lesson plan evaluation rubrics collected from the literature (Goldston et al., 2010; Jacobs et al., 2008; Subramaniam, 2005; Zhou & Xu, 2017) were reviewed for comparison and to ensure consideration of all key aspects. The final list of elements included: preliminary information; learning materials; activity aim; activities; knowledge, skills, and values; outputs; and assessment strategies.
- *Stage 3: Defining indicator categories, descriptors, and the performance-rating scale*. In Stage 2, the characteristics of the groups were clustered into three broad categories as follows: setting learning outcomes, designing coherent instruction, and designing student assessment. Furthermore, the researcher identified ten indicators for preliminary information; learning materials; activity aim; activities; knowledge, skills, and values; outputs; and assessment strategies, as shown in Table 1.

TABLE 1. CATEGORIES AND NUMBER OF INDICATORS IN THE RUBRIC

Category	Element in the lesson plan	Indicators
Setting learning outcomes	Preliminary information	1: Alignment of outcomes with current standards
Designing coherent instruction	Learning materials	1: Relevance of learning materials
	Activity aim	1: Alignment of activity aim with the lesson
	Activities	1: Clarity of activities 2: Achievement of critical-thinking skills
	Knowledge, skills, and values	1: Coherence of knowledge, skills, and values 2: Form of knowledge statement, skills, and values
	Outputs	1: Coherence of outputs
Designing student assessment	Assessment strategies	1: Presence of formative assessment strategies 2: Form of the assessment strategies
Total number of indicators		**10**

Source: Own compilation, 2023

The team established the following performance-rating scale for each of the indicators in the rubric: 1 = Unsatisfactory, 2 = Developing, 3 = Acceptable, and 4 = Exemplary. The descriptors for each indicator on the above scale were based on the aligned characteristics of the four groups from Stage 2. This stage resulted in the lesson plan evaluation rubric's first draft (Version 1).

The aim of the validation process was to check the clarity, coherence, and relevance of the items or indicators included in Version 1 of the rubric. Generally speaking, validity has to do with whether the data are in fact about what they are believed or purported to be about (Mertler, 2008).

5.3. Evidence of Validity Based on Test Content

As part of the process of evaluating the rubric, evidence of validity based on test content was investigated (Polit & Beck, 2006). The validity index is derived from ratings of at least five experts on the subject matter, based on a 4-point relevance scale (Lynn, 1986).

This phase involved five experts who were selected based on the following criteria: (a) professionals who had engaged in classroom instruction with at least five years' experience; and (b) researchers who had experience both in the development of tools and rubrics and as classroom instructors. The experts were asked to rate the items/indicators in the draft rubric on the aspects of relevance (from 1 = not relevant to 4 = highly relevant), clarity (from 1 = not clear to 4 = very clear), and coherence (from 1 = not coherent to 4 = highly coherent). Furthermore, comments were solicited from the experts to identify indicators/ aspects that needed clarification or revision.

Then, for each item j, the Item-level Content Validity Index $(I\text{-}CVI_j)$ was computed as the number of experts who rated it either 3 or 4, divided by the total number of experts. Hence, an item was judged as having excellent content validity if it had a minimum $(I\text{-}CVI_j)$ score of 0.78.

The researcher acknowledges that other content validation approaches, such as divergent and concurrent validation, were not explored. However, the expert judgement provides an opportunity for receiving high-quality responses and extensive information on the subject matter (Fernández-Gómez et al., 2020).

5.4. Rubric and Item/Indicator Adjustment

The rubric was revised based on the findings from the content validity testing with experts. Several items/indicators were adjusted based on the feedback, ensuring that all indicator descriptors were clear, coherent, and relevant. This resulted in Version 2 of the rubric that was used to evaluate the quality of teachers' lesson plans.

5.5. Ethical Considerations

Informed consent was obtained from all stakeholders participating in the research. Identifying information such as names, addresses, and phone numbers was collected. This information was not reported in this study even when the participants had agreed to be identified.

5.6. Limitations of the Study

Some challenges and limitations impacted this study. The COVID-19 pandemic did not only limit the frequency of physical interactions between the researchers and the study participants due to the lockdown restrictions but also delayed classroom lesson plan implementation. However, online Zoom and Google Meet interactions were utilised to continue the interaction.

The results presented in the findings session do not fully explain the transformational journey the teachers who participated in this study experienced. For this reason, a qualitative study through professional development action research was conducted to better frame the changes that took place in the school thanks to the coaching sessions (for more details on this, Giacomazzi, Zecca, et al., 2022).

Though the amount of data collected in this process was huge, the research's main limitation was the involvement of only 16 teachers of three different subjects. The iterative learning process in the course of the 7 months of coaching and the 2 months of classroom lesson implementation led to the collection of lesson plans and qualitative data that mostly represented the specific context of a private, urban school serving the low-income population of Wakiso district. The experience of the research team, composed of teacher professional development facilitators in Uganda, helped in recognising the unique aspects of the environment in which the study was implemented, such as the active participation of the school administration, and this was considered while drawing conclusions and recommendations.

Another limitation is linked to the participation of the researchers in collecting lesson plans and developing the rubric for measuring the effectiveness and coherence of the lesson plans. The possible subjectivity of the experts in rating the rubric might also have affected the rubric development process. To mitigate this, two rounds of expert feedback were implemented; lesson plans were selected randomly for rating and the raters did not know whether the lesson plans were at their initial or final stage.

6. Presentation of the Findings

The participants were introduced to a method for enhancing critical thinking that highlighted the inclusion of critical-thinking skills into classroom instruction. The lesson plans they developed continued to evolve based on the comments and feedback from the facilitators and fellow teachers during discussions, reflections, and microteaching sessions that were conducted after their introduction to the method.

The quality of the teachers' lesson plans was assessed using the validated rubric that addressed 10 indicators under three broad categories: preliminary information, designing clear instruction, and designing student assessment. The evaluation was conducted through the following steps: (1) scoring of the lesson plans by two independent raters. The scoring was done by subject-matter experts based on a

4-point scale: 1 = unsatisfactory, 2 = developing, 3 = acceptable, and 4 = exemplary; and (2) raters' iterative discussions and reconciliation of the ratings. This facilitated agreement on indicators with divergent scores.

The first step in the evaluation of lesson plans was to establish consensus among the respective subject raters on how they applied the rubric. For each subject, the pair of raters were asked to independently score the same lesson plans, one at a time, after which inter-rater agreement was measured. This was based on the percent agreement between the raters on the 10 indicators of the rubric—whereby agreement between the raters was scored 1 and no agreement was scored 0. The level of agreement was the percentage of indicators the raters agreed on, as shown below in Table 2.

TABLE 2. INTER-RATER RELIABILITY SCORES

Indicator	English					Mathematics					History				
	E1	E2	E3	E4	E5	M1	M2	M3	M4	M5	H1	H2	H3	H4	H5
Alignment of outcomes with current standards	0	1	1	1	1	1	0	1	1	1	0	1	1	1	1
Relevance of learning materials	1	0	1	1	1	0	0	1	1	1	1	0	1	1	1
Alignment of activity aim with the lesson	0	1	0	1	1	0	1	0	1	1	0	1	0	1	1
Clarity of activities	0	1	1	1	1	0	1	0	1	1	0	1	1	1	1
Achievement of critical-thinking skills	0	1	0	1	1	1	0	1	1	0	0	1	0	1	1
Coherence of knowledge, skills, and values	1	0	1	0	1	1	0	1	0	1	1	0	1	0	1
Form of knowledge statement, skills, and values	0	0	1	1	0	0	1	1	0	1	0	0	1	1	1
Coherence of outputs	0	0	0	1	1	0	1	1	1	1	0	0	0	1	1
Presence of formative assessment strategies	0	0	0	1	1	0	1	1	1	0	0	1	1	1	1
Form of the assessment strategies	0	1	1	1	1	1	1	0	1	1	0	1	1	1	1
Percent agreement	**20**	**50**	**60**	**90**	**90**	**40**	**60**	**70**	**80**	**80**	**20**	**60**	**70**	**90**	**100**

Source: Own compilation, 2023

Once a general agreement between the raters reached at least 80 percent, the raters independently scored the lesson plans and—throughout the entire exercise, they consulted each other if they were not certain of the appropriate score to reach a common understanding.

The teachers participating in the research developed a total of 69 lesson plans that included the first, intermediate, and final versions for 20 different topics. However, in order to establish the extent to which the quality of the lesson plans improved, only the first and final versions of each lesson plan were considered. Ultimately, the first and the final versions of 20 different topics (English = 6, mathematics = 6, history = 8) were evaluated.

During the analysis, a total score was computed for the developed first and final versions. Higher scores for the final versions than the first versions of the lesson plans indicated improved quality of the respective lesson plans. The raters did not know whether the version they were scoring was the initial version of the lesson plan or the final one.

Overall, an improvement in the quality of the successive versions of the lesson plans was observed, with final versions scoring higher than first versions. The final versions of the lesson plans had an average score of 31.9 (SD = 3.9) out of a possible 40 points, while the first versions had an average score of 21.8 (SD = 5.6) out of 40 points.

TABLE 3. IMPROVEMENT IN THE QUALITY OF LESSON PLANS BY SUBJECT

| Subjects	First versions	Final versions	p-value	Cohen's d
	Mean (SD)	Mean (SD)		
English ($n=6$)	22.5 (3.7)	31.2 (2.6)	0.0055*	2.709215
History ($n=8$)	23.0 (7.5)	34.0 (3.8)	0.0011*	1.877835
Mathematics ($n=6$)	19.2 (4.2)	29.2 (3.3)	0.0026*	2.6758
Total ($n=20$)	21.8 (5.6)	31.9 (3.9)	0.0000*	2.074609
*Difference is statistically significant at 0.05 level				

Source: Own compilation, 2023

Based on Table 3 above, the average improvement in the quality of the lesson plans from the first to the final versions across the three subjects were statistically significant at 0.05 level. Furthermore, the average quality of the final version of the lesson plans was at least 1.9 standard deviations greater than the average quality of the corresponding first version lesson plans across all subjects.

As seen in **Error! Reference source not found.** below, there was an improvement in the quality of the l esson plans for all 6 English topics from the first to the final versions:

FIGURE 2. SCORES FOR FIRST AND FINAL VERSIONS OF LESSON PLANS – ENGLISH
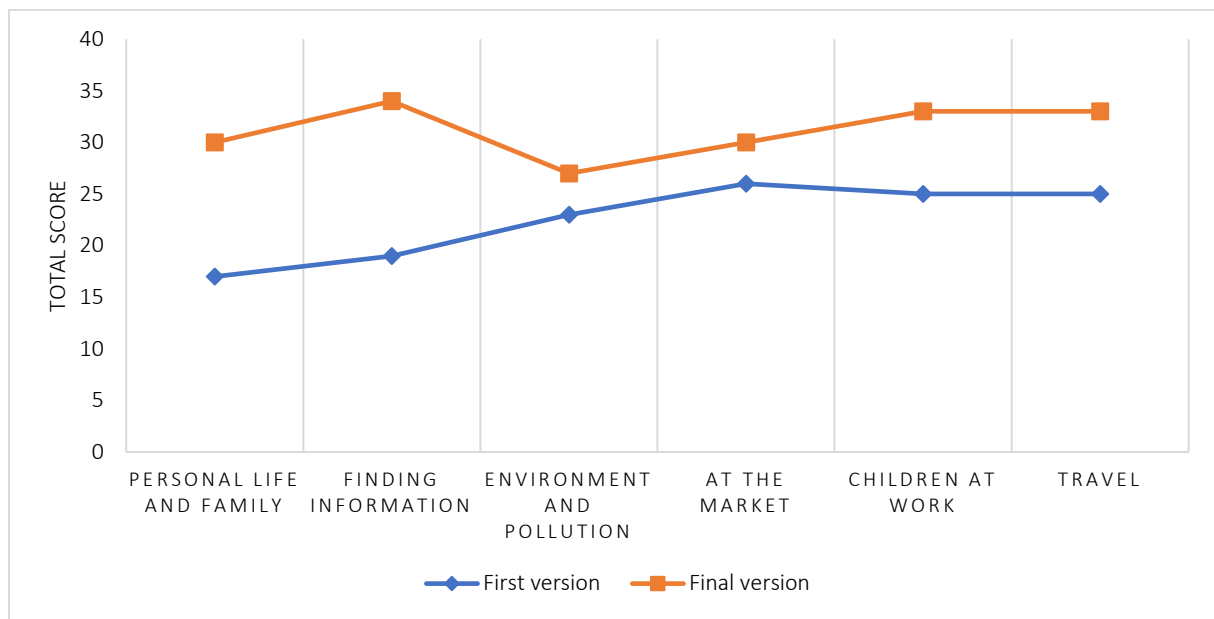
A big difference from the first to final versions was observed for *Personal Life and Family* and *Finding Information*, the first two topics the teachers decided to work on when designing the lesson plans. Looking at the figure above, one may notice the general improvement of the lesson plans' first versions during the training intervention.

Similarly, Figure 3 below shows how the first versions of the history lesson plans that the participants designed improved from a level of 16 points to 32 points in the last lesson plan that was designed on the topic *Local and External Trade*. It is also possible to see that the difference in scores between the first version and last version of the same lesson plan is vast at the start of the process (i.e., *Origin of Man* from 15 to 35 and Migration from 14 to 34) and smaller for the lesson plans designed at the end of the process (i.e., *Culture and Ethnic Groups* from 30 to 33, and *Local and External Trade* from 32 to 38).

FIGURE 3. SCORES FOR FIRST AND FINAL VERSIONS OF LESSON PLANS – HISTORY
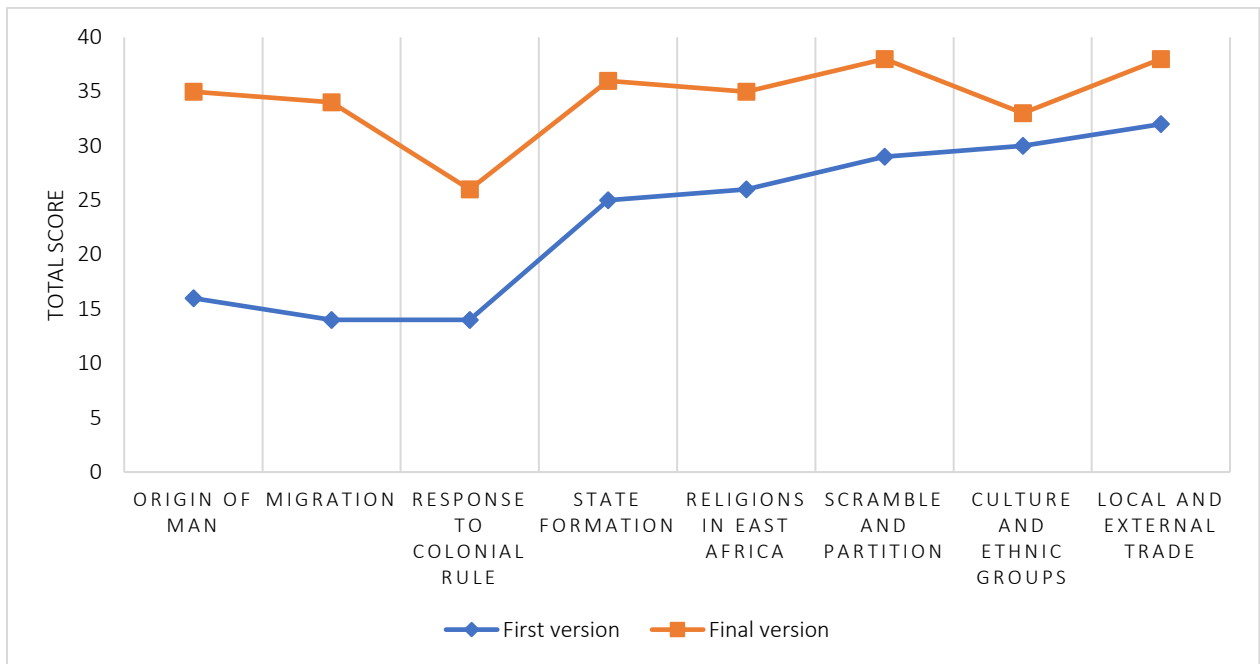
The same pattern is presented in Figure 4, which represents the progress in scoring for the lessons designed by the mathematics teachers; the first versions of the lesson plans on the topics of *Fractions*, *Working with Integers*, and *Number Bases* had quite low scores due to their poor quality. The first versions of the lessons improved throughout the programme.

FIGURE 4. SCORES FOR FIRST AND FINAL VERSIONS OF LESSON PLANS – MATHEMATICS
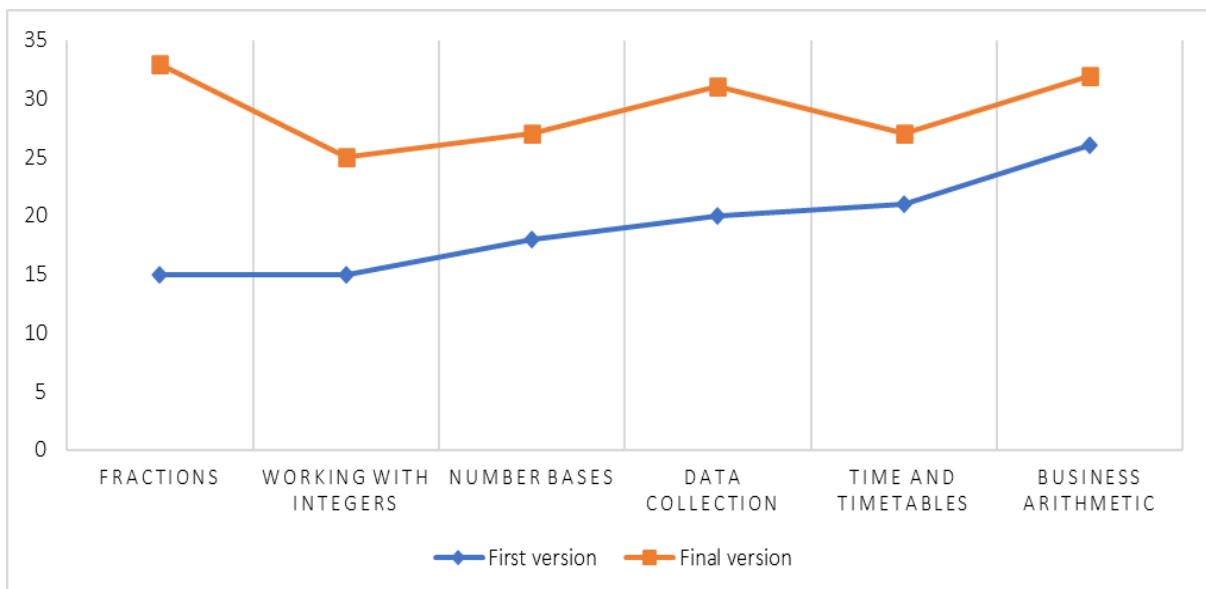
6.1. First Versions of the Lesson Plans

Across the three subjects, the first-version lesson plans for these topics had very low scores mostly because of their poor quality in terms of alignment of outcomes with curriculum standards; alignment of activity aims with the lesson expected outcomes; clarity of activities and coherence of outputs; description of knowledge, skills, and values; achievement of critical thinking; and assessment strategies.

TABLE 4. IMPROVEMENT IN THE QUALITY OF LESSON PLANS BY INDICATOR AND SUBJECT

		Alignment of outcomes with current standards	Relevance of learning materials	Alignment of activity aim with the lesson	Clarity of activities	Achievement of high-level skills	Coherence of knowledge, skills, and values	Form of knowledge statement, skills, and values	Coherence of outputs	Presence of formative assessment strategies	Form of the assessment strategies
English (n=6)	First versions Mean (SD)	2.3(1.0)	1.5(1.2)	2.3(0.5)	2.3(1.5)	1.3(0.5)	2.2(0.4)	3.0(0.9)	2.3(1.5)	2.3(1.5)	2.8(1.5)
	Final versions Mean (SD)	3.0(1.1)	2.2(1.5)	3.3(0.5)	3.8(0.4)	2.7(0.5)	3.3(0.5)	3.7(0.5)	3.0(0.0)	2.3(1.5)	4.0(0.0)
	p-value	0.2354	0.2354	0.0117*	0.0756	0.0015*	0.0009*	0.0250*	0.1019		0.1099
	Cohen's d	0.6262	0.4924	1.9365	1.3599	2.5820	2.5064	0.9129	1.1547		1.1209
History (n=8)	First versions Mean (SD)	3(1.1)	1.5(0.5)	2.3(0.7)	2.4(1.5)	2.3(0.9)	2.3(0.7)	2.5(1.3)	2.5(1.1)	2.1(0.8)	2.5(1.3)
	Final versions Mean (SD)	3.8(0.5)	2.8(1.2)	3.5(0.5)	4.0(0.0)	2.9(0.6)	3.4(0.7)	3.8(0.7)	3.6(0.7)	2.9(0.6)	3.9(0.4)
	p-value	0.0796	0.0112*	0.0053*	0.0185*	0.0492*	0.0016*	0.0190*	0.0148*	0.0479*	0.0136*
	Cohen's d	0.9105	1.3792	1.9943	1.5260	0.8081	1.5500	1.1880	1.2215	1.0080	1.4338
Mathematics (n=6)	First versions Mean (SD)	2.7(1.0)	1.8(1.3)	2.3(0.5)	2.3(0.8)	2.0(1.3)	1.7(0.5)	1.2(0.4)	1.8(0.8)	1.7(0.8)	1.7(1.0)
	Final versions Mean (SD)	3.5(0.8)	3.7(0.5)	3.3(0.5)	2.8(1.2)	2.7(2.1)	2.7(0.5)	2.5(0.8)	2.7(0.8)	3.0(0.0)	2.3(1.2)
	p-value	0.0925	0.0121*	0.0409*	0.0756	0.0250*	0.0409*	0.0103*	0.0422*	0.0103*	0.1019
	Cohen's d	0.8867	1.8182	1.9365	0.4959	1.1547	1.9365	2.0255	1.0612	2.3094	0.5923
Overall (n=20)	First versions Mean (SD)	2.7(1.0)	1.6(1.0)	2.3(0.6)	2.4(1.3)	1.9(0.8)	2.1(0.6)	2.3(1.2)	2.3(0.9)	2.1(0.8)	2.4(1.3)
	Final versions Mean (SD)	3.5(0.8)	2.9(1.2)	3.4(0.5)	3.6(0.8)	2.8(0.6)	3.2(0.7)	3.4(0.9)	3.2(0.7)	2.8(0.6)	3.5(1.0)
	p-value	0.0039*	0.0001*	0.0000*	0.0006*	0.0000*	0.0000*	0.0000*	0.0001*	0.0018*	0.0005*
	Cohen's d	0.8030	1.1198	2.0445	1.1703	1.2508	1.7223	1.0426	1.0818	1.0559	0.9449
*Difference is statistically significant at 0.05 level											

Source: Own compilation, 2023

Overall, all the indicator level mean scores for the final versions lesson plans were statistically significantly higher than the mean scores of corresponding first-version lesson plans. Furthermore, the average indicator level quality of the final version of the lesson plans was at least 0.8 standard deviations greater than the average quality of the corresponding first-version lesson plans across all the indicators, which points to a large difference in the mean scores.

Alignment of outcomes with curriculum standards: In the first versions, there was a mismatch between what was outlined under this section and what was stated in the curriculum. In this section, teachers were expected to select and transfer what was applicable to the developed lesson, exactly as stated in the curriculum. Some of the generic skills, values, and crosscutting issues stated in this section could not be developed during the lesson. The teachers were simply stating everything in the curriculum instead of selecting those aspects that the planned activities could develop. This was one of the easiest and fastest elements to change. The teachers simply needed to learn how to read the new curriculum and how to report the indications that it contained in the lesson plan format. The process, though repetitive, helped the teachers become better acquainted with the terminology used in the curriculum and become more deliberate in the choice of what they aim at developing in the lesson.

Activities and outputs: The activities described in the successive steps of the lesson plan lacked a clear progression from one step to the next, and the teacher's instructions were sometimes not clear. Furthermore, the output or product expected from an activity done by learners was at times not stated, and when it was stated, it was not actually an output, but, for example, the learning material used by the teacher, as seen in the following example:

FIGURE 5. LESSON PLAN: MATHEMATICS – EXCERPT

Teacher's activity	Students' activity
- The teacher asks learners to give the fraction that represents 4 parts that he/she has provided and so on.	The learners partition the card and they fill each part with a fraction it represents.
- The teacher asks learners to state the types of fractions they know and give examples.	The learners use the parts of the cards to figure out and respond to the teacher's questions.
- The teacher asks the learners to state the difference between proper and improper fractions.	The learners state the types of fractions and use the previous responses to distinguish between proper and improper fractions
- The teacher gives learners (*in their groups of five*) e.g. 6,7, etc. pieces of chalk to share among themselves equally and asks them to tell what each has acquired.	
- The teacher asks the learners to tell the relationship between the fraction e.g. 6/5 and what each of them has acquired (*this is to bring out the concept of a mixed fraction*)	The learners share the pieces of chalk and tell what they have acquired. Learners give the relationship between the improper and the mixed fraction

Source: Own compilation, 2023

In addition, a clear link between the consecutive steps of the lesson was lacking in all these three lesson plans. It was observed that some of the steps could have been taken either before or after the others.

Knowledge, skills, and values: At the start of the process, the planned activities primarily fostered low-level cognitive skills. Where high-level cognitive skills were identified, the activities were not designed in a way that could foster the development of such skills.

Critical-Thinking Skills: The activities mostly fostered the development of low-level cognitive skills such as reading, writing, or listening, among others.

FIGURE 6. LESSON PLAN: MATHEMATICS – EXCERPT

Teacher's activity:	Students' activity:	Knowledge, value and skills:

● The teacher calls on 4 learners (john, Philip, Grace, and Dorcus) to step onto the designed learning area at the starting point and do actions as instructed ((i)all of you move 4steps forward, (ii)2steps backwards, (iii)John and Grace move 4steps backwards and tell your positions) **(Annex 1B)**
● The teacher draws and explains the steps made by the 4 learners on the black board and he also asks the learners to individually represent the tasks on a paper as illustrated on the board
	● The 4 learners listen to the instructions as given by the teacher, perform the tasks as the rest are observing and following the steps made.
	● The learners draw the steps made on the paper as also illustrated on the board in relation to the instructions given
		● **Skill;**(following instructions, listening and observation)
		● **Values;** Humility
		● **Knowledge:** (use of standard dimensions)
		  ● **Values:** (Humility)
		  ● **Skill: (**Listening and following instructions, observation,**)**
		● **Skill:** (Drawing and labeling)

Source: Own compilation, 2023

Assessment strategies: These were either not stated or the assessment strategies identified could not assess all of the stated knowledge, skills, and values.

Often the Assessment strategies were not written in the *-ing* form. This might seem unusual, but the decision to express the strategies in this form was linked to the teachers' awareness of the importance of conceiving the assessment strategies as continuous and as having a formative purpose. In their context, classroom assessment is mostly reduced to exam tests with merely summative purposes.

6.2. Final Versions of the Lesson Plans

Regarding quality, the final versions of the lesson plans were all considered to be at an acceptable level. Almost all key aspects in these plans were constructed in a way that met the set standards. Considering, for example, the lesson plans on the topic of *Origin of man* for history, the outcomes were aligned with curriculum standards.

FIGURE 7. LESSON PLAN: HISTORY – EXCERPT

Theme: Understanding our past
Topic: The origin of man
Competency: The learner understands the theories about the origin of man using a series of accounts
Learning Outcome: The learner should be able to;
Understand traditional East African beliefs about the origin of man *(Identifying the main characters in the stories about creation; Making a connection between her/him and the creation stories)*
Generic Skills: *1. Critical thinking and problem solving; 2. Communication*
Values *1. Respect for humanity and environment; 2. Social harmony*
Cross-cutting Issues: *1. Life skills; 2. Mixed abilities and involvement; 3. Citizenship and patriotism*
Key learning outcomes: *1. Self-assured individuals; 2. Positive contributors to society*
Pre-Requisite Knowledge: *Traditional stories on the origin of man - according to their tribes*

Source: Own compilation, 2023

In this plan, the generic skills, values, and crosscutting issues identified applied to the lesson and could be developed by the planned activities. As seen in the excerpt below, students are involved in a mixed group in which each of them takes a turn reading origin stories of their own tribe. This activity directly relates with the skill of communication as well as the value of respect. The proposed activities were directly linked with the knowledge, skills, and values the lessons were intended to develop among the learners. There was a clear link between the different activities in the lesson. For example, there was a clear progress from the activities done before the lesson to those conducted in the planned lesson, as seen below. Furthermore, the outputs or products at each step of the lesson were clearly stated, and aligned with what the students were actually doing at that particular stage.

FIGURE 8. LESSON PLAN: HISTORY – EXCERPT

Activities before lesson

    i.   The teacher asks the students to inquire from their parents / relatives / elders / tribe mates... information regarding the origin of man (creation story) according to their tribe.
   ii.   Teacher researches about the origin of man according to different tribes.

Teacher's activity	Students' activity	Knowledge, skills and value	Output
Takes a glance at the stories in the students' books on the origin of man according to their tribes.	Present the books for checking	**Knowledge** Stories about the origin of man from different tribes	The stories in the books of the students on the origin of man according to their own tribes (from research)
Asks students to get into groups according to their tribes to first read to each other their stories on the origin of man and then harmonise them with the teacher's guidance	Get into groups according to their tribes to first read to each other their stories on the origin of man and then harmonise them with the teacher's guidance	**Knowledge** Origin of man according to each one's tribe **Skills** Collaborating with colleagues Reading fluently Listening attentively **Values** Respect for humanity Open mindedness	A harmonized document on the origin of man according to each tribe

Source: Own compilation, 2023

According to the lesson plans, the teacher's role throughout the entire lesson was primarily to facilitate learning through learner-engaging activities that enhanced guided discovery at every step of the lesson. The teacher planned clear instructions for each and every activity and asked guiding questions that involved the learners in a process that could enhance their critical-thinking skills.

Overall, the quality of the teachers' lesson plans improved after teachers were introduced to and taken through the critical thinking coaching process. The final versions of their lesson plans across all topics in all three subjects (English, history, and mathematics) scored higher in quality than the initial versions. Moreover, the gap between the first version of the lesson plan and the final version was considerably reduced over the course of the coaching process.

7. Discussion of the Findings

The findings indicated that, though designing for teaching had always been a school requirement, lesson planning activities prior to the intervention were done just for formality. Lesson planning was utilised for compliance with rules, but it was not student-centred in its conceptualisation or in its implementation. There was no clear objective to be achieved, and the learning outcomes were mostly related to the factual knowledge to be passed to the students. The literature shows that while planning for their lessons, teachers tend to focus on the content and strategies before considering the objectives of their lessons; they might think about the available resources, but they rarely consider assessment strategies in the lesson (Ball et al., 2007). It is common practice for teachers to plan for their students without considering

their characteristics, without considering the needs or the preferences of the learners themselves, and (consequently) without involving them in the design process (Könings et al., 2010). As frequently happens in Uganda, the demands of the school administrators are often at the forefront of teachers' planning decisions (Ball et al., 2007). The professional development process presented in this study helped the teachers rethink how they planned for instruction; the coaching sessions helped them make deliberate decisions in their lesson planning. They also realised how important it is for the learners to be aware of the objectives of the lesson; this helped them reflect, in their lesson designs, on what exactly they wanted to achieve at every step of the learning process. Subsequently, the choice of the activities to be implemented was developed around the objective and needed to be appropriate to the goal, starting from the actual needs and challenges the students face.

The lesson plan template co-constructed with the teachers allowed them to have a focused objective and purpose for their instructional planning. This template and consistent instructional coaching support helped the teachers to be consistent in their planning and coherent in their development of activities.

8. Conclusions and Recommendations

The study confirmed that providing a professional development programme that focuses on instructional planning strategies and coaching is beneficial for improving teachers' instructional design and classroom instruction.

The teachers showed a greater ability to differentiate between the cognitive process and mere rote learning, helping them to elicit student thinking and to remain open to students' discoveries and ideas. This increased attention to the students also led the teachers to research lesson preparation; the desire to reach out to each and every student led to increased attention toward finding the most appropriate tools and instruments for facilitating learners' participation and understanding. The teachers of the three subject matters (i.e., English, history, and mathematics) have also broadened their instructional efforts by focusing on developing concepts and skills in learners rather than focusing solely on the transfer of factual knowledge.

At the end of the process, the lesson plans were clearer and more coherent, incorporating activities that could improve the learners' critical-thinking skills. The shift from focusing on factual knowledge to helping students become responsible for their own knowledge was documented in the evaluation of the lesson plans. The process, moreover, gave the teachers the ability to break up complex competencies into smaller subskills, and it helped them to develop simple performance tasks for the learners that could build the learners' knowledge, skills, and values, as indicated by the new competency-based curriculum (NCDC, 2019). In addition, the lesson plan template became a useful tool for the teachers; it allowed them to have a comprehensive approach toward the whole thematic unit. In this model, the teachers not only focus on the small objectives of a short lesson but also on the bigger picture, establishing aims for the unit that are focused on the students' challenges and on the essential questions that should lead the whole development of the lesson.

The study findings have vital implications for educational reforms in Uganda. In the newly reformed lower secondary curriculum (NCDC, 2019) and Uganda's Vision 2040, the learner is for the first time placed at the centre of the educational journey, with the aim of fostering deep learning and the competencies that will help students thrive in life and in the job market. One of the crucial components of this reform is to create an education system that endows learners with the cognitive skills that will enable them to become active and productive citizens and work for the good of themselves and their communities. This vision relies mostly on nurturing problem-solving and critical-thinking skills, as

learners need to interpret and use existing evidence to make decisions or contemplate possible solutions to problems.

However, the introduction of a new competency-based curriculum—which is in line with the education strategies of other East African countries—should pose questions on the origin of the conceptual frameworks underpinning the curricula reforms. The generic skills framework proposed by the new curriculum is based on Western conceptualizations and models. Even though what inspired the reform in Uganda was a market research study (Cambridge Education, 2012) that highlighted local market needs for higher-order thinking skills including critical thinking, problem solving, and creativity (among others), there is no clear evidence of a contextualisation process or of understanding of how these skills might be related to the local environment. This has a direct impact on the implementation of the reform and on the achievements of learning outcomes. Is the reform a step toward achieving a delinked (Mignolo & Escobar, 2013) education system that, while looking at the future, aims at rediscovering the uniqueness of the East African local cultures? Is the system prepared for this epochal change? Are we confident that the educational system and the main stakeholders are open to or capable of change? Perhaps education, even if it improved, could not make a difference given the societal conditions outside the direct sphere of influence of the educational sector. This reminds us of the Greek word metanoia, which means a radical shift of mind. This is what needs to accompany every educational reform or change (Fullan, 1994b, 1994a). Without such a metanoia, "the insurmountable basic problem is the juxtaposition of a continuous change theme with a continuous conservative system" (Fullan, 1994a, p. 3). This top-down reform could now be coupled with a more bottom-up approach through which the teachers and school leaders can find their way and navigate through the challenges that this reform poses. The question of how this can be incentivised is still relevant, and this study offered what could be a viable possible solution to the challenge.

Thus, 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, continuous professional development training, as already stated in the new Uganda National Teacher Policy (Ministry of Education and Sports, 2019), would be a first step, particularly given that the vast majority of teachers in Uganda have not had any personal experience with pedagogical innovations that may impact critical thinking.

A recent study also highlighted the gaps of the Ugandan pre-service teacher education curricula (Ministry of Education and Sports, 2020) and underscored the importance of focusing on critical thinking and life-skills enhancement at the pre-service level of teacher formation. This professional development model could thus serve as a tool for implementing new pedagogical approaches at the tertiary and university levels.

At the regional level, achieving the Sustainable Development Goals by 2030 (at least for sub-Saharan Africa), requires resilient efforts in facilitating education systems that produce graduate learners who are well-equipped for 21st-century living and working. The education systems in East Africa are integrating values and life skills, but at varied levels. Kenya is already implementing a curriculum that has integrated 8 values and 7 core (21st century) skills. Uganda, as mentioned, has integrated life skills in both policy and curriculum. Tanzania is revisiting and revising the National Life Skills framework and has even developed tools and a detailed strategy for formative assessment of selected life skills at primary and secondary levels.

Implementing this study in only one secondary school in Uganda poses questions of generalizability. This coaching model for teacher professional development could be implemented in other schools in the

context and with more teachers involved in the process. A quantitative approach could also be implemented to measure the impact of the model on teachers' and learners' critical-thinking skills.

Further research on teacher knowledge, especially teacher pedagogical knowledge specifically linked to nurturing critical thinking and other higher-order thinking skills, would be beneficial for crafting teacher education programmes that recognize the essential role that these aspects play in generating a system that aims at improved outcomes for all learners (Kadir, 2017). Going beyond the Ugandan context, the study methodology could be successfully implemented in other countries. Adapting the methodology for use in other African contexts could provide insight into the concept of critical thinking elsewhere in the region and expand the understanding of how the region's education systems may be helping or hindering the development of critical thinking in their student populations.

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Declaration Statements

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