Practicalizing the Theory: Daily Scheme of Learning and Lesson Implementation

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Abstract: This study was purposed to examine the relationship between lesson plan (scheme of learning) and lesson implementation among in-service teachers and pre-service teachers at the basic level. Interview guides and scoring rubrics were used to collect both qualitative and quantitative data to test the hypothesis and answer research questions. The respondents were made up of 91 mathematics in-service teachers and 89 mathematics pre-service teachers. The findings of this study show that in-service teachers demonstrated a higher level of competence in lesson planning. The ability of pre-service teachers to plan a lesson significantly impacts the lesson plan's implementation, and effective training and support are crucial. However, there was no significant relationship between in-service teachers' ability to plan a lesson and their ability to implement it, suggesting that other factors such as adaptability to unexpected situations in the classroom may play a more significant role. The study highlights the importance of effective lesson planning for successful teaching and student learning and the need for ongoing professional development and support for both pre-service and in-service teachers in this area. Further studies are needed to explore the factors that contribute to the difference in pre-service and in-service mathematics teachers' ability to prepare lesson plans.

Keywords: Lesson plan, Pre-service teachers, In-service teachers

1. Introduction

"Education is not the filling of a pail, but the lighting of a fire." - W.B. Yeats (Kongari, 2018). This thought-provoking quote by W.B. Yeats underscores the essence of education as an endeavour that goes beyond rote memorization, emphasizing the kindling of curiosity and intellectual growth. At the heart of this endeavour lies the process of crafting a meticulous lesson plan, a dynamic blueprint that bridges the chasm between educational intent and meaningful learning experiences.

The process of crafting a comprehensive lesson plan holds a pivotal role within the domain of pedagogy, serving as a linchpin for facilitating effective teaching and learning experiences. A lesson plan, meticulously structured and richly informative, encapsulates critical elements such as the lesson's objectives, anticipated learning outcomes, pedagogical strategies, and evaluative techniques (Stringer, Christensen, & Baldwin, 2009; Cicek & Hidayet, 2013). It functions as a compass, guiding educators through the educational journey and enabling them to forge meaningful interactions with their students. This process fosters the realization of predetermined educational objectives. Implementation, on the other hand, denotes the concrete translation of the meticulously outlined plan into actionable teaching practices, embodying the strategies that transform educational intent into reality.

The insightful findings of Lederman & Niess (2000) underscore a notable gap in the comprehension of aspiring educators regarding the foundational rationale underscoring the imperative need for constructing a robust lesson plan. These future teachers often think that planning a lesson is unnecessary. This is a clear gap in their understanding. They contend that their intuitive ability to discern the content for forthcoming lessons should suffice. However, as educators, we understand that the inherent complexity of the educational process necessitates a more structured approach to ensure comprehensive learning experiences for all students.

Furthermore, within academic circles, there exists a faction of instructors who downplay the relevance of structured lesson-planning procedures (Conkell & Imwold, 1992). These "lay-down lesson planning procedures" refer to established frameworks or templates that guide teachers in designing their lessons. The debate around their necessity is a reminder of the diverse perspectives within the educational community. Such discourse prompts contemplation on how educators, both prospective and established, perceive the role of lesson planning in the educational landscape.

Delving deeper, instances come to light where pre-service teachers exhibit commendable proficiency in conceiving high-calibre lesson plans, only to encounter challenges when it comes to executing them effectively (Schmidt, 2005;Grossman, Hammerness, & McDonald, 2009; Stuhlman & Pianta, 2009). These challenges might include classroom management issues, adapting to diverse learning styles, or addressing unexpected questions from students. This phenomenon sheds light on a critical facet of pedagogical practice—while

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meticulously designed lesson plans undoubtedly bear immense value, their successful implementation isn't an assured outcome. This revelation raises pertinent questions about the factors contributing to this discrepancy and the intricate dynamics that govern the translation of planning into practice. This prompts reflection on the inherent complexities of teaching, where the fusion of planning acumen and instructional prowess plays a decisive role.

Parallels can be drawn to the experiences of in-service educators who rely on established lesson plans, commonly referred to as schemes of learning. These standardized plans are crafted to streamline curriculum delivery, ensuring consistency across educational settings. Thus, a compelling avenue of inquiry emerges a comprehensive evaluation of both pre-service and in-service educators' capacity to articulate and execute finely calibrated lesson plans. This dual exploration illuminates the spectrum of pedagogical competence, stretching from the formative stages of educators' careers to their subsequent professional trajectories.

Expanding the purview, it becomes increasingly evident that dissecting the complex relationship between the creation of a meticulously devised lesson plan and its practical implementation resonates as a pressing concern within the Ghanaian basic school context. This warrants an extensive inquiry into the Ghanaian educational landscape's unique nuances, identifying the factors that either bolster or hinder the seamless transition from planning to practice. This research seeks to enquire about how the process of preparing and implementing effective lesson plans within the mathematics classroom poses challenges for both pre-service and in-service teachers, and what are the interrelated dynamics between their planning and implementation efforts.

This endeavour's significance lies not only in enriching the discourse on pedagogical best practices but also in forging actionable insights that can catalyse positive transformations in educational paradigms. The exploration of challenges faced by pre-service educators during the process of conceiving and executing lesson plans is poised to uncover intricate barriers that may range from pedagogical uncertainties to contextual constraints. The investigation into the nexus between meticulously designed lesson plans and their real-world impact offers the promise of enhancing instructional effectiveness, thereby nurturing a generation of learners primed for academic success.

Therefore, the construct of lesson planning stands as a cornerstone in educational practice, weaving together pedagogical foresight and instructional execution. The chasm in understanding unearthed by Lederman & Niess (2000) underscores the need to further explore the nuanced dynamics that shape educators' perspectives on the planning-practice continuum. The intricacies of lesson planning and its implementation present a fertile ground for scholarly investigation, promising to unravel multifaceted insights that hold the potential to reshape teaching and learning paradigms. As the educational landscape evolves, embracing the intricate interplay between planning and implementation emerges as a hallmark of effective pedagogical stewardship.

2. Literature Review

2.1. Empirical Study

Several empirical studies have been done on lesson plans and their implementation both locally and globally. Garet, Porter, Desimone, Birman, & Yoon's (2001) studies were to examine the relationship that exists between the quality of a lesson and its implementation. Their findings show that teachers who plan quality lessons are most likely to implement them and vice versa. Penuel, Fishman, Cheng, & Sabelli (2011) studied the relationship between teachers' use of curriculum materials and students' learning outcomes. Their results show that teachers who used curriculum materials more consistently and effectively can model students who performed better on standardized tests. Other studies (Kennedy, Lyons & Quinn,2014; Januarta, Utami & Utami, 2021; Mulyaningsih, & Arifin, 2021) shows that experienced teachers are highly probable to effectively implement a lesson plan than novice teachers. In addition, novice teachers find it challenging to manage curriculum requirements and meet their learners' individual needs (Pierson, 2021). They then address these and other challenges by consulting experience teachers for guidance and using textbooks (Pierson, 2021; Ball & Forzani, 2011). Similar studies were done by Darling-Hammond & Wei (2010) and Hattie (2012). They found that a lesson that has been aligned with the state standards was more effective comparatively.

It can be said that a lesson's effectiveness can be measured based on its alignment with state standards. Also, teachers who use curriculum materials like lesson plans are bound to have their students perform well at the end of their lessons. Again a well-planned lesson can result in the effective implementation of the plan.

Some local researchers have also looked at lesson plans and lesson implementation. Sitabkhan & Ampadu (2022) study reveals that effective lesson plans may highly lead to effective classroom practices like better classroom management and student engagement. Kopsasih & Sujanto (2018) also found that teachers who intermittently receive in-service training and support implement their lessons effectively. Again, lesson plans that are in line with the curriculum standards improve students' achievement (Essel, Vlachopoulos, Tachie-

Menson, Johnson & Baah, 2022) and improve the teachers' attitude toward teaching (McDonald, Klieve, & Kanasa, 2021).

In conclusion, there is a positive relation relationship between a lesson plan and classroom management in the Ghanaian context. A teacher who receives training and other forms of support is at a higher advantage in planning an effective lesson and implementing it. This results in meeting the need of the students and hence improved achievement.

Literature shows that these studies establish the relationship between lesson plans and other factors like class management, students' achievement and others. The population for the studies was mainly in-service teachers. The current study will add to knowledge by determining the relationship between a lesson plan and its implementation among both in-service teachers and pre-service teachers.

2.2. Theoretical Framework

This study pines on David Kolb's experiential learning theory. This theory is influenced by the works of Jean Piaget, John Dewey & Kurt Lewin. The experiential learning theorist is of the view that learning is best done when learners experience it themselves (Kolb, Boyatzis & Mainemelis, 2014). That is knowledge experienced by learners stays with them for a long and it's easy to retain and remember facts. Kolb breaks the process of teaching and learning into 4 stages. The first stage is the concrete experience stage, where learners are allowed to manipulate materials (hands-on activities). This is followed by the reflective observation stage, where learners are allowed some time to reflect on what they have learnt from the first stage. The next stage is the abstract conceptualization stage. This is where the mathematics teacher abstractly lectures students on the lesson of the day. The last stage is the active experimentation stage. This is where learners are given the opportunity to apply their knowledge and skills for the day to solve a problem.

This theory suggests that mathematics teachers should create an opportunity that will help learners to engage in first-hand or hands-on activities that ensures learners' direct experience with the content (Chapman, McPhee & Proudman, 1992). Teachers are therefore encouraged to incorporate experiential activities in their lesson planning that will give room for learners to apply the theories they have learned practically. That is when they are gathering resources to plan the lesson and in the actual planning of the lesson (adapting the GES-prepared lesson plan), they should be guided by the experiential teaching theory. And consequently, this will feature in the implementation of the lesson. This in addition is in line with the Ghanaian basic school mathematics curriculum. It encourages the teacher to engage learners in hands-on and mind-on activities to promote the teaching and learning of mathematics.

2.3. Conceptual Framework

The development and implementation of a lesson plan can be broadly divided into three stages, namely the pre-planning stage, planning stage and post-planning stage. The first stage is the Pre-Planning Stage. At this stage, teachers gather data on learners, the context, and the learning outcomes. Activities performed at this stage include analyzing the needs of the learners, the available resources, and the learning environment. All this activities is done, keeping in mind the experiential theory. The second stage is the planning stage which involves the actual designing of the lesson plan. At this stage, mathematics teachers are to plan the lesson in a way that will address the needs of the learners, align it with the curriculum, select appropriate teaching and learning strategies that will help in the achievement of the set objectives and use assessment techniques that will help in improving the lesson another time. Although there is a model lesson plan available for mathematics teachers, they adapt this model to fit their situation. In the adaption of the model lesson plan, teachers are guided by the experiential teaching and learning theory. The last stage is the post-planning stage which involves the teaching or implementation of the lesson plan, assessing the progress of the learners as well as the lesson and making the necessary adjustment to the lesson plan base on the feedback from the assessment. The activities in the class will encompass the four Stages of Kolb's experiential theory. That is, the mathematics teacher will start the lesson activities with the concrete experiences stage. The teacher will engage students in hands-on activities that allow them to explore mathematical concepts in a tangible way. For example, they can use manipulatives to learn about fractions or use measuring tools to understand geometry. The next activity will involve reflective observation. Where the mathematics teacher will allow students some time to reflect on what they have learned and how it connects to their prior knowledge. This can be done through discussions, writing assignments, or group activities. The next activity will involve abstract conceptualization. The mathematics teacher will now guide students to draw connections between what they have learned and mathematical concepts in a more abstract way. This can be done through problem-solving activities or mathematical modelling. The final stage of the lesson activities will be the active experimentation stage. At this stage, the teacher will now guide students to apply the mathematical concept they have learnt for them to solve a real-life problem or create mathematical models, or use technology to explore mathematical concepts. This can be done independently or in groups.

By incorporating all four of these elements into their teaching, mathematics teachers can help students to develop a deeper understanding of mathematical concepts and see how they apply to real-world situations. Additionally, by providing opportunities for students to reflect on their experiences and engage in active experimentation, teachers can help students to become more self-directed learners who are able to take ownership of their learning.

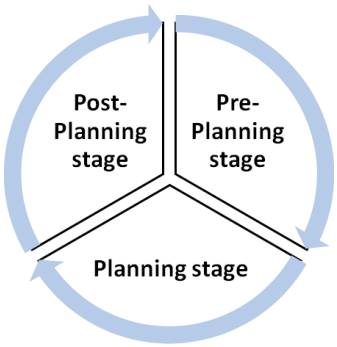

Figure 1. Conceptual Framework on Developing and Implementing a Lesson Plan (Scheme of Learning)

2.4. Research Question and Hypothesis

This paper seeks answer to the following research question: What challenges do pre-service and in-service teachers face as they plan to prepare and implement an effective lesson plan in the mathematics classroom?

In particular, the following three research hypotheses were set:

$H_0$1: There is no statistically significant difference between pre-service mathematics teachers' ability to prepare a scheme of learning and in-service mathematics teachers' ability to prepare a scheme of learning

$H_0$2: There is no relationship between a scheme of learning prepared by pre-service mathematics teachers and its implementation in the classroom

$H_0$3: There is no relationship between a scheme of learning prepared by in-service mathematics teachers and its implementation in the classroom

3. Method

In this section, information about the research model, participants, data collection tools and data analysis will be given.

3.1. Research Design

The paradigm or philosophy supporting this study is pragmatism and the approach was the mixed method. The embedded mixed method design was used.

The design for the study was embedded mixed method design. The study largely collected quantitative data to test the hypothesis and a small qualitative data is collected to answer the research question (Creswell, Klassen, Plano Clark & Smith, 2011).

3.2. Participants

The accessible population for this study was made of both in-service basic school teachers who teach mathematics and pre-service who are on out programme (Off-campus teaching practice) in the Northern region of Ghana. The region has four public colleges of education and over 5,000 basic schools (Ghana Statistical Service, June 2018).

A convenient non-probability sampling technique was used to select 91 mathematics in-service teachers and 89 mathematics pre-service teachers. A focus group was selected among the teachers who had a mismatch in the scores for the lesson plan and its implementation and interviewed on the causes of this mismatch.

3.3. Instrument

The instruments that were used in collecting the data for the study include scoring rubrics and an interview guide. The scoring rubric was made up of three sections. The first section of the instrument gathered data on respondents' backgrounds like sex, experience, etc. The second section contains rubrics which were scaled to measure the lesson plan presented. It was scaled from 1 to 5. The third part was of a similar format which was also used to score the implementation. The instrument was adapted from the rubrics used by the colleges to assess pre-service teachers on off-campus teaching practice.

The interview guide was designed by the researcher. It was made up of two parts. The first part was for bio-data and the second part of data on the challenges pre-service teachers face as they plan and implement a lesson in a mathematics classroom.

3.4. Data Collection Procedures

The lesson plan was first scored based on the rubrics and the teachers now went ahead to teach the lesson plan they have presented. The researcher observed and score as the teacher teaches. A focal person selected from the pre-service teachers was interviewed.

3.5. Data Analysis

Both qualitative and quantitative data analysis were used. The data that was collected using the rubrics were analyzed using independent t-test and regression respectively (first hypothesis for the t-test and last 2 for the regression test). Thematic analysis was used for the qualitative data.

3.6. Pilot Testing of Research Instrument

Both instruments of the study was pilot tested in two schools at Navorongo, to test their reliability and validity. To ensure the instruments were valid, they were first submitted to some colleagues for their input to shape the instruments. Thus face, content, and construct validity of the instruments were tested.

An interrater reliability test was employed on the instrument. The researcher and a colleague college mathematics tutor observed the same lesson plan and teaching. Both scored with the same rubric. The alpha value obtained was concluded based on Selim's (2016) assertion. Thus, an alpha value less than 0.7 cannot be accepted, that is, it's not reliable. Thus an alpha value of 8.2 was obtained, for the scoring rubrics, hence the instrument is valid.

To ensure the trustworthiness of the results from this instrument (interview guide), strategies like member checking, and peer debriefing were employed. First, the findings from the study were shared with participants to ensure that their responses were accurately captured. Also, the findings of this study were shared with other researchers in this field to gain their perspectives on the analysis.

4. Findings

To answer the research question, a focus group of pre-service teachers were interviewed. One of the focal persons indicated that "One of the major challenges is understanding the diverse learning needs of students and finding ways to cater to them effectively. She added that because they have not been with them for long, it's difficult to know them well. For instance, their sociocultural background, learning abilities etc". Another also indicated that "it is challenging to find the right balance between covering the curriculum and ensuring that students have a solid understanding of the material. And also added that it is challenging to create engaging and interactive lesson plans that keep students motivated and interested in the subject matter". The last person made a reference to time. She stated that "there is the challenge of managing time effectively and ensuring that all the necessary content is covered within the allotted time frame".

They were asked how they intend to overcome these challenges. The measures they intend to put in place to overcome these challenges include seeking guidance from experienced educators, utilising resources such as textbooks, online tools, and lesson plans, and continuously reflecting on their teaching practices to improve and adapt them based on student feedback.

Table 1. Difference between the abilities of pre-service and in-service teachers in preparing a lesson plan

		Levene's Test for Equality of Variances				
		F	Sig.	t	df	Sig. (2-tailed)
Lesson plan	Equal variances assumed	.590	.443	-8.357	339	.000
	Equal variances not assumed			-9.419	197.700	.000

From Table 1, it appears that there is a statistically significant difference between the abilities of pre-service and in-service teachers in preparing a lesson plan (scheme of learning). Levene's test for equality of variances indicates that the variances of the two groups are equal, and the t-test for equality of means shows a significant difference between the two groups.

The mean difference between the two groups was -0.467 indicating that in-service teachers had a higher ability to prepare a lesson plan than pre-service teachers. This result was statistically significant at the 0.05 level, with a two-tailed p-value of 0.000.

Table 2. The impact of in-service teachers' ability to plan a lesson and its impact on the implementation of the plan

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	22.127	1	22.127	247.241	.000[b]
	Residual	22.373	90	.089		
	Total	44.500	91			

Table 2 shows the results of a regression analysis examining the impact of pre-service teachers' ability to plan a lesson on the implementation of the lesson plan. The dependent variable is "Lesson plan implementation," and the predictor variable is "Lesson plan," which measures the pre-service teachers' ability to plan a lesson.

The regression analysis shows that the model is significant ($F=247.241$, $p<.001$), indicating that the pre-service teachers' ability to plan a lesson has a significant impact on the implementation of the lesson plan. The model explains 49.7% of the variance in lesson plan implementation.

The coefficient for the lesson plan variable is 4.698, indicating that for every one-unit increase in the pre-service teachers' ability to plan a lesson, there is a 4.698-unit increase in lesson plan implementation. The statistical significance denoted by this "b" attached to the significance value underscores the robustness of the findings, further reinforcing the notion that the pre-service teachers' ability to design effective lesson plans indeed contributes significantly to their successful implementation.

The purpose of this regression analysis was to examine the potential relationship between in-service teachers' ability to plan a lesson and the subsequent implementation of the lesson plan. The analysis involved a sample of 89 participants.

Table 3. The impact of in-service teachers' ability to plan a lesson and its impact on the implementation of the plan

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.004	1	.004	.217	.642[b]
	Residual	1.407	88	.016		
	Total	1.411	89			

Table 3 provides the results of a regression analysis that investigates the relationship between in-service teachers' ability to plan a lesson and the implementation of the lesson plan. The analysis was conducted on a sample of 89 participants, with the dependent variable being the implementation of the lesson plan.

The first row of the table presents the results of the regression model. The regression model includes one predictor variable, which is the ability to plan a lesson and a constant term. The sum of squares for the regression is 0.004, with 1 degree of freedom (df) and a mean square of 0.004. The F-value for the model is 0.217, which is not statistically significant ($p > 0.05$), indicating that the ability to plan a lesson does not significantly predict the implementation of the lesson plan. This suggests that the ability to plan a lesson, as reflected by the coefficient "b," is not statistically significant in predicting the implementation of the lesson plan.

The second row of the table presents the results of the residual, which is the difference between the predicted values from the model and the actual values in the data set. The sum of squares for the residual is 1.407, with 87 degrees of freedom (df) and a mean square of 0.016.

The last row of the table presents the total sum of squares, which is the sum of the regression and residual sum of squares. The total sum of squares is 1.411.

In summary, the results of the regression analysis suggest that there is no significant relationship between in-service teachers' ability to plan a lesson and the implementation of the lesson plan.

5. Discussion

According to a study by Pierson (2021), pre-service teachers often struggle with adapting their teaching to meet the diverse learning needs of their students, finding the right balance between covering the curriculum and ensuring student understanding, and creating engaging and interactive lesson plans. These challenges are often exacerbated by their limited experience in the profession.

To overcome these challenges, the pre-service teachers in the focus group suggest seeking guidance from experienced educators, utilizing resources such as textbooks and online tools, and continuously reflecting on their teaching practices to improve and adapt them based on student feedback. These strategies are consistent with recommendations in the literature (Pierson, 2021; Ball & Forzani, 2011) for pre-service teachers to develop their teaching skills and overcome common challenges.

Hypothesis one states that "There is no statistically significant difference between pre-service mathematics teachers' ability to prepare a scheme of learning and in-service mathematics teachers' ability to prepare a scheme of learning". The findings from the study indicate that in-service teachers had a higher ability to prepare a lesson plan than pre-service teachers. One study that supports this finding is a research article by Januarta, Utami & Utami (2021), which found that pre-service teachers often struggle with the complex task of planning and organizing a lesson effectively. Another study by Mulyaningsih, & Arifin, (2021) found that in-service teachers had a higher level of competence in lesson planning than pre-service teachers.

The results for hypothesis two (There is no relationship between a scheme of learning prepared by pre-service mathematics teachers and its implementation in the classroom) show that pre-service teachers' ability to plan a lesson has a significant impact on the implementation of the lesson plan.

This finding is consistent with previous research indicating that effective lesson planning is essential for successful teaching and student learning (Darling-Hammond, 2017; Hattie, 2012). In conclusion, the results suggest that pre-service teachers' ability to plan a lesson is a critical factor in the successful implementation of lesson plans, and highlights the importance of providing effective training and support for pre-service teachers in this area.

Hypothesis three was testing the relationship between a scheme of learning prepared by in-service mathematics teachers and its implementation in the classroom. The regression analysis suggests that there is no significant relationship between mathematics in-service teachers' ability to plan a lesson and their ability to implement the lesson they have planned. This finding is consistent with previous research that has shown that the quality of lesson planning does not necessarily guarantee the successful implementation of the lesson (Grossman, Hammerness, & McDonald, 2009; Stuhlman & Pianta, 2009). It can be said that other factors, such as the teacher's ability to adapt to unexpected situations in the classroom, maybe more important for successful lesson implementation.

6. Conclusion and Recommendations

Based on the findings of the study and previous research, it can be concluded that there is a significant difference in the ability of in-service and pre-service teachers to prepare a lesson plan, with in-service teachers demonstrating a higher level of competence in this area. Furthermore, the study suggests that the ability of pre-service teachers to plan a lesson has a significant impact on the implementation of the lesson plan and effective training and support in this area are crucial.

On the other hand, the study did not find a significant relationship between the ability of in-service teachers to plan a lesson and their ability to implement the lesson they have planned. Other factors such as adaptability to unexpected situations in the classroom may play a more significant role in the successful implementation of a lesson.

In a nutshell, the study highlights the importance of effective lesson planning for successful teaching and student learning and the need for ongoing professional development and support for both pre-service and in-service teachers in this area.

Investigate the factors that contribute to the difference in the ability of pre-service and in-service mathematics teachers in preparing lesson plans. This study can include exploring the impact of experience, teacher training programs, and teaching styles on lesson planning skills.

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