

Effectiveness of Activity-Based Learning and Project-Based Learning for Improving Preservice Teachers' Teaching Skills in a Micro Teaching Course

By

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Abstract

Innovative teaching methods are gradually becoming indispensable. Today, more than ever, teacher trainers are expected to think critically about effectively applying activity-based and project-based learning in a micro-teaching course. This study investigates the effectiveness of activity-based and project-based learning for improving preservice teachers' teaching skills in a micro-teaching course. The study employs the experimental research design. A purposive sampling technique is used to select a sample of 63 second-year students out of 300 undergraduate students of the Department of Curriculum and Pedagogy in the Faculty of Education of the University of Bamenda. Stratified randomisation is used to place students into two treatment groups: control and experimental. Each group is made up of 21 students. Data for the study is collected using a self-constructed pre-test and post-test. The instrument is face validated by two experts, and the Cronbach alpha reliability coefficient is 0.821. The estimation technique used is a paired sample t-test. From the findings, the higher post-test scores as compared to pre-test scores reveal that, micro-teaching course has resulted in the expected acquisition of teaching skills. The results for hypotheses one and two are statistically significant ($t=5.542$; $df=20$; $p=.000$) and ($t=5.878$; $df=20$; $p=.000$) respectively. The study concludes that activity-based and project-based learning are effective, innovative methods for improving preservice teachers' teaching skills. Based on the findings, this study recommends that teachers and learners should frequently use innovative teaching methods in a micro-teaching course and other courses alongside other innovative teaching strategies. Higher education authorities should insert innovative teaching methods and strategies into their programmes.

Keywords: Activity-based learning, project-based learning, preservice teachers, teaching skills, micro teaching course.

Introduction

The importance of innovative teaching methods like activity-based learning and project-based learning has become very glaring in the face

Nubonyin Hilda Fokong

of the technological revolution and innovation to provide 21st century skills. Activity-based learning and project-based learning are believed to encourage not only active participation and engagement but can result in a better improvement in critical thinking skills, creativity, collaboration and communication skills (Mustapha et al., 2020; Cohen & Cipollone, 2021). Put simply, Ikbal (2023) describes activity-based learning as one that encourages active student engagement, participation through hands-on activities and practical experiences, enabling deeper understanding and better retention of knowledge. Whereas, project-based learning refers to an innovative teaching method that encourages students to work on real-world projects, collaborating with peers to find creative solutions to complex problems (Ikbal, 2023). From this conceptual review, it is worth noting that, for activity-based learning and project-based learning to be effective, teacher trainers (educators) in a micro-teaching course must ensure that pre-service teachers acquire several basic teaching skills. These skills include: introduction, chalkboard writing, questioning, explanation, illustration, reinforcement, stimulus variation, classroom management and achieving closure, among others (Ambarini et al., 2023). Despite the mentioned empirical facts, a question remains: Are pre-service teachers able to master numerous teaching skills as expected in micro-teaching and the learning process?

To attempt an answer to this question, it is important to examine the concept of micro-teaching and how activity-based learning and project-based learning are practised in a micro-teaching course. Interestingly, there is no single definition of micro-teaching. In Cameroon, Zama and Endeley (2023) observed that micro-teaching is an effective method of teacher training and the most effective tool for bridging the gap between theory and practice. At the simplest level, micro teaching is a cycle that generally seeks to enhance pre-service teachers' teaching skills, through the process of planning, teaching, feedback, re-planning, re-teaching and re-feedback. This therefore elucidates the view that micro

Effectiveness of Activity-Based Learning and Project-Based Learning

lessons should be taught between five to ten minutes, in a reduced class size, with reduced tasks to be accomplished and skills to be employed, and student teachers should get feedback and re-teach after getting feedback (Arsal, 2015). From the aforementioned micro teaching cycle, there is no doubt that activity-based learning and project-based learning are innovative methods that may likely offer the opportunity to pre-service teachers to clarify, apply, question and consolidate new knowledge. Unfortunately, nowadays, even when the teacher trainer explains a lesson in detail and creates a positive learning environment, it can still be hard to spot whether there is an improvement in pre-service teacher acquisition of teaching skills.

Amongst other concerns in a micro teaching course are the valuable role that teacher trainers have played over time through tailoring activities to match pre-service teachers' learning styles, preferences and abilities; and guiding them through various activity-based and project-based learning tasks. This implies that activity-based learning and project-based learning provide several benefits that foster hands-on activities and personalised learning opportunities that prepare pre-service teachers for lifelong learning, citizenship and participating in the information age (Tian et al., 2023; Ikbal, 2023). It is unfortunate that in many instances, these critically important skills and teaching behaviours are primarily acquired by pre-service teachers as they immerse themselves in field classroom teaching rather than being taught in a micro-teaching course (Zama & Endeley, 2023). In this respect, the real worry could be that either the teachers who teach the curriculum are not sufficiently effective, or perhaps the pre-service teachers are not ready to learn.

Statement of the Problem

The lack of properly trained educators to teach a micro-teaching course has resulted in many pre-service teachers being unable to effectively teach after going through the process of planning, teaching,

feedback, re-planning, re-teaching and re-feedback in a micro-teaching course. A majority of pre-service teachers do not possess the skills of introduction, chalkboard writing, questioning, explanation, illustration, reinforcement, stimulus variation, classroom management and achieving closure, which is a big contributor to the problem. Another problem is that many teacher trainers assigned to teach the micro-teaching course are still working through the challenges of applying activity-based learning and project-based learning in a micro-teaching course. The lack of empirical literature provides little or no evidence to ascertain the ability of pre-service teachers to be actively engaging and to improve their critical thinking, creativity, collaboration and communication skills in a micro teaching course. It is against this backdrop that this paper attempts to provide answers to the following questions:

1. How effective is activity-based learning in improving pre-service teachers' teaching skills in a micro-teaching course?
2. How effective is project-based learning in improving pre-service teachers' teaching skills in a micro-teaching course?

The following research hypotheses were formulated to guide the study:

1. H_{0_1} : There are no statistically significant differences between the mean scores in activity-based learning in improving pre-service teachers' teaching skills in a micro-teaching course.
2. H_{0_2} : There are no statistically significant differences between the mean scores in project-based learning in improving pre-service teachers' teaching skills in a micro-teaching course.

2. Literature Review

From a theoretical perspective, this study is based on experiential learning theory, which is commonly known as learner-centred teaching (Fokong, 2023). In the context of this study, the theory holds that meaningful learning occurs when teachers engage preservice teachers in tasks and activities through micro lessons based on activity-based learning and project-based learning. The framework of the theory explains that providing opportunities for preservice teachers to use their concrete experiences to contextualize teaching, reflective observation by reflecting on their peer teaching and their own teaching and active

Effectiveness of Activity-Based Learning and Project-Based Learning

experimentation by actively participating in micro lesson is likely to help them in developing teaching skills such as pre-instructional skills, instructional skills and post instructional skills all based on critical thinking, creativity collaboration and communication skills. Under this logic, this theory is based on the three phases of micro teaching, namely: knowledge acquisition, skill acquisition and transfer. Candidly, this theory is relevant to this study because it examines the activities in which preservice teachers participate as learners (being taught during the lesson), as teachers (by teaching the lesson) and as observers (by observing the lesson and giving feedback about the lesson or receiving feedback) in front of their peers in a constructive atmosphere.

The importance of activity-based learning and project-based learning in improving preservice teachers' teaching skills in a micro-teaching course has been well articulated in the literature. Empirically, Ikbal's (2023) content analysis study indicated that activity-based learning equips learners with essential skills needed in the 21st century. To him, the reasons for learners not acquiring these skills are attributed to numerous factors such as: time constraints, curriculum pressure, classroom management and resource limitation.

In another study, Mustapha et al. (2020) investigated the use of an activity-based learning strategy in enhancing students' outcomes in English Language and Basic Science. He employed and stratified sampling technique to sample 110 Junior Secondary School students in two selected schools from a target population of 643 students. The quasi-experimental study and independent t-test results show that activity-based learning strategy significantly enhances students' outcomes in English Language and Basic Science. Ho (2018) corroborates the idea, claiming that activity-based learning fosters creativity and innovative thinking by encouraging students to explore and experiment with different solutions, thus developing a deeper appreciation for creative problem solving. Similarly, Johnson and Johnson's (1999) findings that

Nubonyin Hilda Fokong

the use of activity-based learning promotes effective communication by engaging students in group work and presentations reaffirm the above findings.

In a recent study, Fimansyah et al. (2023) used a sample of 30 students in the anthropology education study programme, Faculty of Social Sciences, State University of Medan, to evaluate the module's effectiveness on student learning outcomes in microteaching courses. The pre-experimental design with a one-group pretest-posttest design was used. The results of the N-Gain analysis indicate that the average value was 0.41. The results further reveal that there was an increase in student learning outcomes after using the micro-teaching module based on the project-based learning model on essential teaching skills material, with a moderate category. To reiterate Fimansyah et al., (2023) findings, Sagdic and Sahin (2023) state that the use of micro-teaching helps to promote pre-service teachers' understanding through their engagements in micro-teaching activities.

In an earlier study, Msimanga (2021) used experiential learning theory to determine how student teachers' participation in micro lessons develops their skills. He selected the sample of 14 fourth-year Bachelor of Education students using a purposive sampling technique. A group interview was used to collect data, which was analysed using descriptive statistics. The findings reveal that micro lesson presentation can develop student teachers' skills when presentations are conducted in progress from friendship groupings, random groupings and peer presentations. The findings also reveal that participation in micro lessons develops student teachers' skills of planning, lesson delivery, use of resources, reflection, decision making, time management, responsibility and professional conduct. To corroborate the idea of Msimanga (2021), Issa and Khataibeh (2021) investigated the effects of project-based learning on improving the critical thinking of students from male and female perspectives. They used a questionnaire to sample 111 male and female science teachers teaching in Upper Basic schools in Al-Kourah District,

Effectiveness of Activity-Based Learning and Project-Based Learning

Irbid, Jordan. The results state that there is a significant statistical difference ($\alpha = 0.05$) attributed to the conventional method and the project-based learning strategy. The differences came in favour of the project-based learning strategy. From the findings, they recommend that, project-based learning strategy should be adopted and that textbook content and activities should be organised to align with it.

In another study, Pagarra et al. (2020) use a survey research design to examine the effectiveness of micro-teaching learning on the basic skills of teaching students. The FIP UNM results show the low category, indicating that micro-teaching learning was not an effective method for students to acquire the basic skills of teaching. The study suggested that teachers should use the existing facilities to facilitate students when practising each teaching skill to improve the quality of implementing micro-teaching learning.

3 Methodology

Research Design

The study employs the experimental research design. This design attempts to establish a cause-and-effect relationship. The design serves as a yardstick to ensure that the method matches the research objectives, the data collected is of high quality, and the results obtained are relevant and valid.

Population and Sample

The total population for the study is made up of 300 undergraduate students of the Department of Curriculum and Pedagogy in the Faculty of Education of the University of Bamenda. A purposive sampling technique is used to select a sample of 63 second-year students. These students are offering the course in micro-teaching. Stratified randomization is used to place students into two treatment groups: control (made up of students offering a micro teaching course in inclusive education) and experimental (activity-based learning group made up of students offering a micro teaching course in pedagogy) and project-based

Nubonyin Hilda Fokong

learning group (made up of students offering a micro teaching course in curriculum planning and design). Each group is made up of 21 students who are later on distributed into seven groups of size three through the simple random sampling technique.

Instrument

Data for the study is collected using a self-constructed pre-test and post-test. Generally, the study assumes that the four macro skills for effective teaching (lesson planning, lesson delivery, classroom management and assessment of learners' achievement) should be acquired in a micro teaching course. Based on this assumption, the variables of the study are developed. The independent variables are activity-based learning and project-based learning. On the one hand, activity-based learning is defined as engagement of preservice teachers in hands-on activities and practical experiences, which enables them to develop teaching skills. While project-based learning is defined as the encouragement of preservice teachers in group activities that enable them to develop teaching skills. The independent variable (activity-based learning and project-based learning) is measured in three categories: 1, referring to low development of teaching skills when preservice teachers are engaged in activity-based learning and project-based learning; 2, meaning average development of teaching skills when preservice teachers are engaged in activity-based learning and project-based learning; and 3, referring to high development of teaching skills when preservice teachers are engaged in activity-based learning and project-based learning. On the other hand, the dependent variable (teaching skills) is defined as improvement in preservice teachers learning of pre-instructional skills (as related to lesson planning and preparation behaviours of teachers before interaction with learners), instructional skills (as related to stimulus variation, questioning, classroom management and other behaviours that occur during interaction) and post instructional skills (as related to skills manifested after interaction with learners). The dependent variable is measured using an increase in critical thinking

Effectiveness of Activity-Based Learning and Project-Based Learning

skill, creativity skill, collaboration skill and communication skill of preservice teachers through their active participation in pre-instructional, instructional and post-instructional activities.

Validity

The instrument is face validated by two experts in the Department of Curriculum and Pedagogy from the Faculty of Education at the University of Bamenda. The corrections and suggestions indicated are duly integrated into the final draft of the instrument. Ten (10) copies of the pre- and post-test instruments are trial tested on Economics students in the first cycle of the Higher Teacher Training College (HTTC), Bambili.

Reliability

Cronbach's Alpha (α) statistics are used to determine the internal consistency of the items. The instrument is found to have a reliability coefficient of .812 for the pre-test and post-test, respectively. The researcher has used a direct delivery method to administer the instrument to the respondents. The pre-test is administered, and after a three-week interval, the post-test is administered.

Method of Data Analysis

The data collected is analysed using a paired samples t-test, and the null hypotheses are tested at a 0.05 level of significance. If the p-value is less than our alpha level of 0.05, we will reject the null hypothesis and ascertain that there are statistically significant differences between the mean scores.

Ethical Considerations

Ethically, the students and teachers are informed, and they are not forced to participate in the study.

4. Presentation of Findings of the Study

The descriptive statistics of the variables included in the estimation are presented in Tables 1, 2, 3 and 4. The inferential statistics of the variables included in the estimation are presented in Tables 5, 6, 7 and 8.

Research Question One: How effective is activity-based learning in improving preservice teachers' teaching skills in a micro-teaching course?

The data is analysed and presented in Tables 1 and 2.

Table 1: Differences Between Activity-Based Learning Pre-Test and Post-Test by Groups

		Group							Total
		1	2	3	4	5	6	7	
Differences between pre- and post-test	.00	1	0	0	0	1	0	1	3
	1.00	1	0	0	0	0	0	0	1
	2.00	1	3	0	0	0	0	2	6
	3.00	0	0	1	3	0	0	0	4
	4.00	0	0	1	0	0	0	0	1
	5.00	0	0	1	0	0	0	0	1
	6.00	0	0	0	0	2	0	0	2
	8.00	0	0	0	0	0	1	0	1
	9.00	0	0	0	0	0	1	0	1
	10.00	0	0	0	0	0	1	0	1
Total		3	3	3	3	3	3	3	21

Table 1 presents activity-based learning scores on the differences between pre-test and post-test according to groups. The score for the differences between the pre- and post-test ranged from .00 to 10.00. Out of the 7 groups, there is no change in the score (.00) of preservice teachers in groups 1, 5 and 7 over time. Generally, there is an increase in the differences between the scores in all the groups. For example, the scores of preservice teachers in group 1 have increased by 1.00 and 2.00. Similarly, those in group 2 and group 7 the scores that increased by 2.00. Although the scores of preservice teachers in groups 3 and 4 increased by 3.00 initially, the scores of group 3 teachers later on increased by 4.00 and 5.00. Group 5's score increased by 6.00. Group 6 differences between the scores are as large as 8.00, 9.00 and 10.00, respectively.

Table 2: Differences Between Activity-Based Learning Pretest and Post-Test by Teaching Skills

		Differences between pre-test and post-test										Total
		.00	1.00	2.00	3.00	4.00	5.00	6.00	8.00	9.00	10.00	
Critical Thinking	Low	2	0	0	0	0	0	0	0	0	0	2
	Aver	0	0	0	4	0	0	0	1	1	1	7

Effectiveness of Activity-Based Learning and Project-Based Learning

Skill	age											
	High	1	1	6	0	1	1	2	0	0	0	12
Total		3	1	6	4	1	1	2	1	1	1	21
Creativity Skill	Low	2	0	0	3	0	0	0	1	1	1	8
	Average	0	0	0	1	0	0	0	0	0	0	1
	High	1	1	6	0	1	1	2	0	0	0	12
Total		3	1	6	4	1	1	2	1	1	1	21
Collaboration Skill	Low	2	0	0	0	0	0	0	0	0	0	2
	Average	0	0	0	1	0	0	0	0	0	0	1
	High	1	1	6	3	1	1	2	1	1	1	18
Total		3	1	6	4	1	1	2	1	1	1	21
Communication Skill	Low	2	0	0	0	0	0	0	0	0	0	2
	Average	0	0	0	1	0	0	0	0	0	0	1
	High	1	1	6	3	1	1	2	1	1	1	18
Total		3	1	6	4	1	1	2	1	1	1	21

Table 2 shows that the differences between the pre-test and post-test scores as a whole increased from 0.00 to 10.00 as the teaching skills of preservice teachers who have taken part in a micro-teaching course increased from low, average to high. Out of the 21 preservice teachers who are engaged in activity-based learning in the micro teaching course, the critical thinking skill of the majority (12) of the preservice teachers is high, followed by 7 teachers that is average and 2 who are low. Moreover, the results indicate that out of the 21 preservice teachers who are engaged in activity-based learning in the micro teaching course, the creativity skill of 12 preservice teachers is high, as opposed to 8 teachers who are low and 1 average teacher. Furthermore, the results depict that, out of the 21 preservice teachers who are engaged in activity-based learning in the micro teaching course, the collaboration and communication skills of the majority (18) of the preservice teachers are high as compared to 2 teachers whose skills are average and 1 teacher whose skills are low.

Nubonyin Hilda Fokong

Research Question Two: How effective is project-based learning in improving preservice teachers' teaching skills in a micro-teaching course? The data is analysed and presented in Tables 3 and 4.

Table 3: Differences Between Project-Based Learning Pre-Test and Post-Test by Groups

		Group							Total
		1	2	3	4	5	6	7	
Differences between pre- and post-test	.00	0	0	0	2	1	0	0	3
	1.00	0	0	0	0	0	2	2	4
	2.00	0	0	0	0	1	1	0	2
	3.00	0	0	0	0	1	0	0	1
	4.00	1	3	0	1	0	0	0	5
	5.00	2	0	0	0	0	0	0	2
	6.00	0	0	0	0	0	0	1	1
	8.00	0	0	3	0	0	0	0	3
Total		3	3	3	3	3	3	3	21

Table 3 presents project-based learning scores on the differences between pre-test and post-test according to groups. The score for the differences between the pre- and post-test ranged from .00 to 8.00. Out of the 7 groups, there is no change in the score (.00) of preservice teachers in groups 4 and 5 over time. Generally, there is an increase in the differences between the scores in all the groups. Specifically, the scores of preservice teachers in groups 6 and 7 have increased by 1.00. Similarly, scores of preservice teachers in groups 5 and 6 increased by 2.00. Moreover, the scores of preservice teachers in group 5 have increased by 3.00, while those of teachers in groups 1, 2 and 4 increased by 4.00. Group 1's score increased equally by 5.00. Groups 3 and 7 differences between the scores are as large as 6.00 and 8.00, respectively.

Effectiveness of Activity-Based Learning and Project-Based Learning

Table 4: Differences Between Project-Based Learning Pre-Test and Post-Test by Teaching Skills

		Differences between pre-test and post-test								Total
		.00	1.00	2.00	3.00	4.00	5.00	6.00	8.00	
Critical Thinking Skill	Low	2	2	0	0	0	0	1	3	8
	Average	1	2	1	1	5	2	0	0	12
	High	0	0	1	0	0	0	0	0	1
Total		3	4	2	1	5	2	1	3	21
Creativity Skill	Low	2	2	0	0	3	0	1	3	11
	Average	1	2	1	1	2	2	0	0	9
	High	0	0	1	0	0	0	0	0	1
Total		3	4	2	1	5	2	1	3	21
Collaboration Skill	Low	2	2	0	0	0	0	1	0	5
	Average	1	2	1	1	5	2	0	0	12
	High	0	0	1	0	0	0	0	3	4
Total		3	4	2	1	5	2	1	3	21
Communication Skill	Low	2	2	0	0	0	0	1	0	5
	Average	1	2	1	1	5	2	0	0	12
	High	0	0	1	0	0	0	0	3	4
Total		3	4	2	1	5	2	1	3	21

Nubonyin Hilda Fokong

Table 4 indicates that the differences between the pre-test and post-test scores as a whole increased from 0.00 to 8.00 as the teaching skills of preservice teachers who have taken part in a micro-teaching course increased from low, average, to high. Out of the 21 preservice teachers who are engaged in project-based learning in the micro teaching course, the critical thinking skill of the majority (12) of the preservice teachers is average, followed by 8 teachers who are low and 1 who is high. Moreover, the results portrayed that, out of the 21 preservice teachers who are engaged in project-based learning in the micro-teaching course, the creativity skill of 11 preservice teachers is low, as opposed to 9 average teachers and 1 who is high teacher. Furthermore, the results depicted that, out of the 21 preservice teachers who are engaged in project-based learning in the micro teaching course, the collaboration and communication skills of the majority (12) of the preservice teachers are average as compared to 5 teachers whose skills are low and 4 teachers whose skills are high.

Research Hypothesis One H_{01} : There are no statistically significant differences between the mean scores in activity-based learning in improving preservice teachers' teaching skills in a micro-teaching course?

Data is analysed and presented in Tables 5 and 6.

Table 5: Activity-Based Learning Paired Samples Statistics

	Mean	N	Std. Deviation	Std. Error Mean
Pre test	14.95	21	2.941	.642
Post test	18.43	21	2.399	.524

Table 5 indicates that the mean pre-test score for activity-based learning is 14.95, while the mean post-test score is 18.43. The effect size is 1.18, which is an indication that the post-test scores are slightly more than a standard deviation better than the pre-test scores. This is considered a high effect size.

Table 6: Activity-Based Learning Paired Samples Test

pre-	Mean	Std.	Std.	95%
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Effectiveness of Activity-Based Learning and Project-Based Learning

test and post-test	Deviation	Error Mean	Confidence Interval of the Difference		t.	Df	Sig (2-tailed)
			Upper	Lower			

Table 6 reveals that the mean value is -3.476. The negative value means that the experimental group is associated with a decrease in the value of the outcome, relative to the control group. The significance of using a paired samples t-test (2-tailed) is .000, at 20 degrees of freedom and a confidence level of 95%. The value of the t is 5.542. Since the test is significant at $p < 0.05$, the null hypothesis is rejected. Thus, the difference between means is statistically significant.

Research Hypothesis Two H_{02} : There are no statistically significant differences between the mean scores in project-based learning in improving preservice teachers' teaching skills in a micro teaching course?

Data is analysed and presented in Tables 7 and 8.

Table 7: Project-Based Learning Paired Samples Statistics

	Mean	N	Std. Deviation	Std. Error Mean
Pre test	13.62	21	2.729	.596
Post test	17.00	21	2.775	.606

Table 7 indicates that the mean pre-test score for activity-based learning is 13.62, while the mean post-test score is 17.00. The effect size is 1.23, which is an indication that the post-test scores are slightly more than a standard deviation better than the pre-test scores. This is considered a high effect size.

Table 8: Project-Based Learning Paired Samples Test

pre- and post-test	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t.	Df	Sig (2-tailed)
				Upper	Lower			
	-3.381	2.636	.575	-2.181	-4.581	-5.878	20	.000

Table 8 reveals that the mean value is -3.381. The negative values reflect the fact that the pre-test has a lower mean than the post-test. The significance of using a paired samples t-test (2-tailed) is .000, at 20 degrees of freedom and a confidence level of 95%. The value of t is 5.878. Since the test is significant at $p < 0.05$, the null hypothesis is rejected. Thus, the difference between means is statistically significant.

5. Discussions of the Findings

The study revealed that there is a statistically significant difference, meaning activity-based learning is effective in improving preservice teachers' teaching skills in a micro-teaching course. This finding supports the findings of Mustapha et al. (2020) that activity-based learning strategy significantly enhanced students' outcomes in English Language and Basic Science. Using a cross tabulation descriptive statistics, the findings of this study in table 2 indicated that when teacher trainers effectively engaged preservice teachers in activity-based learning in a micro-teaching course, their teaching skills, such as critical thinking, creativity, collaboration and communication skills, are improved upon. The findings are in tandem with Ho (2018); Johnson and Johnson (1999), who contend that activity-based learning fosters creativity and innovative thinking as well as effective communication. One important reason that has led to the effectiveness of activity-based learning in improving preservice teachers' teaching skills in a micro-teaching course is the teacher trainer's engagement of preservice teachers in group work and discussions as presented in Table 1. These findings reaffirmed earlier research that the use of activity-based learning promotes effective communication by engaging students in group work and presentations (Johnson & Johnson, 1999).

Comparatively, the findings in Table 2 revealed that the majority of the preservice teachers who are engaged in activity-based learning in the micro teaching course in the programme of curriculum and pedagogy skills of critical thinking, creativity, collaboration and communication are

Effectiveness of Activity-Based Learning and Project-Based Learning

highly improved upon as opposed to few whose skills are either averagely or lowly enhanced. Some explanations for a handful of preservice teachers not highly improving their teaching skills may be that they are compelled to use a higher level of thinking in planning and implementing a micro lesson plan based on activity-based learning, and they may also not be given enough opportunity to apply their skills. Regarding this explanation, Ikbal (2023) stated that prominent factors like time constraints, curriculum pressure, classroom management, and resource limitation explain the reason why learners find it difficult to acquire basic 21st century skills when the activity-based learning method is used in the teaching and learning process.

Similar to the above findings, the paired samples statistics results in Table 5 show higher post-test scores as opposed to the pre-test scores, revealing that teachers' use of activity-based learning in micro-teaching courses has resulted in the expected teaching skills needed in the 21st century classroom. This position is reinforced by the findings of Ikbal (2023) that activity-based learning equips learners with essential skills needed in the 21st century.

Furthermore, the findings in Table 8 showed that there is a statistically significant difference, meaning project-based learning is effective in improving preservice teachers' teaching skills in a micro-teaching course. This finding aligns with the findings of Fimansyah et al. (2023) that a project-based learning strategy significantly enhanced teaching skills. The descriptive statistics in Table 2 corroborated the above results by illustrating that when teacher trainers effectively engaged preservice teachers in project-based learning in a micro-teaching course, their teaching skills, such as critical thinking, creativity, collaboration and communication skills, are enhanced. The findings conform with Sagdic and Sahin's (2023) as well as Issa and Khataibeh's (2021) arguments that the use of project-based learning in micro-teaching courses helps to promote preservice teachers' teaching skills.

Nubonyin Hilda Fokong

One salient factor that has accounted for the effectiveness of project-based learning in improving pre-service teachers' teaching skills in a micro-teaching course is the teacher trainer's engagement of preservice teachers in group work as presented in Table 3. These findings reiterated earlier research by Msimanga (2021) that when teacher trainers assign groups by using strategies such as friendship groupings, random groupings and peer presentations, preservice teachers' teaching skills are enhanced.

Comparatively, the findings in Table 4 revealed that the majority of the preservice teachers who are engaged in project-based learning in the micro teaching course in the programme of curriculum and pedagogy skills of critical thinking, creativity, collaboration and communication are average, improved upon as opposed to a few whose skills are highly enhanced. These results are clear proof that a handful of preservice teachers are unable to actively participate in a project-based learning task in a micro-teaching course. Perhaps it is difficult for them to work in groups or identify new ideas, implement and integrate them. However, results obtained from the paired samples statistics in Table 7 revealed that teachers' use of project-based learning in a micro-teaching course has resulted in expected teaching skills, as shown by high post-test mean value as compared to the pre-test value. This position is reinforced by the findings of Fimansyah et al. (2023). Therefore, Pagarra et al.'s (2020) argument that micro-teaching is not an effective method for students to acquire the basic skills of teaching is in disagreement with the findings of this study.

6. Implications for Innovation in Education

The results obtained have important implications for innovation in education.

1. The first implication from the results is that, in the short run, activity-based learning and project-based learning are effective in improving preservice teachers' teaching skills in a micro-teaching course because

Effectiveness of Activity-Based Learning and Project-Based Learning

preservice teachers now know more than they did at the beginning of the course.

2. The second implication from the results is that, in the long run, activity-based learning is an effective method in enhancing preservice teachers' teaching skills in a micro-teaching course. This is because it encourages the use of innovative teaching strategies like personalised learning. It was evident from the findings that when teacher trainers engaged preservice teachers in activity-based learning to assess their pre-instructional, instructional or post-instructional skills, they saw clearly when preservice teachers needed help and provided feedback. Moreover, preservice teachers who have achieved low and average teaching skills are challenged with harder tasks to enable them to attain a higher level of achievement. For example, after preservice teachers plan, teach and receive feedback from any activity-based learning task assigned to them by the teacher trainer, they are challenged with harder tasks to re-plan, re-teach, and to re-receive feedback until mastery level is achieved.

3. The third implication from the results is that in the long run, project-based learning is an effective method in enhancing preservice teachers' teaching skills in a micro-teaching course. This is because it encourages the use of innovative teaching strategies like small group discussion and problem-based learning. It is manifested from the findings that when teacher trainers engaged preservice teachers in project-based learning to assess their pre-instructional, instructional or post-instructional skills, they see clearly when preservice teachers are working in small groups of three with each teacher having a responsibility. Moreover, preservice teachers who have achieved low and average teaching skills are challenged with harder tasks to enable them to attain a higher level of achievement. For example, preservice teachers can see how part of a large lesson is learn via collaboration with one another. In each group, these teachers are engaged with a real-world problem to solve that makes them brainstorm; they have to reflect on their prior knowledge; they do some

Nubonyin Hilda Fokong

inquiry and present their ideas; thereafter, they receive feedback and integrate the skills acquired into the previous ones.

7. Conclusion

The study aimed at investigating the effectiveness of activity-based learning and project-based learning in improving preservice teachers' teaching skills in a micro-teaching course. The technique of estimation used is a paired samples t-test. The findings showed that on the one hand, there are statistically significant differences between the mean scores in activity-based learning in improving preservice teachers' teaching skills in a micro-teaching course. On the other hand, there are statistically significant differences between the mean scores in project-based learning in improving preservice teachers' teaching skills in a micro-teaching course. Holistically, the results revealed that activity-based learning and project-based learning emphasise active learning where teacher trainers and pre-service teachers in a micro teaching course effectively use interactive teaching and teamwork to increase pre-service teachers' engagement and enhance their critical thinking, creativity, collaboration and communication skills.

8. Recommendations

Based on the findings, the following recommendations are proposed for innovative policy and practice.

- Activity-based learning promotes interactive learning, provides extensive opportunities for preservice teachers to develop their cognitive, affective and psychomotor abilities in teaching. Therefore, teacher trainers in particular and teachers in general should frequently use activity-based learning methods and other innovative teaching strategies like active learning, inquiry-based learning, small group discussions and peer-assisted learning in a micro teaching course and other courses.
- Project-based learning promotes group work and global collaboration, enhances student-student interaction, provides access to information and enhances preservice teachers' teaching

Effectiveness of Activity-Based Learning and Project-Based Learning

skills. Therefore, teacher trainers in particular and teachers in general should frequently use innovative teaching methods like project-based learning in a micro teaching course and other courses alongside other innovative teaching strategies like collaborative learning.

- Activity-based learning and project-based learning boost preservice teachers' interest in learning, provide deeper engagement, make them more accountable and foster their critical thinking, creativity, collaboration and communication skills. Therefore, preservice teachers in particular and learners in general should develop a love for using active learning and other innovative methods and strategies during the teaching and learning process in a micro-teaching course and other courses.
- Innovative teaching methods and strategies offer a promising framework to equip preservice teachers or learners and teacher trainers or teachers with the essential skills needed in the 21st century. Thus, higher education authorities should align a micro teaching course with innovative teaching methods and strategies and incorporate them into all higher education programmes.

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