EFFECT OF FLIPPED CLASSROOM ON COGNITIVE AND EMOTIONAL SKILLS DEVELOPMENT OF PRIMARY SCHOOL PUPILS

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Abstract

The term "flipped classroom" refers to a teaching method that blends traditional classroom activities with the use of internet or web-based resources to improve learning. It is a cutting-edge, kid-centered approach that combines both customary classroom activities and online learning activities that frequently entail watching web videos. The implication is that, in a flipped classroom setting, the regular classroom activities are frequently supplemented by the flipped or inverted class activities, which may foster or support pupils' cognitive growth and foster emotional skills development. This study was therefore carried out to determine the effect of flipped classroom on cognitive and emotional skills development of primary school pupils. The study adopted a quasi-experimental research design with a sample of 160 primary school pupils purposively selected. Intact classes were used during the experiment. The instruments for data collection were validated emotional and cognitive development skills developed by the researchers. The reliability indices of emotional and cognitive skills development using Cronbach's Alpha were 0.87 and 0.91 respectively. The classroom teachers of the sampled schools were used as research assistants. A pretest was administered before the treatment that lasted for six weeks after which the posttest was equally administered. Mean and Standard deviations were used to answer the research questions while analysis of covariance (ANCOVA) was used to test the null hypotheses formulated for the study at 0.05 significant level. The findings of the study among others showed that flipped classroom was effective in developing primary school pupils' emotional and cognitive skills than the conventional teacher centered approach.

Keywords: Cognitive skills, Emotional skills, Flipped Classroom, Primary school, Pupils.

1 INTRODUCTION

Primary education's major goal is to prepare children ready for a purposeful life and subsequent intellectual pursuits. Primary education, as defined by the Federal Republic of Nigeria in her National Policy on Education, is the instruction provided in a facility for young people between the ages of six and eleven [1]. The elementary level is crucial to the success or failure of the entire educational system since it serves as the foundation for everything else. This is due to the fact that children's overall development is determined by the quick changes that take place during primary education. According to the National Policy on Education [1], the objectives of primary education in Nigeria are: "to inculcate permanent literacy and numeracy and ability to communicate effectively; to lay a sound basis for scientific and reflective thinking; to give citizenship education as a basis for effective participation in and contribution to the life of the society; to mould the character and develop sound attitude and morals in the child; to develop in the child the ability to adapt to his/her changing environment; to give the child opportunities for developing manipulative skills that will enable him/her to function effectively in the society within the limits of his/her capacity, and to provide the child with basic tools for further educational advancement, including preparation for trades and crafts of the locality".

Primary education is the foundation of a child's fundamental education, and it is a highly important portion of the nation's educational system that ought to be handled with great care and concern. Primary education also has advantages in nation building. Despite the significance of primary education for a child's growth, it is disheartening to notice that children in primary schools have struggled to develop their cognitive and emotional skills throughout time. Studies have revealed that the teacher-centered teaching technique, such as the traditional lecture method of education, is to blame for the poor and underdevelopment of cognitive and emotional skills in primary school pupils [2]. The poor and underdevelopment of cognitive and emotional skills of primary school pupils may be enhance when a learner centred instructional strategy is used during classroom instruction. An alternative to traditional lecture method is flipped classroom which refers to a teaching method that blends traditional classroom activities with the use of internet or web-based resources to improve learning.

Because flipped classrooms allow for more individualized and self-paced learning, they can be great for a child's growth. Flipped classrooms promote review, questioning, and progress rather than overloading pupils with information. Pupils can learn in a variety of ways with less stress and pressure. Children who are growing and developing require confidence, and they flourish when they can learn and accomplish rather than getting bored or stressed out. The flipped classroom form of instruction is becoming more and more popular in educational settings because it appears to better meet the educational demands of primary school pupils growing up in the constantly connected world of today [3]. However, pupils will watch or listen to the lectures at home, before the class starts, and spend the time in the classroom to complete their homework instead of paying attention to the lessons while in class and applying the new knowledge in their assignments after school. Teachers assist pupils in becoming self-directed learners rather than telling them what to learn, how to learn it, when to learn it, and how to demonstrate that they learned it, [4].

Cognitive skill development entails the development of the thinking ability of children. It means how children think, explore and figure things out. It is the development of knowledge, skills, problem solving and dispositions, which help children to think about and understand the world around them. Cognitive skill development is seen as an active learning through “critical thinking and practical inquiry”, which grow out of experience but also involve imagination and reflection upon what is learned [5]. Achievement of cognitive skill development in children is dependent upon appropriate teaching and learning skills. Cognitive skill occurs in an environment of effective teaching presence and satisfactory social presence. The development of cognitive skills in primary school pupils can also be fostered with the use flipped classroom instructional approach.

Emotional skill development means how children start to understand who they are, what they are feeling and what to expect when interacting with others. It is the development of being able to form and sustain positive relationships [6]. According to the National Center for Safe and Supportive Learning Environments [7], strong emotional development leads to five key skills: self-awareness, social-awareness, emotional regulation, responsible decision making and relationship building. In their first few years of life, young children acquire emotional skills, such as regulating emotions, sharing with others and following instructions [8]. These skills lay the foundation for developing literacy, numeracy and other cognitive abilities that are critical for success in school and life. Some examples of emotional skills in use are; recognising if someone is sad, and asking if they're ok, expressing oneself with your friends in a different way than with parents and understanding your thoughts and feelings, and being able to relate to others.

Besides, there are empirically established documentations which prove that, Flipped classroom strategy significantly improved students’ academic achievement and interest in school subjects than the traditional formats [9], [10] and [11]. No doubt, the use of innovative strategies such as the Flipped classroom strategy, could lead to the development of cognitive and emotional skills in primary school pupils too. Other researchers have tried to find the effects of other teaching methods such as cooperative instructional strategy on primary school cognitive and emotional skills development [12], Yet, it is obvious that, none of the researches sought to determine the effect of Flipped classroom on primary school cognitive and emotional skills development which is the focus of the present study. The cognitive and emotional skill development of primary school pupils may be influence by gender of the learner.

Gender is described as the subjective feeling of being a male or female irrespective of one’s sex. Gender involves the societal expectations about the characteristics and likely behaviours of men and women (masculinity and femininity) [13]. Gender is also viewed as the socially constructed roles, learned behaviours and the expectations that are associated with females and males in the society. Gender involves both psychological and socio-cultural dimensions of being a man or woman [14]. Operationally however, gender as used in this study could be seen as the roles and functions ascribed to male and females. As such, gender describes the individual’s personal traits, roles and behaviours. It is of course the underlying reason why females view themselves as weaker vessels (feminine in nature) while males equally feel much stronger and more influential (masculine or manly in nature). This variable could influence the development of cognitive and emotional skills of primary school learners when flipped classroom instructional strategy is used.

However, results of existing empirical works on the interaction effect of instructional strategy and gender on pupils’ achievement in primary school subjects had been no consensus among researchers. For instance, while [15], [16] and [17] in their independent investigations revealed that, instructional strategy and gender had no statistically significant interaction effect on male and female students’ achievement and interest in school subjects, other scholars like [18] and [19] revealed in their respective studies that, there was significant interaction effect of instructional method and gender on students’ academic

achievement. The above observations indicate that, instructional strategy and gender can influence students' academic achievement. Meanwhile, there are no research evidences on the effect of gender on primary school pupils' cognitive and emotional skills development when using flipped classroom instructional strategy especially in the study area. Besides, findings of existing empirical works are inconclusive regarding the influence of gender on students' achievement in school subject.

The general purpose of the present study therefore is to investigate the effect of flipped classroom on primary school pupils' cognitive and emotional skills development. Specifically, the present study addressed the following research questions. (i) What is the effect of flipped classroom on pupils' cognitive skills development? (ii) What is the effect of flipped classroom on pupils' emotional skills development? (iii) What is the influence of gender on pupils' cognitive skills development? (iv) What is the influence of gender on pupils' emotional skills development? Four null hypotheses were formulated to guide the study as follows; (i) There is no significant difference between the mean rating score of cognitive skills development of pupils taught using flipped classroom and those taught using conventional lecture method; (ii) There is no significant difference between the mean rating score of emotional skills development of pupils taught using flipped classroom and those taught using conventional lecture method; (iii) There is no significant influence of gender on pupils' cognitive skills development; (iv) There is no significant influence of gender on pupils' emotional skills development.

2 METHODOLOGY

A quasi-experimental design was adopted for this study. Specifically, the non-equivalent control group design was used. According to [20], the non-equivalent control group design is a unique quasi experiment in which randomization of subjects to experimental and control groups is not possible, rather it allows the researcher to use two streams of classes or intact groups (which are not equivalent) and can be assigned randomly to treatment conditions. The design is therefore considered appropriate for this study because intact classes from two sampled schools were used rather than assigning subjects randomly to groups. This of course was to avoid the possible disruption of existing classes, school registers and school organisation which are common in subject randomisation. Thus, the intact classes were further assigned randomly to the two groups; A (experimental group) and B (Control group) respectively. The design is symbolically represented thus:

O_1 X_I O_2

O_1 X_2 O_2

Figure 1: A quasi-experimental design: The non-equivalent control group design.

Where;

O_1 refers to pretest

O_2 refers to post-test

X_1 refers to treatment given to the experimental group

X_2 refers to treatment given to the control group (no treatment)

---- refers to non-equivalent groups.

The population of the study was 28,547 primary five pupils in private primary schools in Cross River State, Nigeria, while the sample for the study was 160 pupils from four intact classes in the study area. Out of these schools, one school with two intact classes was exposed to flipped classroom instructional strategy while the remaining two intact classes from another school were taught using lecture method. A rating scale developed by the researchers on cognitive and emotional skills development was used as instrument for data collection. The instruments had 15 items each. The instruments were validated by two experts in childhood education and one expert in measurement and evaluation. The reliability of the instruments was established using Cronbach's Alpha and it yielded coefficients of 0.91 and 0.87 for cognitive and emotional skills questionnaires respectively. The researchers visited the sampled schools, introduced themselves to the school authorities, and sought permission to conduct the study using the schools. The school authorities provided the researchers with informed consent and approval before the experiment began, and this was done following proper consultation with the parents of the children, who also gave their consent for the participation of their children in the study through the school authorities. Upon granting permission, one-day training was organized by the researchers to train the teachers who were drawn from the sampled schools as research assistants. The teachers from the school that was

used as experimental group were specifically trained on how to use flipped classroom instructional strategy, while the teachers from the control group were not trained but were asked to use the conventional lecture method.

The experiment lasted for six weeks. Before the commencement of the experiment, the teachers from both the experimental and control groups were ask to rate the pupils using the cognitive and emotional skills development rating scale, which the researchers used as pretest. After the six weeks of experiment, the teachers were asked to rate the pupils again using the same instrument, which now served as posttest. Mean and standard deviation were used to answer the research questions while Analysis of Covariance (ANCOVA) was used to test the null hypotheses at 0.05 level of significance.

3 RESULTS

This section presents the results of the study based on the research questions and the null hypotheses that guided the study.

3.1 Research Questions

Research Question One. What is the effect of flipped classroom on pupils' cognitive skills development?

Table 1: Mean and Standard deviation of pretest and posttest rating of the effect of Flipped Classroom on pupils' cognitive skills development.

		Pre-test		Post test		
Instructional Strategy	***N***	$\bar{x}$	***SD***	$\bar{x}$	***SD***	***Mean gain***
Flipped Classroom	72	37.34	9.39	51.43	6.61	14.09
Lecture Method	88	35.01	6.51	45.35	4.19	10.34

Results in Table 1 show that the experimental group taught using flipped classroom instructional strategy had a pretest mean rating (cognitive skills development) of 37.34 with a standard deviation of 9.39 and a posttest mean of 51.43 with a standard deviation of 6.61. The difference between the pretest and posttest mean for the experimental group was 14.09. The control group taught using lecture method had a pretest mean of 35.01 with a standard deviation of 6.51 and a posttest mean of 45.35 with a standard deviation of 4.19. The difference between the pretest and posttest mean for control group was 10.34. However, for each of the groups, the posttest means were greater than the pretest means with the experimental group having the higher mean gain. This is an indication that flipped classroom instructional strategy had some effects on primary school pupils' cognitive skill development more than the conventional lecture method.

Research Question Two. What is the effect of flipped classroom on pupils' emotional skills development?

Table 2: Mean and Standard deviation of pretest and posttest rating of the effect of Flipped Classroom on pupils' emotional skills development.

		Pre-test		Post test		
Instructional Strategy	***N***	$\bar{x}$	***SD***	$\bar{x}$	***SD***	***Mean gain***
Flipped Classroom	72	33.70	3.98	55.41	2.06	21.71
Lecture Method	88	32.84	4.27	42.57	5.05	9.73

Results in Table 2 show that the experimental group taught using flipped classroom instructional strategy had a pretest mean rating (emotional skills development) of 33.70 with a standard deviation of 3.96 and a posttest mean of 55.41 with a standard deviation of 2.06. The difference between the pretest and posttest mean for the experimental group was 21.71. The control group taught using lecture method had a pretest mean of 32.84 with a standard deviation of 4.27 and a posttest mean of 42.57 with a standard deviation of 5.05. The difference between the pretest and posttest mean for control group was 9.73. Results show that for each of the groups, the posttest means were greater than the pretest means with the experimental group having the higher mean gain. This is an indication that flipped classroom

instructional strategy had some effects on primary school pupils' emotional skill development more than the conventional lecture method.

Research Question Three. What is the influence of gender on pupils' cognitive skills development?

Table 3: Mean and Standard deviation of the influence of gender on pupils' cognitive skills development.

		Pre-test		Post test		
Gender	N	$\bar{x}$	SD	$\bar{x}$	SD	Mean gain
Male	91	36.03	8.08	48.43	6.52	12.40
Female	69	36.10	7.94	47.62	5.73	11.52

Results in Table 3 show that the male pupils had a pretest mean rating (cognitive skills development) of 36.03 with a standard deviation of 8.08 and a posttest mean of 48.43 with a standard deviation of 6.52. The difference between the pretest and posttest mean for the male pupils on cognitive skills development was 12.40. The female pupils had a pretest mean rating of 36.10 with a standard deviation of 7.94 and a posttest mean of 47.62 with a standard deviation of 5.73. The difference between the pretest and posttest mean for female pupils on cognitive skills development was 11.52. However, result showed that for both male and female pupils, the posttest means were greater than the pretest means with the male having slightly higher mean gain. This implies that the male pupils developed slightly higher cognitive skills than their female counterparts during the experiment.

Research Question Four. What is the influence of gender on pupils' emotional skills development?

Table 4: Mean and Standard deviation of the influence of gender on pupils' emotional skills development.

		Pre-test		Post test		
Gender	N	$\bar{x}$	SD	$\bar{x}$	SD	Mean gain
Male	91	33.31	4.05	48.64	7.23	15.33
Female	69	33.11	4.31	47.97	7.97	14.86

Results in Table 4 show that the male pupils had a pretest mean rating (emotional skills development) of 33.31 with a standard deviation of 4.05 and a posttest mean of 48.64 with a standard deviation of 7.23. The difference between the pretest and posttest mean for the male pupils on emotional skills development was 15.33. The female pupils had a pretest mean rating of 33.11 with a standard deviation of 4.31 and a posttest mean of 47.97 with a standard deviation of 7.97. The difference between the pretest and posttest mean for female pupils on emotional skills development was 14.86. However, result showed that for both male and female pupils, the posttest means were greater than the pretest means with the male having slightly higher mean gain. This implies that the male pupils developed slightly higher emotional skills than their female counterparts.

3.1.1 Hypotheses

The following null hypotheses are tested at 0.05 level of significance.

Hypothesis One. There is no significant difference between the mean rating score of cognitive skills development of pupils taught using flipped classroom and those taught using conventional lecture method

Table 5: Analysis of Covariance (ANCOVA) of the difference between the mean rating score of cognitive skills development of pupils taught using flipped classroom instructional strategy and those taught using conventional lecture method

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Decision
Corrected Model	1613.965[a]	4	403.491	13.939	0.00	0.265	
Intercept	15261.293	1	15261.293	527.212	0.00	0.773	
PretestCognitive	46.455	1	46.455	1.605	0.20	0.010	
Group	1288.398	1	1288.398	44.509	0.00	0.223	S
Gender	58.001	1	58.001	2.004	0.15	0.013	NS
Group * Gender	55.714	1	55.714	1.925	0.16	0.012	
Error	4486.810	155	28.947				
Total	376086.000	160					
Corrected Total	6100.775	159					

Note: α = 0.05, S = Significant, NS = Not Significant

The result on Table 5 shows the ANCOVA of the difference between the mean rating score of cognitive skills development of pupils taught using flipped classroom instructional strategy and those taught using conventional lecture method. The result was statistically significant at (F) = 44.509, p = 0.00, η^2_p = 0.223). Since the associated probability value of 0.00 is less than 0.05 set as level of significance, the null hypothesis is rejected. Thus, inference drawn is that there was a statistically significant difference between the mean rating score of cognitive skills development of pupils taught using flipped classroom instructional strategy and those taught using conventional lecture method. The result further showed the effect size of (η^2_p = 0.223), which indicates that 22.3% variance in pupils' cognitive skills development is attributed to flipped classroom instructional strategy.

Hypothesis Two. There is no significant difference between the mean rating score of emotional skills development of pupils taught using flipped classroom and those taught using conventional lecture method

Table 6: Analysis of Covariance (ANCOVA) of the difference between the mean rating score of emotional skills development of pupils taught using flipped classroom instructional strategy and those taught using conventional lecture method

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Decision
Corrected Model	6631.177[a]	4	1657.794	105.940	0.00	0.732	
Intercept	5630.696	1	5630.696	359.824	0.00	0.699	
PretestCognitive	.924	1	.924	.059	0.80	0.000	
Group	6504.262	1	6504.262	415.648	0.00	0.728	S
Gender	58.712	1	58.712	3.752	0.06	0.024	NS
Group * Gender	36.451	1	36.451	2.329	0.12	0.015	
Error	2425.517	155	15.648				
Total	383189.000	160					
Corrected Total	9056.694	159					

Note: α = 0.05, S = Significant, NS = Not Significant

The result on Table 6 shows the ANCOVA of the difference between the mean rating score of emotional skills development of pupils taught using flipped classroom instructional strategy and those taught using conventional lecture method. The result was statistically significant at (F) = 415.648, p = 0.00, η^2_p = 0.728). Since the associated probability value of 0.00 is less than 0.05 set as level of significance, the null hypothesis is rejected. Thus, inference drawn is that there was a statistically significant difference between the mean rating score of emotional skills development of pupils taught using flipped classroom instructional strategy and those taught using conventional lecture method. The result further showed the

effect size of (η^2_p = 0.728), which indicates that 72.8% variance in pupils' emotional skills development is attributed to flipped classroom instructional strategy.

Hypothesis Three. There is no significant influence of gender on pupils' cognitive skills development.

The result on Table 5 shows the ANCOVA of the influence of gender on cognitive skills development of primary school pupils. The result was not statistically significant at (F) = 2.004, p = 0.15 η^2_p = 0.013). Since the associated probability value of 0.15 is greater than 0.05 set as level of significance, the null hypothesis is not rejected. Thus, inference drawn is that gender did not significantly influence the cognitive skills development of primary school pupils. The result further showed the effect size of (η^2_p = 0.013), which indicates that only about 1% variance in pupils' cognitive skills development is attributed to the influence of gender.

Hypothesis Four. There is no significant influence of gender on pupils' emotional skills development.

The result on Table 6 shows the ANCOVA of the influence of gender on emotional skills development of primary school pupils. The result was not statistically significant at (F) = 3.752, p = 0.06 η^2_p = 0.024). Since the associated probability value of 0.06 is greater than 0.05 set as level of significance, the null hypothesis is not rejected. Thus, inference drawn is that gender did not significantly influence the emotional skills development of primary school pupils. The result further showed the effect size of (η^2_p = 0.024), which indicates that only about 2% variance in pupils' emotional skills development is attributed to the influence of gender.

3.1.2 Discussion of Findings

Result from research question one which dwelt on the effect flipped classroom instructional strategy on cognitive skills development of primary school pupils showed that flipped classroom instructional strategy had some effects on primary school pupils' cognitive skill development more than the conventional lecture method. Result from the test of hypothesis one equally showed that there was a statistically significant difference between the mean rating score of cognitive skills development of pupils taught using flipped classroom instructional strategy and those taught using conventional lecture method. This implies that flipped classroom instructional strategy is more effective in developing primary school pupils' cognitive skills. This result is consistent with Nawi et al., (2015) who found among others that flipped classroom instructional strategy is effective in enhancing students' academic achievement in school subjects. This result is not surprising because in flipped classroom instructional strategy, learners interact freely and learn from each other instead of depending on the teachers' knowledge and explanations. This, no doubt sustains pupils' interest and develop their cognitive skills during classroom instructions.

Results from the research two equally showed that flipped classroom instructional strategy proved to be more effective in developing primary school pupils' emotional skill than the conventional lecture method. Result from the test of hypothesis two also showed that there was a statistically significant difference between the mean rating score of emotional skills development of pupils taught using flipped classroom instructional strategy and those taught using conventional lecture method. This is an indication that flipped classroom instructional strategy is an effective method that can be used to teach primary school pupils if the emotional and cognitive skills is to be properly developed. The result is consistent with Okeke and Akobi (2021) who found among others that innovative instructional strategies are more effective in enhancing primary school pupils' emotional skills than the conventional lecture method.

On the influence of gender on pupils cognitive and emotional skills development, result showed that there was no statistically significant influence of gender on pupils' cognitive and emotional skills development. This implies that gender is not a significant factor in determining primary school pupils' cognitive and emotional skills development. This means that both male and female primary school pupils have the tendency to develop their cognitive and emotional skills irrespective of the instructional strategy used during classroom instructions. This result is consistent with Badamasi, (2015), Bhaskar and Mathur (2015) and Haliru (2015) who found in their independent investigations that, instructional strategy and gender had no statistically significant interaction effect on male and female students' achievement and interest in school subjects

4 CONCLUSIONS

Based on the findings of the study, it is therefore concluded that flipped classroom instructional strategy is very effective in developing primary school pupils' cognitive and emotional skills. It is also concluded that gender is not a significant factor in determining pupils' cognitive and emotional skills development.

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