



Assessment of the Impact of Circle Time Instructional Approach to Enhance Social-Emotional Skills and Academic Achievement of Early childhood care Education Pre-Service Teachers in Mathematics

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Abstract

This study assessed the impact of circle time instructional approach to enhance social – emotional skills and academic achievement of Early childhood care Education pre-service teachers in mathematics. This study was carried out in Alvan Ikoku Federal College of Education in Owerri Municipal Council Area of Imo State. Based on the purpose of the study, four research questions and four hypotheses were formulated and tested at 0.05 level of significance. The study adopted Quasi –experimental research design involving pre-test-post-test group design. The population of the study comprised of 1105 Pre-service teachers. A sample size of 105 Pre-service was used for the study involving 30 males and 75 females. The instruments for data collection was Mathematics Achievement Test (MAT) and Social - emotional learning Questionnaire (SELQ). The reliability co-efficient(r) of 0.92 and 0.89 respectively was obtained using test-retest method. Data collected were analyzed using Mean, standard deviation for the research questions and the hypotheses were tested using t-test statistical tool. The results showed that the implementation of circle time instructional approach is effective strategy in developing social - emotional skills and improve academic achievement in mathematics irrespective of gender. Based on the findings; Teachers should adopt circle time instructional approach in teaching mathematics in schools so as to enable the students improve on their achievement.

Keywords: Mathematics, Circle time, Social- Emotional Skills and Academic Achievement

Introduction

Mathematics occupies central position in education because mathematics is a science and the nucleus of all other sciences, which lays strong emphasis on both theory and practical. Mathematics is also called the science of reasoning. Mathematics is perceived by society as the foundation for scientific and technological knowledge that is cherished by societies worldwide. It is an instrument for political, socio-economic, scientific and technological developments (Githua & Mwangi, 2003). This does explain why mathematics is a compulsory subject for all learners in primary, secondary and tertiary schools in Nigeria (FGN, 2013). This implies the fact that before an individual can

function well in the society, one must possess relatively good knowledge of mathematics especially in this era of technological age. Okebukola, in Unamba, Nwaneri & Ike (2019) referred to mathematics as the central intellectual discipline of the technological societies. Kerlinge in Ihekweba, Nkwocha, & Unamba, E.C. (2019) describes mathematics as a language of science. Aminu (1990) in Unamba, Nwaneri & Ike (2019) argues that mathematics is not only the language of sciences, but essential nutrient for thought, logical reasoning and progress. Mathematics liberates the mind and also gives individuals an assessment of the intellectual abilities towards direction of improvement. The author concludes by saying that mathematics is the basis of all sciences and technology and of all human endeavours. Despite the importance attached to mathematics by the society there has been lack of interest and low achievement in the subject (Gonzales, Guzman & Jocelyn, 2004). A multiple of causes for the students' lack of interest and low achievement in mathematics has been attributed to difficulty in understanding the specialized mathematical language ((Agommuoh, 2004; Agwagah, 2005; Harbor –Peters, 2000; Ifeanacho, 2012; Iji and Harbour –Peters, 2005; Kurumeh, 2004; and Ogbonna 2007). These include but not limited to: Ineffective, teacher-centered teaching methods and learner's negative attitude towards the subject (Githua & Mwangi; 2003), and non-coverage of mathematics syllabus (Shikuku, 2009). Also, another factor attributed lack of interest and low achievement in mathematics is non improvement of social - emotional skills of the learners. Klyic and Edic (2005) observed children have difficulties in developing the social-emotional skills required to effectively interact and maintain social awareness within the learning process. He went further to opined that for effective teaching and learning in mathematics there is need to enhance students social – emotional skills.

Zins & Ellias in Kylic and Edic (2005) define social - emotional learning as the process of acquiring and effectively applying the knowledge, attitudes, and skills necessary to recognize and manage emotions. Social - emotional learning curriculums focus on the development and enhancement of five core skills, including: self - awareness, social - awareness, self-management, relationship skills and responsible decision-making (Lantieri. 2009). These skills include the ability to recognize emotions within yourself and others, and use this emotional intelligence to regulate behaviour and control impulses as well as to maintain reciprocal relationships. Self - awareness is the ability to recognize and assess one's emotions, interests, values and self-confidence. Social awareness; The ability to empathise, recognize and accept the perspective of others and appreciate similarities and differences among peers, family and the wider community. Self-management; The ability to regulate one's emotions, control one's impulses, manage stressful situations and display persistence. Relationship skills; The ability to establish and maintain reciprocal relationships, cooperate with others, and seek and provide help and assistance. Responsible decision making; The ability to consider ethical standards, safety, social norms and respect for others when making decisions. Therefore, to enhance the understanding of mathematics, learners must be more active in the classroom and must creatively acquire knowledge, especially in understanding and solving mathematical problems. Thus, one effective innovative technique to improve the teaching of mathematics is through circle time.

Circle time is a teaching strategy which allows a universal delivery for explicit teaching on various subjects (Roffey 2009). In recent years, the world of education has adopted this strategy as it can be key to developing self-esteem and problem solving among the learners. Circle time is part



of an overall whole school strategy for behaviour management. Circle time is a concept which has been devised and developed by Jenny Mosley. It is a strategy which encompasses a whole-school approach in enhancing self-esteem and building positive relationships within school communities. To be most effective, circle time needs to take place within the normal daily routine of the learning environment rather than be an occasional event (Roffey, 2009). Circle time provides a framework within which interactions may be enhanced (Roffey, 2009, Roffey & McCarthy, 2013). Circle time provides teachers with a student-centered learning where they can explicitly implement their learning curriculum. The teacher becomes the facilitator and a participant in the learning, steering the discussions and activities to suit the needs of the learners. Circle time is also called group time, refers to any time that a group of learners are sitting together for an activity involving everyone. The method is now in widespread use in schools across the country. In Nigeria many primary schools use the method regularly.

It is a special time to share finger plays, chants and rhymes, songs, play rhythm instruments, read a story, and participate in movement games, relaxation activities and play mathematical games. Circle time provides a time for listening, developing attention span, promoting oral communication, and learning new concepts and skills, it is a time for auditory memory, sensory experiences, socialization, and a time for fun. Circle time can be a complex, dynamic interaction among learners. Teachers have the power to make group time more effective and enjoyable for all involved. The circle helps to encourage the development of positive relationships, self-discipline, conflict resolution, assertive communication and democratic group processes alongside the skills of speaking, listening, observing, critical thinking and concentrating. Circle time offers a useful tool through which teachers can discuss issues related to self-esteem with students. It also provides a forum in which students can openly share their own feelings with others. This will allow the teacher to make more accurate assessments about students' levels of self-esteem. This is supported by Housego and Burns in Klyic and Edic (2005) who have argued that circle time can help teachers to engage in more effective formative assessment. White in Klyic and Edic (2005) has also argued that circle time can cultivate group identity and cohesion. Wooster and Carson in Klyic and Edic (2005) found that circle time activities led to improved self-concept and social interaction amongst a group of eight-year old and above. In addition, it has been argued that circle time can improve students' social skills (Wooster, Kantor in Jonathan, 2016) and extend "social networks introducing children to the pressures and demands of large group living" (Lown, 2002). Curry and Bromfield (2010) argue that circle time aims to develop the unique potential of each learner, of looking at their social and emotional growth and nurturing this within a caring group environment. Curry and Bromfield (2010) assert that circle time allows children to explore feelings and encourages them to believe that they are worthwhile people, thus developing self-esteem. Mosley in Carmel, Erika, Valeria, Audrey & Tracy (2013) shares this view, although she also emphasizes the value of circle time in fostering skills of group problem solving and group-decision making. This is an important point in the context of schools and classrooms, where groups of students may have an issue to solve, which is affecting their daily lives. Solutions can be shared among the group before a consensus is made regarding the best way to address the issue. Rothlein, Einspruch, & Goldberg in Klyic and Edic (2005) argue that circle time can improve intellectual development and social development of students. However,

these writers also argue that circle time can improve the physical motor development of learners. Many circle time games are practical and involve movement. This will develop the learners physically as well as socially and intellectually.

Kelly in Klyic and Edic (2005) also found that circle time brought about a marked positive change in behaviour of children with emotional and behavioural difficulties. In circle time games and activities can be engaged in and are designed to promote trust, respect, empathy and understanding which offers participants the security and freedom to explore issues and find ways forward, it can be used to build relationship and improve classroom behaviours, and to provide direction for future studies. Circle time can be used to build cooperative skills, turn-taking skills, and ability to express feelings irrespective of gender.

Gender is a specially constructed phenomenon that is brought about as society ascribes different roles, duties, behaviours, and mannerisms to the two sexes, (Mangwat, 2006). It is a social connotation that has sound psychological background, and it is used to refer to specific cultural patterns of behaviour that are attributed to human sexes. Gender relates to cultural attributes of both males and females (Akpochofo, 2009). Gender according to Lahey (2003) is a psychological experience of being a male or female. For instance, Singh (2010) opines that gender refers to a socio-cultural construct that connotes the differentiated roles and responsibilities of male and female in a particular society. Okoro (2008) thus observed that males and females show great differences in their interest and career choice. Gender differences in academic achievements of students have been examined over the years with conflicting results. For instance, it has been reported Peterson and Fennema in Unamba, Nwaneri & Ike (2019) that males outperformed females in Mathematics during the school years. The findings of Okebukola (2002), Bamidele, Odusola and Dibu – Oyerinde (2006), Kolawole (2007), Aguele and Uhumaiah (2008) also found in their separate studies at various times that male students achieved significantly better than female students in different science subjects studied. Christine (2004), Umar (2008) and Amoo (2011) in their separate studies were of a different view that the performances of female students in science subjects studied were better than that of the male counterparts. In another conflicting view also, Abe (2004), Bichi (2004), McGreith and Lapointe (2005), Atadoga (2005), Lynn and Jaan (2008), Lawal (2009) and Olasehinde and Olatoye (2014) indicated that there were no significant differences between male and female students.

Academic achievement refers to particular learning in a particular setting which is defined by examination marks, teachers' given grades and percentiles in academic subjects Chowdhury and Pati in Unamba, Nwaneri & Ike (2019). School success depends upon the ability of the students to qualify such examinations. For present study Academic Achievement is defined as that which is indicated by the total marks obtained by the students in the final examinations. A study by Canney and Byrne (2006) investigated effect of circle time on social skills development among students with mild intellectual disability. Results indicated that those who had used Circle time most frequently had the best academic achievement. Doveston's (2007) investigated use of circle time in teaching and learning among pre-schools. Findings of the study showed significant difference between the learners taught using circle time and children taught using traditional approach. Dix, Slee, Lawson, & Keeves (2012), Durlak, Weissberg, Dymnicki, Taylor & Schellinger (2011); Payton, Weissberg, Durlak, Dymnicki, Taylor, Schellinger & Pachan, (2008) investigated academic achievement



and social-emotional learning using circle time . Result indicated that circle time promotes academic achievement, engagement, positive behaviour and healthy relationships. Mosley (2009) examine the impact of using Circle time in teaching 300 children in 16 primary schools in Ireland. Result indicated positive academic and behaviour outcomes, including improved concentration, listening and motivation, enhanced communication and collaboration, higher self-esteem and better behavior among the children. Another study with 20 early years' groups in the UK reported positive impact on both learning and behaviour goals in preschool (Wood, 2001). A number of studies in secondary schools found similar positive effects for secondary school students, including enhanced self and social awareness and more positive attitudes towards learning (Aguis, 2011; Hennessey, 2007; Kulchy, 2009). Other studies which made use of a multi-strategy approach, including CT, similarly reported improvements in emotional literacy and social skills such as listening and speaking (Coppock, 2007). Therefore, this study aims to assess whether social-emotional and academic achievement of pre-service teachers will be enhanced using circle time instructional approach. The main purpose of the study is to assess whether social-emotional skills and pre-service teachers' academic achievement will be enhanced using circle time instructional approach. Specifically, the study will seek to;

- i. Examine the mean level of pre-service teachers social - emotional skills in mathematics before and after implementing circle time instructional approach?
- ii. Examine the mean level of male and female pre-service teachers social - emotional skills in mathematics after implementing circle time instructional approach?
- iii. Examine the mean level of pre-service teachers' achievement scores in mathematics before and after implementing of circle time instructional approach?
- iv. Examine the mean level of male and female pre-service teachers' achievement scores in mathematics after implementing of circle time instructional approach?

Research Questions

1. What is the mean level of pre-service teachers social - emotional skills in mathematics before and after implementing circle time instructional approach?
2. What is the mean level of male and female pre-service teachers social - emotional skills in mathematics before and after implementing circle time instructional approach?
3. What is the mean level of pre-service teachers' achievement scores in mathematics after implementing circle time instructional approach?
4. What is the mean level of male and female pre-service teachers' achievement scores in mathematics after implementing circle time instructional approach?

Hypotheses

HO₁: There is no significant difference in the mean level of pre-service teachers social-emotional skills in mathematics before and after using circle time instructional approach.

HO₂: There is no significant difference in the mean level of male and female pre-service teachers social- emotional skills in mathematics after implementing circle time instructional approach.

HO₃: There is no significant difference in the mean level of pre-service teachers' achievement scores in mathematics before and after implementing of circle time instructional approach.

HO₄: There is no significant difference in the mean level of male and female pre-service teachers' achievement scores in mathematics after implementing circle time instructional approach.

Method

The research design for this study was Quasi-experimental pre-test- post-test group design. The population for this study was final year Nigeria Certificate in Education (NCE) Pre-service teachers comprising of 105 in school early childhood care education in Owerri Municipal Council. A sample of 105 was used (Intact class) consisting of 30 males and 75 females. Two instruments were used for data collection one is Mathematics Achievement Test (MAT): It was constructed by the researchers with special attention on Fraction. MAT consists of 30 items objective with options from A to D. it was drawn through the guide of a table of specification and Social - emotional learning Questionnaire (SELQ). It was used to assess the participants' competencies in the five core areas of the social-emotional learning curriculum including self-awareness, social awareness, self-management, relationship skills, and responsible decision-making. It consists of 10-item statements and structured based on four-point scale. The researchers adapted this instrument. The face and content validation were done by three experts in measurement and evaluation and two in mathematics education from Alvan Ikoku Federal College of Education. They were instructed to check for the language level, relevance, ambiguity, plausibility, vagueness and content coverage of the instruments for the study. Their advice, comments, recommendations and suggestions were used to modify instruments. Test-retest method was used to obtain the reliability of the instruments and estimated at 0.92 and 0.89 respectively by using Pearson product moment correlation method. This was considered reliable enough to be used for the study. The researchers trained two (2) mathematics teachers in the school used in the study for a period of two weeks. The training exercise was based on the purpose of the study. They were trained to assess the students during the experimental exercise. Before the commencement of the experimental process the participants were pre-test to determine their cognitive backgrounds. The researchers prepared three lesson notes and infused circle time on each of the topics during the training exercise. teachers introduce the topic (fraction, types of fraction, addition, subtraction, multiplication and division of fraction) to the participants using prepared lesson notes with Instructional Materials and infuse social - emotional skills to teach the topic. They were allowed to pose problems and proffer solutions among themselves and compare solutions strategies within themselves. They interacted with the teachers when difficulties were countered. Teacher gave participants room for questions in areas not clear and later responded. The treatment period lasted for 3 weeks. Each session lasted for 1hr 20 minutes. After which a post-test was administered to the participant using the re-arranged version of MAT and SELQ. The test instruments were marked over 100%. The data generated was analyzed using mean and standard deviation for answering the research questions while t-test statistical tool was used to test the hypotheses at 0.05 level of significant.



Results

Research Question 1: What is the mean level of pre-service teachers social - emotional skills in mathematics before and after implementing circle time instructional approach?

Table 1: Mean and Standard deviation on level of pre-service teachers social-emotional skills in mathematics

Variables	N	Mean	SD	Mean Gain
Before (Pre-test)	105	42.34	1.05	
After (post-test)	105	53.56	2.21	11.22

Results in Table 1 shows that the mean level of pre-service teachers in social - emotional skills before 42.34 with a standard deviation of 1.05 while the after the implementation circle time instructional approach the mean level was 53.56 with a standard deviation of 2.21. This implies that social - emotional skills of pre-service teachers was improved with a high mean gain of 11.22 after implementation of circle time instructional approach.

Research Question 2: What is the mean level of male and female pre- service teachers social - emotional skills in mathematics after implementing circle time instructional approach?

Table 2: Mean and standard deviation on gender social - emotional skills

GENDER	N	MEAN	SD	MEAN Gain
MALE	30	28.71	3.43	0.4
FEMALE	75	29.11	3.18	

Table2 shows that the mean level of male pre-service teachers in social–emotional skills in mathematics at post-test are 28.71 with standard deviation of 3.43 and those of female pre-service teachers is 29.11 and a standard deviation of. Their mean gain is 0.4. The slight difference is in favour of female pre-service teachers.

Research Question 3: What is the mean level of pre-service teachers' achievement scores in mathematics before and after implementing circle time instructional approach?

Table 3: Mean and Standard deviation on level of pre-service teachers' achievement scores in MAT

Variables	N	Mean	SD	Mean Gain
Before (Pre-test)	105	40.78	1.67	
After (post-test)	105	59.03	1.06	18.25

Results in Table 3 shows that the mean level of pre-service teachers in MAT before 40.78 with a standard deviation of 1.68 while the after the implementation circle time instructional approach the mean level was 59.03 with a standard deviation of 1.06. This implies that MAT of pre-service

teachers was improved with a high mean gain of 18.25 after implementation of circle time instructional approach.

Research Question 4: What is the mean level of male and female pre-service teachers' achievement scores in mathematics after implementing circle time instructional approach?

Table 4: Mean and standard deviation on gender achievement scores in mathematics after implementing circle time instructional approach.

GENDER	N	MEAN	SD	MEAN Gain
MALE	30	42.09	4.24	0.04
FEMALE	75	42.05	4.30	

Table 4 shows that the mean achievement scores of pre-service teachers at posttest is 42.09 with standard deviation of 4.24 and those of female pre-service teachers had a mean achievement scores of 42.05 and a standard deviation of 4.30. Their mean difference is 0.04. The slight difference is almost insignificant but in favour of male pre-service teachers.

Hypotheses testing

Ho₁: There is no significant difference in the mean level of pre-teachers social - emotional skills in mathematics before and after implementing circle time instructional approach.

Tale 5: t-test analysis on pre-service teachers social - emotional skills in mathematics

GROUP	N	MEAN	SD	Df	t-cal	t-tab	Decision
Pre-Test	105	42.34	1.05	103	2.05	1.96	Reject
Post -Test	105	53.56	2.21				HO

The result of the t-test presented in table 1 shows the calculated t-value of 2.05 is significant at (P<0.05) the null hypothesis is rejected and the researchers concludes that there is significant difference in the mean level of pre-service teachers social-emotional skills in mathematics

Ho₂: There is no significant difference in the mean level of male and female pre-service teachers social - emotional skills in mathematics after implementing circle time instructional approach.

Table 6: t-test analysis on social - emotional skills in mathematics

GENDER	N	MEAN	SD	t-cal	t-tab	Decision
MALE	30	28.71	3.43	1.06	1.96	Accept
FEMALE	75	29.11	3.18			HO

The result of the t-test presented in table 6 shows the calculated t-value of 1.06 is not significant at (P>0.05) the null hypothesis is accepted and the researchers concludes that there is no significant difference in the mean scores on gender social-emotional skills in mathematics



H₀₃: There is no significant difference in the mean level of pupils' achievement scores in mathematics before after implementing circle time instructional approach.

Tale 7: T-test analysis on Achievement test in MAT

Variables	N	MEAN	SD	Df	t-Cal	t-tab	Decision
Pre-test	105	40.78	1.67	103	2.77	1.96	Reject
Post test	105	59.03	1.06				HO

The result of the t-test presented in table 7 shows the calculated t-value of 2.77 is significant at ($P < 0.05$) the null hypothesis is rejected and the researchers concludes that there is significant difference in the pre-service teachers' achievement scores in mathematics

H₀₄: There is no significant difference in the mean level of male and female pre-service teachers' achievement scores in mathematics after implementing circle time instructional approach.

Tale 8: T-test analysis on Gender Achievement in MAT

GENDER	N	MEAN	SD	t-Cal	t-tab	Decision
MALE	117	42.09	4.24	0.05	1.96	Accept HO
FEMALE	130	42.05	4.30			

The result of the t-test presented in table 8 shows the calculated t-value of 0.05 is not significant at 1.96 ($P > 0.05$) the null hypothesis is accepted and the researchers concludes that there is no significant difference in the mean achievement scores on gender in mathematics

Discussion

The results of the study revealed that social-emotional skills of pre-service teachers were improved with a high mean gain of 11.22 after implementing circle time instructional approach. The finding in hypothesis one showed that there was a significant difference after implementing circle time instructional approach. This result is in accord with the findings of Doveston's (2007) investigated use of circle time in teaching and learning in pre-schools. Findings of the showed significant difference between the learners taught using circle time and children taught using traditional approach. Also Dix, Slee, Lawson, & Keeves, (2012), Durlak et al., 2011; Payton et al., (2008) indicated that circle time promotes academic achievement, engagement, positive behaviour and healthy relationships.

Also, there is no significant difference in the mean level on gender social- emotional skills and academic achievement in mathematics. Also, the results of the study revealed that MAT of pre-service teachers was improved after implementing circle time instructional approach. This result is in accord with the findings of Abe (2004), Bichi (2004), McGreith and Lapointe (2005), Atadoga (2005), Lynn and Jaan (2008), Lawal (2009) and Olasehinde and Olatoye (2014) indicated that there were no significant differences between male and female students in mathematics.

Conclusion

The study assessed the Impact of Circle Time Instructional Approach to Enhance Social-Emotional Skills and Academic Achievement of Early childhood care Education Pre-Service Teachers in Mathematics. Due to poor achievement in mathematics, the use the innovative approach to see whether the improvement will be achieved. The major findings showed that the implementation of circle time instructional approach is an effective strategy to develop social-emotional skills and improve academic achievement in mathematics irrespective of gender.

Recommendations

Based on the findings of the study, the following recommendations are made:

1. Teachers should adopt circle time instructional approach in teaching mathematics in schools as to improve their achievement of students.
2. Workshop and seminars should be organized for teachers as to be abreast with innovative approaches of using circle time instructional approach teaching mathematics at tertiary level.
3. Teacher Educators should understand their students in the classroom so that they will know the appropriate strategy to be applied when teaching mathematics.

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