Cooperative Learning and Teacher-Directed Learning Classrooms: Places for the Development of Metacognitive Skills for Reading Proficiency

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Abstract

Introduction. Persistent abysmal academic achievement among adolescents in Nigerian secondary schools has become a concern among stakeholders in the Nigerian system of education. This, over time, has been linked to poor reading culture and reading skills, worsened by unproductive instructional approaches adopted by teachers for reading proficiency. An investigation into effective instructional approaches to arm adolescents with metacognitive skills for reading proficiency becomes imperative. This study, therefore, investigated the impact of cooperative learning and teacher-directed learning approaches on secondary school students' development of metacognitive skills for reading proficiency.

Method. We adopted a quasi-experimental research design in our study. One hundred and eighteen early adolescent students were sampled from three public secondary schools in Anambra state. The instrument used in the study is an open-ended metacognitive skill for reading proficiency questionnaire (OMSRPQ). Three operations were used for the experiment: 1) task understanding, 2) strategy understanding, and 3) management of learning process. The sum of these three operations is the overall metacognitive skills of the students.

Results. Our findings showed that students in cooperative integrated reading and composition (CIRC) learning approach differed significantly from those in the teacher-directed instructional (DI) approach and the control group (C_1) in task understanding operation $F(2, 118) = 8.783, p < .01$, strategy understanding $F(2, 118) = 6.324, p < .01$ and the overall metacognitive reading skills $F(2, 118) = 7.047, p < .01$. No significant mean differences occurred among the groups in management of learning process skills $F(2, 118) = 2.949, p > .05$. Adjusted omega squared (est. ω^2) test showed large to moderate effect sizes in the operations that were significant.

Discussion and Conclusion. We concluded that metacognitive skills for reading could be better enhanced in cooperative learning approach. Based on these findings, the researchers recommended that CIRC can be used in developing metacognitive skills needed in secondary school reading classrooms.

Keywords: cooperative learning; direct instruction; metacognition; reading

Resumen

Introducción. El logro académico abismal persistente entre los adolescentes en las escuelas secundarias nigerianas se ha convertido en una preocupación entre los interesados en el sistema educativo nigeriano. Esto con el tiempo se ha relacionado con una pobre cultura de lectura y habilidades de lectura que se han visto agravadas por los enfoques instructivos improductivos para el dominio de la lectura adoptados por los maestros. Se hace imprescindible una investigación sobre enfoques de instrucción efectivos para armar a los adolescentes con habilidades cognitivas para el dominio de la lectura. Por lo tanto, este estudio investigó el impacto del aprendizaje cooperativo y los enfoques de aprendizaje dirigido por el maestro en el desarrollo de habilidades metacognitivas de los estudiantes de secundaria para el dominio de la lectura.

Método. Adoptó un diseño de investigación cuasi-experimental. Ciento dieciocho estudiantes adolescentes tempranos fueron muestreados de tres escuelas secundarias públicas en el estado de Anambra. El instrumento utilizado en el estudio es una habilidad metacognitiva abierta para el cuestionario de competencia lectora (OMSRPQ). Se utilizaron tres operaciones para el estudio: 1) comprensión de la tarea, 2) comprensión de la estrategia y 3) gestión del proceso de aprendizaje. La suma de estas tres operaciones son las habilidades metacognitivas generales de los estudiantes.

Resultados Los resultados mostraron que aquellos en el enfoque de aprendizaje cooperativo integrado de lectura y composición (CIRC) diferían significativamente del enfoque de instrucción directa (DI) y el grupo de control (C1) en la operación de comprensión de tareas $F(2, 118) = 8.783, p < .01$, comprensión de la estrategia $F(2, 118) = 6.324, p < .01$ y las habilidades generales de lectura metacognitiva $F(2, 118) = 7.047, p < .01$. No hubo diferencias medias significativas entre los grupos en el manejo de las habilidades del proceso de aprendizaje $F(2, 118) = 2.949, p > .05$. La prueba de omega cuadrado ajustado (est. Ω^2) mostró tamaños de efecto moderados en las operaciones que fueron significativos.

Discusión y conclusión. Se concluyó que las habilidades metacognitivas para la lectura podrían mejorarse mejor en el enfoque de aprendizaje cooperativo. Con base en estos hallazgos, los investigadores recomendaron que CIRC debería usarse para desarrollar las habilidades metacognitivas necesarias en las aulas de lectura de la escuela secundaria.

Palabras clave: aprendizaje cooperativo; instrucción directa; metacognición leyendo

Introduction

There have been reported disaffections with the fallen standard of education in Nigeria among Nigerian adolescents (Tanko, 2013, World Bank, 2017). It has been noted that adolescents' failure rates in public examinations revolve within 59.9% and 65.9% in English language (Owolabi, 2012), their reading culture and comprehension skills are poor (Okosa, Aluede, Owens-Sogolo, 2013; Omole & Ladan, 2011; Osa-Edoh & Alutu, 2012). This seems to manifest in almost all the indices of their academic performance. This is in apparent contradiction to the fact that adolescents are to be educated in such a way that they could cope with the demands of the 21st century (Nwosu, Grosser, & Nwanguma, 2017). For Dede (2010), students who would cope with challenges of the 21st century must be equipped with not just analytical skills but also skills that have to do with self-regulation, metacognition, negotiation of shared meaning, and co-construction of problem solution which will help them progress in situations that defile conventional rules.

Students' success in their studies is, to an extent, dependent on proficient reading and comprehension of texts (Alsofyani, 2019; Ameyaw & Anto, 2018; Whitten, Labby, & Sullivan, 2016). This is because reading is basic to academic success (Loan, 2012), life-long learning (Shippen, Houchins, Steventon, & Sartor, 2005) and academic proficiency regardless of subject areas (Dagget & Hasselbring, 2007). Taking into consideration the cognitive development of early adolescents, their reading instruction should entail the inculcation of metacognitive strategies since they can help learners take charge of their cognitive processes (Kolić-Vehovec, Zubković, & Pahljina-Reinić, 2014). This is imperative given that they are beginning to develop abstract thinking, and are considerably interested in expanding their social circle (U.S. Department of Health and Human Services, Office of Adolescent Health, 2018) and their reading tasks more challenging (Alverman, 2002; National Institute for Literacy, 2007; Nippold, 2017). The fact that early adolescent readers gradually migrate from the concrete operation stage to formal operation stage, and are interested in peer affiliation, could pose a dilemma to a classroom teacher. This warrants that a reflection and an empirical verification on whether the teacher should take up more roles in enhancing their metacognitive reading skills for reading proficiency or if they should be made to take up more roles in a peer-directed learning approach to foster their metacognitive reading skills for reading proficiency is looked into. Current pedagogical theorists have taken different paths in explaining how children could learn. Scholars

such as Lev Vygotsky (1896–1934) have underscored the importance of social interactions existing in a cultural milieu in deepening thinking and reflection (Carlson & Wiedle, 2013). Thought processes are shared in social interaction and this could enhance learning. On the other hand, Ausubel's subsumption theory banks on students' prior knowledge to provide adequate background for the new information they would be subsequently taught in which instructors present superordinate concepts to enhance cognitive organization within students' minds through expository methods of instruction (Authur, 2010). Theoretical assumptions on developing metacognitive skills that can foster students' own comprehension strategies have focused on 'cognitive aspects of the mind' (Schraw & Moshman, 1995:357). For metacognitive skills to be developed, experiences must be meaningful which Vygotsky's theory has emphasized bringing to the fore the need for students' learning to learn (Williams & Burden 1997 in Turuk, 2008). Furthermore, Ausubel's propositions on teachers' recourse to students' prior knowledge of tasks to provide superordinate concepts can foster students' development of their own strategies to the extent teachers integrate these skills in the lessons taught the students.

Metacognitive reading strategies encompass strategies used in planning, monitoring and evaluating reading processes enabling readers to take charge of their cognitive processes while reading (Ahmadi, Ismail, & Abdullah, 2013; Cakici, 2017; Jaleel & Premachandran, 2016; Mir, 2015). Ability to think about one's cognition is a requirement for reading proficiency (Nicolliello-Carrilho, Crenitte, Lopes-Herrera, & Hage, 2018). This is true because researchers have noted that adequate metacognitive skills could ignite good thinking which will lead to higher academic performance (Jayapraba, 2013; Osuji, 2017) and that good readers adopt a number of metacognitive strategies to comprehend texts (Boulware-Gooden, Carreker, Thornhill, & Joshi, 2007). Despite a good number of research work on metacognition, researchers are yet to arrive at a consensus on the best approach to adopt (de Jager, Jansen, & Reezigt, 2005; Iftikhar, 2014), and this may warrant that further studies on teaching of reading strategies are conducted (Alsofyani, 2019). Some are of the opinion that teachers should take more roles in enhancing metacognitive reading skills (direct instructional approach) since students require explicit instruction on metacognitive strategies from their teachers (McTavish; 2008), others are of the opinion that it could be enhanced in peer/student-directed cooperative learning environment leveraging on its more participatory characteristic (Jayapraba & Kanmani, 2014; Jbeili, 2012; Slavin, 1991; Stevens, 2003). The argument for the direct instructional approach in which teachers take more roles in teaching metcognitive reading skills could be weakened on the basis that students could be dependent on teachers' metacognitive feedback mechanism which has been identified as an

instance of students' metacognitive weakness (Ramadhanti, Ghazali, Hasanah, & Harsiati, 2019). Opponents of instructional approaches where students become more active in cooperative learning could also advance that this approach can lead to over-dependence on peer mechanism which may even be wrong thereby leading to another students' metacognitive weakness (Ramadhanti, et al., 2019).

These reflections may be lacking in the Nigerian context because teachers are tied to the use of conventional instructional approaches (Osuji, 2017; Udosen, 2011) which makes it difficult for Nigerian adolescents to possess good metacognitive skills. Researchers are of the view that integration of metacognitive strategies in second language learning is an approach that leads to improvement in second language learning (Guo, 2018). Also, there seems to be limited empirical evidence establishing the effects of these two approaches on early adolescents' metacognitive reading skills in Nigeria. To ascertain this, the researchers adopted the cooperative integrated reading and composition (CIRC) developed specifically for reading by Stevens, Madden, Slavin, and Farnish (1987) and a teacher-directed instructional approach in which metacognitive strategies were infused in the learning process. Although the aforementioned research regarding the impact of cooperative learning and a teacher-directed instructional approach on early adolescents' metacognitive skills for reading proficiency illuminates important findings, we have found no research that has examined this among Nigerian adolescents. Given such, further research is warranted that could examine the differential impacts of cooperative learning and teacher-directed classrooms on adolescents' metacognitive skills for reading proficiency in a bid to address the documented Nigerian adolescents' deficient reading strategies and achievement (Okosa, et al., 2013; Osa-Edoh & Alutu, 2012; Owolabi, 2012).

Cooperative learning approach and metacognitive strategies

Several shades of cooperative learning have emerged in recent times (Grosser, 2014). This could be a response to the evidence that learning could be enhanced when learners share from the cognitive resources of their peers (Jayapraba & Kanmani, 2014; Jbeili, 2012). As the world is becoming more competitive, problem solutions seem to go beyond what an individual could handle without a sort of healthy interdependence. Drawing from the tenets of the social constructivist theorists such as Lev Vygotsky, researchers see cooperative learning as relying on the cognitive scaffold by more knowledgeable persons to bridge learners' zone of proximal development (Jbeili, 2012). As such, learning is facilitated. Crosby and Owens (1993, p. 4-5)

were of the opinion that cooperative learning approach ‘builds upon the social instincts of children and adolescents as well as supplementing and replacing independent seat work with activities for small mixed-ability groups’. In this, children begin to work out their own learning strategies for them to benefit from the process (Gumperz, Cook-Gumperz, & Szymansky, 1999). As they share what they know, they could also share the strategies that help them understand that. This confirms the assertion that metacognitive skills are shared in social interactions (Iiskala, Vauras, & Lehtinen, 2004). Hence researchers have looked at effects of cooperative learning approaches on students’ metacognition. In 1995, Stevens and Slavin conducted a two-year study to determine the long-term effects of CIRC on students’ metacognitive awareness. In this study, students worked in heterogeneous learning groups on reading and writing activities and were provided with explicit instruction on comprehension strategies. The second year result showed that CIRC students significantly exhibited greater metacognitive awareness than their peers. Since the study of Stevens and Slavin (1995), studies are lacking in replicating the impact of CIRC on students’ metacognition though researchers are in agreement that it could bolster students’ metacognitive skills (Nasution, 2017, Slavin, Lake, Cheung & Davis, 2008). However, studies have been conducted on the impact of other forms of cooperative learning on metacognitive skills. For example, Iiskala, Vauras, and Lehtinen (2004) demonstrated the manifestation of metacognition in social interaction during collaborative solving of task in mathematics. The qualitative analysis after five weeks revealed metacognition in students’ interaction. Other researchers such as Erdoğan and Şengül (2017) looked at the effects of two cooperative learning approaches on the metacognition of students. In the study, Erdoğan and Şengül (2017) found that students in the cooperative learning group laced with metacognitive strategies improved on their metacognitive skills more than those who were grouped in the cooperative learning class taught without metacognitive strategy intervention and the control group. On a contrary note, Langdon, et al (2019) examined a number of strategies to improve undergraduates’ metacognitive strategies in Physiology and found no significant improvement of metacognition in the collaborative strategy that was adopted for the study. They insisted that to advance the knowledge on how skills on metacognition could be facilitated, that there is need for researchers to adopt instruments of data collection that are not solely self reports from research participants.

Teacher-directed instructional approach and metacognitive strategies

From the teacher effectiveness orientation, acquisition of metacognitive reading skills will be much easier when an effective teacher explicitly scaffolds the skills to the learner. This

will save the child enough cognitive resources to handle other tasks. Empirical evidence in support of this abounds even though some constructivists may argue that the teacher taking the lead may result to apathy in learning as metacognitive skills could at times be idiosyncratic. Recent advances in classroom instruction have refined and expanded direct instruction and lay emphasis on both cognitive and metacognitive strategies (Veenman, Denessen, Oord, & Naafs, 2003). In this study, the direct instructional approach adopted is a modified approach that lends itself to explicit instruction given that it is not limited to structured instruction in basic skills (Luke, 2014) but extends to instruction on own strategies. Caliskan and Sunbul (2011) investigated the effects of learning strategies instruction on metacognitive knowledge, metacognitive skills, and achievement and result showed increased awareness of strategy and metacognitive knowledge. The experiment showed that students were adept in using metacognitive skills. de Jager, Jansen, and Reezigt (2005) compared the development of students' metacognition in different learning environments: direct instruction, and cognitive apprenticeship in primary school including a control group of teachers. These interventions significantly improved pupils' metacognitive skills and metacognitive knowledge when compared to the control group. Also direct/explicit instruction on strategic reading has been shown to increase awareness of metacognitive reading strategies and positive attitude about learning of student teachers (Iwai, 2016). Qualitative results of the study conducted by Iwai (2016) showed that students are in affirmation of the positive impact of strategy instruction in their learning. McFarland (2013) demonstrated that metacognitive awareness of students could be increased through direct instructional approach which gives students opportunity to practice the use of the learning strategies. McFarland's (2013) study was consistent with other studies that present direct instructional approaches of metacognitive strategies as facilitators of students' metacognitive awareness.

Objectives and Hypotheses

The purpose of this quasi-experimental non-randomized pretest-posttest control group design study is to ascertain: a) the total mean metacognitive reading skills for reading proficiency, task understanding, strategy understanding and management of learning process skills scores of adolescent readers taught with CIRC, DI and that of those in the control group; and b) if there are significant differences in the total mean metacognitive reading skills for reading proficiency, task understanding, strategy understanding and management of learning process skills scores of adolescents taught with CIRC, DI and the control group.

Research question

- a. What is the total mean metacognitive reading skills for reading proficiency, task understanding, strategy understanding and management of learning process skills scores of adolescent readers in CIRC, DI and that of those in the control group?

Hypothesis

- a. There are no significant differences in the total mean metacognitive reading skills for reading proficiency, task understanding, strategy understanding and management of learning process skills scores of adolescents readers in CIRC, DI and the control group.

Method

Participants

Using a multi-stage sampling technique, 118 Junior Secondary School Class II (JSSII) students participated in our study. Junior secondary education in Nigeria is the formal education a child acquires immediately after his/her primary education (Federal Republic of Nigeria, 2013). It comprises the first three classes (JSSI, JSSII, and JSSIII) in secondary education in Nigeria. Before we arrived at the sample size used for analysis, certain inclusive and exclusive criteria were outlined. For inclusion in the study, students must have been pre-and posttested, must have participated in all the seven contact sessions during the period of the intervention. Of the 39 students in CIRC class, 31 students met the inclusion criteria; 3 male and 5 female students did not participate in the posttest exercise and were excluded in the analysis. All the students in the DI and control classes met the inclusion criteria. Hence, there were 31 students (13 male and 18 female) in the CIRC, 48 JSS students (35 male, 13 female) in DI class and 39 JSS students (17 male, 22 female) in the control group. Average age for the groups are: CIRC ($mean = 13.12 \pm 1.67$); DI ($mean = 13.49 \pm 1.12$); and control group ($mean = 12.93 \pm 1.10$). The age of the students was pulled from the school enrolment register. Those whose age-related records were missing were entered in SPSS as missing data.

We also conducted a power analysis using G*Power 3.1.92. For our study, the needed sample size for a medium effect is 159. This was determined appropriate based on sample size analysis using ANOVA with 3 groups, effect size of .25, power of .80, and an alpha of .05.

While the needed sample for a large effect for our study is a sample size of 66. This was determined appropriate based on sample size analysis using ANOVA with 3 groups, effect size of .40, power of .80, and an alpha of .05.

Simple random sampling technique was used in sampling the 3 Education Zones which are Awka, Onitsha and Ogidi Education Zones. Also simple random sampling technique was used to select 3 Local Government Areas, one from each of the Zones. The Local Government Areas were Awka South, Onitsha North and Idemili L. G. As. Using the purposive sampling technique, one school in each of the three local governments was used in the study. The reason for this is that, different English textbooks are used in the secondary schools. Therefore, those that were using the *New Concept English for Junior Secondary Schools* as recommended by the government were selected. Then one school was selected from each of the local governments.

Instruments

The instrument used in this study was a modified open-ended questionnaire from the works of Anastasiou and Griva (2009); and MacLeod, Butler, and Syer (1996). The open-ended questions were adapted from Anastasiou, et al.'s and MacLeod, et al.'s retrospective interviews directed at eliciting the metacognitive reading skills adopted while students worked on a given tasks. There were six (6) open-ended questions in which questions 1 and 2 elicited information on understanding about a reading task; questions 3 and 4 elicited information on students' understanding about reading strategies, and questions 5 and 6 were asked to elicit information on students' management of the reading process. The questions are: 'What was your goal when you were reading the comprehension passages? How did you know you have achieved your goal in reading the passages? How did you confront the difficulties you encountered in certain parts of the text? What do you usually do for a better comprehension of a reading text? What were the major difficulties you faced while reading the text? When you discover that you no longer understand what you read, what do you do to keep going?' The researchers adapted it as a retrospective open-ended questionnaire based on Flavel model of metacognitive knowledge. Scoring guide as developed by MacLeod, et al. (1996) is attached as appendices A and B. The instrument was validated by experts in Educational Psychology; Measurement and Evaluation in Nnamdi Azikiwe University, Nigeria. After this, a pilot study was conducted to ascertain the reliability coefficient of the instrument as well as the challenges that could arise during the implementation of the programme. This was conducted a term before the actual experiment and

students were pretested and posttested using the instrument. Scores realized from this pilot study were used to conduct a reliability test. The coefficient of stability of the instrument was determined using the Pearson Product Moment Correlation Coefficient after it was pilot tested. The reliability coefficient of the instrument was .76.

Procedure

A rapport was established with the research assistants who are the regular teachers in the three schools sampled. The essence of the study was discussed with them and the researchers tried to share the dominant practice in teaching reading in schools for early adolescents. The researchers trained the two research assistants on CIRC and teacher-directed instructional strategy while the teacher in the control group did not receive any training but used scripted lessons for the control group. Students in the three groups (CIRC, DI and control groups) were taught same reading comprehension passages using the government approved English text. And this lasted for the term; i.e. 12 weeks. The first week which is the 'resumption exercise' was used for training the research assistants and pre-testing the students while the second week was used to train the students in the CIRC class and two class sessions were used by the research assistant as hands-on training exercise.

Research assistants in CIRC and DI groups infused metacognitive reading skill in the lessons by training (as in the case of CIRC) or teaching explicitly (as in the case of DI) students on how to plan their reading comprehension by previewing the passages, thinking about what they know about the text they read; making some guesses about what kind of information they expect in the text and evaluating the correctness of their guesses. In identifying difficulty words and monitoring comprehension, they were, depending on the instructional approach, trained on or taught self-questioning and self-assessment (asking themselves if they have understood what they are reading or not, etc), consulting reference materials; and making intelligent guesses. To improve the use of strategies and monitor their comprehension, students were taught to underline important points, reread and highlight important points, mental repetition, summarizing and self-questioning.

A two-day training session was held for the teacher at the beginning of the school term for the CIRC research assistant. The research assistant was trained on procedures related to the logistics of implementing CIRC in the classroom, with particular attention to small, cooperative

learning groups in which students work during implementation of CIRC. Groups were heterogeneous in nature having a mixture of low and high achievers, male and female students, fast and slow readers in each group. To get the heterogeneity in groups, the previous academic record of the students was used and students were distributed in groups based on their performances. The first best five students were used to form the five groups and subsequently the next best students were rotated among the groups until all the students were grouped. This was flexibly done in that groups were not allowed to be unisex and in such cases students with equivalent ability were swapped. The research assistant was trained on how to infuse metacognitive reading strategies in a cooperative learning approach. The second week was used to train students on CIRC model and group them into groups of 5 which they remained in throughout the reading sessions. Before the actual experiment, the teacher trial tested the approach with hands-on practices with the students for two sessions to receive necessary feedback leading to adjustment where necessary. The essence of this is also to ensure that students master the skills needed in cooperative learning. Students were exposed to techniques such as question and answer, brainstorming, turn-taking, and discussion. They were told to plan on how to read, think of the tasks before them, consider the title of the passage given to them and think of what they know about the title, look at the pictures and see if they communicate anything to them, think of strategies to adopt when they do not understand an idea in the passage, and monitor their understanding while they read. The CIRC script followed the following example:

Introduction of main idea: The teacher introduced the story line to the class, told them the main theme and established context and background information necessary for the comprehension of the passage.

Assignment of students to group/partner reading/activities: The teacher assigned the students to reading groups and asked them to read the story silently and then orally in their groups. Before they started reading, the teacher told them to look at the pictures in their text and think of how it helped them understand the passage; think about what they have heard about the passage they were to read, what it stands for, and what they expected as they read, re-read if they didn't understand what they are reading, try to pick out the main points and write down any striking point. They as well asked themselves questions reflecting on what they had read to determine if they had achieved the aim of their reading. The group leader beckoned on members to read from one paragraph to another until they took turns reading the whole story.

Treasure hunts/quizzes: The teacher then provided students with questions related to the story read which is referred to as 'Treasure hunt'. The teacher asked them to brainstorm on these questions and individually write down the answers which was marked later. The total score for each group was determined by the aggregate scores of the members.

Words out/word meaning: The teacher also gave students a list of new words in the story which was practiced by the students. They practiced saying the words out loud with their partners. They were asked to think about the meaning of these words and as well check their meanings in the dictionary and use them appropriately.

Story retelling: They were asked to retell the story to their partners and point out the main ideas in the story. As they were engaged with their partners in these activities, the teacher visited each group to monitor their progress and render help where and when necessary.

Wrap-up activity/Independent reading: When students were through with the activities, the teacher brought them together as a single group and wrapped up the story and stressed its main idea. He asked students to report where they had problems while reading the story and where they might have disagreed with their partners as they were providing solutions to the problems. He asked them to read other stories as they get home.

For the DI, there was a two-day training session for the teacher at the beginning of the school term. He was made to know that the DI used in the study is one laced with metacognitive strategies alongside the teaching of the comprehension passages. This was characterized by highlighting the need to teach the reading comprehension strategies explicitly and systematically, monitoring adolescents' answers and enabling feedback. The teacher was exposed to what metacognitive reading strategies are and how they can be embedded in his reading comprehension instruction. Students in the DI group were taught by their teacher directly which was characterized by gradually moving the learning responsibility from the teacher to the student consisting of the principles and procedures of direct instruction. The lessons followed the procedures of orientation, presentation, structured practice, guided practice and independent practice. Students were taught about learning strategies and how learning strategies should be used. Students in the DI group were taught to look at the title, pictures, graphs (previewing) to think about what they know about the text they are about to read, make some guesses about what kind of information they expect in the text, and evaluate their guesses. They were taught skimming

and scanning to locate main ideas, rereading, highlighting important points, and summarizing. They were also taught monitoring and self-questioning, that is, the conscious habit of checking if one has understood what one has read. The teacher used two contact sessions to explain the above metacognitive reading strategies to them and modeled them as they read the passages which were not among the seven taught to the students. One lesson during the double period took place every week until the seven passages were completed.

The control group was taught by the classroom teacher using the usual conventional method. In their lessons there was no conscious attempt by the teacher to either explicitly teach them metacognitive strategies or model them as they engage in their reading comprehension. Students did not learn collaboratively here. They were also exposed to the same comprehension passages the CIRC and DI group were exposed to.

Based on the result of the pilot test, the classes were held on Wednesdays in which there was a double period for English Language in the school time-table. There was one contact session in each week and seven comprehension passages in their scheme for the term were covered. Thereafter, the post-test was conducted. The post test was done during the revision period and just like the pretest, was conducted for two contact sessions. Four comprehension passages were given to the students and their papers were collected from them and in the next session, three reading comprehension passages and the Metacognitive Reading Skills Questionnaire (MRSQ) were given to them.

Research Design

The design of our study is a quasi-experimental design non-randomized pretest-posttest control group design given the fact that secondary schools in Anambra state use unified curriculum and school authorities may not allow randomization to avoid disruption of the school activities. The pretset scores were used to determine the equivalence of the three groups (CIRC, DI and control group) using ANOVA.

Datal Analysis

The data collected were analyzed using mean to answer the research question while the hypotheses were tested using Welch ANOVA test at 0.05 level of significance. The researchers used the above robust statistics because the data failed the assumptions of analysis of variance.

Steps in analyzing the data included data screening and there were no significant outliers, assessment of normality of data using histograms of the participants' post-test scores and the Shapiro-Wilk test of the post-test scores = $p < .05$, assessment of the homogeneity of error variances assumptions in which the Levene's test was used showed the posttest scores = $p < .05$ for all the distributions. Distributions failed major assumption of the classical ANOVA which is the homogeneity of error variances which ANOVA was not robust enough to counter hence, the use of Welch ANOVA in testing the hypotheses (Delacre, Leys, Mora, & Lakens, 2019). Following this, effect sizes were calculated using Adjusted omega squared (*est. ω^2*) test, while the post hoc analysis was conducted using Games-Howell. See tables 1 and 2 for normality and homogeneity of variance test.

Table 1. *Test of Normality of Group Post Scores*

Groups		Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	Df	Sig.	Statistic	Df	Sig.
Task understanding scores	Cooperative	.138	31	.138	.935	31	.062
	Direct	.247	48	.000	.833	48	.000
	Conventional	.253	39	.000	.826	39	.000
Strategy understanding scores	Cooperative	.194	31	.004	.857	31	.001
	Direct	.220	48	.000	.852	48	.000
	Conventional	.187	39	.001	.871	39	.000
Management of learning process scores	Cooperative	.157	31	.050	.915	31	.018
	Direct	.167	48	.002	.876	48	.000
	Conventional	.182	39	.002	.882	39	.001
Metacognitive total score	Cooperative	.129	31	.199	.929	31	.042
	Direct	.151	48	.008	.902	48	.001
	Conventional	.165	39	.009	.937	39	.030

a. Lilliefors Significance Correction

Table 2. *Test of Homogeneity of Variance*

	Levene Statistic	df1	df2	Sig.
Post task understanding scores	6.776	2	115	.002
Post strategy understanding scores	8.520	2	115	.000
Post management of learning process	4.229	2	115	.017
Post total scores of metacognitive reading skills	8.096	2	115	.001

Furthermore, the equivalence of the three groups were tested using the pretest scores to determine if they were equivalent enough to be compared after the intervention. Using

ANOVA, the results indicated that the groups were equivalent in the pretest total metacognitive reading skills ($p>.05$), the pretest task understanding ($p>.05$), and the pretest strategy understanding. The groups were not equivalent in the management of learning process skills ($p<.05$) indicating that caution must be taken in the interpretation of the result. See table 3 for ANOVA.

Table 3. *ANOVA Test for the Pretest Scores of the Three Groups*

		<i>Sum of Squares</i>	<i>Df</i>	<i>Mean Square</i>	<i>F</i>	<i>Sig.</i>
Pre task understanding scores	Between Groups	1.254	2	.627	.743	.478
	Within Groups	97.017	115	.844		
	Total	98.271	117			
Pre strategy understanding scores	Between Groups	1.360	2	.680	.360	.698
	Within Groups	217.190	115	1.889		
	Total	218.551	117			
Pre management of learning process scores	Between Groups	18.336	2	9.168	5.667	.004
	Within Groups	186.037	115	1.618		
	Total	204.373	117			
Pre metacognitive total score	Between Groups	22.708	2	11.354	1.199	.305
	Within Groups	1089.232	115	9.472		
	Total	1111.941	117			

Results

Table 4 showed that adolescent readers in CIRC group had a pretest mean of 2.87, and a posttest mean score of 8.10; and gained 5.23 points in the overall metacognitive reading skills. Those in DI group had a pretest mean of 3.61, and posttest mean of 4.50 in metacognitive reading skills. They gained 0.89. Adolescent readers in Control group had a pretest mean of 3.08 and a posttest mean score of 4.08; and gained 1.00 points in metacognitive reading skills. It indicated that the CIRC improved their metacognitive reading skills more than the other two methods.

Table 4. Descriptive statistics for pretest and posttest metacognitive reading skills achievement of early adolescent readers in CIRC, DI and control groups

Variables	CIRC(N=31)					DI (N=48)					Control (N=39)				
	Pretest		Posttest		$(\bar{x})$ Gain	Pretest		Posttest		$(\bar{x})$ Gain	Pretest		Posttest		$(\bar{x})$ Gain
	$(\bar{x})$	SD	$(\bar{x})$	SD		$(\bar{x})$	SD	$(\bar{x})$	SD		$(\bar{x})$	SD	$(\bar{x})$	SD	
Overall Meta-cognitive reading skills	2.87	3.11	8.10	5.24	5.23	3.61	2.75	4.50	3.47	0.89	3.08	3.30	4.08	3.10	1.00
Sub-scales: Task understanding	0.94	0.96	2.39	1.71	1.45	0.77	0.92	1.98	2.92	1.45	0.67	0.86	0.95	0.95	0.28
Strategy understanding	0.97	1.25	3.36	2.33	2.39	1.23	1.32	1.73	1.49	0.27	1.18	1.52	1.77	1.61	0.59
Management of learning skills	0.97	1.28	2.36	1.84	1.39	1.73	1.22	1.50	1.34	-0.23	0.90	1.33	1.46	1.27	0.56

*CIRC=Cooperative integrated reading and writing; DI=Direct instruction; CONTR=Control

In task understanding, mean gain was greatest in CIRC, followed by that of the control group, while the DI group had the least gain. It also showed the mean of metacognitive reading skills on task understanding scores of early adolescent scores in the CIRC, DI and the control groups. The pretest mean scores indicated that the CIRC group had the highest mean score followed by the DI group while the Control group had the least mean score. The table showed that the adolescents had the highest mean score in strategy understanding in CIRC.

Furthermore, it showed the mean of metacognitive reading skills on management of learning process scores of early adolescent scores in the CIRC, DI and the control groups. The pretest mean scores indicated that the DI group had the highest mean score followed by the CIRC group while the control group had the least mean score. After the treatment, the CIRC group had the highest mean score and a mean gain of 1.39, followed by the control group with a mean gain of 0.56 while the DI had the least mean score but with a mean loss of -0.23. Adolescents had the highest mean management of the learning process in CIRC, followed by the

control group. However, the DI group did not gain in the management of learning process in the DI group.

Table 5 showed the Welch ANOVA and findings showed a significant main effect on the task understanding skills of the students in the three groups $F(2, 118) = 8.783, p < .01, \omega^2 = .129$. Using Games-Howell posthoc analysis as indicated in table 6 to determine where the differences lie, findings showed that significant differences occurred among students in CIRC and DI groups; CIRC and Control groups. There was no significant difference task understanding skills of students in DI and control groups.

Table 5. *Welch ANOVA Test on Mean Differences Among the Groups*

Clusters/Operations	CIRC(N=31)	DI (N=48)	Control(N=39)	Test	sig	adjusted omega squared (est. ω^2)
	<i>M(SD)</i>	<i>M(SD)</i>	<i>M(SD)</i>	<i>F / Welch</i>		
Task understanding	2.39(1.71)	1.27(1.33)	.95(.94)	8.783	.000	0.129
Strategy understanding	3.36(2.33)	1.73(1.50)	1.76(1.61)	6.324	.003	0.082
Management of learning process	2.36(1.84)	1.50(1.34)	1.46(1.27)	2.949	.059	0.032
Overall metacognitive reading skills	8.10(5.25)	4.50(3.47)	4.18(3.04)	7.047	.002	0.092

More so, Welch ANOVA revealed a significant main effect on the strategy understanding skills of the students in the three groups $F(2, 118) = 6.324, p < .01, \omega^2 = .082$. Games-Howell posthoc analysis showed that significant differences occurred among students in CIRC and DI groups; CIRC and Control groups. There was no significant difference in strategy understanding skills of students in DI and control groups.

Furthermore, Welch ANOVA revealed a non-significant main effect on the management of learning process skills of the students in the three groups $F(2, 118) = 2.949, p > .05$. Welch analysis of variance showed a significant main effect on the overall metacognitive reading skills of students in the three groups $F(2, 118) = 7.047, p < .01, \omega^2 = .092$. Further analysis to determine where the mean metacognitive reading skills differences lie among the groups, using Games-Howell posthoc analysis, showed that significant differences occurred among students in CIRC and DI groups; CIRC and Control groups. There was no significant difference in overall metacognitive reading skills among students in DI and control groups.

Table 6. *Post Hoc Multiple Comparison Analysis of Mean Differences based on the Three Groups*

Multiple Comparisons							
Games-Howell	Dependent Variable	(I) groups	(J) groups	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound Upper Bound
Posttask	Cooperative	Direct	Cooperative	1.11626*	.36185	.009	.2438 1.9888
			Conventional	1.43838*	.34176	.000	.6096 2.2671
	Direct	Conventional	Cooperative	-1.11626*	.36185	.009	-1.9888 -.2438
			conventional	.32212	.24470	.390	-.2618 .9060
	Conventional	Direct	Cooperative	-1.43838*	.34176	.000	-2.2671 -.6096
			Direct	-.32212	.24470	.390	-.9060 .2618
Poststratagey	Cooperative	Direct	Cooperative	1.62567*	.47130	.003	.4843 2.7671
			conventional	1.58561*	.49206	.006	.3980 2.7732
	Direct	Conventional	Cooperative	-1.62567*	.47130	.003	-2.7671 -.4843
			Conventional	-.04006	.33690	.992	-.8449 .7648
	Conventional	Direct	Cooperative	-1.58561*	.49206	.006	-2.7732 -.3980
			Direct	.04006	.33690	.992	-.7648 .8449
Postmetatotal	Cooperative	Direct	Cooperative	3.59677*	1.06662	.004	1.0154 6.1782
			Conventional	3.91729*	1.06025	.002	1.3488 6.4857
	Direct	Conventional	cooperative	-3.59677*	1.06662	.004	-6.1782 -1.0154
			conventional	.32051	.69873	.891	-1.3465 1.9875
	Conventional	Direct	cooperative	-3.91729*	1.06025	.002	-6.4857 -1.3488
			Direct	-.32051	.69873	.891	-1.9875 1.3465

*. The mean difference is significant at the 0.05 level.

Discussion and conclusion

Our study investigated the effects of CIRC and DI on the metacognitive reading skills of early adolescents in Nigerian. Even though cooperative learning has been said to improve students' achievement, its application in the Nigerian context has been turbulent given the large classes teachers handle. This made it pertinent for the design of a model that infused metacognitive reading strategies in DI which is closer to what is obtainable in Nigerian classes. Our findings showed that students in CIRC had the highest mean gain in the overall metacognitive reading skills followed by those in control group. Those in the DI group had the least mean gain in metacognitive reading skills. This means that the CIRC group was the most effective in training students in the use of metacognitive reading skills. The fact that those in CIRC achieved

more than any other group was expected going by its ability to spur the adoption of metacognitive reading skills due to the fact that it involves active participation of the students in the classroom, scaffolding, and interpersonal relationships. Our finding is in agreement with other studies that have found significant improvement of metacognitive reading skills of students after being trained in CIRC (Stevens & Slavin, 1995). They found that students who received instruction in metacognitive skills in CIRC outperformed their peers in metacognitive reading awareness within two years of the experiment. Iiskala, Vauras, and Lehtinen (2004) study showed that the cooperative atmosphere can enhance metacognitive reading skills.

Our findings further showed that those in control group outperformed those in DI even though the metacognitive reading skills were infused in DI. This finding contrasts our initial expectation. It was thought that infusing metacognitive strategies in DI will give them better opportunity to develop metacognitive reading skills. Researchers such McFarland (2013) and McTavish (2008) have in their studies demonstrated the effectiveness of DI/explicit instruction on metacognitive skills or awareness. The effective teacher assumption could posit that the teacher may be in a better position to direct learners to use, regulate and strategize their thoughts. However, their poor performance may confirm the idiosyncratic nature of metacognitive reading skills which may be why the actual internalization of these skills in DI was inhibited. There is the possibility that acquisition of these skills may need more engaging learning environment. More so, students may see it as more tedious since it looks as if it is another cognitive load. This, if not carefully handled, may lead to difficulty in use. Furthermore, a careful observation of their pretest will bring to the fore the fact that those in the control group may have better metacognitive reading skills than those in DI group. Since it is a skill they have a bit of, it is bound to influence their posttest. However, the fact that significant differences did not occur in their mean metacognitive reading skills (DI and Control) shows that the observed mean differences between the two groups could be attributed to chance.

Our study further showed that adolescents in CIRC did better than other groups in all the components of metacognitive reading skills. We found that adolescents had the highest mean score in metacognitive reading skills on task understanding in CIRC than in the other groups implying that these skills were better nourished in CIRC than in any other group. Adolescents in CIRC were significantly better in the ability to understand the overall task purpose and of the relationship between specific task elements and possess the skills at understanding specific criteria for judging the quality of their own task performance. They were able to have

understanding of the task purpose and aligned that purpose with concrete task elements (MacLeod, et al, 1996) than those in DI and control groups. This skill places them in a vintage position to plan for their task. This, in spite of the fact that they were prompted to use metacognitive reading strategies, suggests that the responsibility given to them in CIRC might have been responsible in nourishing this skill, helping them to examine the weight of a task before they venture into it. Those in CIRC, considering their task understanding dimension mean score, are likely to have better understanding of what they are required to do. The improvement adolescent readers in CIRC have in the strategy understanding dimension was expected going by the fact that studies have found that cooperative/collaborative learning environment facilitates strategy use. Iiskala, Vauras, and Lehtinen (2004) have found that metacognition is manifested in social interaction during collaborative problem-solving. Adolescents in CIRC group gained the ability to provide a clear and specific description of the strategies they use in completing the task before them and make the strategies adopted focused and appropriate to the demands of the tasks (MacLeod, et al, 1996).

Contrary to our expectation is our finding that those in DI did not do better than those in control group in strategy understanding. The DI received instruction in metacognitive reading strategy while those in control group did not. Their not improving on their strategy understanding may be that the programme might not have given them the opportunity to internalize what was taught them. A good number of studies in DI have demonstrated its superiority over the control group (de Jager, Jansen & Reezigt, 2005).

Equally important is our finding that adolescents had the highest post mean score in the management of the learning process in CIRC, followed by the control group. However, the DI group did not gain in the management of learning process. The improvement in CIRC could have been spurred by the opportunity that it provides for learners to have ownership of the learning process. The interaction existing in CIRC could help students learn to select, apply and evaluate strategies which is the function of strategy monitoring in the management of learning process (Cho, Woodward, Li, & Barlow, 2017). This is likely going to help them regulate their thought processes as they learn so that they could offer help that would help their peers achieve. However, the testing of our hypothesis showed that there was no significant difference in the post-mean scores of the three groups on their management of the learning process. We noted that this finding must be interpreted with caution given that analysis of equivalence of the three groups in management of the learning process using the pre-test scores indicated that the groups

were not equivalent. This might have affected the significant main effect despite the remarkable mean gain scores of CIRC group. DI group and the control group had better pretest scores than the CIRC group which is likely to have sustained their performances stemming from superior possession of this skill before the intervention. The fact that DI did not achieve more than the control group, is equally against the expectation of the researchers. It could equally be explained going by the fact that students could see the strategies used by the teacher as ‘teachers’ own’ strategies. Given that students in the DI group had the highest pretest scores in the management of learning skills than any other group but had a mean loss may suggest that those who already possess certain skills may want their own skills to be consolidated since metacognitive skills most times appear idiosyncratic.

One of the limitations of our study is the issue of small sample size which limits the generalizability of the findings. Given this limitation, findings cannot be interpreted beyond the students used in this study. More so, non-randomization in sampling is another limitation in the study. Considering the effects size in our study, we needed a sample size of 159 with a medium effect size and did not reach that size, hence a limitation of our study.

However, from the findings, it is concluded that metacognitive reading skills can be better nourished in a cooperative learning environment due to the active participation, peer cognitive scaffold and interaction in such environment. DI approach did not facilitate early adolescents’ metacognitive reading skills which implies that just infusing metacognitive reading skills in DI may not guarantee acquisition of metacognitive reading skills. It could be that active participation and exchange of ideas by students could be a significant factor in any method that would enhance metacognitive reading skills. This becomes very important in designing an instructional strategy to facilitate metacognition among early adolescents. Therefore, it could be recommended that efforts should be made to incorporate cooperative learning approach in Nigerian classrooms. For this to be effectively done, there should be teacher retraining, and restructuring of classrooms so that they could be manageable.

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APPENDIX A

SCORING CATEGORIES, DEFINITIONS AND SCORING CRITERIA FOR META-COGNITIVE READING SKILLS

Scoring Categories and definitions

<u>Category</u>	<u>Definition</u>
<i>Students' Understanding about Task</i> <ul style="list-style-type: none"> • Task Definition/Description • Quality Criteria 	<ul style="list-style-type: none"> • The student's understanding of overall task purpose and of the relationship between specific task elements. • The student's understanding of specific criteria for judging the quality of his/her own task performance.
<i>Students' Understanding about Strategies</i> <ul style="list-style-type: none"> • Strategy Description • Strategy Focus 	<ul style="list-style-type: none"> • The student's ability to provide a clear and specific description of the strategies he/she uses to complete the task. • The degree to which students' strategies are focused and personalized, in the sense that strategy elements are clearly interconnected and appropriate given the student's perception of the task demands.
<i>Students' Management of the Learning Process</i> <ul style="list-style-type: none"> • Monitoring • Motivation/Action Control 	<ul style="list-style-type: none"> • The student's description of learning difficulties (cognitive or performance) and of how he/she reflects on their learning activities to manage his/her learning. • The student's understanding of the kinds of thoughts or emotions that interfere with his/her learning and of action control strategies that help him/her to stay on task.

APPENDIX B

Scoring Criteria for metacognitive Measures

a) Task Understanding.

<i>Task Definition/Description (Students' description of task elements)</i>	
0	Nothing relevant to the task is indicated in the response. The student doesn't describe the <u>task</u> .
1	The student lists concrete task elements or makes nonspecific statements that are not interrelated or connected. (e.g., "Solutions and connections" or "Understanding what I've read".)
2	The student has a general understanding of the task or of global purpose, but hasn't connected task elements to one another or to that purpose. (e.g., "Reading comprehension passages is about identifying main ideas".)
3	The student has a clear overview of the task purpose and connects that purpose with concrete task elements. The description must have a clear focus and be specific. (e.g., reading comprehension passages is about understanding main ideas which are embedded in the paragraphs in the passages").
<i>Quality Criteria (Students' criteria for judging task completion or quality)</i>	
0	The student states that he/she doesn't know how to judge task quality or gives an irrelevant, off-topic response. (e.g., "I'm done when it's time to go to bed").
1	The student relies on others to make the judgment of task quality or uses external criteria. (e.g., "I know I comprehended well if I get a good mark".)
2	The student has a general sense of what counts as Ok for the task. (e.g., "I know when I have comprehended a passage if I could make meaning from it".)
3	The student provides a clear description of how to judge the quality of his/her own work in a focused, personalized way. His/her response demonstrates both a general understanding and concrete elements to check. (e.g., "I know when I've read a passage successfully because I can answer the question asked at the end of the passage and I can self-test and I know all the vocabulary".)

b) Strategy understanding

<i>Strategy Description (Students' concrete description of the strategies they use)</i>	
0	The student doesn't describe any strategies for completing the task
1	The student's description is vague or nonspecific. (e.g., "I try to get a grip on the information, and try to go through it really well".)
2	The student recognizes one or more specific approaches relevant to the task, but the description is limited or unclear. (e.g., "I try to read through the chapter thoroughly once, and then twice if I have enough time".)
3	The student's description is both clear and specific; strategy elements are interconnected and clearly relevant to the task. (e.g., "When writing an essay, I first brainstorm, then make up a rough outline. I review the outline, and then....")
<i>Strategy Focus (Students' ability to describe a personalized and focused approach to tasks)</i>	
0	The student doesn't describe any strategies for completing the task.
1	The student describes one or more approaches that are not linked to one another or to the demands of the task. (e.g., "I try and get it all alone".)
2	The student provides steps and some sense of the connection between steps and/or the task. (e.g., "I read it through and highlight the most important points, the things I think will be on the test".)
3	The student provides a clear and focused description of how he or she approaches the task in a personalized way. The link between strategy elements and the students' perception of the task is clear. (e.g., "I study the most important information until I feel like I know it very well, and do well on the self-tests that I make up".)

c) Managing Learning

Monitoring/Reflection (Students' understanding/description of the overall learning process; How students are reflecting on the process of learning and managing that)

- 0 The student provides no evidence of assessment of his/her own learning process (problems in the task) or of how to manage his/her own learning (assess/check learning).
- 1 The student demonstrates limited understanding of how to assess problems, understanding, or performance. (e.g., "There are some things I find difficult.")
- 2 The student provides a clear, but not necessarily complete assessment of his/her problems in the task, but doesn't provide a concrete plan for checking progress or managing learning. (e.g., "I will read and reread a paragraph and still not remember or understand what is being said".)
- 3 The student provides a clear assessment of problems or an awareness of the process or learning, including a description of approaches for managing their learning (which may or may not be effective). (e.g., "I've noticed that I have trouble mid-way through a chapter, so that's when I have to really concentrate and make myself stay attentive.")

Motivation/Action Control (Students' description of strategies for managing motivation or volition)

- 0 The student provides very vague or non-specific information related to factors that impede his/her performance in tasks. (e.g., "I just can't stick with it".)
- 1 The student mentions that they experience interfering thoughts or emotions, but doesn't describe any actions to support their task performance. (e.g., "I feel frustrated when trying to read".)
- 2 The student mentions interfering thoughts or emotions and provides a general statement about how they might change the situation to manage learning. (e.g., "When I get frustrated, I usually have to stop and take a break".)
- 3 The student's comment provides both a description of interfering emotions or thoughts and specific strategies for managing task performance. (e.g., "When I get frustrated, I may take a break. But, if I don't have time, I stop take a deep breath and sit back for a bit").

Received: 29-04-2020

Accepted: 19-09-2020