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Effect of Team Assisted Individualisation Strategy on Senior Secondary School Students' Motivation to Learn Mathematics

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Abstract

Mathematical concepts are often regarded as difficult to learn. A large percentage of students only study it because of its compulsory nature at the secondary school level. These students go through the learning process without enthusiasm and motivation to learn the subject which often results in frustration and lack of success. This study examined the effect of team assisted individualisation (TAI) on senior secondary school students' motivation to learn mathematics using cognitive style as a moderator variable. The study was carried out using the quasi-experimental pre-test, post-test non-equivalent control group with a sample of 289 students made up of 128 males and 161 females. The instruments for data collection were the Group Embedded Figures Test and a Motivation to Learn Mathematics Questionnaire. Analysis of data showed that TAI strategy had a significant main effect on students' motivation to learn mathematics. Field dependent students were better motivated than the field independent students. The interaction effect of treatment and cognitive style also had a significant effect on students' motivation to learn mathematics. It was recommended that teachers should adopt TAI in teaching mathematics since it enhanced students' motivation to learn the subject and they should attempt to identify the cognitive style of their students so that they will be able to optimise each teaching and learning session to ensure students are adequately motivated to learn mathematics.

Introduction

The rigour of manipulating mathematical concepts and formula often frustrates students from achieving significantly in mathematics. The high rate of failure experienced at the Senior Secondary Certificate Examination in mathematics in Nigeria also confirms that many students lack the ability to solve mathematical problems (Attah, 2009). The compulsory nature of mathematics in schools therefore becomes a burden to students (Awofala, 2000; Awofala, Awofala, Nneji & Fatade, 2012) who often show negative attitudes towards the subject (Awofala, 2017a; Awofala, 2016). While the statistics of students' achievement in senior Secondary Certificate Examination in mathematics appears to be improving, the motivation to learn the subject appears to be of less concern in the Nigerian mathematics education community as observed in the paucity of literature in this regard. Motivation to learn however, has been accorded to be responsible for an individual's choice of learning mathematics beyond the compulsory levels. It is therefore expedient to examine students' motivation to learn mathematics and how it can be enhanced to produce long lasting results as a base for scientific and technological development. Eurydice (2011) opined that raising levels of motivation is a key element in improving mathematics performance.

In co-operative learning situations, students like mathematics more and are more intrinsically motivated to continue to learn it (Entonado & García, 2003). Team Assisted Individualization (TAI) initiated by Slavin (2009) is a blend of cooperative learning with individualized instruction that focuses on the process of group learning, where students work in cooperative learning teams to help each other in solving problems and encouraging one another to make academic progress. Japan International Cooperation Agency (2012) pointed out the necessity of transforming mathematics lessons from teacher-centred to learner-centred and the need to make mathematics learning more meaningful for the students. The TAI increases individual understanding of the subject matter, cooperation and a sense of responsibility for the group. Due to the combination of cooperative and individual learning, learners explore concepts, construct knowledge and experience about the subject matter and do not feel overwhelmed when result is incorrect. Also, the individual learning ensures that each student learns independently, not only receiving lessons from a teacher so that meaningful learning can occur.

Sulistyaningsih and Mawarsari (2013) investigated the effectiveness of the implementation of TAI on students' ability to think about trigonometry creatively. The result showed that TAI was effective in promoting students' ability to think creatively. Awofala, Arigbagbu and Awofala (2013) also considered the relative effectiveness of framing and team assisted individualised (TAI) instructional strategies on the mathematics attitude of senior secondary school students. The results indicated significant main effect of treatment on participants exposed to the TAI strategy. No significant main effect of cognitive style was found on students' attitudes toward mathematics. Adopting a factorial design, Tilaar (2014) explored the effect of TAI and performance assessment on the achievement of students in Linear Program. The findings showed that the results of students who obtained treatment models of TAI differ significantly from students exposed to classical learning. Pramestasari and Qohar (2016) examined the application of guided journal in Team Assisted Individualization (TAI) to support mathematical communication ability using a classroom action research design.

Gusantika, Mardiyana and Pramudya (2017) also examined the effect of TAI teaching strategy to learning approach, mathematics learning style and the interaction between them on the students' mathematics achievement. Based on the research results, it was found that students' taught by TAI learning model had a better mathematics achievement than those who were taught by direct instructional model.

Motivation is an intrinsic or extrinsic goal-oriented behaviour which drives and sustains the activities of individuals (Schunk & Mullen, 2013; Singh, 2011). Intrinsic motivation occurs when the activity is done out of the free choice of the individual while extrinsic motivation is a construct that is relevant whenever an activity is done to attain some reward. As an affective variable capable of influencing learners' educational progress and success, Sikhwari (2014) found that there is a significant correlation between academic achievement and motivation of secondary school students in mathematics. When students are motivated to learn mathematics, they spend more time on mathematical tasks and tend to be more persistent in solving mathematical problems and open to taking a larger number of mathematics courses or pursuing a mathematics-related career (Stevens et al., 2004; Lepper & Henderlong, 2000).

Shin, Lee and Ha (2017) explained motivation to learn as an essential element of self-regulated learning and long-term academic achievement. The motivation to learn as specified by Glynn and Koballa (2006) has six components which includes intrinsically motivated learning, extrinsically motivated learning, personal relevance of learning, self-determination, self-efficacy, and test assessment anxiety. Intrinsically motivated learning refers to the degree to which the student perceives himself/herself to be participating in a task for inward reasons such as challenge, curiosity, and mastery (Awofala & Falolu, 2017; Awofala, Lawani & Adeyemi, 2020). Extrinsically motivated learning concerns the degree to which a student perceives himself/herself to be participating in a task for outward reasons such as grades, rewards, performance, evaluation by others, and competition (Awofala & Falolu, 2017; Awofala, Lawani & Adeyemi, 2020). Personal relevance of learning is the relevance of learning mathematics to students' goals (Awofala & Falolu, 2017; Awofala, Lawani & Adeyemi, 2020). Self-determination (responsibility) is the ability of the student to be in control over his/her own behaviour (Awofala & Falolu, 2017; Awofala, Lawani & Adeyemi, 2020). Self-efficacy (confidence) relates to students' feelings about their ability to succeed and test (Awofala & Akinsola, 2009; Awofala & Falolu, 2017; Awofala, Lawani & Adeyemi, 2020). Assessment anxiety is the debilitating tension some students experience in association with grading in mathematics (Awofala & Falolu, 2017; Awofala, Lawani & Adeyemi, 2020).

While several researches have addressed the problem of poor attitude and achievement in mathematics, only few have examined the problem of lack of motivation or its decline in the subject. Previous studies revealed that students' attitudes, interest, and motivation towards science learning decline throughout their years at school, especially during secondary school (Galton,2009; Osborne, Simon, & Collins, 2003). The decline in students' motivation for science learning might be linked to the way science is taught in schools (Vedder-Weiss & Fortus, 2011). However, Kiemer, Greoschner, Pehmer and Seidel (2015) opined that student interest and motivation in Science, Technology, Engineering and Mathematics (STEM) have dropped significantly throughout secondary education, for which teacher-student interactions have been identified as a vital reason. Murayama, Pekrun, Lichtenfeld, and vom Hofe (2013) reported that while the progress of mathematics achievement at initial stages strongly correlated to students' level of intelligence, the long-term growth of students' mathematics achievement was strongly correlated to their motivation to learn. Consequently, motivation to learn is a key research area where educators should intensify efforts to increase student motivation and improve the long-term effects of education. Shaaban and Ghaith (2008) examined the motivation of university students to learn English as a Foreign Language (EFL). Findings revealed that integrative motivation, effort, valence, expectancy, and self-estimation of ability were internally related determinants of motivation for learning EFL. As well, female students were more motivated than their male counterparts. Similarly, level II proficiency students displayed more motivated than level III students showing a decrease in motivation gain as students progressed academically.

Togia, Korobili and Malliari (2011) gave an insight to the motivation processes and learning strategies of the students of the Library and Information Systems in courses encompassing Information Technology (IT). Results showed that participants recorded increased levels of motivation and employment of effective learning strategies.

Participants' intention to continue their studies in library/information science emerged as the only variable that significantly contributed to the prediction of motivation to learn.

Kiemer, Greoschner, Pehmer and Seidel (2015) also investigated whether a video-based Teacher Professional Development (TPD) intervention on productive classroom discourse improved students' learning motivation and interest development over the course of a school year. The teachers showed a significant increase in constructive feedback and decrease in simple feedback as a function of the treatment. Pre and post-tests revealed that students in the video-based TPD significantly increased their perceived autonomy, competence and intrinsic learning motivation as compared with those in the control group. Awofala (2016) investigated the effect of personalisation of instruction on the motivation to learn mathematics word problems in Nigeria using the quasi-experimental design of Solomon Four non-equivalent control group design. The influence of gender on motivation to learn mathematics word problems and personalisation was also examined. The results showed significant main effect of personalization of instruction on students' motivation to learn mathematics word problems while no significant main effect of gender was found on motivation to learn mathematics word problems.

One reason for the failure of students in mathematics other than intelligence and motivation is cognitive styles which is an individual's habitual way of organizing and processing information (Ramlah, 2014; Liu, 2008; Awofala, Balogun & Olagunju, 2011). Shi (2011) defined cognitive style as a psychological construct relating to how individuals process information. Studies on cognitive style have shown that individuals do not approach scientific tasks in the same manner (Asuzu & Onwu, 1989; Babalola, 1989). A good number of researcher suggested that students with different cognitive styles approach processing of information and problem solving in different ways (Alamolhodaei, 2002; Johnstone & Al-Naeme, 1991). This study therefore investigated the effect of team assisted individualisation on senior secondary students' motivation to learn mathematics. The moderator effect of cognitive style on students' motivation to learn mathematics was also investigated.

Research Questions

The study provided answers to the following research questions.

RQ1: What is the main effect of treatment on senior secondary school students' motivation to learn mathematics?

RQ2: What is the main effect of cognitive style on senior secondary school students' motivation to learn mathematics?

RQ3: What is the interaction effect of treatment and cognitive style on senior secondary school students' motivation to learn mathematics?

Null Hypotheses

Ho1: There is no significant main effect of treatment on students' motivation to learn mathematics.

Ho2: There is no significant main effect of cognitive style on students' motivation to learn mathematics.

Ho3: There is no significant interaction effect of treatment and cognitive style on students' motivation to learn mathematics.

Methodology

Research Design

The design of the study was the pre-test post-test non-equivalent control group quasi-experimental research design with a 2×2 factorial representation. The instructional methods was manipulated at two levels {team assisted individualisation (experimental) and lecture method (control) and cognitive style at two levels (field dependent and field independent).

The design of the study is symbolically given as follows:

$O_1\ X_1\ O_2$ X_1gain = $O_2 - O_1$ O_1O_3 pre-tests

$O_3\ C\ O_4$ C gain = $O_4 - O_3$ O_2O_4 post-tests

Where X_1 and C represent Team Assisted Individualisation and lecture method respectively. The mean gain scores between O_1 and O_2 as well as O_3 and O_4 were tested for statistical significance using the Analysis of Covariance (ANCOVA).

Participants

The population consisted of all coeducational public senior secondary schools year two students in Yaba Local Council Development Area. The participants comprised 289 Senior Secondary School year two mathematics students (128 males and 161 females) of varied cognitive style (147 field independents and 142 field dependents). Simple random sampling was used to select three intact classes each from three streams each of two equivalent coeducational senior secondary schools that were distantly located from one another within Yaba Local Council Development Area of Lagos, Nigeria. The schools were randomly assigned to treatment, one school to the Team

Assisted Individualisation strategy with 154 students (66 males and 88 females) and the remaining one school to the lecture method with 135 students (62 males and 73 females). The mean ages of the students in the team assisted individualisation group and lecture method group were 16.8 years (SD=1.50) and 16.9 years (SD=1.61) respectively.

Research Instruments

The following research instruments were used to collect data for the study.

Group Embedded Figures Test (GEFT)

The Group Embedded Figures Test is a 25-item standardised instrument developed by Witkin, Oltman, Raskin, and Karp (1971) to classify students into field dependent and field independent cognitive style. Its reliability was reported as 0.82 (Witkin, et al, 1971). Aside the general use of GEFT, the choice of this test in this study is predicated on three reasons: First, the GEFT is a non-verbal test which requires only a minimum level of language skill for performing the tasks. Second, the psychometric properties of the test have been evaluated in cross-cultural settings and pronounced quite sound. Third, the GEFT has been adopted and validated for Nigerian use (Awofala, Arigbabu & Awofala, 2013). The test requires students to locate simple geometric figures within more complex geometric designs within a specified time limit. Participants' score on the instrument was used to categorise them into field dependent or field independent cognitive style.

The first section of the test is made up of seven questions and was used as practice. The second and third sections have nine questions respectively and served as the test. The responses are scored as one when students correctly locate the figure and as zero when they cannot. Each student's test score was the total number of figures correctly located. Students whose score falls above the median are regarded as field independent while those whose score fall on or below the median are regarded as field dependent. The GEFT was revalidated with 86 students through test-retest method leaving an interval of three weeks between the first and second administration and data collected were correlated using the Pearson Product Moment Correlation and a test-retest reliability coefficient of 0.84 was obtained.

Motivation to Learn Mathematics Questionnaire (MLMQ)

The MLMQ was adapted from Glynn and Koballa's (2006) Science Motivation Questionnaire (SMQ) with some modifications to reflect motivation towards learning of mathematics. It had a total of thirty items constructed on a five point Likert Scale. The elements in measuring motivation were intrinsic motivation, extrinsic motivation, relevance, self-determination, self-efficacy, and assessment anxiety. Each of the elements of MLMQ contained five items. The maximum score of the MLMQ was 150 and the minimum 30. The questionnaire was validated by two experienced mathematics teachers and two mathematics educators. The MWPMQ was pilot tested in one secondary school in Lagos State, Nigeria with 50 students. The Cronbach's Alpha analysis showed that the reliability for the MLMQ was high ($r = 0.87$).

Procedure for Data Collection

The administration of instrument for the experimental and control groups lasted for ten weeks.

Week 1: Orientation programme for all research assistants and pre-test administration. The Group Embedded Figures Test and Mathematics Achievement Test were administered in the first week.

Week 2 – 9: These weeks were characterised by the administration of experimental and control instructional strategies in the schools selected for the study using the instructional procedural steps for experimental and control groups.

Week 10: The motivation to learn scale was administered to both the experimental and the control groups.

Instructional Procedural Steps for Team Assisted Individualisation (Experimental Group)

Step 1: Students' scores from a researcher made mathematics test were used to divide them into mixed ability groups while their scores on the Group Embedded Figures Test were used to categorise them into field dependent and field independent learners.

Step 2: Students were exposed to instruction in geometry using Team Assisted Individualisation approach. They were assigned to work in heterogeneous five-member learning teams on individualized mathematics pen and paper materials at their own pace.

Step 3: The teacher introduced the topic of the lesson and explained the underlying concepts.

Step 4: Students in the teams helped one another with problems and other tasks in the individualized instruction material.

Step 5: The teacher monitored the groups to ensure that no group or student is left behind.
Step 6: The teacher made clarifications where necessary and gave students individual weekly assessments.
Step 7: At the end of each week, students and teams that had the highest mean gain received rewards in form of verbal praise and stationeries.
Step 8: The instrument was re-administered on the tenth week and data were analysed.

Instructional Procedural Steps for Lecture Method (Control Group)

Step 1: Students were exposed to the lecture method of teaching which involved chalk and talk.
Step 2: Teacher-centred instruction characterised this stage while students participated passively by taking notes and listening during instruction. The teacher posed problems on the chalkboard and solved them with explanations. In the better part of the instruction time, the students received instruction and engaged in discussions stemming from the teacher's explanations and questions. The topics were treated in the order below:

- Chord Property (1 week)
- Circle Theorems (3 weeks)
- Angles of Elevation and Depression (2 weeks)
- Bearings and Distances (2 weeks)

Step 3: The motivation to learn mathematics scale was re-administered on the tenth week.

Method of Data Analysis

Data gathered from the study were analysed using quantitative methods. Statistical tools employed were mean, standard deviation, and Analysis of Covariance (ANCOVA) of the SPSS software. All hypotheses were tested at 0.05 level of significance.

Results

Research Question 1. What is the effect of treatment on senior secondary school students' motivation to learn mathematics?

Table 1: Descriptive Statistics of Motivation gain by Treatment

		Pre – Test		Post -Test		
Treatment	N	Mean	SD	Mean	SD	Mean Difference
TAI	154	78.01	21.36	82.97	12.69	4.96
Lecture Method	135	79.36	18.19	78.34	17.02	1.01

Table 1 showed that the experimental group taught mathematics with the TAI strategy had a mean score of 78.01 (SD = 21.36) in the pre-test and a mean score of 82.97 (SD = 12.69) in the post-test making a pre-test, post-test mean difference of 4.96. However, the control group taught mathematics with lecture method had a mean score of 79.36 (SD =18.19) in the pre-test and a post-test mean of 78.34 (SD = 17.02) with a pre-test, post-test mean difference of 1.01. This showed that students in the experimental group taught mathematics with the TAI strategy performed better than the students in the control group taught with the lecture method. Hence, the TAI strategy was more effective in improving students' motivation learn mathematics than then lecture method.

Research Question 2: What is the main effect of cognitive style on senior secondary school students' motivation to learn mathematics?

Table 2: Descriptive Statistics of Motivation gain by Cognitive Style

		Pre - Test		Post -Test		
Cognitive Style	N	Mean	SD	Mean	SD	Mean Difference
FD Dependent	142	76.25	21.31	81.20	14.00	4.95
FD Independent	147	80.95	18.26	80.50	15.83	0.45

In Table 2 the field dependent students advanced from a mean score of 76.25 (SD = 21.31) to a post-test mean score of 81.20 (SD = 14.00) which revealed a mean difference of 4.95 while the field independent students progressed from a mean score of 80.95 to a post-test mean score of 80.50 and this indicated a mean difference of

0.45. This analysis showed that the field dependent cognitive style students gained a higher motivation to learn mathematics than their field independent counterparts.

Research Question 3: What is the interaction effect of treatment and cognitive style on senior secondary school students' motivation to learn mathematics?

Table 3: Descriptive Statistics of Motivation gain by the Interaction of Treatment and Cognitive Style

			Pre-Test		Post-Test		
Treatment	Cognitive Style	N	Mean	SD	Mean	SD	Mean Difference
TAI	FD Dependent	78	76.64	21.92	82.39	13.06	5.79
	FD Independent	76	79.41	20.83	83.40	12.47	3.99
Lecture Method	FD Dependent	64	75.77	20.69	79.92	14.93	4.15
	FD Independent	71	82.59	15.02	77.00	18.61	5.59

In table 3, the interaction effect of treatment and cognitive style on students' motivation to learn mathematics is summarised as follows. In the TAI experimental group, the field dependent students progressed from a mean score of 76.64 (SD = 21.92) to a post-test mean score of 82.39 (SD = 13.06) with a mean difference of 5.79 while the field independent students had a mean difference of 3.99 as they progressed from a pre-test mean score of 79.41 (SD = 20.83) to a post-test mean score of 83.40 (SD = 12.47). Amidst students exposed to the lecture method treatment, the field dependent students progressed from a mean score of 75.77 (SD = 20.69) to a mean score of 79.92 (SD = 14.93) with a mean difference of 4.15 while the field independent students advanced from a mean score of 82.59 (SD = 15.02) to a mean score of 77.00 (SD = 18.61) with a mean difference of 5.59. Thus, the highest gain in motivation was recorded amidst field dependent students exposed to the TAI treatment.

Null Hypotheses

Ho1: There is no significant main effect of treatment on senior secondary school students' motivation to learn mathematics

Table 4: Summary of Analysis of Covariance of Achievement in Mathematics by Treatment, Cognitive Style and Gender

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	4719.731[a]	4	1179.933	5.558	.000	.073
Intercept	88264.327	1	88264.327	415.779	.000	.594
Covariate	1376.578	1	1376.578	6.485	.011	.022
Treatment	1750.081	1	1750.081	8.244	.004	.028
Cognitive Style	524.448	1	524.448	2.470	.117	.009
Treatment * CogStyle	1032.010	1	1032.010	4.861	.028	.017
Error	60289.418	284	212.287			
Total	1952077.000	289				
Corrected Total	65009.149	288				

a. R Squared = .073 (Adjusted R Squared = .060)

The result in table 4 showed that there was a significant main effect of treatment on senior secondary school students' motivation to learn mathematics after controlling for the effect of pre-test scores ($F_{(1, 284)} = 8.244$, p = 0.004, η^2_p= 0.028). The partial eta squared (η^2_p) which is the proportion of the effect + error variance that is attributable to the effect (Awofala, Fatade & Udeani, 2015) was just 0. 028 in the study, which means that treatment alone accounted for only 2.8% of the overall (effect+error) variability in the senior secondary school students' motivation to learn mathematics score. This result suggested a large effect for treatment (Cohen, 1988). Clearly, $p < 0.05$ hence, the null hypothesis was rejected and it was concluded that there was a significant main effect of treatment on senior secondary school students' motivation to learn mathematics.

Ho2: There is no significant main effect of cognitive style on senior secondary school students' motivation to learn mathematics.

The result in Table 4 above showed that there was no significant main effect of cognitive style on senior secondary school students' motivation to learn mathematics ($F_{(1, 284)} = 2.470$, p = 0.117, η^2_p=0.009). Clearly, $p > 0.05$ hence, the null hypothesis was not rejected and it was concluded that there was no significant main effect of cognitive style on senior secondary school students' motivation to learn mathematics.

Ho3: There is no significant interaction effect of treatment and cognitive style on senior secondary school students' motivation to learn mathematics.
Table 4 showed that there was a significant interaction effect of treatment and cognitive style on senior secondary school students' motivation to learn mathematics after controlling for the effect of pre-test scores ($F_{(1,284)} = 4.861$, p = 0.028, η^2_p=0.017). Clearly, $p<0.05$ hence, the null hypothesis was rejected and it was concluded that there was a significant interaction effect of treatment and cognitive style on senior secondary school students' motivation to learn mathematics. Further analysis using the line graph (Figure 1 below) provides illustration on the nature of the significant interaction effect of treatment and cognitive style on students' motivation to learn mathematics.

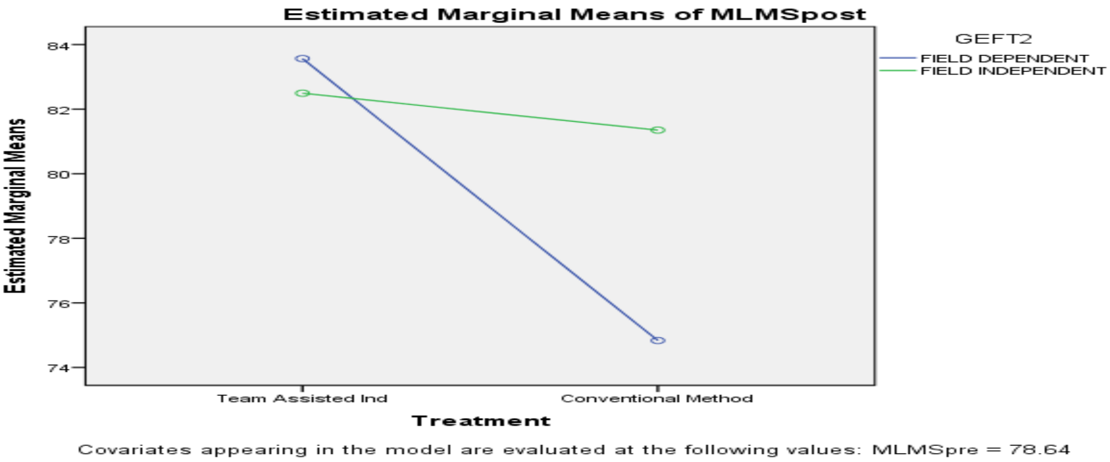

Figure 1. *Interaction of effect of treatment and cognitive style on students' motivation to learn mathematics*

Discussion

Results indicated positive gains in the post treatment scores of students' motivation to learn mathematics. Analysis of the main effect of treatment on motivation to learn mathematics showed that there was a statistically significant effect of treatment on students' motivation to learn mathematics and treatment accounted for 2.8% of the variation observed in students' motivation to learn mathematics. This result agreed with prior results which linked enhanced and meaningful content learning in mathematics to learner-centred pedagogies (Awofala & Lawani, 2020a; Awofala & Lawani, 2020b; Olabiyi & Awofala, 2019; Awofala, 2017b; Awofala, 2016; Kiemer, Greoschner, Pehmer & Seidel, 2015; Awofala, 2014; Awofala, Arigbabu & Awofala, 2013; Awofala, Fatade & Ola-Oluwa, 2013; Awofala, Fatade & Ola-Oluwa, 2012; Awofala, 2011a; Awofala, 2011b; Awofala & Nneji, 2011; Akinsola & Awofala, 2009; Akinsola & Awofala, 2008). More so, it supported the findings of researchers who have found the effectiveness of leaner-centred strategies in promoting students' motivation to learn mathematics (Awofala, 2016; Sharaobi-Naor et al, 2014). The results of the analysis revealed that students taught with the team assisted individualized instructional strategy recorded, significantly better motivation to learn mathematics than those taught with the lecture method. The effectiveness of TAI in this study is connected to the opportunity it offered the students to work together in teams, share views and opinions, and engross in brainstorming on problems and this helped them in their motivation to learn mathematics. TAI was successful in this study because it made students more confident by sharpening their social skills in communication, increased their liking of mathematics, and decrease their anxiety in mathematics (Awofala, Arigbabu & Awofala, 2013). The inducement and task configuration linked with the TAI helped to increase the motivation to learn mathematics of the students. The non-effectiveness of the lecture method is hinged on the fact that it only emphasized teacher activity at the expense of students' involvement and made learning of mathematics uninteresting (Lawal & Awofala, 2019; Ojaleye & Awofala, 2018). In addition, lecture method has been criticized for impeding motivation in which students only engage in memorization of facts without being active in the construction of their knowledge of mathematics.
Outcome regarding students' cognitive style showed that the field dependent students pooled a marginally greater motivation to learn mean score than the field independent counterparts but this variance in mean score was statistically not momentous. Hence, in this study there was no significant main influence of cognitive style on senior secondary school students' motivation to learn mathematics. This outcome supported Idika (2017) and Lawal and Awofala (2019) that field dependent students achieved better than the field independent students but

negated the outcome of Arisi (2011) in which the field independent students outperformed their field dependent students.

This study showed that there was a significant interaction effect of treatment and cognitive style on senior secondary school students' motivation to learn mathematics. This outcome was in consonance with the findings of Agboghoroma (2015) whose result indicated a significant interaction effect of treatment and cognitive style on students' learning outcome. However, the result negated the finding of Lawal and Awofala (2019) in which there was no significant interaction effect of treatment and cognitive style on students' learning outcome in mathematics. In this study the field dependent students exposed to the TAI yielded the overall highest motivational gain. In the present study, cognitive style seemed to interact with instruction to produce results and this means that the treatment conditions did discriminate across cognitive style in this study. This confirms the assertion of (Onyekuru, 2015) that field dependent students tend to thrive more when reinforcement abounds such as a verbal praise or a reward as applied in the TAI treatment. The interaction of treatment and cognitive style accounted for 1.7% of the variation in students' motivation to learn mathematics.

Conclusion

The study concluded that Team Assisted Individualisation strategy has a positively significant effect on student' motivation to learn mathematics. It was also established that there was a significant interaction effect of treatment and cognitive style on students' motivation to learn mathematics while cognitive style yields no statistically significant effect on the dependent variable.

Recommendations

1. Senior secondary school teachers should make effort to study the cognitive style of their students with a view to tailoring their teaching methods in line with the students' cognitive styles.

2. Teachers should embrace the Team Assisted Individualisation in teaching mathematics to enhance students' motivation to learn the subject.

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