

Do Student Teams Achievement Divisions Enhance Economic Literacy? An Quasi-experimental Design

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ABSTRACT Student Teams Achievement Divisions (STAD) is one of the simplest and most extensively researched form of cooperative learning technique. This paper reported the impact of a STAD on students' performances in economic literacy. Results showed that the experimental group had a 16.13 score increased from the pretest to posttest compared to the control group. The experimental group, which were exposed to STAD, had a statistically significant increased in economic literacy levels compared to the control group.

INTRODUCTION

In recent years, South Africa has experienced an important paradigm shift in education: a teacher-centred approach has been replaced by one which is learner-centred. Put differently, the emphasis is now on an Outcomes-Based Education approach (OBE approach) as the key underlying principle of the National Curriculum Statement (NCS) (Van Wyk 2007). The process associated with reviewing and modernising the school curriculum for grades R to 12 commenced in the year 2000 and was aimed at restructuring and rewriting the interim syllabi into new, integrated and justified learning programmes. The culmination of the process was the establishment of a curriculum for the General Education and Training (GET) and Further Education and Training (FET) phases, which is known as the National Curriculum Statement (NDE 2000).

According to the National Department of Education (NDE), the NCS policy envisages students who will be inspired by values such as respect for democracy, equality, humanity and social justice, as outlined in the Constitution (NDE 1996a). From this, it may be deduced that those educational students who successfully complete the Baccalaureus Education (B.Ed.): Foundation and Intermediate phases qualification, will demonstrate competencies in the following critical outcomes:

- access to, success in, and experience of lifelong learning;
- the ability to think logically, analytically, holistically and laterally; and

- transfer of skills from known to unknown situations (NDE 2000).

The following cooperative learning techniques that have been extensively researched and assessed specifically on academic achievements, attitudes, social interactions and interpersonal relationships was the Student Teams Achievement Divisions (STAD) (Tarim and Akdeniz 2008; Balfakih 2003; Johnson and Johnson 1998; Johnson et al. 1983; Slavin 1983, 1990; Kagan 1994). STAD is one of the simplest and most extensively researched forms of all cooperative learning techniques, and it could be an effective instrument to begin with for teachers who are new to the cooperative learning technique (Becker and Watts 1998; Slavin 1990). STAD as teaching technique was designed and researched by Johns Hopkins University and is known as "student team learning" (Sharan 1994). Research studies in the use of STAD as a teaching technique was applied with great success in various research projects (Vaughan 2002; Bossert 1989; Jacobs et al. 2004; Owens and Sweller 1985; Sharan 1980; Slavin, 1980, 1983, 1986 and Stallings and Stipek 1986). The main purpose of STAD is to drastically improve and accelerate learner performance. The modified STAD consists of: subsection teams; individual improvement scores; class presentations/demonstrations and economic quizzes.

Design of the Modified STAD

The teams for this research consist of heterogeneous groups of five members composed on

the basis of random selection in accordance with gender and ethnicity (diversity). Each week new subject matter and material of the module EEE 112 (elementary economics) were introduced. The researcher assigned the members to groups, because learners tend to choose only certain members for their groups. According to Slavin (1994) "*the main idea behind STAD is to motivate students to encourage and help each other master skills presented by the teacher*". Teams had the opportunity to choose a creative name for their respective group. Team members remain in their respective groups for the rest of the semester. Team members study the subject matter and learning material together until all students successfully master the subject matter and work assignments. Each student is tested individually on the learning material without any assistance from other learners. Each student's points (marks per worksheet or assignment) are constantly compared with the points (marks) scored previously. The sum of the individual points (marks) in a group serves as basis for the points allocated to the group. Group members compete with one another and earn certificates on the basis of how well the group performs. Groups are rewarded marks (points) which count towards their semester mark (continuous assessment mark).

Components of the Modified STAD

Slavin (1990) stipulated five major components of the STAD, namely class presentations, teams, quizzes, individual improvement scores, and team recognition. The researcher implemented a modified STAD during the contact sessions and focused on elements such as direct instruction, class demonstrations, student presentations through role play, simulations and group discussions. Some of these class presentations were done through audiovisual presentations, such as the playing of a DVD of elementary economics topics during contact sessions (Becker and Watts 1998). Students observed and made presentations per group on activities during contact sessions. Students paid special attention to the researcher's presentations during the contact sessions on economic content and skills.

The Purpose of the Study

The purpose of this study is to investigate the impact on the performances of students (experimental group) exposed to a modified STAD as a cooperative learning-teaching technique

compared to students (control group) exposed to the lecture method in economic literacy.

Directional Hypothesis

"Students exposed to Student Teams Achievement Divisions (STAD) as a teaching technique performed better in economic literacy compared to students who were not."

METHODOLOGY

Research Design

A quasi-experimental research, pretest-posttest design, with partially matched experimental and control groups, was constructed because of its resistance to common threats to internal validity (Mouton 2001; Gray 2004).

Sampling

Third year B.Ed. student teachers were identified for the investigation. Only 110 B.Ed. students who were registered for module EEE 112, elementary economics, were selected as the proportional stratified sample for the quasi-experimental research. The sample consisted of thirty five percent (35%), Black (African, Coloured and Asian) and sixty-three percent (63%) White (Afrikaner, English, Chinese and Portuguese) students. Furthermore, 81% of the students were females (N=89) and 19% were males (N=21). The sample comprised the experimental group (N=57) and the control group (N=53), who were randomly selected from the registered list for module EEE 112. The experimental group consisted of 57 students and the control group of 53 students minus 2; these two students were registered for module AEO 112 (Economics subject didactics) but a clash in their classroom timetable meant that they had to be accommodated into the experimental group before the pretest. Both groups were taught by the researcher over a 12-week period of two contact sessions of 55 minutes per week for the first semester. This action research was done in the Department of Curriculum Studies in the Faculty of Education.

Research Instrument

The Test of Economic Literacy (TEL) which is a standardised test of economics content. This TEL is nationally norm-referenced in the United

States for use in high schools and first-year economics classes at university level (NCEE 1987, 2005). The researcher used a modified TEL for the pre-post test for both groups. The TEL comprised 90% of standardised economic literacy questions from the NCEE Test for Economic Literacy and 10% of general South African newspapers' economic issues. The TEL comprised fifty multiple-choice items which was structured and aligned on the content of EEE 112 (Van Wyk 2008). This gave the researcher an indication of which angle to present of the modified STAD during the contact sessions.

Validity and Reliability

The TEL is a standardised test of economics content used by high schools and universities in the United States. The statistical tool used was the Cronbach's alpha coefficient which indicates a measure of internal consistency of the items in the questionnaire (Huysamen 1993). Furthermore, Starborn (2006) mentions that Cronbach's alpha is an appropriate test to use to assess the internal consistency of scales that are computed from a 4-point Likert scale. To test the reliability of the research results, Cronbach's alpha coefficient was calculated for items in question 2 ($0.9501 > p$), question 3 ($0.8788 > p$) and question 4 ($0.733 > p$). The total average was $0.8166 > p$ for items in the questionnaire.

Procedure

A pretest was administered at the first orientation session of the module EEE 112 for the study. The experimental group received training

and demonstrations in using STAD during their contact sessions. After 12 weeks, all participants were retested with the TEL instrument. The researcher calculated the standardised mean difference of percentiles to determine impact on students' economic literacy levels.

RESULTS

Firstly, in this study, I aimed to determine whether there was any significant difference between the means of the achievement pretests of the students of the STAD and control groups' economic literacy levels. An independent t-test comparing the mean scores of the pretest and the posttest between the experimental group and control group was computed to determine if a significant difference existed. In order to reject or accept the hypothesis for this study, the t-test scores for both groups were computed (Mouton 2001; Gray 2004).

The means and standard deviations (SD) for the pretest and posttest are displayed in table 1. The overall mean for the students' pretest was 42.43 (SD = 9.249) with scores ranging from 35 to 69. The overall mean for the students' posttest was 57.99 (SD = 12.603) with scores ranging from 54 to 97. Table 1 indicates that the whole population participating in the study made an overall increase of student achievement in economic literacy levels (see also Table 3).

The analysis of the achievement test data indicated significant overall treatment effects, controlling for pretest, $F(2,244) = 27.81$, $p = 0.000$. Regarding academic achievement, students in the STAD groups benefited significantly more than those in the control groups (mean difference:

Table 1: Summary of pre-test and post-test of both groups in economic literacy

Test	N	Minimum	Maximum	Mean	SD
Pretest	110	35	69	42.43	9.249
Posttest	110	54	97	57.99	12.603

Table 2: Results of analysis of covariance achievement and attitude measures

Measures	F	df	p	Direction
Academic achievement overall	27.81	2	0.0000	
STAD vs Lecture	2.310	2	0.0000	STAD > Lecture
Attitude to economic literacy	1.321	2	.26	n.s

Table 3: Summary of paired samples test for pretest and posttest of experimental and control groups

Mean Paired df	SD	t-value	Sig. (2-tailed)
-11.60	8.846	-7.183	.000**

Table 4: Mean differences between the experimental group and control group

Group	N	Pretest Mean	SD	Posttest Mean	SD	Difference	t-value	Sig. (2 tailed)
Experimental	57	35,67	8.966	51.80	12.399	16.13	-7.485	.000
Control	53	36,00	9.285	43.07	9.285	7.07	-3.936	.001

7.057, $p=0.000$), as did students in the STAD groups (mean difference: 2.310, $p=0.000$). Similarly, there were significant differences between the STAD groups, in favour of STAD (mean difference: 2.310, $p=0.000$). Concerning the attitude data, neither the overall analysis for covariance, $F(2,213)=1.321$, $p=0.26$, n.s., nor the pairwise comparisons showed any treatment effects (see Table 2).

A paired sample t-test was used to determine the paired differences between the pretest and posttest for the two groups. Table 3 shows that the mean of the paired differences was -11.60 ($SD = 8.846$). The difference showed a t-value of -7.183 with a p-value of < 0.1 . The data results show that there was a statistically significant difference between the pretest and the posttest of the experimental and control groups.

An independent t-test was used to determine the difference between the means of the pretest and posttest of the experimental groups versus the control groups. Table 4 shows that the experimental group (pretest mean of 35,67) and the control group (pretest mean of 36,00) as very similar. After conducting the quasi-experiment, the posttest for the experimental group reported a mean of 51.80 ($SD = 12.399$) compared to the control group of 43.07 ($SD = 9.285$) which showed a remarkable and a significant difference in scores. This showed that the experimental group had a 16.13 increase from pretest to posttest. The control group had a 7.07 increase from pretest to posttest. There was a 9.06 difference between the increases of the experimental over the control group. Table 4 reveals that the experimental group which used STAD, had a statistically significant increase of student achievement compared to the control group. The results revealed that the hypothesis testing for this study is acceptable because STAD is a more effective teaching technique compared to the traditional lecture method in economic literacy.

DISCUSSION

Since the sample is limited to only one hundred and ten B.Ed.Foundation and Intermediate phase students who were registered for

module EEE 112, elementary economics, and for the duration of 14 weeks, any generalisations drawn from this study should be considered with caution. The results of the study indicated that the cooperative learning method STAD was more effective in terms of academic achievement than the traditional lecture method. The findings here were rather similar to those of Slavin (1980) and Tarim and Akdeniz (2008). In these studies, Slavin, analysed 28 experimental studies in which nine different cooperative learning methods compared with other methods were used. He indicated that in general, cooperative learning was found to be more effective than other methods on students' academic achievement, positive relationships among different ethnic groups, students' mutual relations and students' self-esteem. Tarim and Akdeniz, compared the effects of Team Assisted Individualisation (TAI) and Student Teams Achievement Divisions (STAD) on fourth grade students' academic achievement in and attitudes to mathematics. The result of the study compared both the TAI and STAD methods and were found to have positive effects on students' academic achievement in mathematics. The pairwise comparisons showed that the TAI method had a more significant effect than the STAD method. Furthermore, the study also revealed no significant differences regarding students' attitudes towards mathematics. The findings of this study also support the findings of previous research by van Wyk (2009a), Berry, (2008), Bernaus and Gardner (2008), Vaughan (2002), Bonoparte (1990) and Bryant (1981).

Similarly, Leikin and Zaslavsky (1999) and Tarim and Akdeniz (2008). stated that while learning mathematics in certain cooperative learning settings, students often improve their problem solving abilities, solve more abstract mathematical problems and develop their mathematical understanding. In addition, from a cognitive developmental perspective, the cooperation between students of similar ages with common aims is very important.

Moreover, Adams and Hamm (1990) support this idea as follows:

"Collaboration between peers clearly helps even very young children to learn how to take

different points of view into account. And when children at different development levels work together to explore differences of opinion, they all improve their thinking skills" (P. 33).

Furthermore, Balfakih (2003) conducted a study to investigate the effectiveness of STAD in teaching high school chemistry at the UAE. The results showed that the treatment groups benefited most from the study.

It is obvious from the results of this investigation that there were significant differences in the performances of students who were exposed to STAD as a cooperative learning-teaching technique. This implies that all students' economic literacy increases. Considering the application of STAD for the experimental group, the results are very encouraging and in agreement with findings of the application of this strategy and with the findings of the application of STAD in school settings (Slavin 1995). Previous research on the application of STAD reported significant increases in participants' knowledge about life skills and perception of their competence to achieve the goals they have set (Zenginobuz and Meral 2008; Bernaus and Gardner 2008). Nichols (1998) has also reported significant changes in social responsibility, goal knowledge and social interest, as a result of implementing an abbreviated version of IOWA Test of Basic Skills. This study replicated and extended these results to include students' performance in team-learning (demonstrations / role play) skills that are very popular among students and are widely used in Geometry. The students who participated in the experimental group demonstrated better knowledge about economic literacy compared to the control group of this study. The overall mean for the students' pretest was 42.43 (SD = 9.249) with scores ranging from 35 to 69. The overall mean for the students' posttest was 57.99 (SD = 12.603) with scores ranging from 54 to 97, which indicates that the whole population participating in the study achieved an overall increase of student achievement in economic literacy levels. The experimental group had a 16.13 increase from pretest to posttest. The control group had a 7.07 increase from pretest to post-test. There was a 9.06 difference between the increase of the experimental over the control group. The analysis of the achievement test data indicated that there were significant overall treatment effects, controlling for pretest, $F(2,244) = 27.81$, $p = 0.000$. Regarding the academic achievement, students in the STAD groups

benefited significantly more than those in the lecture control groups (mean difference: 7.057, $p = 0.000$), as did students in the STAD groups (mean difference: 2.310, $p = 0.000$). With reference to the attitude data, the overall analysis for covariance, $F(2,213) = 1.321$, $p = 0.26$, showed no significant effects from any treatment conducted.

The practical significance of the research showed that the hypothesis testing for this study is acceptable. Findings from this research study shows that STAD as a teaching technique contributes to positive effects such as extra teaching practice sessions, simulation, role playing, group demonstrations of economic concepts, increased social skills and an increase in economic knowledge. The experimental group did practical classroom demonstrations during the application of STAD. These demonstrations enhance students' interpretation skills, interpersonal group relationships and economic concepts. STAD provided an alternative technique that impacted on student achievement. Students were positively interdependent on one another for the learning process during STAD in elementary economics. The experimental group members realised that a strong relationship can only be created if their group members have common goals in mind. They distributed work evenly amongst the members, information was shared amongst group members and the group was rewarded jointly for their project. Students competed with one another to determine who the best was (competitive goal structure), or they worked on their own to achieve a goal (individualistic goal structure), or they worked together to achieve a common goal (cooperative goal structure), after which the group as a whole was rewarded. During the implementation of STAD, the individual responsibility of each group member contributed to the eventual success of the group. There was a high level of cooperation amongst the experimental group members which was necessary to ensure that the students worked together to plan the interaction process and decide how projects would be assigned to each group member. STAD supported the researcher by monitoring the progress of the students' economic literacy growth. This corroborated the study by Slavin (1986) who reviewed eight studies that evaluated STAD. In six of the eight studies, learning had increased significantly over learning by traditional methods. In the two remaining studies, there was no significant effect. These studies had all been administered below

the tenth grade level. Furthermore, Mills (2001) and Newman and Thompson (1987) reported that STAD was the most successful cooperative learning technique for increasing student academic achievement, but the bulk of the research on STAD has been conducted at the elementary level and in subject areas other than social studies. Slavin (1995) reported on 29 studies that examined the effectiveness of STAD. Thus, it could be said that STAD as a teaching technique consistently has positive effects on economic literacy levels of all educational student learning. The findings of this investigation are also in agreement with the efficacy of STAD as a teaching technique for better performances in elementary economics (Van Wyk 2007; 2009a). Furthermore, research studies conducted in STAD as a teaching technique were also applied with great success in various research projects (Sharan 1980; Slavin 1986, 1990, 1995; Nastasi and Clements 1991; Mills 2001; Jacobs et al. 2004; Van Wyk 2009a and 2007).

CONCLUSION

The students who participated in the experimental group increased their posttest mean of 9.06 percentile posttest score over the control group's mean. The findings reveal that the hypothesis testing for this study is acceptable because STAD is a more effective teaching technique compared to the traditional lecture method in economic literacy. Findings showed that STAD had a significant impact on the achievement of the experimental group. While results were extremely powerful, there are some issues to consider when interpreting them. Only 57 experimental group members were exposed to this technique and because this sample size of both groups was statistically small, it was difficult to determine whether or not the results accurately represent a larger population. Another issue is that of the short period of time for this research study which was twelve weeks. The investigation may have shown different results if it had been conducted over a longer period of time.

In the light of the above, I believe that it is important to conduct a study for a longer period of time in order to be able to determine changes in academic performances and attitudes. In addition, the same questions might be used for control and experimental groups in order to achieve a better comparison. Additionally, such

a study can be conducted using larger sample groups and schools with different socio-economic levels. It would be of interest to understand the internal dynamics of STAD. For example, evidence on peer interactions might be obtained from observations or from stimulated recall of cognitive processes in small groups. Moreover, the attitudes of students towards cooperative learning methods can be determined by means of observations and interviews.

RECOMMENDATIONS

Based on the findings of this study, recommendations would allow more research to be conducted, based on the results of STAD, into this technique. Educational students need to increase their practice teaching time on the use of STAD in their respective subject didactics fields. This technique should be used in workshops to train more student teachers in STAD during microteaching and experimental teaching practices. Increasing the use of student STAD would facilitate and increase the growth of student achievement levels. Based on the results of this study, students, lecturers and curriculum developers need to be aware of the positive benefits of this study.

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