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Effect of Cooperative, Competitive, and Individual Use of Self Instruction Method (SIM) on Learners' Achievement in Library Skills

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Introduction

There are as many instructional modes as there are teachers. These are the interplay of activities whose combined effect enhances the accomplishment of specific instructional objectives (Akanbi, 1981). Some commonly identifiable methods include lecture, tutorials, lecture-discussion, discovery expository methods, etc. Some others developed by educational technologists include programmed instruction, self-instructional (audio-tutorial) simulations, games and role playing. Some have been tested and compared with others leading to the popularity of some among teachers. A combination of methods has been suggested (Ashlock & Herman Jnr., 1970). In this study, a self-instructional mode is combined with cooperative, competitive, and individualized techniques in the teaching of library skills.

Theoretical Background

Self instruction is a technique which involves the use of instructional materials designed so that students can learn either without a teacher's intervention or with minimum guidance. The materials include a set of stimuli, provision for/of responses, feedback and test or self-assessment packages. There are very many systems of self instruction but two are most widely used or adopted. These are the Keller Plan (Keller, 1974) and the audio-tutorial system (Postlethwait, 1969).

The Keller Plan places reduced emphasis on the traditional lecture and tutorial format. It makes great use of printed as well as recorded materials which students use to study individually or by sharing ideas with each other through discussion or in a competitive manner. The audio-tutorial plan of instruction provides an excellent way by which modern college teaching may be made more systematic and individualized. Emphasis is on independence.

Though different, the two modes share the following

- Emphasis individualized instruction
- Capacity for self-placed study
- Specification of achievable learning objectives
- Division of the course content into small easily comprehensible and inter-related units.
- Encouragement of active student participation.
- A change in the role of the teacher from dissemination of information to diagnostician, prescriber, motivator and resource person (Postlethwait, 1969).

It is easy to become so involved with routine classroom management at the expense of finding time to give personal attention to those learners who need it. This seem to be the concern of advocates of self-instructional method (SIM) as they argue that under this technique learners could be occupied individually, while always having access to extra help (Akinmoyewa, 1987). Bridge (1976) stated that some teachers use SIM because they are dissatisfied with the traditional lecture/tutorial method while others do so because they are attracted by the potential advantages that it improves or makes efficient the teaching process and increased independence of learning on the part of students.

Akinmoyewa (1987) discussing these advantages (Bridge, 1976) believes that difference in individual ability and knowledge can be dealt with in self instructional programmes. Increasing students' independence of learning could be seen as an objective on its own since it gives learners the opportunity to arrange their learning experiences effectively. At the end, the position that this leads to three (3) distinct interactive patterns – one in which the students cooperate with one another, the second where the learners are in a competitive spirit, and the third where they work their own in all aspects.

The preceding distinctions are in line with Deutsch (1949) who actually provided foundation for the development of cooperative and competitive learning theory. Cooperative instruction is the situation in which there is a positive correlation between/among individuals' goal attainment: where an individual can obtain his own goal if and only if the other participants can obtain their goals. He defined competitive instructional mode as one in which the goal attainment of the separate participants are so linked that there is a negative correlation between their goal attainments. The third is the initial objective SIM where every learner is expected to do it himself, test himself as he progresses, quite independent of any other learner or teacher. The unanswered question is which of these will produce the best learning outcomes and attitude in practice.

Statement of the Problem

There has been a steady increase in the number of students admitted into all institutions of higher learning, reducing the student teachers ratio and increasing its attendant problems. To cope with this problem, most librarians introduced lecture handouts, a way of making students have access to materials they can read and learn on their own.

These have been banned in many institutions. Where they are not banned, the materials are written by curriculum experts. There is no systematic use of these make-shift

SIM. If they were written, which of the modes of SIM would one recommend? These questions need answers that are based on empirical evidence.

Statement of Hypothesis

- Teaching method has no significant effect on achievement test score in library skills.

- Teaching method has no significant effect on students' attitude towards library skills.

- Teaching method has no differential effect on students' academic achievement in library skills.

Assumptions

- This study assumed that through randomization – random assignment of students to groups and of teaching method to groups, the initial group differences have been evened out so that any significant difference observed in both achievement score and attitude towards library skills can be validly claim for differential effect of teaching method.

- It is also assumed that the tests and attitude instrument used are valid, since no formal validation process was not followed. All the psychometric properties were estimated from the same sample.

- Scorer reliability is assumed and all the factors that can influence this reliability are assumed to be stable.

Delimitation

There are very many methods of teaching library skills, but the ones under investigation have been selected on the basis of current practices and research direction. The choice was also guided by the enormous relative theoretical advantage SIM has over other methods in practice and those recommended for practice. The study is also on students in higher institutions because this is where the problem of meeting the needs of the learners is most pronounced.

Limitations

The main constraint in this study was that there was a possibility of the students interacting with each other outside the class room. This will introduce error and reduce group differences. Hence it may affect the results as the observed results may not be a true expression of the differential effect of the teaching methods.

Review of Literature

Students' achievement has been a major focus of many studies examining the effects of interaction pattern, on learning outcomes (Akinmoyewa, 1987). Most studies reported concentrate on the teaching of sciences much more than other subjects (Nowell & Quinn, 2001). A greater proportion of reported studies indicate that teaching methods have differential effect on both attitude and academic achievement (Ashlock & Herman, 1970; Worthen, 1970). The most recent was on mathematics at a large scale involving as many as 40 different countries including the United State of America (Nowell & Quinn, 2001). In all these

results, time, duration of instructional period, student's attitude, teacher quality and training have been investigated (Glas, 1999; Dee, 2003).

Most studies reported that cooperative learning resulted in better academic performance than the other instructional modes (Okebukola, 1984; Michaels, 1977; Altman and Linton, 1971), while a few others found that all the modifications and interactive use of SIM are equally effective (Hammond & Goldman, 1961; Akinmoyewa, 1987).

The study of SIM by Akinmoyewa (1987) is central to this study. In that study, he set out to compare the relative effective of SIM under cooperative, competitive and individualized modes with the traditional text book methods.

The study involved 170 first year students (1984/85) of biology of Oyo State College of Education, Ilesha . This set chosen because they had no previous knowledge of the topics covered in that study. They were randomly assigned to four groups A, B, C, and D. While Groups A, B and C were treatment groups, group D acted as control.

Two research instruments were used – a validated researcher designed SIM package on nutrition and respiration in Biology and a 40-item multiple choice Biology Achievement Test (BAT) in Nutrition and Respiration having a reliability of 0.68. Students in group A were made to treat the topics cooperatively. They were allowed to strive with one another for a goal objective which was a good performance. They could discuss, share views and opinions, and iron out their differences to arrive at a consensus opinion. Those in Group B were made to strive against each other for a goal objective which only one of them was to claim a good grade. Those in Group C were made to use the SIM packages individually without reference to anybody else. Group D, the control group used text book only to treat the chosen topic covered by the package. They are neither in cooperative or competitive situations. Treatment for two weeks was done. The test was administered four weeks to the commencement of the treatment and repeated after the treatment.

The results showed a significant mean effect of teaching method on academic performance, measured in terms gain scores ($t = 6.97$; critical $t = 2.00$; $df = 72$; $p = 0.05$).

Those taught using SIM were better than those taught using text book. Further analysis of variance to compare treatment means showed no significant effect. In other words, the performance of group A, B and C was about the same. He acknowledged the fact that his results were contrary not only to his expectation but many researches result. This he attributed to experiment failure, since most of those who started did not end with the groups.

One would rather say the statistical technique selected was wrong. There are ANOVA designs for unbalanced experimental designs that should have been used. More over in a pre/post test study, analysis of covariance would have been most appropriate.

Several studies have shown that just as teaching method affect academic performance, it also affects attitudes (CETE, 2001). This is expected since attitude has a very strong cognitive component (Uyanah, 1990). No direct study on effect of teaching method on attitudes but it is expected that the direction of influence will not be different from that of academic achievement. This inference is based on the fact that there is a very high positive correlation between attitude and academic achievement (Sheikh, 1982) and they are sometimes negatively correlated (Soyibo, 1982).

Methodology

Design:

The study involved the actual manipulation of variables leading to the measurement of the response variables – academic achievement and attitude toward library skills. To this extent, the research is an experimental design.

Population:

The population affected by the problem under investigation is all the first year (2003/04) students of the faculties of science, engineering and environmental studies, for whom the course, library skills, is compulsory. There are about 480 students in this course which is offered in the second semester of their first year in the university**.**

Sampling Technique:

The sampling technique adopted was simple random sampling. There is a register of the students as they register for the course. Their serial numbers were used as identification numbers. Using a table of random numbers, a sample of 80 students was selected. The 80 students were randomly assigned to four group by a selection of folded papers previously labeled as A, B, C and D. Thus there were 20 students in each group. A student was randomly selected from each group to choose a piece of folded paper previously labeled 1, 2, 3 and 4 for the three treatments cooperative, competitive and individualistic and control. This completed the randomization process.

Sample:

The sample consisted of 80 students, 20 per group, distributed as shown in Table 1.

Table 1

Group	A	B	C	D	Total
Sex					
Male	12>	7	11	6	36
Female	8	13	9	14	44
Total	20	20	20	20	80

The students were all within the age range 18-30

Instrumentation:

The instruments used in the study were:

• A validated researcher designed of self-instructional package on

Library skill of referencing and use of author and subject catalogues for first year students.

• A-30 item multiple choice library skills achievement test (LAT) based on the selected content, whose reliability estimate using same sample of 30 scripts was 0.72. The 20 item attitude questionnaire had a reliability of 0.69.

Treatment:

The four groups were treated thus:

Group A: Subjects were made to treat the library skill topics cooperatively using the SIM package. They could strive with one another for a goal object – a high grade. They were allowed to discuss, argue, and share opinions and position on the various issues raised in the package. They were told the grade obtained by one member is affected by and will affect other members' grades, such that a low grade by any member will, by an undisclosed fraction, reduce other member's grades.

Group B: Students were made to treat the library skills topics competitively using the SIM package. Members were made to strive against each other for goal object, the best grade for which a prize was attached, a prize that only one member will eventually get.

Group C: Subjects were made to use the SIM package individually without competition and cooperation with or from any of the group members.

Group D: The control group used the text book only to treat the library skill topics covered by the SIM package. They were equally not in cooperative nor competitive spirit. They were under the supervision of four different trained teachers, engaged by the research for that purpose while he (the research) went round to ensure that the right thing was done. At the end the multiple choice achievement test and attitude questionnaire were administered. The testing time was 60 minutes with 15 minutes allowed for the completion of the attitude questionnaire.

The data were collected as number right for the library skills achievement test and totaled. The attitudes items build on a five-point Likert Scale were score as follows for positive items.

SA = 5

A = 4

U = 3

D = 2

SD = 1

For negative items, the scoring was reversed. The score on the twenty (20) items were added to obtain a single score.

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The achievement test scores and the attitude scores were analyzed separately using one way ANOVA, and tested for significance at 0.05 levels using the F-ratio test.

The pair wise post – ANOVA test was done using the Fisher's modified t-test for this purpose given as:

$$T = \frac{y_i - y_j}{\sqrt{MSE\,(1/n_i + 1/n_j)}}$$

Where y i and y j are group means

MSE = error means square from ANOVA and n i , nj are the number in each group.

Results and Interpretation

The data analyzed using ANOVA were as follows: Table 2 is the mean And SD of the two variables by group.

Table 1. Mean and Standard Deviations of academic achievement and attitude towards library skills.

Variable	Group											
A		B		C		D		Total				
Attitude towards Library skills		X	S	X	S	X	S	X	S	XS		
79.40	9.33	57.45	11.06	55.75	8.90	47.05	4.87	59.91	14.93			
Academic Achievement in Library skills		16.35	2.63	12.25	2.17	10.00	1.67	7.05	2.94	11.41	4.18	

Hypothesis One: Teaching method has no significant main effect on students' academic achievement in library skills. The results of the one-way ANOVA are given in Table 3.

Table 3. ANOVA of achievement scores in library skills by teaching method.

Score	SS	Df	MS	F
Teaching Method	992.14	3	307.38	50.64*
Residual	416.25	76	6.07	
Total	1383.39	79		
ore	SS	Df	MS	F

*Significant at .05 level. F = 2.72

Since the calculated F-value (50.64) is greater than the critical F-value (2.72) the null hypothesis was rejected at .05 levels in 3, 76 degrees of freedom. This means that teaching method has a significant main effect on students' academic achievement in library skills.

Hypothesis Two Teaching methods have no differential effect on academic achievement in library skills.

The post-ANOVA pair wise comparison was carried out to identify the specific pair(s) that was significantly different. Table 4 is a summary of the results.

Table 4. Pairwise t-test comparison of academic achievement in library skills by groups.

Teaching Group		**A**	**B**	**C**	**D**
Mean	16.35	12.25	10.00	7.05	
A	-	4.10	6.35	9.30	
B	5.262*	-	2.25	5.20	

C	8.150*	2.888*	-	2.95
D	11.937*	6.674*	3.786*	-

***significant at .05 level, df = 76, Critical t= ± 1.96**

From Table 4, it could be observed that all the pairs are significantly different: treatment means among themselves and then from control group.

Hypothesis Three: This hypothesis stated that teaching method has no significant main effect on student's attitude towards library skills.

To test this hypothesis one-way ANOVA was carried out on their attitude scores. Table is a summary of the ANOVA results.

Table 5. One-way ANOVA of Attitude Score by teaching method groups.

Source	Ss	Df	Ms	F
Teaching method	11371.94	3	3790.65	46.121*
Residual	6246.45	76	82.19	
Total	1768.39	79		

*Significant at .05 level. F 0 = 2.72

Since the observed F-value (46.121) is greater than the critical F-value (2.72), the null hypothesis was rejected at .05 level of significance. This means that teaching method has a significant main effect on student's attitude towards library skills.

Hypothesis 4

This stated that teaching method has no differential effect on student's attitude towards library skills.This hypothesis was tested by carrying out pairwise post ANOVA comparison using Fisher's modified t-test. The results are presented in Table 6.

Table 6. Pairwise comparison of attitude scores by teaching method group.

Teaching group	A	B	C	D
Mean	79.40	57.45	55.75	47.05
nj	20	20	20	20
A	-	21.95	23.65	32.35
B	7.656*	-	1.70	10.40
C	8.249*	0.593	-	8.70
D	11.284*	3.628*	3.035*	-

Significant at .05 level, df = 76, Critical t = t 1.96

From Table 6, it was observed that all groups were significantly different from group A, with group A being superior in attitude towards library skills. The difference between each of

the treatment groups and the control were also significant. The difference between groups B and C was not significant and this was the only case where hypothesis 4 was not rejected.

Summary of Results

The teaching method has a significant main effect on both academic achievement and attitude of students towards library skills. It also has a significant differential effect on academic achievement and attitude towards library skills except for attitude where competitive and individualistic groups were not significantly different.

All the results of main effect are as was expected and in agreement with the results obtained by previous researchers though on different academic tasks. They particularly agree with those of Postlethwait (1972), Bridge (1976), and Berry (1974).

Attitude is known to be a very strong determinant of academic achievement in all subjects. The importance of SIM and cooperating as a learning/teaching strategy can no longer be over-emphasized. - Okebukola (1984) strongly recommended the application of cooperative mode of SIM in the teaching of biology.

The objective of this study was to measure the effect of the teaching method, the interaction of SIM and mode of presentation on academic achievement and attitude towards library skills.

A sample of 80 students were randomly selected from a popular course of 480 students and randomly assigned to four groups. Treatment was equally randomly assigned to the groups, a variation of the mode of using SIM- cooperative, competitive and individualistic with fourth group treated with a textbook.

Three instruments were used in the study: SIM package, the multiple choice achievement tests, and a 30-item attitude questionnaires. The collected data was analyzed using a one-way ANOVA.

The results showed a significant main effect and differential effect on both academic performance and attitude towards library skills.

Conclusion

Within limits of experimental and measurement error, the use of SIM has a significant effect on academic performance and attitude towards library skills. The cooperative mode of applying SIM should be adopted in library skills teaching. More studies should be carried out to confirm the no significanct difference between competitive and individualistic modes.

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