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EFFECTS OF GROUP CONTINUOUS ASSESSMENT STRATEGIES ON ACHVEMENT IN ALGEBRA: THE CASE OF SECOND YEAR CANDIDATE TEACHERS

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ABSTRACT: *The objective of this study was to determine the effects of group continuous assessment strategies on candidate teachers' academic achievement and attitude towards modern algebra (**Mathematics**). Group continuous assessment strategies as a preferred continuous assessment methods were tested and proved as stated in the result section of this research. The study was conducted at Giggle Beles College of Teachers Education (**GBCTE**) on second year mathematics stream candidate teachers'. Three intact sections were taken and candidate teachers' are grouped into 4 according to their mathematics group point Average (**GPA**) taken from the registrar of the college and each group is formed systematically according to their achievement level. In the study, data were obtained through the use of quasi experimental group model. Two types of instruments were used for measurement: achievement tests and survey method using five Likert scale questionnaire to know candidate teachers' attitude towards Modern Algebra due to the effect of group continuous assessment. Pilot study was carried out on 20 candidate teachers' of the same background taken from other College of Teachers Education (**CTE**) but not in the sample group to test the reliability of the questionnaire items and achievement test items. The calculated Cronbach alpha coefficient result was greater than 6.5 for each questionnaire and GCA test questions. The data obtained from the three intact sections and all groups result were analyzed using SPSS window 16.0. Descriptive statistics, mean and standard deviation were used to describe candidate teachers'' achievement test scores and their questionnaire responses. Meanwhile, multiple regressions were used to analyze the contribution of continuous marks to final grades of candidate teachers'; ANOVA also used to analyze significant differences in the assessment marks. Each intact section was grouped into four and treated with four GCA strategies and one test after the treatment of each GCA Strategies and*

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with one final examination independently. Likert scale was used to know students attitude towards modern algebra. Results in table 5 and 8 indicated that implementing GCA strategies improved candidate teachers'' academic achievement in modern algebra and attitude towards modern algebra. Candidate teachers' developed positive attitude towards GCA strategies, their academic achievement and attitude towards modern algebra were positively correlated. At college level other teachers are encouraged to implement GCA methods of continuous assessment for their candidate teachers' in the teaching of mathematic concept.

Key Words: Group Continuous Assessment, Collaborative Learning, Achievement of Mathematics

I. INTRODUCTION

1.1 Back Ground of the Study

Collaboration is the "mutual engagement of participants in a coordinated effort to solve a problem together" (Lai, 2011). Consequently, collaborative learning refers to an instruction method in which students at various performance levels work together in small groups toward a common goal (Gokhale, 1995). Collaboration is an umbrella term for a variety of educational approaches involving joint intellectual effort by students, or students and teachers together. Usually, students are working in groups of two or more, mutually searching for understanding, solutions, or meanings, or creating a product. Collaborative learning activities vary widely, but most center on students' exploration or application of the course material, not simply the teacher's presentation or explication of it. Collaborative learning represents a significant shift away from the typical teacher centered or lecture-centered milieu in college classrooms.

In collaborative classrooms, the lecturing/listening/note-taking process may not disappear entirely, but it lives alongside other processes that are based in students' discussion and active work with the course material. Teachers who use collaborative learning approaches tend to think of themselves less as expert transmitters of knowledge to students, and more as expert designers of intellectual experiences for students-as coaches or mid-wives of a more emergent learning process. It is broadly defined as "a situation in which two or more people learn or attempt to learn something together (Dillenbourg, 1999).

Because group work can facilitate learning (Slavin, 1990), school districts and state departments of education have started to mandate the use of cooperative

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and collaborative learning methods on a large scale (e.g., California Department of Education, 1985, 1992). Large scale assessment programs are increasingly requiring students to word in collaborative small groups instead of, or in addition tom requiring them to work individually (Webb, 1995). A major reason for using group work in assessment is to link assessment more closely to the growing emphasis on small-group collaboration and cooperation in classroom instruction (Linn, 1993). Assessing students in groups provides information about group productivity and group effectiveness that individual assessment of student skills does not.

One reason for using group assessment is to reflect the growing importance being placed on group collaboration and group problem solving in instruction. Second, what students can accomplish in teams is important to potential employers who are increasingly using work teams to respond to global competition (Hackman, 1990). Third, group assessment makes it possible to measure students' abilities to collaborate with others. Team effectiveness involves many dynamic processes including, for example, coordination, communication, conflict resolution, decision making, problem solving, and negotiation (Salas, Dickinson, Converse, & Tannenbaum, 1992). Observing students collaborating with others also makes it possible to evaluate their ability to work with others and their ability to monitor and shape their own behavior (Redding, 1992).

Fourth, group assessment can be used to measure students' problem solving processes. When students work with others to solve problems, they freely verbalize their knowledge, understanding, problem-solving strategies and misconceptions (see Shavelson, Webb, Stasz, & McArthur, 1988). They may reveal much more about their understanding than can be inferred from responses to questions on an individual test. Fifth, the drive toward authentic assessment calls for complex problems in realistic contexts (Meyer, 1992). Complex problems may be less intimidating to students if they can work with others. Finally, group testing is sometimes used for logistical reasons, such as making more efficient use of limited test materials. Some performance assessments use special equipment that would be very expensive to duplicate for every student to be tested, and so are used with groups of students to save costs (e.g., electric circuits, Shavelson & Baxter, 1992).

However, many testing programs stress individual accountability and obtain

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achievement scores for individual students from group assessment. Thus, it is unclear whether the performance of students in collaborative group contexts accurately represents their individual competence. Part of the uncertainty hinges on the definition of a valid measure of individual competence. From one perspective, individual competence is best measured by individuals working alone without assistance (the traditional individual testing context). Group assessment contexts that give students opportunities to collaborate may overestimate individual competence when students use resources in the group to solve problems that they would not be able to solve individually. This is especially a concern when students are allowed to collaborate on all aspects of the task, including the work that they will submit for evaluation (e.g., Shavelson & Baxter, 1992).

Differences between performance in group and individual settings have long been documented in out-of-school contexts (Hare, 1992; Kahan, Webb, Shavelson, & Stolzenberg, 1985), and occasionally in educational contexts (e.g., Johnson, Johnson, & Skon, 1979), but rarely have been studied in educational assessment contexts. In non-assessment contexts, students often perform better when collaborating with others, due to cognitive factors (e.g., greater intellectual resources available) and social variables (e.g., increased task motivation; Knight & Bohlmeyer, 1990). But negatively functioning groups can sometimes produce worse performance than individuals working alone (Hackman, 1990). So scores from group assessment contexts may overestimate or underestimate students' performance in an individual setting.

A social constructivist perspective presents a somewhat different view of individual competence. While individual competence can be measured by individuals working alone, it can also be demonstrated when individuals collaborate with others to learn how to solve problems that they could not previously solve by themselves (Vygotsky, 1978). In a truly collaborative context, all individuals are actively engaged in working toward a solution to the problem (Damon & Phelps, 1989; Tudge & Rogoff, 1989). From this perspective, the performance of students working collaboratively with others would be a valid measure of individual competence when students are actively involved in learning how to solve the problem. On the other hand, when students use the group's resources to obtain a solution or an answer without trying to learn how to solve the problem (e.g., copying other students' work without

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trying to understand it, carrying out the arithmetic operations after another student has set up the solution to the problem), scores from the group assessment context will overestimate their individual competence.

From perspectives on what constitutes individual competence, then, scores from a group assessment context may not be valid indicators of students' individual competence. Furthermore, achievement scores from group assessment contexts provide little information about group functioning. Studies of group dynamics in instructional settings show that data on group processes are necessary for understanding how groups operate and the experiences of students in them (Webb, 1989, 1991). Group process data can reveal the extent and nature of individual student participation as well as the nature of the group's collaboration (e.g., conflict and controversy, joint construction of ideas and solutions, helping relationships, beneficial and debilitating social processes.

As a whole, collaborative learning is a beneficial assessment technique for students to improve learning. However, the issues surrounding its implementation should be carefully studied to avoid pitfalls in its implementation and, thus, maximizing its benefits.

1.2 Statement of the Problem

In Ethiopia, Ashcroft (2007) discussed on some pedagogic and curriculum issues. Graduates will need to develop relevant knowledge that fits with the developmental stage of the country, practice orientation and service commitment. To achieve this, appropriate pedagogy is essential: instructor development must focus less on subject knowledge and more on pedagogic skills and the world of work. The process of education must focus on group work, performance assessment, self-assessment and self-motivation. However, the researcher was not able to find any materials or studies that involve group work much more on group assessment.

Also, the National workshop on Group Continuous Assessment (GCA): Current practices and Future directions for Ethiopia (Addis Ababa, 3-7 June 2005) reveals that GCA is not implemented carefully. More importantly, the formative aspect of GCA is ignored during assessment of students learning by the teacher education institutions like the researchers' college. GCA is mainly aimed at:

i. improving the accuracy and fairness of students evaluation
ii. improving teaching
iii. improving students learning

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Among the above three cases teachers educators of teaching college in our case only addresses the first goal of continuous assessment by implementing summative assessment only, the final examination. This reveals that teacher educators have incomplete view of seeing GCA. So this motivated the researcher to study how GCA affects students' performance and to fill this discrepancy problem of GCA implementation using research based results and findings. The researcher is also interested to see how the attitude of teacher-candidates affects their performance. Finally, the researcher needs to see the relation of GCA and student's attitude towards CGA with final examination. Thus, the primary aim of this study is to know the type of group assessment method that largely affects the achievement of students and to explore teacher-candidates attitude of group assessment. Throughout this research study, the following research questions will be answered,

1. Which GCA strategy affects the candidate teachers' final examination achievement in algebra course?
2. Is the attitude of teacher-candidates' the same for all the selected GCA strategy?
3. Is the teacher-candidates attitude related with their performance in each GCA strategy?

1.3 Objective of the Study

The general objective of the study is to investigate the effect of GCA techniques of assessment on students' achievement and the attitudinal in GCA during learning algebra.

The specific objectives of this study are:

1. to identify which GCA strategy affects the final examination in Algebra Course.
2. to know the attitude of candidate teachers' towards each GCA strategy.
3. to find out if there is a significant relationship between the attitude of candidate teachers' to each GCA and their performance in each GCA strategies.

1.4 Significance of the Study

The present study is, therefore, expected to have the following theoretical and practical contributions. The findings from the study will enable:

- to inform college teachers candidates to have effective basis for GCA methods in mathematics.
- to identify attitudinal and pedagogical factors influencing the implementation and practice of group continuous assessment in the colleges and make

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recommendations to the decision makers regarding the monitoring of GCA evaluation with a view to improve its implementation during instruction delivery.

- to inform the authorities, college administrators, and the Ethiopian Education service personnel, as it will serve as a guide to design an appropriate in service training program on GCA evaluation to update college teachers' skills in GCA assessment.
- the stakeholders, to gain an insight on the activities of GCA in schools and colleges in terms of GCA assessment .
- to provide a fertile ground for further research on group assessment and evaluation.

1.5 Scope of the Study

This research study by the researcher has been studied in Benishangul Gumuz regional state in Metekel Zone in Gilgel Beles Colleges of Teachers' Education among mathematics second year candidates teachers on the effect of group continuous assessment on achievement in of the course 'Introduction to Algebra'. However due to financial limitations, the researcher has limited to study the problem in the area the researcher has selected if the problems of finance and time were enough the researcher wanted to extent to the all staff department second year students and also the researcher wanted to expand to other stream students in the college. The work load by the researcher also restricted the study to second year mathematics department students.

This study will also include the attitude of candidates' teachers' towards each GCA strategies. Candidate-teachers will be given group continuous assessment and final examination on selected topics of algebra. Why attitudinal factors will be considered in this study. Other extraneous factors such as the researcher qualification to implement the new strategies, the teaching facilities such as classroom arrangement and the teacher readiness and students' readiness and the school environment such as keeping good time for students to attend the activities of GCA effectively will be observed and tried to be controlled by the researcher.

1.6 Definitions of Terms

1. *Attitude*: attitude can be defined as a positive or negative evaluation of people, objects, event, activities, ideas, or just about anything in your environment (Zimbardo et al., 1999)
2. *Academic Performance (AP):* refers to successful accomplishment or achievement in particular subject, areas or course (Encarta, 2008).

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3. *Evaluation:* the process of making a value judgment about the worth of a students' performance.
4. *Assessment (A):* a working definition of assessment for learning from a widely cited article contends: "the term 'assessment' refers to all those activities undertaken by teachers, and by their students in assessing themselves, which provide information to be used as feedback to modify the teaching and learning activities in which they are engaged.
5. *Continuous Assessment (CA):* It is as a mechanism whereby the final grading of learners in the cognitive, affective and psychomotor domains of learning systematically takes account of all their performances during a given period of schooling (Falayalo, 1986).
6. *Collaborative Learning:* An instruction method in which students work in groups toward a common academic goal.
7. *Individual Learning:* An instruction method in which students work individually at their own level and rate toward an academic goal.
8. *Examination:* It is formal assessment given at the end of a term that is comprehensive relative to the competences covered in the term.
9. Group Continuous Assessment: as a result of group work the assessment taken from the group work.

III. RESEARCH METHODOLOGY

3.1 Description of the Study Area

This study was conducted at Benishagul Gumz Regional State Metekel Zone Gilgel Beles College of Teachers Education that is located in the North-Western part of Ethiopia about 545km from Addis Ababa and 250 km from the nearest town Bahir Dar.

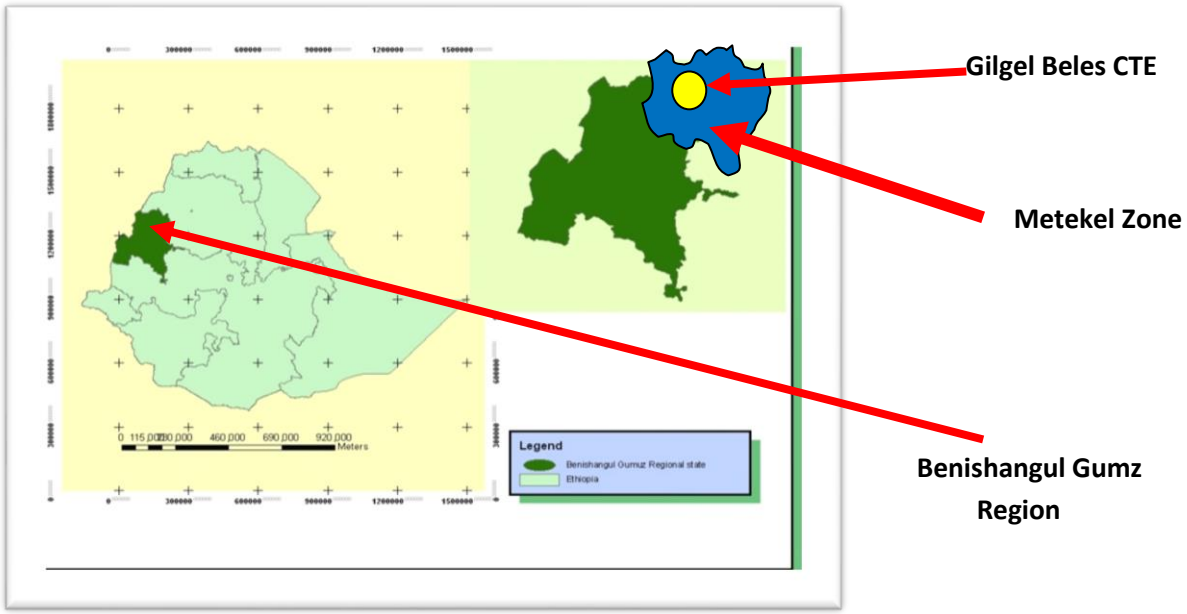

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Fig.1 Location of specific study area

3.2 Research Design and Instrument

This research is a kind of evaluation quantitative educational research which involves determining the worth or merit quality of an evaluation object. The research design was quasi-experimental which is frequently used in educational research which does not meet all the requirements necessary for controlling the influence of extraneous variables. This research design involved three intact sections. Each class was arranged in groups of four students per group which was subjected to four different GCA strategies using systematic assignment per group. The GCA attitude response and their test scores with the final examination was recorded. The GCA were implemented with selected lesson topics from the course introduction to modern algebra appropriate to the implementation of GCA strategies.

To investigate the effectiveness of GCA strategies on achievement of modern algebra were preferred in continuous assessment of modern algebra of mathematics course. Attitude toward modern algebra, Group Continuous Assessment (GCA) questionnaires were used. After each lecture four GCA tests were given and the effect of attitude of candidate teachers before and after the implementation of each GCA was taken and one final independent examination of from the four GCA lessons was given to see the relationship of the GCA test result and their final examination score.

In this study the extraneous variables that may affect the result of the study are the researchers' experience and qualification that is the capacity of the researcher to implement the strategies, teaching facilities and learning environment.

3.3 Subject of the Study

The subjects of this study used three equivalent groups of second-year mathematics class students who are registered in the Department of Mathematics in Gilgel Beles College of Teacher's Education (GBCTE). The study was conducted in 2012-2013 academic year in Modern Algebra course to see the effect of GCA on the achievement of algebra Since there is no other teachers' college in the region where it is located the college is selected purposely by the researcher. Most of the mean ages of the candidate teachers in the three intact sections is 20-22 years old.

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3.4 Sample and Sampling Technique

There are three intact sections taking the course Introduction to Modern Algebra (Math 221) from mathematics stream candidates' teacher ranging from 28-36 students in each section. All candidate teachers students were included in the study. The students will be grouped according to their year I first and second semester mathematics grade point average results to form equivalent groups containing four students who were mixed to different CGPA levels: high scorer from 3.00 - 4.00, average CGPA from 2.00 - 2.99 and low CGPA below 2.00 and warning candidates teacher in the college registrar.

GBCTE	Sections of Mathematics Department								
No of students	Section A			Section A			Section A		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
	25	3	28	26	6	32	32	4	36

3.5 Research Questions

The research questions which this research intended to find answer to were:

1. Which GCA strategy affects the candidate teachers' final examination achievement in algebra course?
2. Is the attitude of teacher-candidates' the same for all the selected GCA strategy?
3. Is the teacher-candidates attitude related with their performance in each GCA strategy?

3.6 Hypotheses

H0: There is no significance difference in the contribution of the GCA strategies to the final examination achievement of the students of modern algebra course.

3.7 Data Analysis

After the data were collected, the means, standard deviations, variances, were calculated to determine the statistically significant difference observed after the treatment of the four GCA strategies that affected their final examination score for the whole group using version SPSS 16.0 for windows. Multiple regressions were used to analyze the contribution of continuous marks to final examination of students modern algebra; ANOVA was also used to analyze differences in the assessment marks at significance level of 0.05 confidences.

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To analyze students' interest towards modern algebra ; the normality of questionnaire items was confirmed by normality test and normal curve histogram, then their means, standard deviation and variance were calculated to determine the significant difference of students' attitude towards modern algebra and group continuous assessment using SPSS version 16. Two tailed Paired samples one way ANOVA was used to compare the groups' teacher candidates' attitude towards GCA strategies before and after the treatment.

3.8 Multiple Regression

Multiple regressions is a flexible method of data analysis that may be appropriate whenever a quantitative variable (the dependent or quantitative variable) is to be examined in relation to any other factor (expressed as independent variable or predictor variable). Relationship may be non linear, independent variable may be quantitative or qualitative and one can examine the effect of a single variable or multiple variables with or without the effect of other variables taken into account (Cohen,et.al, 2003)

Many practical equations involve the relationship between a dependent or criterion variable of interest call it Y a set of k independent variables or potential predictor variables call them x1,x2,…,xk where the squares on all variables are measured for N cases. A multiple regression equation for predicting Y can be expressed as follows: $Y' = A + B_1 X_1 + B_2 X_2 + B_3 X_3$ The correlation between Y' and the actual Y value is also called the multiple correlation coefficient Ry.12…k or simply R. Thus, R provides a measure of how well Y can be predicted from the set of scores. The following formula can be used to test the null hypothesis that in the population there is no linear relationship between Y and prediction based on the set of kX variables from N cases:

Alternatively the independent variable can be expressed in terms of standardized scores where Z_1 is the z score of variable X_1, etc. The regression equation then simplifies to: $Z_{Y'} = A + \beta_1 Z_1 + \beta_2 Z_2 + \beta_3 Z_3$. A useful application of multiple regression analysis is to determine where a set of variables (Set B) contributes to the prediction of Y beyond the contribution of a prior set (Set A) using the R squared statistic.

The statically significance of R squared is determined by the formula:

$$F = \frac{\left(R^2{}_{Y.AB} - R^2_{Y.A}\right)/k_B}{\left(1 - R^2_{Y.AB}\right)/\left(N - K_A - K_B - 1\right)} \quad ,$$

$df = k_B, N - K_A - k_B - 1$ with standard

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scores the regression coefficients are: once we have the beta coefficients for standardized scores, it is easy generate the B_j regression coefficients shown in the formula $Y' = A + B_1X_1 + B_2X_2 + B_3X_3$ for prediction using the standardized or raw sores, given that $B_1 = \beta_1 \frac{SD_Y}{SD_{X_1}}, B_2 = \beta_2 \frac{SD}{SD_{x_2}}$ and $A = \overline{Y} - (B_1)(\overline{X_1}) - (B_2)(\overline{X_2})$

IV. RESULTS AND DISCUSSION

The purpose of this study was to ascertain whether the use of group continuous assessment strategies of continuous assessment had positive or negative effect on achievement of modern algebra at college level.

6.1 Research Question 1: Which GCA strategy affects the candidate teachers' final examination achievement in algebra course?

Table 16* shows the mean score of Group Continuous Assessment (GCA) marks for Gilgelbeles College of Teachers Education candidate teachers. The mean mark range from 6.2604 to 7.3688 and an Analysis of Variance (ANOVA) was performed to find whether there is a significance difference of GCA strategies exists on the final mark of modern Algebra result. As table 16* showed that there is a significance difference in continuous mean score difference at level of 5% (F=7.523, p<0.05). This result showed that the null hypothesis is rejected and therefore we conclude that the there is a significant difference on the achievement of teachers candidates on modern algebra score.

The result of the multiple regressions also showed that there is an impact difference on the achievement of candidates' teachers' result of modern Algebra score. Table 17** of regression analysis showed that among the strategies GCA1 has the greatest impact on the achievement of candidate teachers modern algebra final result because the big absolute value of beta β =4.188 and small value of sig p<0.05 confirms that GCA1 has good impact on the achievement of modern algebra as multiple regression analysis result showed.

Table 16*: comparison of GCA mean marks by ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.	Assessment	mean	SD
Between Groups	1.217	4	.304	7.523	.000[a]	Final exam	6.4813	.22702
Within Groups	3.680	91	.040			GCA1	6.8438	.58854

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Total	4.896	95				GCA2	7.3688	1.04030
						GCA3	6.2604	.57915
						GCA4	6.6506	.55401

Table17: Result of regression analysis of candidates teachers achievement on modern algebra**

Independent variables	Beta	t	Sig.
GCA1	-.485	-4.188	.000
GCA2	.058	.528	.599
GCA3	.213	2.218	.029
GCA4	.342	3.205	.002

6.2 Research Question2: **Does the attitude of candidate teachers the same for each GCA strategy?**

One of the data analysis tool used to answer this question is to use Liker scale of attitude of candidates teachers before and after the treatment of each GCA variable. The result of their attitude towards each GCA is different as the average result of result shown by the table *** that section A students is changed from almost neutral passion before (3.0305) treatment to strongly agree result (4.6742). A similar argument from table *** showed for section B candidate teachers attitude towards each GCA dramatically changed from almost neutral position(3.0375) to almost strongly agree (4.5792) position and this result showed that teachers candidate have very good satisfaction on the GCA strategy on their assessment result. In similar argument the attitude of candidate teachers for section C is changed from almost neutral (3.0019) position to almost strongly agree (4.5252) position. This result showed that their attitude towards each GCA has changed from almost neutral position to almost strongly agree position and this showed that candidate teachers' altitude is the same towards each GCA even though small difference exists between each GCA strategy.

6.3 Research Question 3: Is there relationship between the altitudes of candidates teachers to each GCA strategy and their performance in each GCA strategy.

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From table18 we see that there is positive correlation between the attitude of candidate teachers and their performance in each GCA. The result of this relationship is shown in table 18 and the pearson correlation coefficient shows in the table 18 that the correlation between GCA2 and AtA2 is the strongest of GCA1 and AtA1, GCA3 and AtA3, GCA4 and AtA4. Even though there correlation difference the result showed that applying GCA on modern algebra help to improve the score of modern algebra result.

Table18: Correlation of attitude toward each GCA strategy and achievement performance

GCA Strategies	Attitude A1	Attitude A2	Attitude A3	Attitude A4
GCA1	.404			
GCA2		.468		
GCA3			.352	
GCA4				.257

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6.4 Effect size calculation of Attitude towards GCA strategies

The eta squared statistic is the between groups sum of squares divided by the total sum of squares:

$$\eta^2 = \frac{SS_{between}}{SS_{total}} = \frac{SS_{between}}{SS_{between} + SS_{within}}$$

Eta Squared: It can readily be seen from the partition of the total sum of squares that eta squared is the proportion of the total variability (as measured by the total sum of squares) that is accounted for by differences among the sample means. Using the values in the ANOVA summary table16, we have

$$\eta^2 = \frac{SS_{between}}{SS_{total}} = \frac{SS_{between}}{SS_{between} + SS_{within}} = \frac{1.217}{4.896} = 0.25$$

the square root of which (the value of the correlation ratio itself) is

$$\eta = \sqrt{0.25} = 0.5$$

The term correlation ratio is not particularly transparent. Eta, however, is indeed, as we have just seen, a ratio. Moreover, the statistic is also a correlation. The eta result is the spearman correlation between the GCA scores. The Pearson correlation was designed as a measure of linear relationship between two scale or

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continuous variables. In this special situation, however, you will notice that the value of the correlation is unaffected by the ordering of the groups, which are identified by arbitrary code numbers. Eta can be regarded as a function-free correlation expressing the total regression linear of the scores upon the treatments, which are represented as arbitrary code numbers. A multiple correlation is the Pearson correlation between predictions from regression and the target variable. In this case, the target variable is the set of raw scores. The predictors are grouping variables carrying information about group membership. Multiple regressions of the scores upon the grouping variables will predict, as the estimate of each score, their groups mean. Thus the multiple correlation coefficients (eta) is the correlation between the scores and their group means, which explains why eta cannot have a negative value.

3.9 The Attitude Difference Before and After the Treatment of Each GCA strategies

The result of table 19 shows that there is a positive attitude difference from almost neutral to almost strongly agree response for example table 19, section A shows that the average attitude of candidate teachers before the treatment of each GCA strategies is 3.0305 this is almost neutral to the strategies before treatment and after treatment their attitude is 4.6742 and this result is almost strongly agree and this strongly agree response indicates that their modern Algebra score is improved due to the effect of each GCA strategies in section A candidate teachers algebra result.

The result of table 19 shows that there is a positive attitude difference from almost neutral to almost strongly agree response for example table 19, section B shows that the average attitude of candidate teachers before the treatment of each GCA strategies is 3.0375 this is almost neutral to the strategies before treatment and after treatment their attitude is 4.5792 and this result is almost strongly agree and this strongly agree response indicates that their modern Algebra score is improved due to the effect of each GCA strategies in section B candidate teachers algebra result.

The result of table 19 shows that there is a positive attitude difference from almost neutral to almost strongly agree response for example table 19, section C shows that the average attitude of candidate teachers before the treatment of each GCA strategies is 3.0019 this is almost neutral to the strategies before treatment and after treatment their attitude

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is 4.5252 and this result is almost strongly agree and this strongly agree response indicates that their modern Algebra score is improved due to the effect of each GCA strategies in section C candidate teachers algebra result.

Table19: result of attitude towards each GCA before and after treatment of Section A, Section B and section C candidate teachers

Section A

Attitude result by Liker scale	GCA1	GCA2	GCA3	GCA4	Average
Before	**3.044**	**2.997**	**2.951**	**3.13**	**3.0305**
After	**4.747**	**4.637**	**4.684**	**4.63**	**4.6742**

Section B

Attitude result by Liker scale	GCA 1	GCA 2	GCA3	GCA4	Average
Before	3.031	3.063	3.04	3.16	**3.0375**
After	4.59	4.521	4.596	4.61	**4.5792**

Section C

Attitude result by Liker scale	GCA 1	GCA 2	GCA3	GCA4	Average
Before	3.014	2.986	3	3.01	**3.0019**
After	4.42	4.41	4.621	4.65	**4.5252**

Table: Results of Modern algebra Test and Final scores after implementation GCA strategies

V. SUMMARY, CONCLUSION, AND RECOMMENDATION

5.1 SUMMARY

The general objective of the study is to investigate the effect of GCA techniques of assessment on students' achievement and to know the attitude of candidate teachers on each GCA strategies during learning algebra and to identify which strategy will be productive in the performance of students in modern Algebra. The data collecting instruments were both achievement GCA tests and questionnaire. Pilot-test was carried out to determine the reliability of the attitude questionnaire items and GCA tests and final exam. The calculated Cronbach alpha coefficient was given in table 20 in the appendix

Moreover, the normality test confirmed questionnaire items. Mean and

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standard deviations, ANOVA and Multiple Regressions was employed to analyze the data that were obtained through GCA tests and questionnaire. Based on the collected data, the candidate teachers' academic achievement of modern algebra and attitude towards each GCA strategies were determined as shown in table 16, 17, and 18, and by using ANOVA, Multiple Regression and correlation respectively. In order to decide which GCA strategy significantly affects the modern algebra result of candidate teachers the treatment of each GCA strategies and their attitude towards each GCA strategy were analyzed by before and after the treatment of each GCA strategies questionnaires. The results obtained from the statistical analysis showed that GCA strategies improved students' academic modern algebra achievement According to table 16,17 and 18. After treatment the attitude of candidate teachers is changed from almost neutral to almost strongly agree response as indicated by tables 22 and 23 in the appendix * .Generally, the finding indicates that candidate teachers s' attitude and their score were positively related.

Almost there was not a statistically difference in the attitude of candidate teachers and each GCA scores before the treatment of each GCA strategies. During implementation equivalent groups of candidate teachers' in each intact section is assigned where each group contains 4 candidate teachers and equal treatment for each group is implemented so that their GCA test score result of modern algebra are collected and analyzed. According to the results of the study learning with GCA strategies improve candidate teachers' performance and this result found from their attitude response after the implementation of thee strategies and the relation of their score with their attitude of learning modern algebra.

5.2 CONCLUSION

Overall this research showed that implementation of each GCA strategies had shown a positive impact in achievement of modern algebra of candidate teachers result, and attitude towards modern algebra after the implementation of each GCA strategies as well as. From the analysis the following conclusion are drawn

a. GCA assessment scores are not similar in each intact section of GBCTE
b. GCA assessment scores contribute to final exam of students significantly
c. Attitude towards each GCA strategies has a positive correlation with their GCA test scores and final exam result
d. The attitude of each candidate teachers is not the same after the

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implementation of each GCA strategies.

5.3 RECOMMENDATIONS

As it was mentioned above, the basic objectives of this research were to search the effects of group continuous assessment of candidate teachers of GBCTE second year modern algebra achievement and attitude towards GCA strategies. The finding indicated candidate teachers showed positive attitude towards each GCA strategies and modern algebra. Based on this research, the researcher recommended the following points:

- College Mathematics teachers should adopt the use of GCA technique at college level.
- Aware candidate teachers about GCA strategies in college students should be enhanced.
- Teacher Educators are initiated to consider the GCA strategies approach as one of their teaching strategies.
- The course modern algebra should be supported by such GCA strategies to increase the attitude of candidate teacher about modern algebra and hence about mathematics
- Through GCA strategies it is possible to develop the learning of candidate teachers as well as the teaching of modern algebra
- Introducing GCA strategies will help students to get immediate e feedback to improve their learning.
- Students can get fare grades when they are involved in such group continuous assessment activities

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