

## **The Contributions of Teaching Learning Methodology Preferences, Motivation, Commitment and Participation to Preparatory School Science Students' Academic Achievement: Bahir Dar City in Focus**

Amera Seifu Belayneh\*

**Abstract:** The main purpose of this study is to examine the contributions of preparatory school science students' independent and group learning methodology preferences, motivation, commitment and participation to their academic achievement. The study also checked the differences in prevalence of the study variables in public and private school science students. Simple random sampling, stratified random sampling, and purposive sampling techniques were employed. Data were collected from 214 (121 male and 93 female) preparatory school science students through questionnaire. Eight participants were interviewed. One sample t-test, independent sample t-test and multiple regression analyses were the data analysis techniques. The study found that both public and private preparatory school science students' academic achievement, participation and group learning methodology preferences were above the expected average. However, students' independent learning preferences, motivation and commitment in learning were below the expected level. Around 38% of students' academic achievement was mainly attributed to the multiple contributions of motivation, commitment and independent learning methodology preferences. In comparison to public preparatory schools, private preparatory school science students were better in their academic achievement, independent learning methodology preferences, motivation and commitment, but they did not have significant differences in their participation and group learning methodology preferences. Based on the findings, the study suggested that preparatory school science teachers, students and the management (particularly in public schools) need to initiate the teaching learning processes towards strict, challenging and hardworking contexts. This may help students to develop the real senses of using proper learning methodologies, appropriate motivation, commitment and participation rather than unnecessarily inclining towards one learning methodology (e.g. group learning method) over the other (e.g. independent learning method) since both of them will have their own time and place.

**Key words:** *academic achievement; teaching-learning methodology preferences; commitment; motivation; participation; school context*

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\* Associate Professor, Department of Teacher Education and Curriculum Studies, College of Education and Behavioral Sciences, Bahir Dar University, Ethiopia. Email: amera1960ec@gmail.com

## INTRODUCTION

### Background of the Study

Basically, all events in this planet can be put either in natural or social categories. Education, therefore, works to examine and handle those events for the advantages of all creatures in general and human species in particular (Matthews, 1997). The learning process, its methodology and other related factors together are expected to be devoted in exploring and understanding the natural as well as social realities (Tytler, 2002; Barrow & Wood, 2006). Being familiarized with theorizing and practicing about these realities might be taken as very important to survive as human beings (Barrow & Wood, 2006; Lawson, 1995) who act as superior to other creatures. Unlike social reality, natural reality, which is the focus of this study, refers to all things that can be touched and observed directly through human sense organs and/or by using traditional and scientific instruments (Driver, 1989; Jegede, 1990; Lawson, 1995). As a consequence of their focus of study, both natural science and social science have worked as the two big classifications of school subjects/disciplines for a long period of time (Jegede, 1990; Matthews, 1997) around the world including Ethiopia.

In the 1994 Education and Training Policy, the educational structure of secondary school education was rearranged into general secondary (Grades 9-10) and preparatory (Grades 11-12) schools (Ministry of Education, MoE, 1994). The latter serves as a bridge in linking secondary school education with higher education. The preparatory school classified itself into science and social science streams (MoE, 1994; MoE, 1998). Of these streams, the focus of this study was examining academic achievement of natural science students in their preparatory schooling by taking selected variables into account. Examining science students preparatory schooling practices, which, according to (Tefera, 2012), is not yet properly studied, seems justifiable because this level serves as a license to get into universities (Tefera, 2012) for various professional training and introduces a different interface in its curriculum (MoE, 1994).

With this in mind, the present study intended to examine the status of preparatory school science students' academic achievement as a function of their teaching-learning methodology preferences, motivation, commitment, and participation in learning by taking both the public and private owned schools of Bahir Dar City into consideration. This might be very useful to inform teachers and students about their gaps in managing these variables while the teaching learning practices are in progress, thereby to think and deliver some possible alternatives.

Academic achievement, the main variable of this study, serves as an indicator of students' caliber on a certain curriculum and is used for various decisions (e.g. further education, job employment, etc) (Dobbie & Fryer, 2011). It is the most important measurement of students' school performance (Dobbie & Fryer, 2011) through the utilizations of various levels and types of tests, assignments and day-to-day classroom activities. Achievement also refers to students' accomplishment of various tasks in a particular subject area within a given academic period of time (term, semester, year, etc) (Lee, Smith, Perry & Smylie, 1999). It is the competence or capacity of an individual to attain a sort of standard (or a certain degree of excellence) as a result

of accomplishing designated types of tasks within the teaching learning endeavors (Dobbie & Fryer, 2011).

Currently, measuring academic achievement in Ethiopia is done by using both summative and continuous assessment techniques (MoE, 1994; MoE, 1998). Continuous assessment works for the sake of following and correcting students' learning engagement and achievement throughout the processes (MoE, 1998) and then to ensure better academic performance. However, students' academic achievement status in Ethiopia is either below the expected level (Derebssa, 2006; USAID, 2008) or even communicated with inflated scores which are not the real representation of students' learning behavior (Derebssa, 2006; Girum, 2010; Tefera, 2012).

On the contrary of such empirical findings, documents from Ministry of Education (MoE, 1998; 2010) contended that students' academic engagement, achievement and school retention have shown progress from time to time although the documents accept the problems related to quality education. Therefore, investigating what preparatory students' academic achievement actually looks like and suggesting possible solutions seem critically important and timely. The other vantage point of this study was that scarcity of in-depth studies that focused particular on preparatory school science students' academic achievement in Ethiopia. Moreover, unlike previous studies (e.g. Ganyaupfu, 2013; Herrmann, 2013; Marshal, 2012; Tuana, Chinb, & Shiehc, 2009), this study examined the multiple contributions of teaching-learning methodology preferences, motivation, commitment, participation, and school contexts on preparatory school science students' academic achievement rather than only their independent contributions. Such a purpose would add unique contributions to the area.

## **STATEMENT OF THE PROBLEM**

Academic achievement is the outcome of various contexts such as students' learning strategies, learning characteristics, and, of course, the nature of the contents students are intended to learn as well as the overall school contexts they have (Frederic & Mcolsky, 2004). The nature of the teaching learning methodologies preferred has significant contributions (positive/negative) to students' motivation, commitment (Tuana et al, 2009), participation (Tefera, 2012), and academic achievements (Ganyaupfu, 2013; Hermann, 2013). Since quality of instruction mainly depends on its variety and flexibility, based on the nature of students and topics of discussion (Cruickshank, Jenkins, & Metcalf, 1995), teaching and learning methodologies in science have their own peculiar features when it compares, for example, to social and business sciences (Lawson, 1995; Tytler, 2002; Harlen, 2006). Therefore, it seems acceptable to examine and suggest possible teaching learning methodology options for obtaining a better academic achievement in science.

Though teaching-learning methodologies around the world are classified into various approaches such as indirect versus direct, inductive versus deductive, modern versus traditional, student centered versus teacher centered instruction, etc. (Cruickshank *et al.*, 1995; Lawson, 1995), this study tried to put all teaching-learning methods/techniques within the continuum of their capacities to facilitate students' group learning and independent learning methods (Delong,

2009; Marshall, 2012). Although they are in a continuum, just for the sake of clarity, instructional tactics/techniques such as students' presentation, group discussions/talks, assignments, class presentations, micro teaching, whole class discussions, peer-led/cooperative learning engagements, etc could be assigned as 'group learning' facilitative teaching-learning methods (Biggs, 1999; Collis & Lacy, 1996;). Instructional tactics such as teachers' gap-lecturing, individual class works and assignments, tests and final examinations, self-readings and writings, etc, on the other hand, could be assigned as 'independent learning' facilitative teaching-learning activities (Biggs, 1999; Meyer, 2010; Prince & Felder, 2006).

Previous findings related to the contributions of teaching learning methodology (independent and group learning) preferences and utilizations on students' academic achievement are with mixed positions. For example, Johnson, Johnson, and Smith K.A. (2007) and Hermann (2013) concluded that preferring independent learning enhancement methodologies has little contribution to science students' academic achievement compared to learning together, which was found to be much better. Writers like Johnson et. al. (2007) and Collis and Lacy (1996), on the other hand, contended that preferring independent learning methodologies has better effect for maximizing science students' academic achievements.

Motivation, commitment, and participation have a potential to influence the selection of contents and learning experiences (Rocca, 2010), teaching-learning methodology preferences (Johnson et al, 2007; Marshall, 2012), and students' academic achievement (Frederic & Mcolsky, 2004) too. In fact, these variables in turn could be influenced by the nature of the content, the teaching-learning methodology preferences, and the overall contexts of the school (Cruickshank, et al, 1995; Delog, 2009). Motivation, in general, is a potential energy that enables someone to direct towards certain theoretical and practical engagements. That is why it is dominantly reported in the literature of learning (Connell & Welborn, 1991; Ryan & Deci, 2000). Aggrawal (1994), for example, contended that motivation is core to enhance academic achievement because it directs the learner towards better commitment in learning through maximizing learning participation.

Therefore, according to Skinner and Belmont (1993), to be effective in their learning processes and then in their academic achievements, students should be not only motivated but also committed (Connell & Wellborn, 1991; Tuana et al, 2009), and participate actively (Rocca, 2010). Participation refers students' direct involvement in order to take part in their education. Normally, students' level of participation has a positive correlation with students' academic achievement (Marshall, 2012). That is to mean that students who take part actively and genuinely in their learning tasks can attain better achievements in their instructional goals than those who do not (Frederic & Mcolsky, 2004; 1995; Kristin, 1995;).

However, so as to get the expected learning outcomes, teachers should differentiate whether students' participation is within the right track of the learning practices (Girum, 2010; Lee, *et al.*, 1999; Tefera, 2012). Commitment, on its side, is the ability to transform motivation and interest into practical reality in order to successfully perform a particular action (Girum, 2010; Skinner & Belmont, 1993). In this sense, commitment is a factor that individuals involve

in performing certain tasks so as to realize achievement (Aggarawal, 1994; Connell & Wellborn, 1991). With this notion, researchers found that as long as they are treated carefully and genuinely motivation, commitment (Tuana et al, 20090), and participation (Tefera, 2012; Rocca, 2010) have positive impact on students' academic achievements. If not, the consequence might be the reverse (Kristin, 1995; Marshall, 2012).

The other intent of this study was to see the differences between the variables of the study as per the two selected school contexts: public and private owned. These two types of schools have different interfaces in their management approach, availability of resources (material, time as well as human), and arrangements (Amera, 2008; Dronkers & Robert, 2013; Newhouse & Beegle, 2005). These items are naturally decisive in order to enhance students' academic achievement either positively or negatively depending on the nature of their handling. Newhouse and Beegle (2005) and Amera (2008) further noted that there exist differences in teachers' instructional performances between public and private owned schools which obviously have an impact on the academic achievements of students (Frenettten & Chanw, 2015). Therefore, examining the variations between public and private schools may help to acknowledge the observed gaps among the variables under investigation in each of the schools, thereby to develop and communicate a lesson from one to the other.

From the aforementioned literature review, it is possible to infer that science students' academic achievement might be affected by the identified variables (teaching-learning methodology preferences, motivation, commitment, participation, and school context). That is to mean the contexts of the school (public or private) may determine the teaching-learning methodology preferences (independent or group learning facilitative methods), level of motivation, commitment, and participation since the public and private school settings are different in resource availability, management efficiency, teachers' recruitment, etc. (Amera, 2008; Beegle, 2005) and altogether could affect students' academic achievement. In general, examining the level of contributions of the identified independent variables (teaching-learning methodology preferences, motivation, commitment, participation, and school context) to the dependent variable (students' academic achievement) was the main intent of this investigation. The study also tried to examine and report the status of the variables across the two school contexts which might be helpful to exchange lessons in between the two school settings. Knowing the current status of the variables and their level of variations between the two school contexts could help to have additional and supportive evidence so as to give peculiar suggestions for each school type and then to develop positive practices. Accordingly, the diagram presented in Fig. 1 (taken as a conceptual framework) may summarize and inform the basic lines of connections of variables of the study which correspondingly appeared in the research questions as well.

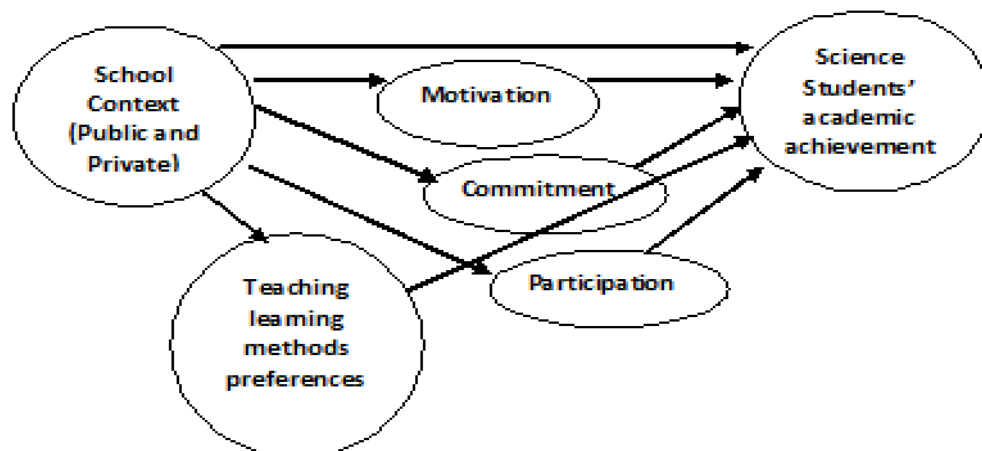


Figure 1: Conceptual Map of the Study

Based on the review of related literature made above and conceptual map of the study (Fig. 1), the following research questions were formulated.

- 1) What is the status of public and private preparatory school science students' academic achievement, independent learning methods, group learning methods, motivation, commitment, and participation in learning?
- 2) What is the contribution of preparatory school science students' independent learning methods, group learning methods, motivation, commitment, and participation to their academic achievement?
- 3) Are there variations between public and private preparatory school science students in their teaching learning method preferences, motivation, commitment, participation, and academic achievement?

## METHOD

### Research Design

The study collected data relatively through questionnaire from large size sample. Its design is, therefore, a quantitative descriptive survey which is meant to examine preparatory school science students' academic achievement with reference to methodological and learning variables.

### Participants and Research Setting

In Bahir Dar City, there are three private and four public owned preparatory schools. The study selected two private (Bahir Dar Academy and SOS Bahir Dar Branch) and two public (Tana Haiq and Bahir Dar) preparatory schools through simple random sampling in a way to have the same quota from each school type. Grade 12 science students were purposively considered as major data sources because they are believed to have relatively sufficient experiences about the

level and, as a result, provide data comfortably. Bearing this in mind, of the 1,835 student population, 214 (121 male and 93 female) students were selected through stratified random sampling technique in order to have reasonable sample size from each of the school settings. With regard to school types, 112 students from public and 102 students from private science preparatory schools were selected and participated in the study. Eight interview respondents (4 teachers and 4 students) were identified through purposive sampling by taking their willingness, experience, field of specialization, and school context into account. For the sake of anonymity, teacher respondents were labeled as T1, T2, T3 and T4 and student respondents as S1, S2, S3 and S4.

### **Instruments and Procedures**

The data collection instruments used in this study are questionnaire, interview and document analysis.

**Questionnaire:** was used to collect information about the independent variables (students' independent learning method preferences, group learning method preferences, motivation, commitment, class participation, and school context) of the study. The present writer, based on related literature (Aggrawal, 1994; Collis & Lacy, 1996; Dobbie & Fryer, 2011; Frederic & Mcolsky, 2004; Kristin, 1995; Meyer, 2010, Tefera, 2012), developed the questionnaire items. The questionnaire had 60 items with 5 point scales labeled as strongly disagree (1), disagree (2), slightly agree (3), agree (4), and strongly agree (5). The study preferred agree-disagree scale because the items inquired respondents' understanding, plan, level of decision making, participation, commitment, and motivation level. Five professionals (two PhD holders in Educational Psychology and three PhD holders in Curriculum and Instruction) worked on the face validity of the questionnaire. These professionals suggested avoiding of 2, adding 1 and revising 12 items. Accordingly, the author did necessary amendments. Lastly, the number of items was maintained as 56. The reliability coefficient of the questionnaire was calculated by using Cronbach alpha. The obtained reliability indexes were 0.88, 0.79, 0.82, 0.78 and 0.84 for students' independent learning method (10 items), group learning method (10 items), motivation (12 items), commitment (12 items), and participation (12 items) respectively.

In order to address the construct validity of the scales (among other options), convergent validity test was employed. For each of the variables treated in this study, previous researchers' scale was found. Accordingly, Vallerrand et. al.'s (1998) academic motivation scale with 24 items, Sman et. al.'s (2005) commitment in course engagement scale with 23 items, Reid et. al.'s (2006) group learning method scale with 23 items, Marshal's (2012) independent learning method scale with 8 items, and Tefera's (2012) students' level of participation scale with 16 items were all identified so as to check the construct validity by comparing these scales with the present researcher-made scales. For this purpose, 54 (33 male and 21 female) public (30 students) and private (24 students) preparatory school science students in Bahir Dar participated to fill both of the scales (scales by the above-mentioned researchers and the present study).

Lastly, the correlation coefficient between the two scales was calculated and designated as 0.74 for motivation scale, 0.71 for commitment scale, 0.71 for group learning method scale, 0.82 for independent learning method scale, and 0.79 for participation scale. These correlation values indicated that the scales used to collect data for this investigation seem to be accepted for getting the intended data. For the sake of ensuring clarity and then response effectiveness, the researcher himself administered the questionnaire. The rate of return of the questionnaire was 95.1% (214 out of 225) which is regarded as high for a descriptive survey study of this kind.

***Semi Structured Interview:*** was conducted just to have additional and supplemental data from the selected preparatory school teachers and students. The interview session mainly focused on exploring the view and opinion of respondents about preparatory school science students' teaching-learning methodological preferences, nature of participation, motivation, and commitment in relation to their academic endeavors and then achievements. The data from interview was helpful to strengthen the discussion part of the study. Seven items were used to guide the interview sessions.

***Document Analysis:*** was employed in looking into the average preparatory school academic scores of sample students, which measure the dependent variable of the study, over the three semesters (Grade 11 first and second semesters; Grade 12 first semester). In order to protect artificiality and/or carelessness of students towards test performance, the article preferred to use their official academic scores rather than prepare examinations peculiar to the purposes of this study.

### **Data Analysis Techniques**

One sample t-test was applied to see the current status of students' academic achievement, independent and group learning method preferences, motivation, commitment, and participation in learning. Independent samples t-test was employed to examine the significance level of mean differences of the variables of the study as per public and private preparatory school science students. For the sake of controlling the expected variations in academic achievement scores between the public and private preparatory schools, students' academic scores were changed into standard scores. Multiple regressions were used to see the contributions of the independent variables (independent and group learning method preferences, motivation, commitment, and participation) to the dependent variable (academic achievement). The level of significance was set at 0.05.



## Results

Examining the current status of the variables under investigation is one of the purposes of this study. The mean scores observed at a glance (Table 1) indicated that, except for the academic achievement and group learning methods, all the observed scores of public preparatory school science students are below the expected mean of the population (3.00) as calculated from the five-scaled questionnaire.

Table 1

*Descriptive Statistics and One-Sample t-test Values for Public Preparatory School Science Students' (N = 112) Academic Achievement (SAA), Motivation (SM), Commitment (SC), Participation (SP), Independent Learning Method (ILM), and Group Learning Method (GLM)*

Sources of Variation	Expected Mean	Observed Mean	S.D	t-observed	P-Value
SAA	50.00	56.38	4.41	8.83	0.00
SM	3.00	2.08	1.82	2.29	0.00
SC	3.00	2.14	0.89	3.88	0.00
SP	3.00	2.98	1.16	0.11	0.07
ILM	3.00	2.46	1.67	3.43	0.00
GLM	3.00	3.10	1.22	4.42	0.01

In order to check whether these observed mean scores are significantly different from the expected standard, one sample t-test was calculated. As Table 1 shows, public school science students' group learning methodology preferences and academic achievement were relatively above the expected average. Public school students' motivation, commitment, and independent learning method preferences could be taken as weak (see Table1). Unlike the other variables, Table 1 depicts that students' participation in learning seemed at average level.

Table 2 also indicates that private preparatory school science students' academic achievement and group learning methods were exhibited relatively above the expected standard (Table 2) though students' motivation, commitment, and independent learning were not as expected. Students' participation did not have significant differences; it was rather at average level.

Table 2

*Descriptive Statistics and One-Sample t-test Values for Private Preparatory School Science Students' (N = 102) Academic Achievement (SAA), Motivation (SM), Commitment (SC), Participation (SP), Independent Learning Method (ILM), and Group Learning Method GLM)*

Sources of Variation	Expected Mean	Observed Mean	S.D	t-observed	P-Value
SAA	50.00	62.84	3.82	11.42	0.00
SM	3.00	2.89	1.97	1.08	0.00
SC	3.00	2.90	0.64	0.87	0.02
SP	3.00	2.96	1.36	0.73	0.08
ILM	3.00	2.88	0.87	3.42	0.01
GLM	3.00	3.04	1.02	0.45	0.02

Regarding the relationships among variables, there were high and moderate relationships among most of the variables although the correlation results (e.g. between participation and academic achievement, independent learning and group learning method, etc) seem to be weak (see Table 3). From the relationship statistics observed in Table 3, it is possible to formulate the regression analysis and then to see the contributions of the independent variables to the dependent variable.

Table 3

*Correlation Coefficient Results among Students' (N = 214) Academic Achievement (SAA), Motivation (SM), Commitment (SC), Participation (SP), Group Learning Methods (GLM), and Independent Learning Methods (ILM)*

Variables	SAA	SM	SC	SP	GLM	ILM
SAA	1					
SM	0.48*	1				
SC	0.78*	0.68*	1			
SP	0.12	0.73*	0.38	1		
GLM	0.15	0.18	0.16	0.54*	1	
ILM	0.69*	0.72*	0.77*	0.15	0.13	1

Analyzing the contributions of the identified independent variables to students' academic achievement is another purpose of this study. To this end, Table 4 reveals that results of the unique proportion of variance explained by students' motivation, commitment, and independent learning methods in their academic achievement were 11 %,  $F(1, 209) = 7.14$ ,  $P < 0.05$ , 14%,  $F(1, 209) = 9.12$ ,  $P < 0.05$ , and 13%,  $F(1, 209) = 8.27$ , respectively. Participation in learning and

group learning method preferences alone could not make unique contribution to students' academic achievement though the unique proportion of variance explained by the multiple contributions of the five independent variables is 39%,  $F(1, 209) = 12.68$ ,  $P < 0.05$  (Table 4). In general, the regression analysis in Table 4 reveals that the contributions of the independent variables to the academic achievement was designated by students' motivation (11%), commitment (14%), independent learning method (13%), and group learning method (0%) and then their multiple contribution was 39%. This indicates that 39% of preparatory school students' academic achievement is claimed upon their motivation, commitment, independent learning method, and group learning method. The remaining 61% could be attributed to the other extraneous variables which were not the concern of this study.

Table 4

*Multiple Regression Statistics of Academic Achievement by Students' Motivation (SM), Commitment (SC), Participation (SP) Group Learning Methods (GLM), Independent Learning Methods (ILM), and Their Interaction*

Source	DF	Sum of scores	R <sup>2</sup>	F
SM	1	412.07	0.11	7.14
SC	1	367.16	0.14	9.12
SP	1	286.84	0.00	0.06
GLM	1	236.12	0.00	0.04
ILM	1	382.08	0.13	8.27
SMXSCXSPXGLMXILM	1	348.80	0.39	12.68
Regression	5	288.47		5.42
Residual	211	1996.65		
<b>Total</b>	<b>214</b>	<b>2285.12</b>		

Regarding the comparison between the two school contexts, independent t-test results (Table 5) reveal that there were significant differences in academic achievement, motivation, commitment, and independent learning method preference between public and private preparatory school science students in favor of private schools. That is to mean private preparatory school science students had better motivation, commitment, independent learning method preferences, and academic achievement than their counterparts in public preparatory schools.

Table 5

*Independent Sample t-test Results of Science Students' Academic Achievement (SA) in Standard Score, Motivation (SM), Commitment (SC), Participation (SP), Group Learning Methods (GLM), and Independent Learning Methods (ILM) between Private (N=102) and Public (N=112) Schools*

Variables	Mean		Standard Deviation		t-obtained	P-value
	Public	Private	Public	Private		
SA	0.26	0.98	4.41	3.82	6.12	0.0
SM	2.08	2.89	1.82	1.97	8.44	0.03
SC	2.14	3.90	0.89	0.64	13.68	0.00
SP	2.98	2.96	1.16	1.36	1.49	0.89
GLM	3.10	3.04	1.67	0.87	1.20	1.02
ILM	2.46	2.88	1.22	1.02	12.64	0.00

However, there was no statistically significant variation in science students' participation and group learning method preferences as a result of the nature of school context (private or public) (Table 5).

## DISCUSSION

As one sample t-test analyses indicate (Tables 1 and 2), public and private school science students' academic achievement and group learning method preferences were above the expected level though participation was just around the average. Both private and public-school students' independent learning method preferences, motivation, and commitment, on the other hand, were found below the expected level of performance (see Tables 1 and 2). Under normal circumstances, however, it is expected that the types of teaching learning methods that students preferred and motivation in learning serve as a platform for commitment and participation, and then they together work for better academic achievement (Aggarawal, 1994; Dobbie & Fryer, 2011; Hermann, 2013; Rocca, 2010; Ryan & Deci, 2000;). Students' participation, group learning method preferences [which were less related (see Table 3) with minimal contribution (see Table 4) to students' academic achievement] and academic achievement were above the expected average (see Tables 1 and 2). This shows that there might be a kind of 'pseudo' participation and group learning method utilization which may lead to 'pseudo' academic achievement that might not have emanated from individual learners' independent learning engagement, motivation, and commitment, which are mostly initiated from within.

Otherwise, undoubtedly, genuine and focused students' participation, group learning method utilization, and academic achievement would have been highly linked to the level of their motivation and commitment (Herrmann, 2013; Rocca, 2010; Tefera, 2012) though this

study found quite the contrary. In this regard, teacher respondents (T2 and T3) reported that nowadays students' classroom participation, group learning engagement, and academic achievement might not be genuine expressions of their knowledge, skill and perception about a topic/lesson that they are expected to deal with. Teacher respondent T3 further said, "Malpractice of continuous assessments and assignment-oriented teaching learning processes seemed to inflate the glance of academic achievement. Students could have more score from group works, field assignment reports, and other forms of continuous assessment which are highly susceptible to copying." This implies that even though admittedly the academic achievement score is above the expected level, it is implausible to take it as an exhibit for students' genuine and all-rounded academic behavior. Therefore, unhealthy types of connections seem to be observed between the learning variables and students' academic achievement of the preparatory schools. However, it seems the principal option to measure and compare performances among students because more than 50% of their score is obtained from close-ended classroom examination results.

The other result of the study indicated that commitment for learning is the highest contributing factor (14%) for students' academic achievement followed by independent learning method utilization (13%) and motivation (11%) (see Table 4). That is to mean commitment is the most potent learning variable for science students' academic achievement because it has a power to translate individual motivation, interest, preferences of learning methodology, self-efficacy, etc. into the actual practices (Ryan & Deci, 2000). Participation and group learning method utilization, on the other hand, have not brought forth any input to science learners' academic achievement (Table 4). Regarding this, in his interview response, T3 explained, "The essence of participation and group learning engagement in our classroom is more linked to assertiveness for presenting something in front of others than taking into account the lesson context and its delivery as well as the relevance, reliability and validity of the speech for a curricular topic".

Similarly, respondents S2, S3 and T1 said that most of the students perceive classroom participation and group learning as mere exercising, talking and forwarding any kind and level of ideas in the classroom regardless of the cogency and perfection of the contents that students verbalize. If such kinds of learning approaches are tolerated, though it is minimally fruitful for learning all types of contents, it is seriously problematic specially to learn science contents which are dominated with scientifically measured rules/principles and procedures. In support of this, Harlen (2006) stated that teaching and learning in science needs to be strictly focused, in-depth, self-devoted, committed, and hard worked because most of the contents in science need to have all detailed procedures and steps in mind. If this is not the case, science students fail to achieve better in their schooling (Driver, 1989; Ogunmade, 2005).

Therefore, the findings of this study seem to appear justifiable for the reason that science, in its very nature, is learnt better by committed, motivated and individually devoted learners than by groups or whole classes that merely participate. This result is supported by authors like Lawson (1995), Tytler (2002) and Harlen (2006). They reported that individual learners' strong personal engagements and critical observations of the physical environment around are

mentioned as important elements of science learning. In general terms, independent learning methods seem to be more relevant to learn the science contents than group learning methods. Unlike in the social science, learning with independence and in-depth curiosity about the surrounding natural environment is crucially suggested in science contents (Marshall, 2012; Tytler, 2002).

The most contributing variables (motivation, commitment, and independent learning) for academic achievement (see Table 4) have something in common. In this regard, Skinner and Belmont (1993) and Tuana et. al. (2009) noted that commitment, motivation and independent learning often are internal triggers to think and practice more than those imposed by external influences/pressures (e.g. peers, teachers, etc); hence, they seldom become contrived. In support of this, in order to hunt specific and precise facts and procedures found in natural science contents, being pressurized by learners' internal force is more important (Lawson, 1995) than the external force pressures. Participation and group learning, least contributing variables for academic achievement (see Table 4), however, are initiated more from an external (e.g. teachers and peers) set-off to participate or demonstrate though sometimes they are initiated from an internal set-off (Aggarwal, 1994; Barrow & Woods, 2006). Therefore, due to the pressure from teachers, peers, parents and the lesson, participation and group learning might occur just for the sake of abiding to those external pressures alone rather than being always genuine and an extension of the internal and tangible concern of the learner. This might be the reason why participation and group learning methods were with zero independent contribution to academic achievement.

With regard to private and public preparatory school comparisons, the study found that academic achievement was significantly greater in private owned school science students than their counterparts in public schools. This result appears plausible because private schools basically aim to be proficient in enhancing students' academic achievement so as to attract more customers (Frenette and Chanw, 2015; Amera Seifu, 2008). As a matter of this fact, they are relatively more of academic-oriented than involving on side issues and extra-curricular activities (Dronkers & Robert, 2013). On top of this, the teaching learning process in private schools is practiced with effective, efficient and less bureaucratic decision making processes (Amera, 2008) although its fairness in staff treatment might be sometimes questionable (Newhouse & Beegle, 2005; Rammalla, 2009).

Supporting this claim, interview respondents (T1, T3, S3 and S4) reported that private schools, in order to do well in the market, have to work extensively on the academic matters that will have direct positive influence on students' academic achievement. For example, T3 and S4, who were working in private schools and had been in public schools before, said that private schools are engaged in offering tutorial sessions, mock-exam type assignments, and delivering tests continuously more than public schools. Respondents S1, T2 and S3 also reported that in comparison to the public-school scenario, private school teachers and managers are strict, punctual, committed and professional all of which contribute a lot for the betterment of students' motivation, commitment, and academic achievement. "In general, private schools are committed

to an approach which drives students towards academic challenge and hard working. In addition, the teachers, for the sake of their survival, have to work on ensuring higher academic achievement of students which is not much of a concern in public schools and their teachers” (T3).

Similarly, motivation, commitment and independent learning method were better maintained in private school students than in public school (Table 6). The finding is similar with previous findings (Dronker & Robert, 2013; Newhouse & Beegle, 2005). This also might be one of the reasons why private school students scored better academic achievement in comparison to those of the public schools. That is to say motivation, commitment and independent learning methods, which are more of internally triggered (Connell & Wellborn, 1991; Delong, 2009; Ryan & Deci, 2000), seem to be better opportunities for academic endeavor. As it is explained by the interview respondents, private schools also seem to have better educational inputs such as teachers’ strictness and commitment, efficient and prompt management, and parents’ involvedness (Dronker & Robert, 2013) that have a capacity to knock on students’ mind landscape from within (Aggrawal, 1994; Skinner & Belmont, 1993). Because the management in private schools is a bit definite and customer satisfaction oriented (Amera, 2008; Frenette & Chanw, 2015), the school community in general and teachers in particular strive to get students being involved in more academically demanding situations. This in turn stipulates students’ motivation, commitment and independent learning engagements for ensuring better learning engagements (Driver, 1989; Skinner & Belmont, 1993), which can be taken as a pedestal for better academic achievement.

Students’ participation level and group learning methods, on the other hand, were not significantly varied between the two school contexts (private and public). This shows that students’ participation and group learning may not be grounded on their involvement in dealing with challenges and hard work as well as on their motivation and commitment towards learning. They might rather be initiated by interactions with teachers and peers. As interview respondents (T2, T3 & S2) said, interactions through group learning participation might be of any nature and quality which might have weak connection to students’ academic achievement. This argument seems in line with the works of Girum (2010) and Tefera (2012). These scholars roughly contended that teachers and students reckoned participation in a group as well as whole class discussion as the major goal of schooling because they feel satisfied just by raising their hands, saying or demonstrating something without considering whether or not their participation is in the right academic track. Such kinds of participation might be the result of their non-scholastic external environment of students, which seldom is related with the classroom discussion. That is why these two variables (participation level and group learning methods): (i) failed to contribute something for science students’ academic achievement (see Table 4) and (ii) did not indicate variations between private and public owned schools though private school students were better in their academic achievements (see Table 5).

Having the above discussions in mind, the following findings were identified and summarized.

1. Science students' independent learning method preferences, motivation and commitment in general were significantly below the expected average. In both of the public (Table 1) and private (Table 2) preparatory school contexts, 'Group learning methodology preferences' and academic achievement, on the other hand, were above the expected one; 'participation' was at average.
2. All the variables of the study were strongly and moderately correlating except the weak correlations found between academic achievement and participation, and academic achievement and group learning method preferences. This study, moreover, indicated that 39% of students' academic achievement can be attributed to independent learning method preferences, group learning method preferences, motivation, commitment, and participation with a sole contribution of independent learning methods (13%), motivation (11%), commitment (14%), group learning methods (0%), and participation (0%).
3. Private preparatory school science students were found better in their independent learning method preferences, motivation, commitment and academic achievement in learning than their counterparts in public preparatory schools. But, students in the two school contexts did not have differences in participation and group learning method preferences.

## CONCLUSIONS AND IMPLICATIONS

Private and public preparatory school science students were in a position to score above average in their academic achievement (Tables 1 and 2) though (as interview data showed) these scores seemed to be doubtful to represent their real academic behavior. In fact, though it seems weak to define students' behavior as a whole, academic achievement is the main option to compare performances among students. The other possible hints are that the real grounds of academic achievement (e.g. independent learning, motivation, and commitment) were below the expected average (Tables 1 and 2) though they were positively and persistently contributing to students' academic achievement (Table 4). This study, therefore, seemed to entertain a sort of non-complementary findings. Unlike group learning and participation, independent learning, motivation, and commitment might be exercised at minimal level but with genuine attempts which may reasonably work for students' academic achievement. However, 'participation' and 'group learning method utilizations', which were not in their real sense of focus towards the contents under the teaching learning processes (as interview responses indicated), were not as such supportive to have better academic achievement though they seemed above average in their status (Tables 1 and 2). This shows that these two variables (participation and group learning methods) may not play a role that facilitates science contents learning motivation, commitment and academic achievement, rather they might happen just for the sake of formality. That is why these variables did not show statistically significant variations between the two school contexts (see Table 5) even though academic achievement, motivation, commitment, and independent learning methods were exhibited better in private schools.

Based on the aforementioned findings and conclusions, the following implications were forwarded.



- Preparatory school science teachers and students have to work hard to achieve the real senses of participation in learning and group learning methods implementations more than taking them as issues of formality by speaking and demonstrating anything irrelevant (or minimally relevant) to the respective content/topic of learning. If they do in such a way, it is an opportunity to enhance students' effective learning over the planned curricula and then to exhibit a better and genuine academic achievement in their schooling. Therefore, teachers should not allow students to have mere participation and group discussion. Rather, their participation and discussion should relate with and revolve around the contents under presentation.
- Preparatory school science teachers should be devoted for promoting students' independent learning methods, motivation and commitment by exposing students to more useful, relevant, challenging and demanding learning conditions. School teachers can realize this fact through designing and implementing relatively demanding learning tasks as well via selecting inquisitive type of teaching learning methods. Such types of lesson deliveries encourage students to invest high mental energy for their learning. This naturally will help to increase students' motivation, commitment and independent devotion, thereby boosting their academic achievement.
- Like that of the private schools, as reported in the interview results, public school teachers and management have to be effective and academic performance-oriented by giving fast, relevant and continuous decisions, follow-ups and supports so as to enhance teachers' teaching and students' learning practices, thereby improving students' academic achievement. Among other attempts, teachers may realize this fact by following whether or not students' learning experiences (assignments, class works, classroom discussions, tests, etc) are accomplished properly and on time.
- By implementing the above suggested alternatives, it could be possible to initiate learning methodology preferences, motivation, commitment, participation and academic achievement among preparatory school science students towards the right direction and expected standards rather than to perform less-focused types of group learning methods and participation.

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