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Music Teachers' Perceptions

Rhythmics in Music Education

Highlights

Secondary School Level

Students Affirmative Action

Discovering Thoughts, Inventing Future

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Finnish Music Teachers' Perceptions of Rhythmics in Music Education

By Laura Helistekangas, Kaarina Määttä & Satu Uusiautti
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Abstract- The purpose of this study was to analyze music teachers' perceptions of rhythmics and how they use it in music education. They were asked to discuss how they perceive the value of rhythmics and its challenges. Research participants consisted of ten Finnish music teachers who participated in continuing education about rhythmics. They were interviewed and the data were analyzed with the qualitative content analyzing method. The research results showed that teachers found rhythmics a new and challenging area of music education. They had insufficient knowledge of the pedagogical foundation and concepts of rhythmics, even though they had adopted some rhythmics methods in their teaching. According to the findings, teachers were (1) appreciative and enthusiastic, (2) doubtful, or (3) positive but uncertain about using rhythmics. The biggest challenge was the lack of continuing education that would help them learn and employ the contents and methods of rhythmics better in their teaching. Other challenges included difficulties in realizing teaching due to tight teaching premises, students' heterogeneity, scarce time allocation for music teaching, and lack of usable teaching materials. The study contributes ideas and means to develop music education with rhythmics in Finland.

Keywords: *dalcroze rhythmics, orff pedagogy, rhythmics, rhythm education, music education.*

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Finnish Music Teachers' Perceptions of Rhythmics in Music Education

Laura Helistekangas [α], Kaarina Määttä [σ] & Satu Uusiautti [ρ]

Abstract- The purpose of this study was to analyze music teachers' perceptions of rhythmics and how they use it in music education. They were asked to discuss how they perceive the value of rhythmics and its challenges. Research participants consisted of ten Finnish music teachers who participated in continuing education about rhythmics. They were interviewed and the data were analyzed with the qualitative content analyzing method. The research results showed that teachers found rhythmics a new and challenging area of music education. They had insufficient knowledge of the pedagogical foundation and concepts of rhythmics, even though they had adopted some rhythmics methods in their teaching. According to the findings, teachers were (1) appreciative and enthusiastic, (2) doubtful, or (3) positive but uncertain about using rhythmics. The biggest challenge was the lack of continuing education that would help them learn and employ the contents and methods of rhythmics better in their teaching. Other challenges included difficulties in realizing teaching due to tight teaching premises, students' heterogeneity, scarce time allocation for music teaching, and lack of usable teaching materials. The study contributes ideas and means to develop music education with rhythmics in Finland.

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I. Introduction

Music education with rhythmics includes familiar elements of training, playing, singing, rhyming, and body movements (Desain & Honing, 1999; Longuet-Higgins & Lee, 1982), but the way they are taught and trained is new and different in the Finnish music education (Anttila, 2004; Mäkinen, 2012). This notion was made by the author of this article, Laura Helistekangas, when she wrote her researcher's diary while participating music teachers' continuing education. This training period led to the decision to do this research: the purpose was to find out what rhythmics can offer to music education and learning according to experienced music teachers' perceptions.

Rhythmics renews music education by adding body movement in music learning. According to Marcus (2012), rhythmics can help create a joyful atmosphere in the music class and an enthusiastic attitude to learning. Even those students who think they are not skilled in music obtain experiences of success. Rhythmics can prove true the saying "everyone is a musician" (Marcus, 2012).

Traditionally, the emphasis of music education has been on the distribution of musical skills and knowledge (Deutsch, 2009). The current music education is, indeed, changing from the instrument-focused teaching toward holistic student development music-wise (Anttila, 2004; Regelski, 2005). It means that music education pursues developing a student as a holistic human being with all his or her previous knowledge, skills, and experiences in his or her own life situation and social environment including all values and objectives (Cooper, 2009; Elliott, 1995).

Old music educational theories and practices need new approaches and applications that would maintain the position of music education in schools. Rhythmics as an independent school subject and a pedagogical approach is still relatively new in the field of music education. Yet, it has become more familiar after the emergence of new learning materials and continuing education. Scientific research on rhythmics is still relatively scarce (Fraisse, 1982; Jorgensen, 2003).

II. Theoretical Background

Rhythm is the backbone of music. Music flows in time and rhythm is the element that organizes time; sounds are constructed and become live through the rhythm (Ahonen, 2004; Bowman, 2002). The ability to recognize and combine basic and special rhythms is the prerequisite of interpreting reading, and writing live rhythms (Meyer & Cooper, 1960).

Rhythmics is a multidimensional concept that describes a human being's musical action and expression through body, movements, and sounds. Rhythmics is located between movement, singing, and playing, and wherever needed, it can strengthen a part in teaching. The basic idea in rhythmics teaching is rhythm and how it is experienced with one's own body (Gouyon & Dixon, 2005; Stubley, 1998).

Rhythmics exercises prepare students musical skills and develop the so-called communal sense of rhythmics that is the foundation of all playing, moving, and perception. The sense of rhythm covers the ability to time the length and timeliness of movement and the ability to perceive the changes in the speed of movement. The sense of rhythm includes the perception

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of the actual rhythm and the ability to maintain the rhythm. This is especially important when playing together with others (Phillips-Silver, Aktipis, & Bryant, 2010).

The basic elements of rhythmics exercises are musical PE and dancing, body rhythms, songs, rhymes, and playing with small rhythmic instruments. Rhythmics supports the development of basic sense of rhythm, for example, by training beat, word and melody rhythms, tempo, ostinations or similar rhythms or melody themes, and combinations of rhythms. A holistic approach is central in rhythmics; all senses are used for the versatile rhythmic perception. In rhythmics, the body experiences the connection between music and movement-rhythm. Rhythmics provides every human being with an opportunity to make music, experience music comprehensively, and experiences of success. The objective is support a child's holistic development and his or her self-expression skills and self-esteem (Swanwick, 2002; Thackray, 1969).

Teaching proceeds from smaller entities toward larger ones mainly through imitating, experimenting, and discovery. The main emphasis in rhythmics classes is to combine movement and music. It is based on the idea that music belongs to everyone and each student participates in the musical event with his or her own abilities. This is how the student's own active role and interaction with others become fulfilled (Chen, Penhune, & Zatoree, 2008; Haines, 2003).

In rhythmics, music and exercise support each other (Styns, van Noorden, Moelants, & Leman, 2007). Their combination is natural because music and exercising have many elements in common, such as beat, rhythm, tempo, harmony, and the variation between intensity and tempo. Music when combined with movement makes people function holistically, in other words, physically, mentally, and emotionally. Movement, rhythm, and music are channels that people as moving instruments can use as instruments to bring out their creativity (Dumas, Laroche, & Lehmann, 2014; Juntunen 2004; Thomas & Moon, 1976).

Music pedagogue and composer Émile Jaques-Dalcroze (1865–1950) is considered as the pioneer of rhythmics, in the beginning of the 20th century. His footsteps were followed by German music pedagogue and composer Carl Orff (1895–1982). They noticed how children were interested in the holistic expression and used this notion in the methods they created (Johnson, 1993; Mead, 1986; Zachopoulou, Derri, Chatzopoulos, & Ellinoudis, 2013).

Dalcroze pedagogy is a music education approach that is based on Jaques-Dalcroze's educational ideas of combining music and body movement in music teaching. The teaching process covers three contents: rhythmics, melody, and improvising (Juntunen, 2004).

Orff pedagogy is also comprehensive, student-centered music education (Frazee & Kreuter, 1987; Goodkin, 2001; Orff & Walter, 1963; Wheeler, Raebeck, Orff, & Kodály, 1977). It is based on an interactional teaching process that includes the elements of listening, movement, speech, singing, and playing. In the Orff teaching process, students move from experimenting to improvising and expressions, and combine music with other artistic school subjects (Bachmann & Dobbs, 1993; Goodkin, 2002; Shehan Campbell, 1991).

III. Method

In Finland, the phenomenon of rhythmics occurs as the theme in text-books and continuing training. This study focused on the question of how rhythmics appears and is experienced in music education at basic school. The purpose is to describe how music teachers evaluate the value of rhythmics, how they use it and what kinds of challenges they have faced in rhythmics teaching. The research questions set for this study are as follows:

- How to music teachers perceive the value of rhythmics in music education?
- How do music teachers use rhythmics in music education?
- What are the challenges of using rhythmics in music education according to music teachers' perceptions?

To answer these questions, a qualitative study approach was chosen (Silverman, 2006). The research participants were carefully chosen: music teachers who had completed a 5-day continuing education period in rhythmics teaching at the Open University of Lapland. Ten teachers (aged 33–47 years, men and women) were recruited in the study. They all had graduated from class teacher education and five of them were also qualified subject teachers. They worked as teachers in grades 1 to 9 and had been teaching music through their whole teacher's careers (9–22 years).

The data were collected through qualitative theme interview method (Rubin & Rubin, 1995). The interview questions followed the research questions and comprised the following themes: perceptions of rhythm and rhythmics, continuing training in rhythmics, rhythmics in music education, the value of rhythmics, and hopes, needs, and developmental ideas regarding rhythmics teaching.

The data analysis method was qualitative content analysis (Mayring, 2000). The analysis started by transcribing the interviews followed by reduction. The data were divided within the themes of analysis by finding suitable data excerpts to each category. These excerpts were further analyzed in the light of the research questions.

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In the second phase of the analysis, the data excerpts were grouped based on their similarities and differences. These sets of data were analyzed one by one in order to find those themes that repeatedly emerged in the data and that were common to many interviewees. Then, the data were grouped into themes that represented the essential contents for each research question.

The final phase of analysis was abstracting, aiming at creating a clear picture of the data and form reliable and comprehensive results, conclusions, and discussion. Main and sub themes were used for describing teachers' perceptions of rhythmics and rhythmics teaching in music education.

IV. Results

a) The Value and Implementation of Rhythmics

When analyzing teachers' appreciation of rhythmics, it seemed evident that their values reflected on their ways of implementing rhythmics in their practical teaching. The teachers could be divided into three groups based on their appreciation of rhythmics: appreciative and enthusiastic attitude (N=4), doubtful attitude (N=2), and positive but uncertain attitude (N=4).

The first group (appreciative and enthusiastic) saw a clear need for rhythmics in education. These teachers surfaced how rhythmics can help perceiving and expressing a rhythm, and how movement is an essential element in rhythmics teaching:

And I think it is a good thing that we have started to put emphasis on it, because at least I have understood and noticed along these years that finding the basic beat can already be pretty difficult. - - I do not know whether this need has been met by making literature and training to help teachers to find the rhythm. I mean what it is and what you could do or how to develop the discovery or sense of rhythmics. That is one important point. We should remember that, in my opinion, all pretty much starts from rhythm in music. (2)

Appreciative and enthusiastic teachers considered group playing important and pointed out that rhythmics allows everyone to participate in training without waiting their turn. In teaching situations, these teachers had noticed the positive influence of rhythmics as even those students who had not perceived themselves skillful in music had participated in rhythmics training instead of just standing by. Teachers emphasized that rhythmics increased students' motivation in music learning, developed their courage and social skills as well as their sense of togetherness:

But when you do these exercises together, it includes this social aspect, you know, the social way of doing together. (2)

Appreciative and enthusiastic teachers considered rhythmics as an important part of their teaching and wanted to employ it even more. They used rhythmics in almost all of their music lessons, and they used more varied methods and areas of rhythmics in their teaching than other teachers did. These teachers considered it rewarding as they made students to realize and learn how to use their body for producing rhythm.

Teachers who were doubtful about rhythmics did not appreciate rhythmics as a whole but used it to some extent in their teaching. Rhythmics was considered a pretentious and complicated teaching method, nor did they perceive it essential for children's musical development. These teachers described rhythmics merely as trickery and warming up, not real music making. According to the doubtful teachers, rhythmics exercises would be more suitable to PE classes than music education.

The teachers who had a positive, yet uncertain attitude to rhythmics understood that rhythmics would have benefits in music teaching but found it difficult to bring it in practice. They thought that they did not have sufficient skills for rhythmics teaching and described their teaching limited. Physical exercises were seen troublesome and, therefore, movement as the elements of rhythmics had smaller role than playing and singing in their teaching. The positive attitude was manifested by the teachers' understanding about how rhythmics helps students perceive rhythm and play instruments. In addition, they appreciated the possibility of having all student participate, listening to others, and doing together. According to the teachers, rhythmics exercises made teaching more versatile, pleased students, and prepared them to learn even surprisingly difficult contents of education.

b) The Challenges of Using Rhythmics in Teaching

The teachers brought out problems and challenges of rhythmics teaching. These could be divided into three main categories that were the need for continuing education, poor usability of teaching material, and difficulties in realizing teaching.

First of all, the teachers emphasized that they had an on-going need for continuing education. Only training would provide them with sufficient skills to use the new learning contents and teaching methods of rhythmics as a part of their teaching:

It is a fact, like I said, that in my opinion, we need really a lot of continuing education. These are themes that they are difficult to learn from some books or find elsewhere alongside work; instead you should learn by doing. The training should include doing not reading. (6)

Continuing education should be not only long term but repeating as well. A five-day-long continuing education period that the teachers had completed earlier, had not been long enough to comprehensively internalize the idea of rhythmics according to most of the teachers. For example, the concepts of rhythmics

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and the pedagogical thinking had remained unclear. Further training was called for.

In my opinion, this conceptual jungle is horrible. (2)

Teachers had also found it challenging to employ learning and teaching materials of rhythmics in practice as well as to acquire necessary equipment and resources:

Well, the first thing is always that you would have the resources, that you would have the equipment. And, of course, some old [equipment] always breaks down and you need new ones to replace it and so on. (1)

Rhythmics exercises in text-books and especially using body rhythmics and movements in teaching require plenty of studying and training beforehand from teachers. Text-books usually include small, separate areas of rhythmics from which it is difficult to build teachable entities.

When you look at it, you become overwhelmed; oh dear how laborious this is, how can start constructing it. So, maybe you leave it. There is usable material but it requires a lot from yourself. (6)

At least, my experience is that when I choose these [exercises] *I really have to read it carefully and familiarize with it well, and try it by myself several time to get the feeling that this is how it goes.* (8)

The implementation of teaching was challenged by uncomfortable teaching premises, too large and heterogeneous student groups, and lack of time allocated for teaching. The teachers reminded that music is a school subject in which students vary greatly by their skills and preparedness, and in a large group, the teacher has only limited opportunity to provide individual support for students:

The biggest challenge is probably the size of the group. (7)

And when you have these challenging students and really skillful students, you think of how to offer something new to these skillful ones and how to get these weaker students learn so that they would find it even a little bit easier. And on the other hand, those ones who are the ordinary students, you should have time to pay attention to them too. (5)

Teachers who had a positive attitude to rhythmics wished that the Finnish music education would have one hour more teaching per week because, according to their perception, the current time allocation for music education was too limited for including wider use of rhythmics in teaching.

V. Conclusions

The future of rhythmics depends of teachers' current perceptions, practical teaching, and challenges they face. The study showed how teachers experienced rhythmics as a new and challenging area of music education in many ways. However, eight of ten teachers who participated in this study had positive attitudes to it. They wanted to develop their expertise and teaching methods, and they showed interest in rhythmics.

Lack of suitable continuing education was perceived a great challenge hindering the implementation of rhythmics teaching. Teachers considered rhythmics a wide and complicated teaching content that they had find laborious to adopt. Even if the number of teaching materials is increasing, the teachers had found it difficult to take rhythmics as a part of their practical teaching as they did not have sufficient practical experience of it. This can be acquired only by participating in continuing training (Hargreaves, Purves, Welsch, & Marshall, 2007). On the other hand, one can ask whether Finnish teachers lack courage to indulge in rhythmics and bodily expression (see Seppä, 2012; cf., Weikart, Schweinhart, & Larner, 1987)?

The study showed that the development and enrichment of music education with rhythmics necessitates the development of continuing education. Teacher education and continuing education should be combined in a way that they form a harmonious entity and a channel to develop teachers' expertise and their familiarity with new teaching methods and contents (Haack & Smith, 2000). Teachers called for more education in their region. This would cut the costs of and make it easier to participate in continuing education.

VI. Discussion

When evaluating the reliability of the study, one can ask whether the teachers' perceptions of rhythmics were somehow biased (e.g., Creswell, 2009). They had participated in the continuing training, which meant that they had been willing to learn about the method and supposedly had a more positive attitude toward it than teachers who have not taken such training. On the other hand, for the purposes of this study, it was important to find research participants who had hands-on experiences of using rhythmics in music education. Therefore, the recruitment of these participants who had been music teachers for years and who had completed relevant continuing education would have the necessary understanding of the theme under investigation. Their interviews would likely produce multidimensional information and perceptions of rhythmics, which appeared to be true when analyzing the rich data obtained with the interviews. The data were profound and rich and provided widely information about the positive and negative experiences as well as challenges faced by the teachers.

Rhythmics provides new ways of realizing teaching in the field of music education which would benefit the Finnish music education. It presents quite a comprehensive approach to teaching. In addition, it offers opportunities of varied music making allowing

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students with different abilities to participate and contribute (see also Westerlund, 2010). Actually, rhythmics teaches more than music (Frith, 2008), and it influences development and growth in a multi-sensory manner. Rhythmics develops students' body sensation, motor coordination, balance, motivation, memory, listening, and concentration, as well as creativity and improvising skills (Patel, 2006). Due to the aforementioned, rhythmics can be seen a valuable approach especially in early childhood education and elementary education when children's linguistic and motor skills, and perception skills are still developing (Smoll, 1974; Zachopoulou, Tsapakidou, & Derri, 2004).

Rhythmics provides new approaches to perceived teacherhood, too. Teachers do not have to be professional musicians and play all instruments perfectly in order to be music teachers (Small, 2011). Using rhythmics in teaching suggests that teachers dare to use their personality and imagination in teaching. Namely, rhythmics requires most of all the ability to indulge in the process of musical development, to free one's creativity, and support the development of students' creativity (Shehan Campbell, 1991; Sims, 1985). Teachers can use rhythmics to challenge students to work together, participate, and interact.

The current and future challenge of rhythmics teaching and learning materials is to employ information and communication technologies in teaching. Rhythmics provides a means to nourish musical inventions, composition, and other creative production. Rhythmics education could be realized with the modern teaching technologies, such as tablets and music software (Grahn & Brett, 2007).

The purpose of music education is to strengthen students' positive relationship with music and lay foundation to life-long music hobbies (The National Core Curriculum for Basic Education, 2014). According to Dutica (2014), rhythmics approached have been acknowledged as one of the most attractive and efficient method of musical education. In addition to this, a central goal of rhythmics is to maintain every human being's creative musicality from early childhood to older age. Rhythmics in music education provides one way of supporting the comprehensive development, but—as the findings of this study imply—more practice-oriented research and development of teaching methods is still needed.

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The Impact of Pre-Task Planning on the Oral Production of Saudi EFL Learners

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Abstract- The motive of this paper was to examine the impact of pre-task planning on Saudi EFL learners and to find out how planning could influence their accuracy and fluency. The study also intended to investigate the different outcomes from guided and unguided planning. For this purpose, thirty-six Saudi EFL learners took part in this study. They have participated in Picture-Cued Storytelling Task PCST. The findings of the study revealed that guided planning made a minor influence on Saudi EFL learners' accuracy. Fluency, on the other hand, was not affected positively by neither guided nor unguided planning.

Keywords: *EFL, planning, SL.*

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The Impact of Pre-Task Planning on the Oral Production of Saudi EFL Learners

Sami M. Alanazi

Abstract- The motive of this paper was to examine the impact of pre-task planning on Saudi EFL learners and to find out how planning could influence their accuracy and fluency. The study also intended to investigate the different outcomes from guided and unguided planning. For this purpose, thirty-six Saudi EFL learners took part in this study. They have participated in Picture-Cued Storytelling Task PCST. The findings of the study revealed that guided planning made a minor influence on Saudi EFL learners' accuracy. Fluency, on the other hand, was not affected positively by neither guided nor unguided planning.

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I. Introduction

One of the processes in SLA that has received much emphasis in the recent decades is task planning (Ochs, 1979; Crookes, 1989; Wigglesworth, 1997; Foster and Skehan, 1999; Yuan and Ellis, 2003; Ellis and Yuan, 2004; Tavakoli and Skehan, 2005; Kawauchi, 2005). It is clear through results of majority of these studies that there are certain evident impacts of planning on task performance of language learners with regard to fluency and complexity (Foster and Skehan 1996; Mehnert, 1998; Foster and Skehan, 1999; Ortega, 1999; Ellis and Yuan, 2004; Kawauchi, 2005).

There has been a considerable amount of attention on planning, and it has been indicated that it leads to relatively uniform impacts on L2 production (Ellis, 2005). Learners who employ planning prior to engaging with a task are believed to develop more complex and fluent language performance (Foster &Skehan, 1996; Ellis, 2005). Consequently, in the field of applied linguistics; fluency, accuracy, and complexity have become the key research variables (Ghavamniaet. al, 2012). These three features of linguistic performance have been differentiated by Skehan (1996), whereby fluency is regarding the capability of the learner to develop language in real-time without any unnecessary hesitation or pausing. Complexity denotes the elaborate of the produced language (Skehan, 1996).

The impact of planning on oral narratives performance of L2 learners has been analysed in several studies (Foster and Skehan, 1996; Ortega, 1999; Skehan and Foster, 1997, 1999; Yuan and Ellis, 2003). It was found through these studies that there was considerable increase in complexity and fluency when learners were given the option to plan out a narrative prior to speaking it. There are interactions between planning conditions and the type of task, for example, the impact of planning was more for Narrative and Decision-Making tasks (Foster and Skehan, 1996). Ellis (2005) stated that there are two segments of planning time: pre-task and within-task planning time. This paper is focused on pre-task planning which is planning that takes place prior to the actual performance of the task (Ellis, 2005).

Further sub-types of planned are guided and unguided task planning. Learners are left with their own approach for planning in unguided planning, whereas in guided planning, they are advised about what and how to plan (Ellis, 2005).

II. Background

In pre-task planning, learners prepare propositional material and distinct segments of language so as to encode it (Ghavamnia et. al, 2013). It investigates how production is impacted through planning before actual performance. Pre-task planned is categorised into two segments, rehearsal and strategic planning (Ellis, 2005).

It is indicated through studies by Crookes (1989), Foster and Skehan (1996), Skehan and Foster (1997), Wendel (1997) and Mehnert (1998) that fluency increases through pre-task planning. Moreover, suggests that complexity is positively impacted by pre-task planning, and that planners develop a more complex language than non-planners (Wendel, 1997; Yuan and Ellis, 2003; Ellis, 2004). By the same token, Wigglesworth (1997) stated that even a single minute of planning time for a difficult task increased the language complexity in high proficient learners.

a) Strategic Planning

Strategic planning is the preparation of students regarding the content and how that content is presented for the task. It involves preparation of learners for performance of the task by working on the content that they require to encode and how they will present this content. It also involves presenting the learners with the actual task materials the planning process (Ellis, 20005). There have been numerous studies on strategic planning which indicate that all three aspects of students' language performance (accuracy, fluency, and

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complexity) are influenced through strategic planning (Foster, 1996; Foster and Skehan, 1996, 1997; Wnedel, 1997; Ortega, 1999; Ellis 2005; Wang, 2008) among others.

Fluency and complexity are positively impacted by strategic planning, but with regard to accuracy, there are mixed findings (Salimi and Fatollahnejad, 2012). Accuracy did not seem to have been influenced through strategic planning (Yuan and Ellis, 2003). Foster and Skehan (1996) presented that the impact of planning on accuracy was influenced through the type of task. When decision-making task is considered, planned learners have more accuracy than non-planned learners, whereas in case of narrative task, there was no evidence of effect of planning on accuracy (Wang, 2008).

b) Planning Time

A number of studies have analysed planning time regarding first and second language production. Researchers have analysed the impact of planning time on performance of learners (Ellis, 1987; Crookes, 1989; Mehnert, 1998) among others. There is a systematic impact on accuracy levels in accordance with the amount of planning time that a learner has (Ellis, 1987). Mehnert (1998) states that improved accuracy was observed in 1-minute planning learners, however no further improvement in accuracy was observed when more time was provided for planning (5 or 10 minutes). She analysed various time durations of planning (no time, 1, 5, and 10 minutes) and observed that with each increase in time, the fluency also improved (Mehnert, 1998). Nonetheless, Mehnert (1998) indicates that language complexity positively emerged from 10-minute planning time.

Mehnert (1998) states that one main factor which shows where the planners have to focus their attention is the duration of time. She suggests that learners focus on accuracy when they have 1 minute to plan, and when the planning time is 10 minutes, they focus on more complex language use and to exclusion of more improvement of accuracy.

As Skehan and Foster (1997) argue, learners can use the planning time in narrative task to focus more on accuracy, whereas since decision-making tasks are inherently unstructured, learners use planning time to arrange the way of presenting complex ideas, and therefore little time is left to focus on accuracy in this task. Nevertheless, there is no consensus in the literature regarding the time that should be allowed for pre-task planning. Hence this factor needs to be addressed by further research.

III. Methodology

This study was a between-subjects design with three levels of planning condition (guided pre-task planning, unguided pre-task planning, no planning). Twelve participants were randomly assigned to each groups. Data was collected by employing a Picture-Cued Storytelling Task, PCST elicited by the three planning conditions.

a) Research Question

The study addressed the following research questions:

Will guidance and planning affect Saudi EFL learners' choices of past verb forms?

b) Participants

The participated in this study were thirty-six full-time undergraduate and postgraduate Saudi students studying in the UK. They were all adults, 24 males and 12 females who had completed a one-year general English language program in the UK. For the homogeneity of the subject, the study included intermediate level participants with IELTS between 5.0 and 6.0. The participants were studying in different disciplines, and have been in the UK for at least two years.

c) Tasks

The study implemented a Picture-Cued Storytelling Tasks for data gathering. The PCST was used to test the oral narrative production of the Saudi EFL learners. The task employed a set of pictures to used as cue for the participants to build a short story about. The task targeted the past verb forms only.

d) Planning And Guidance

The the participants were put into three groups: guided-planning, unguided-planning, no-planning. The guided and unguided planning groups were given up five minutes for each task to plan their answers. The guided planning group has received an explanation about the nature of the two tasks before engaging with the tasks. During their planning time, they have received assistance from the researcher in the form of explaining the differences between the past verb forms with examples on how to use them in context. The unguided planning group has only received an explanation about the nature of the two tasks prior to starting their planning.

IV. Results

This task was audio recorded to target the oral productive knowledge of the participants and to test their ability on telling a story in English using only the past tense. Audio recordings were transcribed using NVIVO software, then manually coded using Cambridge Grammar of English (2006) as a reference. The calculated sentences were sorted into three categories: The Past Simple, The Past Progressive, and The Past Perfect before analyzed them using SPSS. One-way analysis of variance ANOVA was employed.

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a) The Past Simple Form

The analysis of variance ANOVA showed that no significant results emerged from the three groups [F (2, 33) = 1.384, p = 0.265]. However, the guided-planning group used the past simple tense in the storytelling task less than the other two groups (M = 2.08, SD = 0.669). The no-planning group used the past simple tense more frequently than the other two groups (M = 2.50, SD = 0.522), and the unguided planning group (M = 2.33, SD = 0.651).

Table 1 : The One-way ANOVA results for the past simple

Group	Mean	Std. Deviation	Sig.
Guided-planning	2.08	0.669	0.265
Unguided planning	2.50	0.522	
No-planning	2.33	0.651	

b) The Past Progressive Form

The results obtained from this category in the picture-cued storytelling task were not evenly distributed. Only eight participants of the thirty-sex produced correct forms. Therefore, and due to the unevenness in the distribution of the data, the analysis test that was used before had to been changed. One-way ANOVA can only be conducted if the data is evenly distributed, otherwise the results will be misleading. Hence, to help understand the results statistically, a nonparametric statistical test was the appropriate choice; in this case I used the Kruskal-Wallis Test. The Kruskal-Wallis Test is the equivalent to One-way ANOVA for non-normally distributed data.

Table 2 : Shows Kruskal-Wallis Test results for the past

Group	Participants		Mean Rank	Sig.
	Total	Actual		
Guided-planning	12	4	4.50	1.000
Unguided planning	12	3	4.50	
No-planning	12	1	4.50	

The Kruskal-Wallis Test showed that there was no statistically significant difference in the past progressive tense score between the three groups [$\chi^2(2) = 0.000$, p = 1.000] with a mean rank the past progressive tense score of (4.50) for each group.

c) The Past Perfect Form

The same problem emerged when analyzing the past perfect tense results. In fact, it was even more complicated than the past progressive form, because one of the groups scored zero and only four participants from the thirty-sex produced correct forms. The data was non-normally distributed, therefore, the same nonparametric test was applied, and that is Kruskal-Wallis Test.

The Kruskal-Wallis Test showed no statistically significant difference in the past perfect tense score between the three groups [$\chi^2(2) = 0.000$, p = 1.000] with a mean rank for the past perfect tense score of (2.50) for guided-planning group and unguided planning group. The no-planning group, however, scored zero. The scores analyzed in the category were obtained from only four of the participants out of the thirty-six.

Table 3 : Shows Kruskal-Wallis Test results for the past perfect

Group	Participants		Mean Rank	Sig.
	Total	Actual		
Guided-planning	12	2	2.50	1.000
Unguided planning	12	2	2.50	
No-planning	12	0	0	

In summation, there were no statistically significant differences among the three groups. The results from the picture-cued storytelling task showed no significance at all. Generally, the results were disappointing.

V. Discussion

This paper was intended to discuss the influence of pre-task planning on fluency and accuracy in Saudi EFL learners' oral and written productions. I will summarize the findings in this section and and link them to the research question raised at the beginning of this paper.

The findings of the oral production test PCST revealed that the participants were unable to produce a story using the aspect of the past tense only fluently and accurately. The first and the second encounter were very similar in terms of the type of production. A major factor that I believe have affected the participants' performance was time allowed to plan the answer before engaging with the task.

As mentioned in section 0.0, the allowed time was limited to up to 5 minutes, during which, the participants have received an explanation about the nature of the task. The planning groups were asked to look and the set of pictures and plan their answers in no more than 5 minutes. The allowed time was probably

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too short for the participants to organize their answers, specially that they were asked to use specific verb forms. That been said, the participants current level of language competence has to come into the account. As the participated learners in this study were all in intermediate level, 5 minutes planning-time did seem to be sufficient for them.

To sum up, the results show no improvement in accuracy and fluency with guided and unguided pre-task planning in oral production task. That been said, the type of guidance and the short amount of time allow for planning could have affected the results negatively.

VI. Conclusion

The purpose of this paper was to investigate the impact of pre-task planning on the accuracy and fluency of Saudi EFL learners' productive knowledge in a Picture-Cued Storytelling Task. The study was conducted on thirty-six Saudi university students in the UK with an intermediate level in English. The impact of pre-task planning was measured by comparing the guided and unguided planners to non-planners.

The findings revealed no statistical differences between the participants with regards to fluency in the oral production task. These findings support the claims of Yuan and Ellis (2003) that the accuracy is not influenced through strategic planning. It can also support the claims of Foster and Skehan (1996) that the type of the task determines the impact of planning on accuracy.

Based on the reviewed literature and findings of this paper, it is safe to argue that various aspects influence whether increased accuracy occurs through pre-task planning: the kind of planning, complexity of the task, grammatical aspects involved, learners' proficiency level, and duration of planning time.

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Academic Staff's Perception towards Female Students Affirmative Action in Higher Education: The Case of Wolaita Sodo University

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Keywords: *affirmative action, academic staff, female students, perception, higher education.*

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I. Introduction

a) Background of the Study

Gender equality is at the heart of democratic, equal and prosperous societies. It is expected that women and men should equally benefit from similar rights and chances (Ministry of Foreign Affairs of Denmark, 2014). Women are half part of the society. Women, on an equal basis as their male counterparts, are part of the essential human resource support of every state that takes part to its fight and continued development. In a country like Ethiopia, where male dominate and patriarchal societal exist as well as unequal treatments on the basis of sex has been a practice of the recent past. Therefore, the goal of producing highly qualified, motivated and innovative workforce with a view to change Ethiopia into a middle income nation by the year 2025 is impossible without engaging both women and men equally in higher education. To this end, ensuring equitable distribution and improving access to higher education for disadvantaged groups, including females, is underlined as a goal in Education Sector Development Program (ESDP) IV (MoE, 2014).

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Affirmative action is a widely challenged topic that gets frequently discussed in the absence of a nuanced understanding of its goals and policies (Fried, 2014). The term originated on March 6, 1961 with an executive order signed by President John F. Kennedy to ensure that applicants are treated equally without regard to race, color, religion, sex, or national origin and the term was intended to endorse non-discrimination in the United States (Gerber, 2015). After that, various scholars have tried to define the term affirmative action. Wasson (2004), for example define affirmative action as a program that serves to rectify the effects of supposedly past societal discrimination by assigning works and chances to minorities and women. For Wang are (2009) as cited in Eva (2015), affirmative action is a policy or program for correcting the effects of discrimination. In general, the definitions given above by two scholars have some similarities. They give more attention to reduce disparities observed between women and men due to race, and gender.

Several government institutions have been implemented affirmative action policy since 1965 to redress disparities in education and employment. It is thus imperative to understand that affirmative action is not only an effort to "stable the scales" for previous disparity and unfairness's that ethnic minorities and women in this nation have confronted. Rather, affirmative action searches to deal with existing patterns of freedom and domination that even stay in our society today (Fried, 2014). Despite its limitations, affirmative action has been the only comprehensive set of policies that has given women and people of color opportunities for better paying jobs and higher education access that did not practiced before (Yee et al., 2015). Its overall aim is to reduce discrimination and promote equality of treatment as well as to balance the gaps between males and females by levelling the playing field. In this regard, the University of Massachusetts Amherst forbids bias happened because of sex, age, race, religion, colour, marital status, mental or physical disability, political belief or affiliation, and national origin, gender (University of Massachusetts Amherst, 2014).

Unarguably, females in Ethiopia had been highly disadvantaged in many aspects within the society and not least of all in relation to educational

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opportunities (Asegedech & Tesfashbamlak, 2012). Therefore, affirmative action is designed as a strategy to increase the level of women participation in Higher Education. Affirmative action strategies are also specified in the Ethiopian constitution with the aim to give special attention to expand female participation by addressing gender inequalities. Furthermore, Higher Education proclamation (FDRE, 2003) gives preferential treatment of the existing disadvantageous groups, including women, and states in its Article 33:1 that

> Entry assessment or entrance processes planned for any female, disabled students, a student who has completed the high school education in developing region and is native of the nationality of such region or student from the nationality whose contribution in higher institution is near to the ground shall be different from others. They shall, during their stay in the institution, obtain particular support; specials of such support shall be determined by the ministry.

The current Education and Training Policy (TGE, 1994) equally elaborated the need to tackle gender disparity and unfairness based on the constitution, and stated: *"considerable emphasis will be given to women and to those students who did not get educational opportunities in the formulation, distribution, and use of educational support input"* (TGE, 1994; Article 3.7.7). Hence, the government of Ethiopian has clearly shown its commitment by providing opportunities to women education through its constitution and education and training policy of the country.

As to Brest and Oshige (1995), an affirmative action program tries to find the significant under-representation of members of definite ethnic, racial, or other groups through measures that take group membership or identity into account (Tierney, 1997). Taking this into account, the Ethiopian Government has introduced policies and strategies on affirmative action that are intended to redress this situation. These policies and strategies favor female students in order to ensure access, equity and relevance in education. Besides, gender and education is given higher priority in ESDP document as one of the cross cutting issues and focus areas of both the Millineium Development Goals (MDGs) and Education for All (EFA). The ESDP-IV also identifies the four key dimensions to affirmative action: access, support, gender-friendly environment and harassment (Higher Education Strategy Center, 2014) which are the focus areas of this research. This study thus, explores the perception of academic staff towards female affirmative action in Wolaita Sodo University.

The government of Ethiopia has put adequate emphasis on implementing affirmative action policy targeting gender, persons with disability and students who have completed their high school in developing region. However, there are still challenges in changing the policy in to effect. According to ESDP IV, women's education is constrained by economic problems such as parents' inability to cover food and shelter costs. Socio-cultural problems including, harassment, traditional division of labor in homes, early marriage and marriage by abduction are among the socio-cultural factors that hinder women's education (MoE, 2010). Although improvements have been registered during the implementation of ESDP III, females' attrition and graduation rate in Science Faculty were low in comparable with their male counter parts. For example, female students' dismissal is still high in higher education. Study results revealed that in 2009/10, out of 705 female students' enrolled as first year students in Aksum University 332 (47.1%) were dismissed. In the same year, 40.9% female students were dismissed from Kotebe College. On their expected year of graduation, 2010/11, it was also found out that the graduation rate of these female students was only 18.88% of the total Science graduates (Asegedech & Tesfashbamlak, 2012).

Although communities' attitude towards women education and gender equality is improving, the main challenges of female education and gender in higher education are still uncontrolled among higher education institutions. Gender gap is still considerable at all levels of education, especially in preparatory and secondary high school, Technical and Vocational Education and Training (TVET) and in higher education. The curriculum needs to be completed more constantly gender-sensitive. Community attitude towards girls' education is low and there is still gender based violence in and around schools and higher learning institutions (MoE, 2010). These challenges have been also discovered by many studies conducted on affirmative action around the globe.

Numerous researchers have conducted studies on affirmative action and gender in Ethiopia and outside Ethiopian context. These studies were conducted on different themes of affirmative action at different places, sectors and levels of education. For example, Asegedech and Tesfashbamlak (2012) conducted a research entitled "Assessment of the Effectiveness of Female Affirmative Action in Ethiopian Public Higher Education Institutions". The results of the study indicated that both male and female student enrollments in the PHEIs have progressively increased in the years 2007/08-2011/12. The proportion of female students during this period increased steadily from 28% of the total in 2007/8 to 33% of the total in 2011/12. Despite such increase, the author argues that the progress in gender gap is not substantial. The study also identified the challenges faced in implementing affirmative activities. These challenges include misunderstanding of the nature and purpose of affirmative actions among most University community members at all levels; poor

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accessibility of academic guidance and counseling services; the creation of dependency syndrome in some female students who were beneficiaries of the affirmative activities; and unwillingness of female students to participate in some affirmative action activities.

Molla and Cuthbert (2014) investigated on "Qualitative difference: Experiences of women in Ethiopian higher education". As to the study, affirmative action policies that slightly benefit females at entry point, however, gender inequality continues in qualitative forms. Prejudice against women and sexual harassment are stated as main expressions of qualitative gender inequalities in the two Universities. It is contended that public universities in Ethiopia are male-prevailed, hierarchical and hostile to women. Furthermore, Tsigereda (2010) conducted a study on attitude and the practice of affirmative action for female students: the case of Mekelle University. It was found that both instructors and students of Mekelle University have a positive attitude towards the practice of female students' affirmative action. However, the contribution of affirmative action in increasing the number of female students has been insignificant. Moreover, female students' dismissal because of harassment, poor organization and support for female students, female students' problem of adjusting to campus life, language, financial challenge, poor high school educational background, lack of sufficient role model females' instructors to inspire and motivate female students, shortage of reference materials, stress during exams and low confidence were identified as challenges that impede the academic performance of female students.

In general, all the above research findings revealed that respondents have positive attitudes towards affirmative action. However, as study results also reveal women have encountered many challenges that impede them not to actively engage in various affirmative activities and complete their education successfully. There are still gender inequalities, sexual violence, female students' dismissal and completion problem, stress, shortage of reference materials, poor support and facilities observed in higher institutions particularly in developing countries. Though there were studies conducted on female affirmative action, studies conducted in academic staff's perception towards female affirmative action in Ethiopian context are few. Obviously, the role of academic staff is high in interacting with their students and make many decisions on students' result and their competence. In connection to this, Flores& Rodriguez (2006) strengthened the above idea by describing that faculty members make daily decisions concerning students' achievement in the school and judgments regarding their competence. Further, academic staffs especially are expected to play leading roles in cultivating, teaching, guiding, supporting and treating females' students. This is because their overall teaching methodology, approaches, classroom management, and continuous assessment will contribute positively or negatively to female students' participation, continuity or discontinuity of their education, and overall academic performance. Therefore, academic staff has greater roles in implementing female affirmative action. Understanding academic staff perceptions towards the overall affirmative action is therefore, the main purpose of this study. Hence, the study tried to answers the following basic research questions

- How do academic staff members perceive female students' affirmative action policy?
- How do academic staff' perceive female students access to education and resources?
- How do female students perceive academic staff support in Wolaita Sodo University?
- How do academic staff perceive gender-friendly environment in Wolaita Sodo University?

The major focus of the study was to explore the perception of academic staffs towards affirmative action in Wolaita Sodo University. More specifically, the study has the following specific objectives:

- To explore academic staff's perception towards female students' affirmative action policy
- To assess academic staff' perception about female students access to education and resources
- To examine female students' perception towards academic staff support
- To explore academic staff perception towards gender-friendly environment in Wolaita Sodo University

II. Research Design and Methodology

Case study was used as research method for this qualitative research. I used both primary and secondary sources of information to generate the required qualitative data. The primary data were generated from 22 respondents (10 academic staff, 8 female students, 1 gender office coordinator and 3 gender focal persons). All the research participants were selected purposively and contacted for in-depth data collection. The above respondents were selected on the basis of their experience, willingness to participate in the study, responsibilities in the University and closeness to the issue. Secondary sources of information were documents from Ministry of Education (MoE), University Registrar's office, Gender office, policy documents like Education and Training Policy (ETP) and gender reports of the University.

I used face to face interview, focus group discussion (FGD) and document reviews to obtain the required information from the respondents. I conducted face to face interview with academic staff, gender focal

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persons, and gender office coordinator to collect relevant information related to their perceptions towards affirmative action. In the interviews, 14 respondents were participated. I applied focus group discussions with 8 female students to collect additional qualitative information about their opinions; attitudes and knowledge of female affirmative action. Out of the eight, five of them were enrolled through affirmative action. I developed a semi-structured interview guide to direct the focus group interview.

Once the relevant qualitative information was generated from individual interviews, FGDs and document reviews, the description, classifications, and associations of the information was carried out based on the major themes of affirmative action. Such analysis technique was adapted from the work of Bazeley (2009), where he noted the ideas of thematic analysis (three key strategies), including description of data, classification of data, and seeing how concepts interconnect. Therefore, I first described the information as they are, then categorization of information was conducted based on similarities and difference next to the affirmative action's themes. Lastly, I made the connection between and among concepts described and classified in order to have the full picture of the study.

III. Results and Discussion

a) Views on Female Affirmative Action Policy and its Implementation

Countries have developed affirmative action policy in their own education system to reduce gaps between male and female students and to eradicate gender discrimination. Concerning the respondents' awareness of affirmative action policy, half of the respondents confirmed that they have clear understanding about affirmative action policy. However, the remaining respondents did not know about affirmative action policy at all. As consolidated by Eva (2015) people come to know about the policy by chance. The affirmative action policy is not well known to many, it is like a secret and even some people in Makerere University don't know about it. Some people are too 'mean' with information. As reported by research respondents, they have different views on affirmative action policy. One of the respondents assured that the University did not aware the staff about the policy. Another reason raised by one of the respondents was that the academic staff has an obligation to know about government policies and strategies on affirmative action by their own effort. In relation to this, respondents were asked whether they oppose or favor of female affirmative action policy and one of the respondents strongly opposed the idea of female affirmative action by saying:

> "I completely oppose female affirmative action because as to me everybody is born equal. The difference between the two sexes came from their effort, attention given to their education, understanding of the subject matter, and through hard work. Giving affirmative action only for female students is unfair and degrading of female students. As to me, I believe that female can compete equal to their male counter parts without any support. But affirmative action designed only for female students is totally discrimination of disadvantaged weak male students."

A respondent with four solid year experience in teaching on the other hand stated it in a bit different way,

> "I am in favor of affirmative action programs designed for university students. But, I believe that the focus should not be female students only. Any person who is weak academically should get this chance. Students must treat equally and fairly".

As pointed out by Schuck (2015), affirmative action is justified to counter past discrimination against minorities and women in society. In the United States, as cited in Combs and Nadkarni (2005) affirmative action, in clean terms, is based on the elimination of education and employment inequities for specific ethnic, racial and sexual category (Guerrero, 2002; Nacoste, 1987). In general, almost all respondents except two completely have positive attitude towards affirmative action program designed for female students at University level.

Pertaining to the implementation of affirmative action, respondents reported various responses. One of the respondents described that academic staff has highly engaged themselves in implementing affirmative action. Another respondent also added that:

> "According to my department, it has been implemented well though there are some irregularities among academic staff participation. Most often, tutorial program has been given for first year female students only. Second and third year female students were neglected. I think, this is completely wrong because it must be given for second and third year female students too."

As is argued here, others also strongly opposed the above idea. For instance, a coordinator of gender office who served for four years viewed the implementation of affirmative action as follows:

> "The execution of affirmative action is below my expectation at departmental level. Only some academic staff has been participating in providing support for female students through tutorial program. Preferably, our gender office has provided relevant material support like piece of paper, photocopy services, pen, sanitation materials etc for female students to assist their learning."

The experience in India is a bit different from our experience. India's affirmative action as cited in Combs

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and Nadkarni (2005) is referred to as compensatory discrimination in that its primary goal, as a minimum at beginning, was to compensate affected castes for subjection to past discrimination and oppression (Prior, 1996). Further, one of the respondents also consolidated the above idea as follows- *as to me the implementation of affirmative action was seemed irregular across departments and academic staff. It has been given by some academic staff to capacitate female students' competence.* Another respondent strengthened this idea, and stated that all academic staff has not the same level of understanding about female affirmative action. Some academic staff gives tutorial program but others do not.

The above idea has been assured by female students in the FGD too. They all stated that only few academic staff are interested to support female students in different forms. But others academic staff even do not want to hear about female affirmative action. Their perception towards female affirmative action is not positive. As believed by many scholars, over the previous 30 years, scholars such as Francis (1993), Crosby (1989), and Sandler (1975) have articulated three justifications for the formation and implementation of affirmative action. The first, compensation, refers to addressing previous discrimination. Correction, the second underlying principle, relates to the change of current discrimination. And the third, diversification, concerns the importance of creating a society of several culture (Tierney, 1997).

b) Respondents Views on Gender Friendly Environment

Gender-friendly environment is simply creating an atmosphere, which is physically safe, emotionally secure, and psychologically enabling. Learning institutions need to actively challenge and work to change negative gender stereotyping, gender inequalities, foster gender equality, and healthy gender identity (Pulizzi & Rosenblum, 2007). Therefore, creating conducive learning environment is worthwhile for all students to make them learn safely and freely. Pertaining to this issue, respondents were requested to react on the issue "Do girls feel safe from bullying? Discrimination? Abuse? While they stay in their campus?" and respondents stated two different views. One group of respondents indicated that the university is not safe for both boys and girls.

On contrary, the other group of respondents reported that the university is safe for both male and female students. One of the young respondents strengthened the safeness of the University for female students. There is no discrimination in the university. However, there is bullying and abuse in the University to some extent. Another experienced respondent highlighted his idea like this,

> "Nowadays, the situation in my university has been improving from the past. Discrimination, abuse and bullying have been decreasing rapidly. In addition, gender focal person has been assigned to each college who seriously follows female issues, provide the necessary support for female students and give immediate solutions for female students' problems."

Pertaining to the views on girls' protection in the University, respondents again clearly stated two different views. One of the respondents noted that there are policemen and security guard who protect girls from any danger. On contrary, most of the respondents vibrantly explained that the protection for female students was not strong as such. As pointed out by one of the respondents,

> "There is no sufficient guard for female students. The problem seemed very severe around female dormitory. Female students face so many challenges in the campus and they often don't come out from their dormitory at night especially when there is no light in the campus."

Respondents further consolidated the above issue. One of the respondents reported that *the protection for female students is not adequate. There was no fence between male and female dormitory before. However, now it was constructed few months ago.* Another respondent also strengthened the previous idea like this; *Sometimes, people come to female dorm through the fence from outside.* A study conducted in Jimma found out similar results. The study discovered that the University is unsafe to walk from study rooms to dormitories late at night and particularly unsafe when electricity goes out accidentally (Aseresash, et al., 2002).

In general, as vividly stated by majority of the respondents, the campus is not as such a safe and conducive place for girls to ensure a healthy, hygienic, secured and safe learning environment. There are still unsolved problems related to the availability of adequate water and sanitation facilities for girls particularly around their dorm. Aseresash, et al. (2002) study results strengthened the above idea. There are problems in dormitory such as shortage of facilities (e.g., water, toilet, and so forth), theft and badly trained proctors who are unable to offer appropriate support.

In addition, female students were asked about University and classroom facilities, peace and security of the campus in the FGD, and they confirmed that adequate clean water is not available and accessible for all students in the university. Other problems identified include lack of electric service during night time, lack of well-equipped medical services, lack of separate female library, lack of adequate and recent books, lack of learning materials, lack of smart classrooms, lack of conducive learning environment, and lack of internet services.

In conclusion, majority of the respondents vividly explained that their perception towards gender

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friendly environment was found prejudice and hostile. They assured that the campus is not gender friendly that promote gender equality in resource sharing, and providing adequate facilities and services. Both the physical and social environment is not conductive to the female students as expected. Unarguably, a hostile learning environment as manifest in prevalent sexual harassment has critical consequences on the progress and success of female students in HE. According to the finding of Molla & Cuthbert (2014), most of the female students who took part in the discussions stressed that the library services and dormitory conditions were not favorable to study. Male students can go to the library anytime they like and do their assignments while their female counterparts face various obstacles to doing so.

c) *Respondents Views on Female Access to Education & Resources*

Higher education is indispensable to produce and establish a productive citizenry (Giroux, 2002). The enrolment rate of female students has been also showing fast progress in higher education. As indicated in the interview, majority of the respondents assured that female enrolment rate has grown rapidly in Wolaita Sodo University. Document reviews from the University register indicated that the trend in the female students' access to education has been increasing. Female enrolment rate was 31.3% in year 2013 and now it reached 34.5 % of the total in 2014/2015. Therefore, female access to education was found promising. As stated by Asegedech and Tesfashbamlak (2012), from year to year the proportion of female students entering University studies increased steadily from 15,770 (28% of the total) in 2007/8 to 31,608 (33% of the total) in 2011/12. The problem these days is in completing their education successfully within the specified period of time. According to the interview responses, majority of the respondents vividly stated that the completion rate of female students was found low. According to the university registrar office, the graduation rate was found 595 (31.3 % of the total students) in the years 2011/12-2014/15 in Wolaita Sodo University. As Kabesiime (2010) notes, it has also been observed that completers do not match with enrolment due to high dropout rates.

Regarding the interest and choice of department selection at University level, respondents viewed this issue into two categories. Most of the respondents indicated that department selection has been determined based on the national exam result rather than the interest of the students. One of the respondents disclosed that the department selection was merit based. As a result, most female students have joined the department they did not like to join it. The study result was consistent with the study of Wudu and Girma (2009), who discovered that most students in the University were placed in different departments without considering their interest in to account and this led most of the students to lose their motivation to learn. As a result, they failed to study hard and this directly affects their academic performance negatively. On contrary to this, the study conducted in Mekelle University revealed that 20% reservation is given to female students in every department; thus, they have a better chance to join the field of their first choice (Tsigereda, 2010). This trend is also practiced in Dilla (30%) and Haramaya University (25%) for department placement. The practice is somehow different from India. As cited in Combs & Nadkarni (2005), affirmative action implementation procedures in India suggest that merit is a necessary but not sufficient criterion to address historical injustices (Boston & Nair-Reichert, 2003).

Some respondents reported that the University will give quota for female students in department selection though the percentage differs. Some respondents said that 10% quota is given for females and others said 40 %. This implies that respondents have varied perceptions about quota system in the University. In support of the above idea, another key respondent reported that special quota was given for female students and for those who came from underdeveloped regions. In relation to this, Boston & Nair-Reichert (2003) and Jain et al., (2003) have clearly cited in Combs & Nadkarni (2005) that as compared to the United States, the execution of affirmative action in India is to a certain extent different. Affirmative action policy in India is a system of quotas and reservations. Both need statistical description for each of the disadvantaged groups believed to include little access to employment and education.

As female students also stated in FGDs that they were placed in departments which they were not of their choice-particularly those assigned in College of Natural and Computational Sciences and in social science and Humanities college due to their low GPA. Most of these female students develop anxiety and lose their interest to continue their study because of the departments they are assigned to.

On contrary, the remaining respondents strongly opposed the above idea by saying that the department selection was merit based. Due to the above fact, academic performance difference has been observed between male and female students in the sample University. With regard to this issue, one of the respondents reported that,

> "There were practical performance differences between male and female students two years ago. Now, the gap has been narrowed. Last year, there were female students who graduated with great distinction. The highest grade scorers were females in my department for the last three years."

Obviously, the gap has reduced between male and female students' performance recently. As extracted from the qualitative information of the respondents, in

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many departments top outstanding students were females. However, they were finger counted. Generally, males scored higher grades and survived better than their female counterparts survive.

Additionally, respondents were requested to react on the issue "What is your view about female students' access to resources such as female library, equal laboratory access, books, text-books, and internet? Accordingly, majority of the interview respondents reported that access to resources was found inadequate for both male and female students. One of the respondents supported the above idea and assured that there is no female library, adequate books and internet services for female students. On contrary, only one respondent opposed the above idea partially by saying that although there are shortages of facilities and services, books are now available in adequate number for all students. The findings of Asegedech and Tesfashbamlak (2012) in two Universities are not consistent with the finding obtained in their sampled University. In Aksum and Gondar Universities, there are separate libraries with internet service provided only for female students but not here in the study University.

Furthermore, female students were asked about access to resources and department selection in the FGD. Majority of the respondents indicated that it is difficult for them to get their own department choice, internet services, adequate clean water, adequate recent books, separate female library, and modern medical services so as to do their assignments, to study without disturbance, to keep their personal hygiene and to check their health status.

d) *Participants' Views on Female Students Support in the University*

Female students in public Universities need strong support from the University community, in general and from academic staff and leaders at various levels, in particular. Continual and sustainable support provision for female students may make them strong and academically competent like their male counterparts. In connection to this, respondents were asked about the types of support provided for female students in their University and participants boldly explained their views in almost similar ways. One of the key respondents reported that tutorial support, make-up class, financial and material supports were given for female students. Another respondent also strengthened the idea by mentioning the support provided for female students such as training, consultancy service, material support such as soap, female cleaning materials or sheets, and piece of paper. Besides, counseling and psychosocial support was offered for them as reported by one of the respondents. Other supports given by gender office for female students were photocopy services, sanitation materials, financial and material support though it is not adequate and strong. Similar results obtained in the study of Tsigereda (2010) that majority of the key respondents confirmed that tutorial class has been given for female students; thus, they can cope up with their academic challenges; Guidance and counseling service has been given in the University to give advice to females students; thus, they are able to deal with academicals and social difficulties; The photocopy service is one of the opportunities given to female students by the University so that they can easily duplicate books and handouts. It also reduces the costs they spend for duplication; in taking consideration of the economic challenge of some female students, the university used to give sanitary napkins. On the other hand, other research findings revealed that in two out of seven universities covered in the study, valuable activities were carried out, while three out of the seven universities only nominally planned activities, with no practical support, existed (Asegedech & Tesfashbamlak, 2012).

Furthermore, departments in collaboration with gender office of the University have offered various trainings in different issues. Respondents have disclosed almost similar views. They reported that the gender office in collaboration with counseling and psychosocial support center has given gender related trainings for female students on life skill, study habits, reproductive health, HIV/AIDS, and assertive skills. However, as one of the respondents indicated that some female students were unwilling to participate in these trainings because of fear of exposed to others, and lack of confidence. The study results are almost similar with the study conducted by Asegedech and Tesfashbamlak (2012) with few exceptions. According to them, wherever such support existed, the supportive activities carried out by some (30%) of the Universities (as mentioned by the respondents) were the following: Providing training on assertiveness, reproductive health, study skills, communication, and life skills; Provision of economic support to economically disadvantaged female students, and other financial support systems – for example the provision of shops for the use of the female students association by renting them (only Aksum University); Providing guidance and counseling service to students facing socio-economic and academic problems; Award systems in order to encourage high achieving female students and preferential readmission opportunities for dismissed female students with the provision of English language training (only Haremaya University).

In relation to the contribution of female students' support to minimize female dropout rates, roughly all the research respondents indicated that female support has brought change particularly in minimizing dropout rate, dismissal or/ and attrition rate. This result has been obtained as a result of tutorial and other supports provided for female students. For instance, in Wolaita

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Sodo University, female dropout rate was 0.98 % in the year 2013/14 and now it reduced to 0.6 % in 2014/15 almost below 1%. As compared to other universities, the achievement obtained so far is by far better and promising. As indicated by Asegedech & Tesfashbamlak (2012), in the year 2010/11 out of 1386 female students enrolled in Hawassa University at the end of that academic year, 288(20.8%) of them dropped out. Whereas in the same year and University out of 6,705 enrolled male students only 8.1% of male students dropped out. In the year 2010/11 out of 515 female students enrolled in Kotebe College 194 (37.67) female students and out of 250 male students only 3 (1.2%) of them were either dropped out or dismissed at the end of that academic year.

With respect to female student affirmative action, more than half of the respondents did not accept affirmative action and any support provided only for female students as a good policy option. In connection to this issue, one of the key respondents reported as follows:

> "I feel bad because I do not support tutorial program provided only for female students. This may hurt female students themselves by developing inferiority complex. Therefore, there should be free treatment for both male and female students. In general, affirmative action should be given for both male and female students who are weak academically."

On the other hand, one of the respondents expressed the view like this:

> "I do not support affirmative action provided only for female students. However, based on their past discrimination, focus must be given for female students. I believe that academically weak male students must also get this support like their female counter parts."

Alternatively, few respondents accepted the support given for female students only. Their rationale was based on the assumption that, females are subjected to many obstacles within and outside their campus. To compensate their past discrimination, they must get various supports from university and family.

Female students in FGD also stated that the support obtained from their university is not adequate. Only few academic staff is voluntary to help us in tutorial program and formal classroom teaching. They treat us unequally as compared to male counter parts. Some academic staff do not have positive attitude towards female students. Wudu and Girma (2009) supported this idea that teachers perceive girls to be less intelligent and thus treat boys and girls differently. Accordingly, male students receive more attention from their teachers, given more time to talk in class and ultimately are given more praise than girls in the classroom. As a result, there is no self-esteem for the girls because they are meant to be subservient, to be quiet and sit at the back of the classroom. As indicated by female students in FGD, the support obtained from gender office is by far better than the University community support even from academic staff. In general, academic staff perceived female students support in to two different ways. Some perceived it positively and have tried to assist them in their spare time whereas others perceived it pessimistically and did not offer any support for them.

IV. Conclusion

The major aim of the study was to explore academic staff's perception towards female affirmative action in Wolaita Sodo University. Majority of the respondents believed that female affirmative action is important as it improves female students' personal and educational capacity as well as their academic results. It was observed that academic staff had good attitude concerning the definition and benefit of female affirmative action. Some academic staff was extensively engaged themselves in providing tutorial program for female students even if the support is incomplete and incoherent but others do not. On the other hand, what practically found that some academic staff's engagement in implementing affirmative action in to effect was found to be not adequate because of their prejudice attitude towards affirmative action. Therefore, the implementation of affirmative action in various departments considered in this study-tended not to be regular and consistent.

Besides, the information obtained from respondents clearly indicated that, some academic staff had prejudice attitude towards female affirmative action program. They associated it with unfair treatment and discrimination of others disadvantaged and low achiever male students. Their views towards it differ between male and female academic staff and among students. Except few, majority of the key respondents have good understanding about the policy of affirmative action.

Concerning respondents' views on gender friendly environment, respondents reported two different views. One group of the respondents noted that the university is not safe for boys and girls and not gender friendly. On contrary, half of the respondents reported that the university is safe for both male and female students.

Concerning the perception of academic staff towards female students' access to education and resources, majority of the interview respondents reported that access to female education in Wolaita Sodo University was found high. On the other hand, access to resources is not adequate for both male and female students. As indicated by research respondents, there are no services like female library, adequate books and internet services for female students. There is also

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challenge for female students in department placement. The chance of female students to join the department they want to join was found low and limited.

Results of this study reveal that academic staff perceived female affirmative action in different ways depending on their experience, and exposure to it. Their perceptions and understanding about affirmative action concept, tutorial and other supports are partial and restricted to a narrow perspective. It can be argued from this study that academic staff opinions concerning the definition and importance of female affirmative action were found positive in general. It can also be said that support provided for female students only, creating gender friendly environment, and access to various resources and female students' department placement were found inadequate and lacked greater attention of the academic staff and the University management.

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Multivariate Analysis of Factors Influencing Achievement of Students in Selected Subjects at Secondary School Level: A Case Study of Grade 10 Students at Hawassa City, Ethiopia

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Abstract- This study has been an attempt to determine factors influencing academic achievements of grade 10 students (normally under age 18 years) on specific subjects. A cross-sectional survey was conducted on a total of 719 sample students of grade 10 from 11 different government and non-government secondary schools using multistage sampling technique. A designed questionnaire was used to obtain data from the respondents. The secondary data on students EGSECE scores were obtained from the Education Department as achievements of students in the five selected subjects: Mathematics, Biology, Physics, Chemistry and English. Descriptive analysis, factor analysis and multivariate multiple linear regression analyses were used to analyze the data. From the descriptive results both governmental and non-governmental school students were achieved poorest in physics and best in English. However, on average, non-governmental school students' achievements were better than governmental school students.

Keywords: factor analysis; multivariate multiple linear regression analysis; school subjects; achievement; grade ten.

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Multivariate Analysis of Factors Influencing Achievement of Students in Selected Subjects at Secondary School Level: A Case Study of Grade 10 Students at Hawassa City, Ethiopia

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Abstract- This study has been an attempt to determine factors influencing academic achievements of grade 10 students (normally under age 18 years) on specific subjects. A cross-sectional survey was conducted on a total of 719 sample students of grade 10 from 11 different government and non-government secondary schools using multistage sampling technique. A designed questionnaire was used to obtain data from the respondents. The secondary data on students EGSECE scores were obtained from the Education Department as achievements of students in the five selected subjects: Mathematics, Biology, Physics, Chemistry and English. Descriptive analysis, factor analysis and multivariate multiple linear regression analyses were used to analyze the data. From the descriptive results both governmental and non-governmental school students were achieved poorest in physics and best in English. However, on average, non-governmental school students' achievements were better than governmental school students. In factor analysis, self-concept, motivation to the subjects and teaching-learning process explained most of the variations. Multivariate regression results revealed that, the factors, sex, school type, school facilities, family status, school volume, interest to the subject, motivation to the subject, self-concept, safe reading and trouble (anxiety) to the subjects, had significant influence on achievements of students with respect to most of the subjects. Factors like sex, school facility, family status, motivation to the subject, interest to the subject had a significance positive impact on achievements. However, trouble of the subject and school volume had a significant negative influence on students' achievements on Biology, Physics and English subjects. It is suggested that academic facilities and managements at schools, beside home and students' personal efforts need to be promoted for better academic achievements of students in subjects.

Keywords: factor analysis; multivariate multiple linear regression analysis; school subjects; achievement; grade ten.

I. Introduction

The current educational system in Ethiopia is organized in cycles or levels of formal schooling that includes ten years of general education. General education is completed at the end of the first cycle of general secondary school education (Grade 9 and 10). Moreover, this cycle is intended to enable students to identify area of interest (Natural Sciences Stream and Social Sciences Stream) for further training in the second cycle of general secondary education (Grades 11and 12) to prepare students for continuing their studies at higher education level (University or collages) or selecting their own vocations. Students appear for the New National Examination at the end of grade 10 (normally under 18 years old) which is known us the Ethiopian General Secondary Education of Certificate Examination (EGSECE). This is after the students have successfully achieved school examinations in all school subjects. However, students should score a minimum of 2.00 on a scale of 4.00 in EGSECE or a minimum of 50 out of 100 in standard school exams at least in five or seven subjects: English, Mathematics (both compulsory) and any other three or five science (Natural or Social) subjects in order to appear in EGSECE [14].

Girls' education is one of the fundamental pillars for ensuring sustainable economic development, democratic participation and poverty reduction. As a result, gender discrimination affects not only women but also the overall growth of the economy. In this connection, the Ethiopian government has given more attention to girl's education. In 2003-2004, due to the favorable policy environment, the gross enrollment of female students at general secondary first cycle (9-10) was about 37.0% and at the preparatory level (11-12), it was 29.0%. Moreover, in technical, vocational and training institutions (colleges), it was 49.0%, whereas it was 25.2% in higher education/Universities. Nevertheless, there was a great variation of students' achievement at different school type (non-governmental and governmental) based on their gender. Without controlling for student background differences, non-governmental schools scored higher than government (public) schools ([4]; [13]).

It is obvious that students at schools can be classified as clever (high achievers), medium (average achievers) and lazy (low achievers) with respect to individual's achievements in specific school subjects based on exam scores or general test results of

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subjects. The general belief is that, if the student is intelligent or clever, he/she is expected to perform well at school in compulsory and science school subjects and is well fitted for national and regional exams. But intelligence is not the only influential factor of academic achievement in school subjects. In addition to intelligence, there are various factors influencing academic achievement of students at school in each school subjects ([2]; [19]).

This study has been undertaken to investigate multivariate evaluation of the impacts of family with student and school characteristics variables on academic achievement of students on five selected subjects at secondary schools, specifically in grade 10. The presence of all or some of the factors identified above may have resulted in the poor academic achievement of students on each school subjects in some areas of our country. However, evidence of the availability of these factors as well as other factors need to be obtained or checked. The purpose of this study, therefore, is to obtain the factors that are responsible for the poor academic achievement of students with school type and gender gap on school subjects among secondary schools of grade 10 students at Hawassa city, in SNNPR state.

a) Statement of the Problem

In 2007/08 the number of students who sat for grade 10 national exams, at SNNPR state, was 92,836 (male 61,742 and female 31,094). Out of these who get CGPA of 2.00 and above out of 4.00 were 33,211 (25,085 males and 8,126 females). The percent of promoted students in a successive three years, 2005/06, 2006/07 and 2007/08, were 45.8%, 44.2% and 35.8%. Specifically, the percentage of promoters (scored 2.00 and above) at Hawassa City Administration in 2007/08 were 46.7 %.

[12] Reported that the test items (exam questions) of the EGSECE for English were not relatively content valid. Hence, test items did not match with the syllabus contents.

Students might pass from one class level to the other as they evaluated on CGPA result of all subjects. But due to achievement variation with respect to each school subject, students get difficulty and being unsuccessful in higher level education which leads directionless. The current education system of Ethiopia gives a great attention, about 70%, on natural sciences subjects, to enhance sciences and technology. Therefore, it is better to find solutions to the problems and factors one faced in his/her academic achievements in selected subjects: Mathematics, Biology, Physics, Chemistry and English at secondary schools in grade 10 distinctly but dependably.

Many reasons have been attributed for the high failure rate and poor academic achievements in secondary schools. Some researchers traced that the high failure rate of students was due to student's inability to comprehend and balanced the principles of some subjects such as Mathematics, Physics and others. Others are of the view that the abysmal school achievement is due to loaded curriculum (there is too much to be taught within a short time) ([8]; [12]).

Again some people suggest it on lack of proper supervision on the part of school administration and family control in student's self-carelessness ([7]; [10]).

Likewise, [13] claimed that gender stereotype and student's interest to the subjects have also great influential effect. Peculiar nature of some factors and the students low and unbalanced success rate have led to this study on the multivariate analysis of the determinants of students' academic achievement measured in five selected subjects at general secondary school completion level, first cycle, grade 10.

The following research questions have been developed to guide this study:

- What are the key factors that influence students' academic achievements in Mathematics, English, Biology, Chemistry and Physics at secondary school level in grade 10?
- What relationships (correlations) are there among the selected subjects at student and school levels and what gender and school type gap is observed in terms of the five school subjects?
- How much of the variations (level differences) of the academic achievements are accounted for at school with respect to each response measurement scores of the school subjects?
- How much variations are explained with the interrelationships of general home-school characteristic variables and as students' opinions over a group of items about each separate school subjects?

b) Objectives of the Study

The general objective of the study has been to determine the key factors influencing academic achievements of students measured in exam scores of five subjects in grade 10 (Mathematics, Biology, Physics, Chemistry and English), and to assess the variations accounted at school and individual (student) level for each response (school subjects). The Specific Objectives are

- To identify the most important factors (covariates) influencing academic achievements of student's in each component of selected subjects in grade 10.
- To determine the relationship among the school subjects at both school and student level; and whether there is gender and school type differences in this relationship.
- To quantify and determine the within and between schools variation for each components of selected subject at secondary schools.

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- To determine the groups or clusters of interrelated observed variables or items as component factors that explain the variation of achievement indictor variables.

II. Materials and Methods

a) Description of the Study Area and Population

The study was conducted in Hawassa, the capital city for SNNPR state, which was established in 1960. It is located at about 275 km South West of Addis Ababa, and near to Hawassa Lake. Geographically it lies between 07^0 05' Latitude North and 38^0 29' Longitude East. According to the report of [6], the estimated population size of the city (urban) in 2007 was 159,013 out of which 81,984 were males and 77,029 females. There are 4 governmental colleges and one university, 8 non-government (private) colleges, 5 governmental high (secondary) schools, about 15 non-governmental high (secondary) schools. The gross enrollment rate of secondary school students at Hawassa Town Administration has been 62.1%.

The target population for this study was grade 10 students of both government and non-government schools registered in 2010-2011 academic year at Hawassa City secondary schools. The total population of students in all high schools of the city was 6,384 in 2010-2011 academic year.

Exclusion criteria were made on the students who were transferred to other schools or those dropped out, only completed enrolment procedures at the school but did not yet attend the national exam or left the school or had been absent for more than four continuous weeks (excluding school vacations) and had no examination results in 2 of the most targeted school subjects (compulsory subjects). This was because full information about those students was not available.

b) Sampling Design and Procedure

A cross-sectional study with stratification sampling designed to take independent samples for different sub-populations was conducted. The stratums were governmental and non-governmental secondary schools as school type.

Sampling methods are scientific procedures of selecting those sampling units which would provide the required estimator with associated margins of uncertainty arising from examining only a part not the whole of the population. The main purpose of stratification is to reduce sampling error. Moreover, stratified sampling is a technique which uses any relevant information that might be available in order to increase efficiency. It involves the division or stratification of a population by partitioning the sampling frame in to non-overlapping and relatively homogeneous groups [5].

A list of grade 10 students was obtained from Hawassa City Administration Education and Capacity Building Department. The population of grade 10 students was stratified into governmental and non-governmental school and the required sample size for the study was determined from each stratum. The multistage sampling procedure was employed as:

- Stage one: Stratification by school type

All secondary schools except those with number of students in class less than 15 and far away from the city center were considered.

Stratum 1: Grade 10 students in government schools with population size N_1 and sample size n_1.

Stratum 2: Grade 10 students in non-governmental school with population size N_2 and sample size n_2.

- Stage two: proportional allocation or proportion by sample size method

Sample of students was taken from sampled schools by proportional allocation, to enrollment size of grade 10 students at selected schools, of total sample size n in to sample sizes of governmental and non-governmental schools, n_1 and n_1.The selection of a simple random sample was usually carried out according to a set of mechanical instructions which guarantees the random nature of the selection procedure. This is an equal probability of selecting individual units for all elements in the population of the school.

- Stage three: simple random sampling of students from class

Taking a list of students with their registration number in each school, then refer to a table of random numbers; the required sample students were selected. In simple random sampling, the selection of one individual was independent of the selection of another individual.

i. *Sample Size Determination*

In the planning of a sample survey or researches, a stage at which a decision must be made about the size of the sample is always required. However, too large a sample implies wastage of resources, and too small a sample diminishes the utility of the results. Therefore the decision should be made with a minimum cost but the estimate will explain the population characteristics with a high probability. However, several formulas developed for sample size calculations that conform to different research situations [5].

The sample size for this study was determined based on stratified sampling with proportional allocation at 95% confidence level using the general formula for sample size determination adopted as:

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$$n = \frac{\sum_{h=1}^{2} \frac{W_h^2 S_h^2}{W_h}}{V + \frac{1}{N}\sum_{h=1}^{2} W_h S_h^2}$$, where h = the stratum, $W_h = N_h/N$ = stratum weight, n_h = number of units in strata h, $V = \left(\frac{E}{Z_{\alpha/2}}\right)^2 = Var\left(\hat{Y}_{str}\right)$ = desired variance for estimate of population mean which is $\hat{Y}_{str} = \sum_{h=1}^{2} W_h \bar{y}_h$. $\bar{y}_h = \frac{\sum_{i=1}^{n_h} y_{hi}}{n_h}$ = sample mean, $\bar{Y}_h = \frac{\sum_{i=1}^{N_h} y_{hi}}{N_h}$ = true mean (mean for the population measurements) and $S_h^2 = \frac{\sum_{i=1}^{N_h}\left(y_{hi} - \bar{Y}_h\right)^2}{N_h - 1}$ = true variance (variance of the population measurements). S_1^2 = government school sample variance of students' academic achievement

S_2^2 = non-government school sample variance of students' academic achievement

$\bar{y}_1$ = government school students sample mean of students' academic achievement and

$\bar{y}_2$ = non-government school students sample mean of students' academic achievement,

$z_{\alpha/2} = z_{0.025} = 1.96$ is the critical value for 95% confidence level with standard normal distribution.

The known methods of estimating s^2 for calculating sample size of any survey were by taking the sample in two steps; one by the results of a pilot survey and another by previous studies sampling of the same or similar population and guesswork about the structure of the population [5].

But for the present study, s^2 and the margin of (absolute) error E were determined from the results of previous studies of similar population. The sample variance $s_1^2 = 0.20885$ and mean $\bar{y}_1 = 2.62$ were taken for government school from the study which assessed the determinants of students' academic performance in government schools of grade 10 at Hawassa town taking a sample of 920 students (Hanna; 2010).

Then, E for this study was calculated as:

$$E = Z_{\alpha/2}\sqrt{\frac{S^2}{n}} = 1.96\left(\sqrt{\frac{0.208849}{920}}\right) = .0295$$

On the other hand, the sample variance $s_2^2 = 0.13421$ was taken for non-government schools from the previous study at the same area [11]. The total population was (number of students in 11 selected secondary schools of grade 10) $N = 5006$ from 5 governmental and 6 non-governmental selected secondary schools, which contained total number of grade 10 students in governmental schools $N_1 = 3755$ and total number of grade 10 students in non-governmental schools $N_2 = 1251$.

After all, using the weight $W_h = N_h/N$ and S_h^2 were more convenient for computing the sample size n from the estimated sample size, n_0.

$$n_0 = \frac{\sum_{h=1}^{2} W_h S_h^2}{V} = \left(\frac{Z_{\alpha/2}}{E}\right)^2 \sum_{h=1}^{2} W_h S_h^2 = \left(\frac{1.96}{0.0295}\right)^2 \left(\frac{3755 \times 0.20885}{5006} + \frac{1251 \times 0.13421}{5006}\right) = 840.$$

Then $n = \frac{n_0}{1 + \frac{n_0}{N}} = 719$ was the total sample for this study. Thus, using the above results, the following sample sizes for both school types (Governmental and Non-governmental) as proportional allocation by school type as a factor is: $n_h = \left(\frac{N_h}{N}\right)n$ for $h = 1,2$; $n_1 = \left(\frac{3755}{5006}\right) \times 719 = 539$ (Sample for governmental schools), $n_2 = \left(\frac{1251}{5006}\right) \times 719 = 180$ (Sample for non-governmental schools).

c) Methods of Data Collection

In assessing the academic achievement of students' measured by exam results scored in school subjects, Mathematics, Biology, Physics, Chemistry and English at both government and non-government sample secondary schools, both primary and secondary data were used. The primary data was collected using questionnaire method. The questionnaire consisted the student's, family background and school characteristic variables on the student's academic achievements evaluated in selected 5 subjects. Individuals sampled for this study were asked to complete the determinants of students' outcome (in five school subjects) study questionnaire. The secondary data on academic achievements of respondents was measured by their EGSECE results (scores) in each of the five selected

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subject (Mathematics, Biology, Physics, Chemistry and English). Besides, school records with regard to students' exam registration number and some profiles of teachers and schools were taken from record offices of the schools. Sampled grade 10 students were taken with their exam scores of all five school subjects and the student's results were standardized and scaled to be 4.00.

d) Variables of Interest in the Research

The outcome variables used in this study were the five selected school subjects as individual's achievement measures using EGSCEE results or scores on the five school subjects (Mathematics, Biology, Physics, Chemistry and English). All achievement scores were taken as standardized and transformed to assure that all scores were scaled in the same metric. This also allowed us to interpret the between school variances as the percentage of variation in student achievement accounted for by schools in PCFA, MVML and multivariate multiple linear regression analysis with respect to each response. The set of explanatory variables included were the composite common factors of students, family, teachers and schools characteristic variables.

i. *Students and Family Characteristic Variables*

These were: Age, gender, religion of student, parents' employment status, natural talent, students' job aspiration, time spent on study, peer(group) effect, student class attendance(absence), skipped class, student's satisfaction with school administration, satisfaction with school rules and regulations, academic confidence, preferred study time, preferred study place, distance of the school from students' home, availability of text and reference books at home, home location, parental involvement, fathers'/guardians' level of education, comfort of study place at home, mothers' education level, average family expenditure, other expenses related to education, satisfactions in food type available in home, pervious grade scores, students attitude and perception on school subjects (difficulty, boringness, preference, etc.).

ii. *School Characteristic Variables*

These were: teachers average workload, average year of experience, teachers average educational level, teacher preparation, class size, teaching method, standard of examination, parent to teacher communication, teacher absence, teacher late, average size of school, school fee, completion of the syllabus, school type, student-teacher ratio, teacher efficient and skills, school location/environment, current curriculum, human resources (teachers per subjects, principals, supervisors), infrastructure (buildings, classrooms, sport facilities), library facility, equipment (desks, blackboard, telephone, duplicating computers), amentias (toilets, electricity, water), and availability instructional materials (text and reference books, maps and charts), laboratory facilities, academic counseling service, health service (first aids).

III. Methods of Data Analysis

a) Factor Analysis Model

This analysis describes the covariance relationships among many variables (items) in terms of a few underlying and unobservable random quantities.

The observable random vector X with P components has mean μ and covariance Σ. The factor model postulates that X is linearly dependent upon a few unobservable random variables $f_1, f_2, ..., f_m$ called common factors, ($m < p$) and p additional source of variation $\varepsilon_1, \varepsilon_2, \varepsilon_3, ..., \varepsilon_p$ called specific factors.

The factor analysis model is given by: X = LF+ ε, where L_{PxM} is a matrix of unknown constants called factor loadings.

$$L_{pxm} = \begin{pmatrix} l_{11} & l_{12} \dots & l_{1m} \\ l_{21} & l_{22} \dots & l_{2m} \\ \dots\dots\dots\dots & & \\ l_{p1} & l_{p2} \dots & l_{pm} \end{pmatrix} \quad F = \begin{pmatrix} f_2 \\ f_1 \\ \dots \\ f_m \end{pmatrix} \quad \text{and} \quad \varepsilon = \begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \dots\dots \\ \varepsilon_p \end{pmatrix}$$

The coefficient l_{ij} is the loading of the i^{th} variable on the j^{th} factor.

i. *Assumptions of Factor Model*

1. E (F) = **0** = (0, 0, …,0)^T
2. cov (F)= E (FF^T)=I$_m$
3. E (ε) = **0**= (0, 0,…, 0)
4. Cov (ε)= E(ε ε^T)= Ψ_{pxp}, Ψ is a diagonal matrix
5. Cov (ε ,F) = E(ε ,F^T) = **0**= (0,0,…,0)^T

ii. *Covariance Structure for Orthogonal Factor Model*

1. Cov(X) =LL^T+ ψ
2. Var (X_i) = $l_{i1}^2 + l_{i2}^2 + ... + l_{im}^2 + \psi_i$, where ψ_i is the i^{th} specific factor.

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3. $E(X_i, X_k) = l_{i1}l_{k1} + l_{i2}l_{k2} + \ldots + l_{im}l_{km}$
4. $Cov(X_i, F_j) = l_{ij}$
5. $Cov(X, F) = L$, loading matrix.

Communality is defined by: $h_i^2 = l_{i1}^2 + l_{i2}^2 + \ldots + l_{im}^2$

The factor model assumes that $p + \frac{p(p-1)}{2} = \frac{p(p+1)}{2}$ variables and covariance for X can be reproduced from pm factor loadings l_{ij} and p specific variables ε_i.

The factor model provides a simple explanation of the covariation in X with parameters $(p + pm)$ which are fewer than $p(p+1)/2$ parameters in Σ.

iii. *Methods of Estimation of Loading*

If the off diagonal elements of sample covariance S are small or those of the sample correlation matrix R essentially zero (identity matrix), the variables are not related. This implies that a factor analysis will not prove useful and in these circumstances, the specific factor plays a dominant role. If covariance matrix appears to deviate significantly from a diagonal matrix, then a factor model can be entertained and the initial problem is one of estimating the factor loading l_{ij} and specific variance ψ_i. There are two popular methods of parameter estimation, Maximum Likelihood (ML) Method and Principal Component Method. However, for this study, the principal component method was used.

iv. *The Principal Component Method*

The spectral decomposition of covariance Σ having eigenvalues-eigenvector pairs (λ_i, e_i) with $\lambda_1 > \lambda_2 > \ldots > \lambda_m > 0$ is given as $\Sigma = \lambda_1 e_1 e_1^T + \lambda_2 e_2 e_2^T + \ldots + \lambda_P e_p e_p^T$

From the above equation, we can obtain the loading, $L = \left(\sqrt{\lambda_1 e_1}, \sqrt{\lambda_2 e_2}, \ldots, \sqrt{\lambda_p e_p} \right)$.

v. *The Contribution to the Total Sample Variances*

In applying the principal component to perform factor analysis, we have use, the sample covariance matrix S was used. Observe that $S_{11} + S_{22} + \ldots + S_{pp} = tr(S)$ =trace of the sample covariance matrix and $\hat{\lambda}_1 + \hat{\lambda}_2 + \ldots + \hat{\lambda}_P = \rho$ = trace of sample correlation matrix, where, $\hat{\lambda}_i$'s, $i = 1,2,\ldots..,p$ were estimated eigenvalues of S.

$$\left(\begin{array}{l} \text{The proportion of total sample} \\ \text{variance due to } j^{th} \text{ factor} \end{array} \right) = \begin{cases} \dfrac{\hat{\lambda}_j}{tr(S)} \text{ for factor analysis of sample covariance.} \\ \dfrac{\hat{\lambda}_j}{\rho} \text{ for factor analysis of correlation.} \end{cases}$$

Researchers have no single agreement about selecting the required number of principal components. However, the best choices for researchers to fix the number of factors retained have been the proportion variance explained being at least 50-60% and the Scree plot test examining the graph of the eigenvalues by looking for the natural bend or break point in the data where the curve flattens out. The number of data points above the "break" is usually the number of factors to retain, although it can be unclear if there are data points clustered together near the bend ([16;[21]]).

vi. *Rule of Thumb (Convention)*

- Choose the number of positive eigenvalues of sample covariance matrix *S* $\hat{\lambda}_1 \geq \hat{\lambda}_2 \geq \ldots \geq \hat{\lambda}_m \geq 0$ and
- Choose the number of eigenvalues of sample correlation matrix R which are larger than 1.

vii. *Factor Rotation and Factor Scores*

Factor rotations are an orthogonal transformation of the factor loadings, as well as the implied orthogonal transformations of the factors. If $\hat{L}$ is the pxm matrix of estimated factor loadings obtained by any method, then $\hat{L}^* = \hat{L}T$, where $TT' = T'T = I$, was a pxm matrix of 'rotated' loadings, where I is the identity matrix. This shows that the estimated covariance (correlations) matrix remains unchanged since $\hat{L}\hat{L}' + \hat{\Psi} = \hat{L}TT'\hat{L}' + \hat{\Psi} = \hat{L}^*\hat{L}^{*'} + \hat{\Psi}$.

A useful byproduct of factor analysis was factor scores. Factor scores were composite measures that can be computed for each individual on each common factor. They are standardized measures with a mean = 0.00 and a standard deviation of 1.00, computed from the factor score coefficient matrix. For the given original data x_{ij} ($i = 1,2,3,\ldots n$ and $j = 1,2,3,\ldots, p$) the factor score of the i^{th} individual student on the k^{th} principal component retained can be calculated as: $\hat{f}_{ik} = \hat{l}_1 x_{1i} + \hat{l}_2 x_{2i} + \hat{l}_3 x_{3i} + \ldots + \hat{l}_p x_{pi}$, where

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$\hat{f}_{ik}$ =factor score of the i^{th} respondent/student for the k^{th} factor retained,

x_{ij} = observation of the i^{th} on the j^{th},

$\hat{l}_j$ = the principal component (factor) loading of variable j [15].

b) Multivariate Multiple Linear Regression Model

The multivariate extension of multiple linear regression was used to model the relationship between m responses $Y_1, Y_2, ..., Y_M$ and a single set of r predictor variables $z_1, z_2, ..., z_r$. Each of the m response was assumed to follow its own regression model, so that

$$Y_i = \beta_{0i} + \beta_{1i} z_i + \beta_{2i} z_i + ... + \beta_{ri} z_r + \varepsilon_i \text{ for all } i = 1,2,3,...,m.$$

The vector of error term ε has $E(\varepsilon) = E\left(\begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ .... \\ \varepsilon_m \end{bmatrix}\right) = 0$, $Var(\varepsilon) = \Sigma$

Thus, the error terms associated with different responses may be correlated.

Conceptually, we can let $(z_{j0}, z_{j1}, ..., z_{jr})$ denote the values of the predictor variables for the j^{th} trial (individual student) and $Y_j = \begin{bmatrix} Y_{j1} \\ Y_{j2} \\ ... \\ Y_{jm} \end{bmatrix}$,

$\varepsilon_j = \begin{bmatrix} \varepsilon_{j1} \\ \varepsilon_{j2} \\ ... \\ \varepsilon_{jm} \end{bmatrix}$ be the responses and errors for the j[th] (trial) individual student.

Thus we have a $n \times (r+1)$ design matrix of explanatory (predictor) variables or factors

$$\boldsymbol{Z} = \begin{pmatrix} Z_{10} & Z_{11} \dots & Z_{1r} \\ Z_{20} & Z_{21} \dots & Z_{2r} \\ & \dots\dots\dots & \\ Z_{n0} & Z_{n1} \dots & Z_{nr} \end{pmatrix}$$

Setting the matrix of response (dependent) variables, $\mathbf{Y}$ and a matrix of fixed unknown parameter, β and matrix of errors ε.

$$Y_{(n\times m)} = \begin{pmatrix} Y_{11} & Y_{12} \dots & Y_{1m} \\ Y_{21} & Y_{22} \dots & Y_{2m} \\ & \dots\dots\dots & \\ Y_{\cdot} & Y_{\cdot} \dots & Y \end{pmatrix} = \begin{pmatrix} Y_{(1)} \mid Y_{(2)} \mid ... \mid Y_{(m)} \end{pmatrix}$$

$$\beta_{((r+1)\times m)} = \begin{pmatrix} \beta_{01} & \beta_{02} \dots & \beta_{0m} \\ \beta_{11} & \beta_{12} \dots & \beta_{1m} \\ & \dots\dots\dots & \\ \beta_{r1} & \beta_{r2} \dots & \beta_{rm} \end{pmatrix} = \begin{pmatrix} \beta_{(1)} \mid \beta_{(2)} \mid \dots \mid \beta_{(m)} \end{pmatrix}$$

$$\boldsymbol{\varepsilon}_{(n\times m)} = \begin{pmatrix} \varepsilon_{11} & \varepsilon_{12} \dots & \varepsilon_{1m} \\ \varepsilon_{21} & \varepsilon_{22} \dots & \varepsilon_{2m} \\ & \dots\dots & \\ \varepsilon_{n1} & \varepsilon_{n2} \dots & \varepsilon_{nm} \end{pmatrix} = \begin{pmatrix} \boldsymbol{\varepsilon}_{(1)} \mid \boldsymbol{\varepsilon}_{(2)} \mid \dots \mid \boldsymbol{\varepsilon}_{(m)} \end{pmatrix}$$

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The multivariate linear regression model is: $Y_{(nxm)} = Z_{(nx(r+1))}\ \beta_{((r+1)xm)} + \varepsilon_{(nxm)}$ with $E(\varepsilon) = 0$ and $Cov(\varepsilon_i, \varepsilon_k) = \sigma_{ik} \times I$ for $i,k = 1,2,...,m.$ The '*m*' observed responses on the j[th] trial (student) have covariance matrix $\Sigma = (\sigma_{ik})$, but observations from different trials (individual students) are uncorrelated ([9]; [21]).

i. *Method of Parameter Estimation*

In the model above β and $\sigma_{i,k}$, i,k =1, 2, 3,…, *m*, are unknown parameters. The ordinary least squares (OLS) estimates $\hat{B}$ are found in a manner analogous to the uni-variate case. We begin by taking a single response solution as: $\hat{\beta}_{(i)} = (Z'Z)^{-1} Z' Y_{(i)}$. Then collecting the uni-variate least squares estimates yields:

$$\hat{\beta} = (Z'Z)^{-1} Z' \left(Y_{(1)} \mid Y_{(2)} \mid ... \mid Y_{(m)} \right) = (Z'Z)\hat{\beta}^{-1} Z' Y.$$

Using a matrix $\hat{\beta}$, one can easily ascertain that the matrices of predicted values: $\hat{Y} = Z\hat{\beta} = Z(Z'Z)^{-1} Z' Y$ and residuals: $\hat{\varepsilon} = Y - \hat{Y} = \left[I - Z(Z'Z)^{-1} Z' \right] Y.$ If the model is of full rank, rank (Z) = r + 1 < n; and ε and β are also uncorrelated. Furthermore, because $Y = \hat{Y} + \hat{\varepsilon}$, then one have

$$Y'Y = \hat{Y}'\hat{Y} + \hat{\varepsilon}'\hat{\varepsilon}$$

Total sums of squares and cross products (SSCP)	Predicted sums of squares and cross products (PSSCP)	Residual sums of squares and cross products (RSSCP)

Residual SSCP= $\hat{\varepsilon}'\hat{\varepsilon} = Y'Y - \hat{\beta} Z'Z \hat{\beta}$ and the unbiased estimator of Σ is $\hat{\Sigma} = \hat{\varepsilon}'\hat{\varepsilon} / (n - r - 1)$.

ii. *Test of Hypothesis*

The hypotheses of all explanatory have no effect on academic achievements of students jointly on the responses, i.e. the i^{th} school subject doesn't depend on the 'r' explanatory variables: $H_0 : \beta_{(s,i)} = 0$ Vs. $H_a : \beta_{(s,i)} \neq 0$ for all $s = 1,2,3,...,r$ and $i = 1,2,3,...,m$.

A test statistic: $t_{cal} = \hat{\beta}_{(s,i)} / S.E(\hat{\beta}_{(s,i)}) \sim t(n-(r+1))$, where $S.E(\hat{\beta}_{(s,i)}) = \sqrt{var(\hat{\beta}_{(s,i)})}$

$$Var(\hat{\beta}_{(i)}) = \hat{\sigma}_{i,i} (Z'Z)^{-1} = Diag\left[\hat{Var}(\beta_{0i}), \hat{Var}(\beta_{1i}), \hat{Var}(\beta_{2i}), ..., \hat{Var}(\beta_{r,i}) \right], \quad \hat{\sigma}_{i,i} = \hat{\varepsilon}_{(i)}'\hat{\varepsilon}_{(i)} / (n-r-1).$$

Decision Rule: if $t_{cal} > t_{(n-r-1)tab(\alpha/2)}$ or p-value less than $\alpha = 0.05$, we reject the null hypothesis. On the other hand, the confidence ellipsoid for β can be easily contracted with the one-at- a-time *t* value $t_{n-r-1}(\alpha/2)$ and using intervals $\hat{\beta}_i \pm t_{n-r-1}(\alpha/2) \times SE(\hat{\beta}_i)$. Here if the confidence interval includes $\beta_i = 0$, the variable z_i might be dropped out from the regression model [9].

iii. *Checking the Goodness of Fit of the Model*

It is imperative to examine the adequacy of the model before the estimated function becomes a permanent part of the decision making apparatus [9]. All the sample information on lack of fit is contained in the residuals.

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iv. *Residuals*

The residuals are defined as:

$$\hat{\varepsilon} = Y - \hat{Y} = \left[I - Z\left(Z' Z \right)^{-1} Z' \right] Y$$

Since a residual may be viewed as the deviation between the data and the fit, it is also a measure of the variability in the response variable not explained by the regression model. Plotting residuals is a very effective way to investigate how well the regression model fits the data and to check the assumptions.

v. *Normal Probability Plot*

The most commonly used methods of checking normality of an individual variable are the Quantile-Quantile plot (Q-Q plot), P-P plot and Normal Curve Histogram. The P-P plotted as expected cumulated probability against observed cumulated probability of standardized residuals – line should be at 45 degrees. The variable is normality distributed if this plot illustrates a linear relationship. In case of the assumption that says the combinations of variables follow a multivariate normal distribution, one can generally test each variable individually and assume that they are multivariate normal if they are individually normal [3]; [1]).

vi. *Ethical Issue/ Considerations*

Ethical approval was obtained from research ethics committee of Hawassa University, Postgraduate school of Computional sciences. Following the endorsement by the research ethics committee and acceptance of the postgraduate school and statistics department, Hawassa City Administration Education and Capacity Building Department was informed about the study through a support letter from Hawassa University research Postgraduate research office. Then verbal permission had been obtained from respective department of the city administration.

Following the endorsement by Hawassa City Administration Education and Capacity Building Department, the selected schools were informed about the objective of the study through a support letter from Hawassa City Administration Education and Capacity Building Department and oral permission and supports were obtained from the respected school principals, teachers and students. As the study was conducted through review of academic records, the individual person was not subjected to any harm as far as the confidentiality is kept. Consent was obtained from individual person or student who was selected to fill the study questionnaire. To preserve the confidentiality, data recorders or file keepers, in the City Administration Education and Capacity Building Department extracted the data from the academic records. Moreover, no personal identifiers were used on data collection form. The recorded data was never accessed by a third person except the principal investigator, and was kept with a firm confidentiality in a secured place.

IV. Results

a) Descriptive Results

From the results in Table 3.1, the average academic achievements of students measured in Mathematics, Biology, Physics, Chemistry and English subjects for non-government school students were, respectively, 2.99, 2.97, 2.50, 2.88, and 3.14 with standard deviations 0.822, 0.899, 0.942, 0.806 and 0.805, respectively, and that of government schools were 2.61, 2.73, 2.24, 2.74 and 2.77 with standard deviations 0.838, 0.866, 0.964, 0.872 and 0.802, respectively.

Table 3.1 : Cross Tabulation of School Type and Each School Vs Academic Achievement of Students in Each Selected Subject (Hawassa, 2010)

School Type	School Name		Students' Academic Achievement					Overall Average
			Maths	Biology	Physics	Chemistry	English	
	Comboni	N	35	35	35	35	35	35
		Mean	3.49	3.63	2.37	3.11	3.68	3.25
		SD.	0.743	0.598	0.877	0.758	0.471	0.689
	SOS	N	30	30	30	30	30	30
		Mean	2.83	2.87	2.23	2.83	3.07	2.77
		SD.	0.647	0.973	0.897	0.791	0.827	0.827
	Adventist	N	30	30	30	30	30	30
		Mean	2.90	2.77	2.63	2.77	2.80	2.77
		SD.	0.844	0.817	0.999	0.971	0.805	0.887
	Mount Olive	N	29	29	29	29	29	29
		Mean	2.72	2.55	3.03	2.97	3.10	2.88
		SD.	.702	.783	.778	.778	.772	0.763
Non-government	BNB	N	29	29	29	29	29	29
		Mean	2.83	2.72	2.31	2.79	2.93	2.72
		SD.	.889	.959	.967	.726	.753	0.859

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	Evan	N	27	27	27	27	27	27
		Mean	3.11	3.19	2.44	2.78	3.19	2.94
		SD.	.892	.834	.974	.800	.921	0.884
	Total	N	180	180	180	180	180	180
		Mean	2.99	2.97	2.50	2.88	3.14	2.89
		SD.	.822	.899	.942	.807	.806	0.855
	% of Total N		25.0%	25.0%	25.0%	25.0%	25.0%	25%
Government	Addis Ketema	N	140	140	140	140	140	140
		Mean	2.44	2.62	2.19	2.64	2.64	2.50
		SD.	.915	.978	.853	.866	.778	0.878
	Tabor	N	144	144	144	144	144	144
		Mean	2.64	2.74	2.22	2.91	2.72	2.65
		SD.	.744	.729	1.020	.860	.848	0.840
	Alamura	N	74	74	74	74	74	74
		Mean	2.58	2.70	2.31	2.66	2.90	2.63
		SD.	0.827	0.789	0.842	.865	.847	0.834
	Tulla	N	87	87	87	87	87	87
		Mean	2.52	2.91	2.31	2.76	2.88	2.68
		SD.	.744	.923	1.015	.889	.672	0.849
	Adare	N	94	94	94	94	94	94
		Mean	2.94	2.79	2.23	2.73	2.87	2.71
		SD.	.865	.878	1.082	.869	.819	0.903
	Total	N	539	539	539	539	539	539
		Mean	2.61	2.74	2.24	2.75	2.78	2.62
		SD.	.838	.867	.964	.872	.803	0.869
	% of Total N		75.0%	75.0%	75.0%	75.0%	75.0%	75%

Table 3.2 : Descriptive Statistics Student's Achievement in Ascending Order for the Overall Sample of Students (Hawassa, 2010)

	N	Mean	SD	CV%
English	719	2.87	0.819	28.512
Biology	719	2.79	0.880	31.474
Chemistry	719	2.78	0.858	30.819
Mathematics	719	2.71	0.849	31.386
Physics	719	2.31	0.965	41.852

Table 3.2 shows the mean academic achievements and the coefficient of variations for the five subjects. In terms of coefficient of variation, the variability was the lowest for English and highest for Physics subjects. This may indicate that students' achievements were most consistent for the English subject and least consistent for Physics subject. Physics was considered as difficult subject for many students.

b) Results of Factor Analysis

Before conducting the central MVML and multivariate multiple regression analyses it is important first to establish the psychometric properties of the instrument used. Principal Component Factor Analysis was done in two steps. The first one was a general PCFA that considered the socio-economic and demographic variables with general school characteristic variables and the second was a separate PCFA relative to each achievement measures of the five subjects. This provided component factors for each of the five school subjects each based on the subject related observed items as students' responses on their personal, school and teacher characteristic variables relative to school subjects. The overall reliability was computed to be Cronbach's alpha=0.724 indicating that the questionnaire items were consistent.

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Table 3.3 : KMOs and Bartlett's Tests for Factor Analyses

Responses		Separate Principal Component Factor Analysis					General PCFA
		Maths	Biology	Physics	Chemistry	English	
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.805	0.771	0.821	0.777	0.838	0.789
Bartlett's Test of Sphericity	Approx. Chi-Square	11170.0	8459.0	14820.0	6293.0	9703.0	8391.0
	df	153	190	231	210	231	300
	P-value	0.000*	0.000*	0.000*	0.000*	0.000*	0.000*

**Significant (P-value <0.05)*

The KMO statistic values test if sufficient items (by partial correlation among variables) are available for each factor component in the factor analysis. KMO statistic for the separate PCFA with respect to the school subjects Mathematics, Biology, Physics, Chemistry and English were 0.81, 0.77, 0.82, 0.78 and 0.84, respectively; with the general PCFA of 0.79. These were all greater than 0.5 indicating that the sampling was adequate for factor analysis and there were significant relationships among the perceived factors of achievements in the school subjects.

The data were also checked for Bartlett's test of Sphericity to see that the original variables were sufficiently (bi-variate) correlated and these met the criteria with

$$\chi^2_{153,\text{Mathematics}} = 11170.0\ (P-value < 0.001),\ \chi^2_{190,\text{Biology}} = 8459.0\ (P-value < 0.001),$$

$$\chi^2_{231,Physics} = 14820.0\ (P-value < 0.001),\ \chi^2_{210,Chemistry} = 6293.0\ (P-value < 0.001),$$

$$\chi^2_{231,English} = 9703.0\ (P-value < 0.001) \text{ and } \chi^2_{300,General} = 8391.00\ (P-value < 0.001).$$

These indicated that the original observed variables were sufficiently correlated (the variables were not completely uncorrelated) and factor analysis was possibly appropriate in each case. The output matrixes contained the loading of each variable onto each factor. All loadings less than 0.5 were suppressed in the output and so were blank spaces for many of the loadings. Thus, the loadings were acceptable and easy for interpretation.

The results of separate factor analysis (with factor loadings greater than 0.5) are presented in Tables 4, 5, 6, 7 and 8 of Appendix-1 and Figures 1 in Appendix-2 of the Scree plots. The criteria that the required amount of explained variation accounted for being large, logical interpretability of factors and Scree plot tests were considered with Kaiser Criteria. Kaiser criteria is accurate when there are less than 30 variables with lager sample and communalities after extraction being greater than 0.6. Depending on the correlation matrix and communalities, some observed variables were rejected. Of all 140 observed items, using principal component extraction and Varimax rotation, the study found factor solution of the 28-variables for each subject. Then, six underlying common factors were obtained for each separate factor analysis of Biology, Physics, Chemistry and English related items that constituted or explained 76.67%, 78.80%, 68.64% and 73.43% of the total variability in the corresponding original observed variables, respectively. There were four common factors for Mathematics related items which constituted or explained 77.38% of the total variability in the original observed variables related to Mathematics.

Factor scores of each component factor for each of the 719 individual respondents were computed and these scores were used as data for further analysis. The common factors obtained from the general and separate PCFAs which were used as covariates,

- School facilities (SF),
- Family status (FS),
- School volume (SV),
- Safe reading (SafR),
- Interest (InterstS) to the subjects,
- Motivation (MotivS) to the subjects,
- Trouble (TroubS) to the subjects and
- Self-concept (SelfC) to the subjects.

Table 3.4 : The Generalized Principal Component Factor Analysis (Hawassa, 2010)

Accounted for 64.28%	Common Factors: Component						Communality
	1	2	3	4	5	6	
Eigenvalues	4.56	3.50	2.70	2.21	1.65	1.45	
Variations accounted for %	18.24	14.0	10.8	8.84	6.60	5.80	
Parent student communication	.902						0.841

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Parent teacher communication	.891						0.813
Satisfaction in food at home	.853						0.767
Availability of books at home	.840						0.750
Mother education level	.824						0.685
Father education level	.795						0.702
School amenity		.763					0.606
School instructional materials		.729					0.685
School human resources		.725					0.591
School laboratory facilities		.684					0.654
School library facilities		.635					0.568
School equipment		.619					0.588
School academic and counseling services		.540					0.533
Satisfaction in school administration			.932				0.891
Student confidence			.823				0.770
School health services			.776				0.692
School rules and regulations			.533				0.554
Teacher average experience				.765			0.627
Teacher average work load				.764			0.593
School size (total number of students in the school)				.724			0.551
Class size (number of students in per class)				.603			0.643
Distance from home to school					.831		0.694
Home location for the school					.815		0.706
Comfort of studying at school						.771	0.614
Comfort of studying at home						.687	0.571

- *Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.*
- *Loadings Less than 0.5 were suppressed.*

c) *Results of Multivariate Multiple Linear Regression Analysis*

Multivariate multiple linear regression analysis was used to examine the effect of independent variables or factors on the outcome variables, i.e. academic achievement in selected subjects. Most of the explanatory variables were the common factors obtained from the general PCFA and some were the regularly appeared component factors in each separate PCFA.

Table 3.5 : Model Summary of Multivariate Multiple Linear Regression Model

	Responses				
	Mathematics	Biology	Physics	Chemistry	English
R^2	0.72	0.74	0.68	0.68	0.71
$R^2_{adj.}$	0.64	0.67	0.61	0.64	0.65

The results are shown in Table 3.6. In this analysis the overall determinants of academic achievement were assessed in terms of the five school subjects to identify the basic determinant factors for both government and non-government schools taken together. The factors sex, school type and school facilities (SF) were found to be jointly statistically significant for achievements in all the five selected school subjects. Family status (FS) was significant for achievements in the four school subjects (Biology, Physics, Chemistry and English) but statistically insignificant for achievement in Mathematics. School volume (SV) has a significant influence on achievements in the two school subjects Biology and Chemistry. Interest to the subjects (InterstS) has a significant influence on academic achievements of students in Biology and Physics. Moreover, the factors trouble to the subject (TroubS) and motivation (MotivS) to the subject in terms of Mathematics, self-concept (SelfC) in terms of Physics and students future aspiration (FutureAspira) in terms of Physics and Chemistry had significant impact on student's academic achievement as observed in overall combined data of government and non-government schools.

Moreover, the factors such as sex, interest to the subject (InterstS), motivation to the subject (MotivS), self-concept (SelfC), family status (FS), school facilities (SF) and future aspiration (Future Aspira) had positive impacts on students' academic achievements of the school subjects. However, trouble (TroubS) of the subjects and school volume (SV) showed significant negative impact on students' achievements of all the five subjects.

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Table 3.6 : Parameter Estimates of Multivariate Multiple Liner Regression for Overall Samples Data

Dependent Variable	Parameter	$\hat{\beta}$	S.E.	t-value	P-value	95% CI	
						Lower	Upper
Maths	Intercept	3.042	.117	26.105	.000*	2.814	3.271
	Sex	.149	.064	2.316	.021*	.023	.275
	School Type	-.410	.080	-5.121	.000*	-.567	-.253
	Interest to the subject (InterstS)	.008	.013	.658	.511	-.017	.034
	Trouble of the subject (TroubS)	-.037	.014	-2.669	.008*	-.064	-.010
	Self-concept (SelfC)	.025	.014	1.837	.067	-.002	.052
	Motivation to the subject (MotivS)	.028	.010	2.866	.004*	.009	.048
	School facilities (SF)	.093	.032	2.917	.004*	.030	.156
	School volume (SV)	-.030	.034	-.885	.377	-.097	.037
	Family status (FS)	-.023	.032	-.720	.472	-.085	.039
	Future aspiration (FutureAspira)	-.020	.015	-1.324	.186	-.050	.010
Biology	Intercept	2.808	.119	23.621	.000*	2.575	3.041
	Sex	.291	.066	4.436	.000*	.162	.420
	School Type	-.309	.082	-3.781	.000*	-.469	-.148
	Interest to the subject (InterstS)	.027	.013	2.028	.043*	.001	.052
	Trouble of the subject (TroubS)	-.025	.014	-1.757	.079	-.053	.003
	Self-concept (SelfC)	.000	.014	.032	.974	-.027	.028
	Motivation to the subject (MotivS)	-.007	.010	-.698	.486	-.027	.013
	School facilities (SF)	.210	.033	6.447	.000*	.146	.273
	School volume (SV)	-.075	.035	-2.138	.033*	-.143	-.006
	Family status (FS)	.128	.032	3.943	.000*	.064	.191
	Future aspiration (FutureAsp)	.010	.016	.672	.502	-.020	.041
Physics	Intercept	1.941	.131	14.826	.000*	1.684	2.198
	Sex	.204	.072	2.815	.005*	.062	.345
	School Type	-.172	.090	-1.916	.056	-.349	.004
	Interest to the subject (InterstS)	.033	.014	2.293	.022*	.005	.061
	Trouble of the subject (TroubS)	.001	.016	.065	.948	-.030	.032
	Self-concept (SelfC)	.034	.015	2.242	.025*	.004	.065
	Motivation to the subject (MotivS)	.002	.011	.140	.889	-.020	.023
	School facilities (SF)	.087	.036	2.423	.016*	.016	.157
	School volume (SV)	.030	.038	.772	.440	-.046	.105
	Family status (FS)	.229	.036	6.428	.000*	.159	.299
	Future aspiration (FutureAspira)	.070	.017	4.050	.000*	.036	.103
Chemistry	Intercept	2.780	.118	23.559	.000*	2.549	3.012
	Sex	.338	.065	5.193	.000*	.210	.466
	School Type	-.274	.081	-3.375	.001*	-.433	-.114
	Interest to the subject (InterstS)	.013	.013	1.020	.308	-.012	.039
	Trouble of the subject (TroubS)	-.013	.014	-.936	.350	-.041	.014
	Self-concept (SelfC)	-.003	.014	-.231	.817	-.030	.024
	Motivation to the subject (MotivS)	-.010	.010	-1.000	.318	-.030	.010
	School facilities (SF)	.144	.032	4.471	.000*	.081	.208
	School volume (SV)	-.113	.035	-3.275	.001*	-.181	-.045
	Family status (FS)	.069	.032	2.138	.033*	.006	.132
	Future aspiration (FutureAspira)	.003	.015	.214	.831	-.027	.034
English	Intercept	3.065	.112	27.250	.000*	2.844	3.286
	Sex	.155	.062	2.497	.013*	.033	.277
	School Type	-.387	.077	-5.002	.000*	-.538	-.235
	Interest to the subject (InterstS)	.002	.012	.179	.858	-.022	.027
	Trouble(anxiety) of the subject (TroubS)	-.006	.013	-.453	.651	-.032	.020
	Self-concept (SelfC)	.004	.013	.304	.762	-.022	.030
	Motivation to the subject (MotivS)	.017	.010	1.764	.078	-.002	.035
	School facilities (SF)	.151	.031	4.920	.000*	.091	.212
	School volume (SV)	-.030	.033	-.907	.364	-.095	.035
	Family status (FS)	.061	.031	1.984	.048*	.001	.121
	Future aspiration (FutureAspira)	.002	.015	.109	.914	-.027	.031

**Significant (P-value < 0.05)*

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V. Discussions and Conclusions

The PCFA technique was used as separate PCFA of items with respect to the each five responses and the general PCFA incorporated other general student with family and school with teacher characteristics variables in the data reduction. The multivariate single level multiple linear regression was applied on overall schools data. The results obtained are discussed as follows:

On an average, students, in non-government secondary schools, performed better than those in government secondary schools in almost all the achievement measures of the five school subjects. This might be because of higher availability of school and home educational supply and facilities, better study positions and higher parental involvement with teachers and students at the schools as compared to that at government schools. Moreover, on overall average, male students achieved better in almost all school subjects than female students. This implied that the school and family might treat gender differently and the variation in students' personal factors such as trouble to the subjects, self-concept, interest and motivation to the subjects showed significant impact on students' achievement ([4]; [6]; [20]).

The results obtained from the separate PCFA in each achievement measuring response indicated that about four factors related to Mathematics and six factors related to Biology, Physics, Chemistry and English were sufficient to explain the total achievement variability. Thus, factors self-concept to the subjects, motivation to the subjects, interest to the subjects, trouble (anxiety) to the subjects, teaching-learning process and absenteeism explaining most of the achievement variations in five school subjects. Moreover, the result of general PCFA indicated that the factor named as family status (FS) that encompasses parent-student communication, parent-teacher communication, availability of book at home, satisfaction in food available at home, mother educational level and father education level explained the higher variability for the overall achievement. This finding is in consistent with other studies ([13]; [18]).

The result of the multivariate multiple linear (single-level) regression analysis point to several interesting overall findings. The result indicated that the factors sex, school type, school facility (SF) which encompassed availability and satisfactoriness of school amenity, human resources, library, laboratory, equipment and academic counseling have significant impacts on achievements of the students in terms of all the selected five subjects. School volume (SV) that encompassed school size, class size, teacher workload and experience had a significant negative impact on academic achievements in terms of Biology and Chemistry. This may be due to the negative effect of school size, class size and teacher work load on academic achievement of students at school, as reported earlier ([16]; [17]).

The factor school facility (SF) that deals availability and satisfactoriness of the school instructional materials, school library, laboratories, amenities, academic counseling services and other school characteristics had significant positive impact in all five school subjects used as a measures of academic achievement. Family status (FS) which encompass parent-student communication, parent-teacher communication, availability of book at home, satisfaction in food available at home, mother educational level and father education level had a significant positive impact on academic achievements in terms of Biology, Physics, Chemistry and English subjects as observed earlier ([18]; [19]).

This study was intended to identify some factors influencing the academic achievements of students' measured by five selected subjects (Mathematics, Biology, Physics, Chemistry and English) at secondary school level based on primary and secondary data. Accordingly, factor analysis, multivariate multiple linear regression and MVML multiple linear regression techniques on the five school subjects were employed.

The factor analyses conducted in this study indicated that 4 or 6 factors (instead of twenty eight original observed variables or items) were sufficient to explain 77.4%, 76.7%, 78.8%, 68.6% and 73.4% the total variation in achievement for each separate PCFA of observed items related to Mathematics, Biology, Physics, Chemistry and English subjects, respectively. The factors self-concept, motivation, interest and trouble to the subject were the common factors explaining most of the variability of achievements in terms of each five subject, since these factors were appeared regularly in each separate PCFA. Moreover, six common factors were enough to explain about 64% of the variation using 34 originally observed variables in the generalized PCFA.

The study revealed that the factors sex, school type, family status (FS) holding parents–student communication, parent-teacher communication, satisfaction in food available at home, availability of books at home, mother educational level and father education level, and school facility (SF) enclosing school instructional materials, amenities, library and laboratory facilities had statistically significant influence on achievements of students for the selected subjects. Moreover, school volume (SV) that covers school size, class size, teacher work load and teacher experience in teaching; interests to the subject, motivation to the subject, trouble to the subject and self-concept in school subjects have been significant factors

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influencing students achievement on the school subjects.

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Appendices

Appendix-1

Table 1 : Separate Principal Component Factor Analysis of Items Related to Maths as Opinions of 719 Sample Students (Cronbach's =0.73, Hawassa, 2010)

Accounted for 77.38%	Common Factors: Components				Communality
	1	2	3	4	
Eigenvalues	4.56	3.41	3.28	2.67	
% Variations accounted for	25.42	18.93	18.19	14.84	
Need to do Maths well to get into the University	.905				0.832
The teacher prepares well for Maths daily lessons	.894				0.813
Need to do Maths well to get job	.873				0.782
Learning Maths helps me in my daily life	.845				0.717
Exam questions of Maths are standard	.839				0.726
Teaching Maths covers the whole syllabus	.828				0.692
Often study Maths in groups		.944			0. 907
Maths is difficult to learn		.912			0.861
No strength in learning Maths		.895			0.810
Need lots of hard work studying Maths to perform well		.894			0.835
Teaching method used by Maths teacher fits with the current curriculum			.933		0.880
I am satisfied with the current curriculum of Maths			.921		0.857
Maths need more time to understand			.886		0.809
Maths is Boring			.833		0.729
I usually do Maths well				.898	0.819
Enjoy learning Maths				.874	0.784
I have natural talent in Maths.				.764	0.603
Understand Maths quickly in class				.625	0.568

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

Table 2 : Separate Principal Component Factor Analysis of Items Related to Biology as Opinions of 719 Sample Students (Cronbach's α =0.72, Hawassa, 2010)

Accounted for 76.65%	Common Factors: Components						Communality
	1	2	3	4	5	6	
Eigenvalues	4.13	3.52	2.34	2.17	1.63	1.55	
%Variations accounted for	20.63	17.57	11.69	10.87	8.14	7.75	
The teacher prepares well for Biology daily lessons	.914						0.853
Need to do Biology well to get into the Preparatory or University	.907						0.847
Need to do Biology well to get job	.902						0.820
Learning Biology helps me in my daily life	.897						0.833
Teacher is efficient and skilled while teaching Biology	.864						0.754
I usually do Biology well		.949					0.922
Understand Biology quickly in class		.911					0.864
Enjoy learning Biology		.900					0.844

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I have natural talent in Biology		.900					0.848
No strength in learning Biology			.893				0.845
Biology is difficult to learn			.886				0.834
Need lots of hard work studying Biology to perform well			.795				0.661
Biology need more time to understand				.880			0.786
I am satisfied with the current curriculum of Biology				.845			0.741
Biology is Boring				.798			0.697
Biology teacher often absent from class					.799		0.668
Biology teacher is often late for class					.724		0.574
Student absent from Biology class at least one per week					.626		0.644
The most preferred time of studying for Biology						.862	0.761
The most preferred study place for Biology						.855	0.740

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

Table 3 : Separate Principal Component Factor Analysis of Items Related to Physics as Opinions of 719 Sample Students (Cronbach's α =0.71, Hawassa, 2010)

Accounted for 78.80%	Common Factors: Components						Communality
	1	2	3	4	5	6	
Eigenvalues	3.90	3.75	3.64	2.86	1.60	1.58	
% Variations accounted for	17.75	17.06	16.55	13.01	7.27	7.18	
Need to do Physics well to get job	.898						0.835
Need to do Physics well to get into the Preparatory or University	.871						0.789
Teaching Physics covers the whole syllabus	.850						0.784
Learning Physics helps me in my daily life	.837						0.738
I have natural talent in Physics.	.794						0.676
I usually do Physics well		.967					0.951
Understand Physics quickly in class		.965					0.952
Enjoy learning Physics		.964					0.948
Physics need more time to understand		.956					0.923
Teacher is efficient and skilled while teaching Physics			.941				0.913
I am satisfied with the current curriculum of Physics			.940				0.933
Often study Physics in groups			.929				0.502
Need lots of hard work studying Physics to perform well			.911				0.888
Physics is Boring				.977			0.961
Physics is difficult to learn				.973			0.955
No strength in learning Physics				.947			0.899
Physics teacher is often late for class					-.730		0.609
Student get at least a onetime Physics homework /assignments/ class works per week					.697		0.565
Physics teacher often absent from class					-.688		0.596
Exam questions of Physics are standard						.778	0.641
Teaching method used by Physics teacher fits with the current curriculum						.648	0.547
The teacher prepares well for Physics daily lessons						.556	0.573

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

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Table 4 : Separate Principal Component Factor Analysis of Items Related to Chemistry as Opinions of 719 Sample Students (Cronbach's α =0.74, Hawassa, 2010)

Accounted for 68.64%	Common Factors: Components						Communality
	1	2	3	4	5	6	
Eigenvalues	3.03	2.70	2.64	2.32	1.88	1.85	
% Variations accounted for	14.42	12.85	12.56	11.05	8.96	8.81	
Teaching method used by Chemistry teacher fits with the current curriculum	.884						0.802
Exam questions of Chemistry are standard	.870						0.793
The teacher prepares well for Chemistry daily lessons	.837						0.742
There are enough text and reference books at school for Chemistry	.809						0.671
I usually do Chemistry well		.804					0.708
I have natural talent in Chemistry		.792					0.685
Enjoy learning Chemistry		.760					0.669
Understand Chemistry quickly in class		.744					0.577
No strength in learning Chemistry			.832				0.710
Chemistry is Boring			.824				0.742
Chemistry is difficult to learn			.804				0.723
Need lots of hard work studying Chemistry to perform well			.669				0.596
Need to do Chemistry well to get into the Preparatory or University				.867			0.781
Need to do Chemistry well to get job				.859			0.763
Learning Chemistry helps me in my daily life				.850			0.745
Chemistry teacher often absent from class					.870		0.781
Student absent from Chemistry class at least one per week					.821		0.678
Chemistry teacher is often late for class					.638		0.554
Often study Chemistry in groups						.813	0.676
I am satisfied with the current curriculum of Chemistry						.785	0.674
Chemistry need more time to understand						.708	0.552

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

Table 5 : Separate Principal Component Factor Analysis of Items Related to English as Opinions of 719 Sample Students (Cronbach's α =0.72, Hawassa, 2010)

Accounted for 73.43%	Common Factors: Components						Communality
	1	2	3	4	5	6	
Eigenvalues	3.66	3.59	3.50	2.70	1.45	1.25	
% Variations accounted for	16.65	16.31	15.93	12.28	6.59	5.67	
Need to do English well to get into the Preparatory or University	.862						0.758
Learning English helps me in my daily life	.857						0.751
The teacher prepares well for English daily lessons	.833						0.738
Need to do English well to get job	.827						0.741
Teacher is efficient and skilled while teaching English	.784						0.683
Exam questions of English are standard		.850					0.774
Need lots of hard work studying English to perform well		.845					0.732
I am satisfied with the current curriculum of English		.844					0.783
Teaching method used by English teacher fits with the current curriculum		.843					0.797
English need more time to understand		.743					0.577

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I have natural talent in English			.936				0.898
Enjoy learning English			.934				0.895
Understand English quickly in class			.934				0.894
I usually do English well			.869				0.768
No strength in learning English				.868			0.789
English is difficult to learn				.842			0.723
English is Boring				.836			0.744
Student absent from English class at least one per week				.665			0.573
English teacher often absent from class					.824		0.710
English teacher is often late for class					.802		0.684
The most preferred study place for English						.782	0.629
The average time spent on studying English (hours)						.758	0.611

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

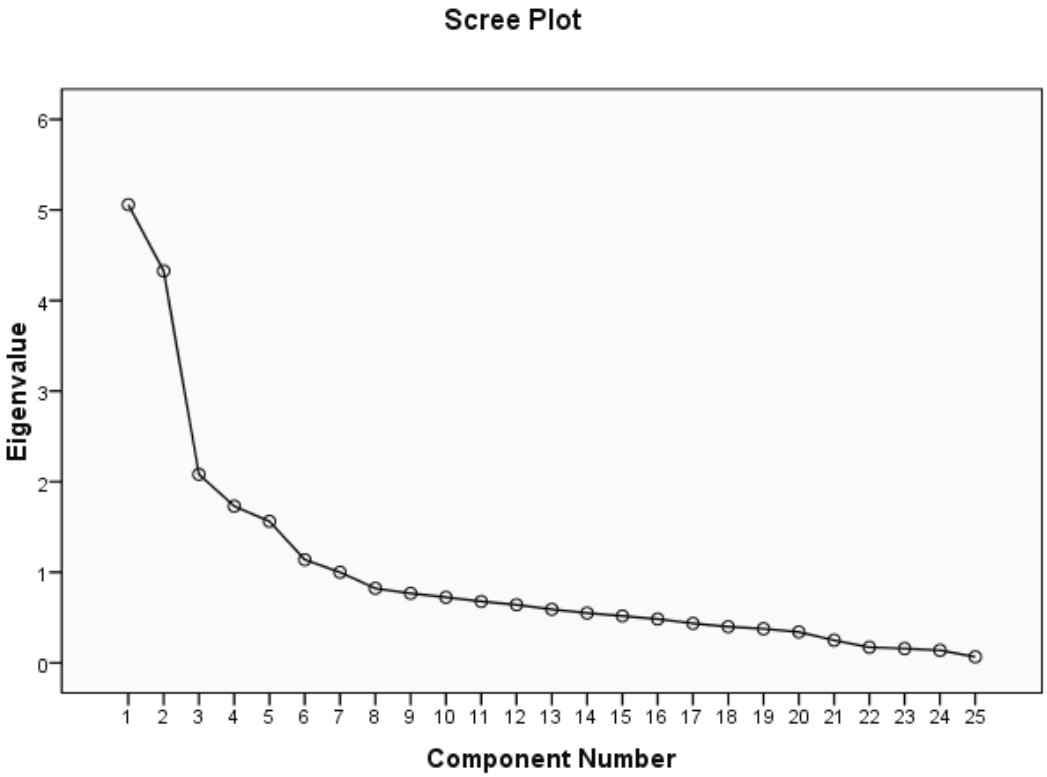
Table 6 : Correlation among Component Factors That Used as Predictors (Covariates)

	Sex	ScType	InterstS	TroubS	SelfC	MotivS	SF	SV	FS	SafR	FutA
Sex	1										
ScType	.038	1									
InterstS	.011	-.012	1								
TroubS	-.030	.119**	.117**	1							
SelfC	-.050	.042	.261**	.007	1						
MotivS	.114**	-.114**	-.112**	-.023	-.047	1					
SF	-.059	.063	-.033	-.148**	.175**	-.120**	1				
SV	.034	-.438**	-.076*	-.019	-.064	.104**	.000	1			
FS	-.240**	-.085*	-.084*	-.092*	-.032	.021	.000	.000	1		
SafR	-.076*	-.055	.065	-.003	.005	-.061	.000	.000	.000	1	
Future Aspire	-.035	-.118**	.032	-.011	-.077*	.307**	-.142**	.083*	.045	-.063	1

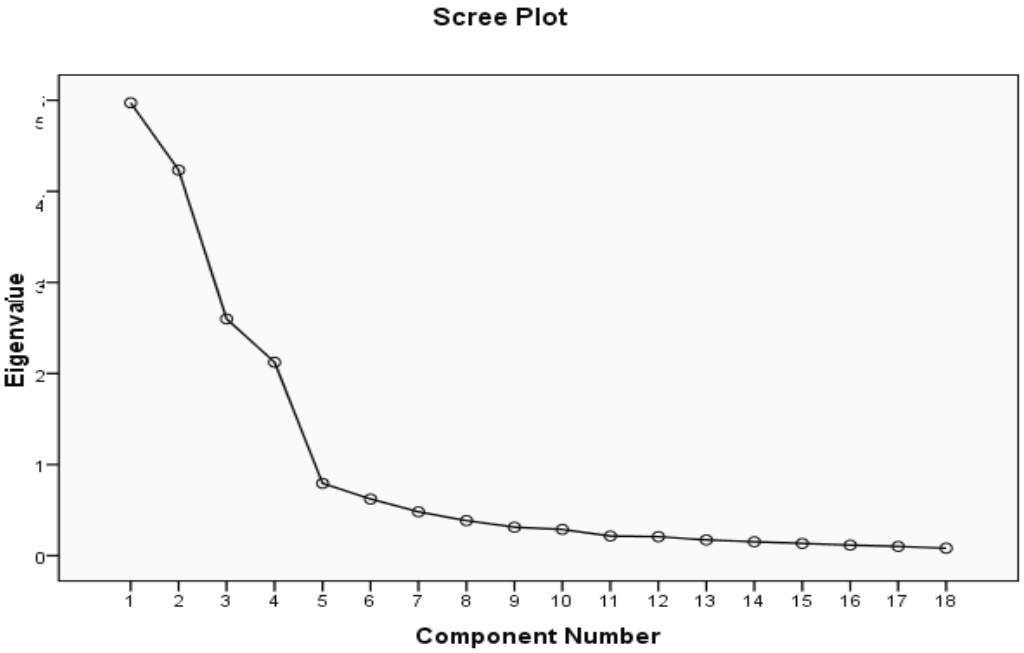
***.Correlation is significant at the 0.01 level (2-tailed)*
**. Correlation is significant at the 0.05 level (2-tailed)*

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Appendix-2: Graphs/Figures for Checking Model Adequacy

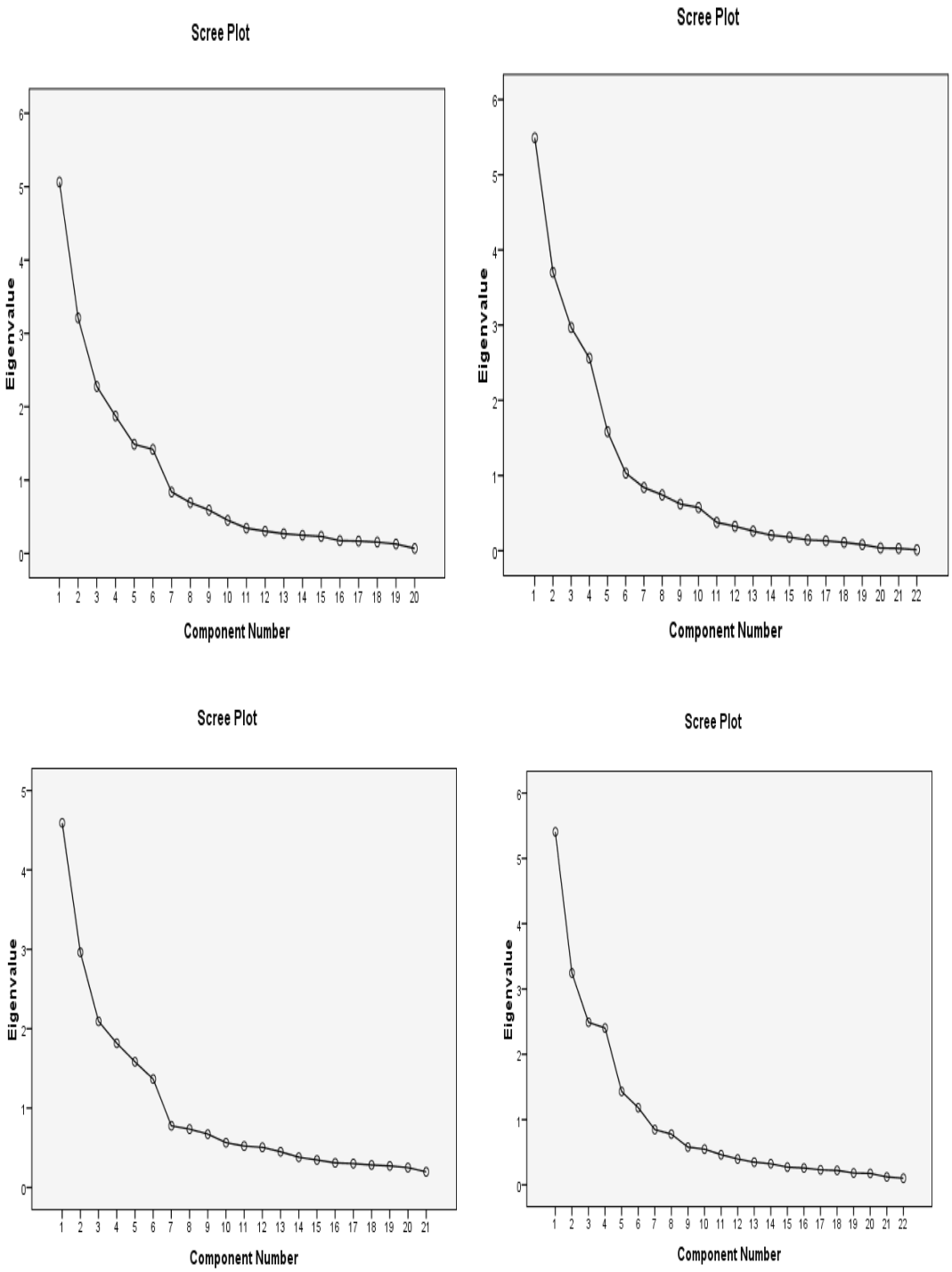


The Generalized PCFA



PCFA of Mathematics Related Items

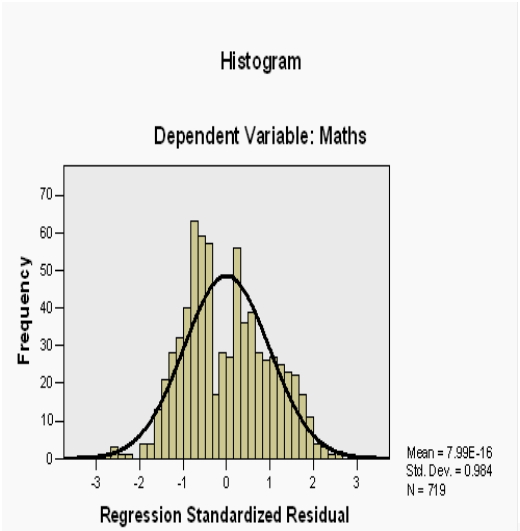
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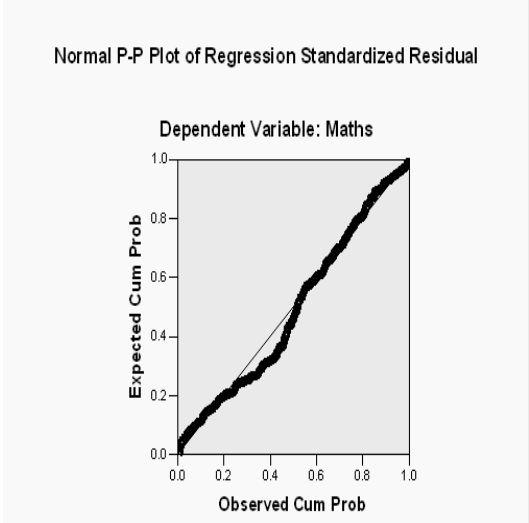


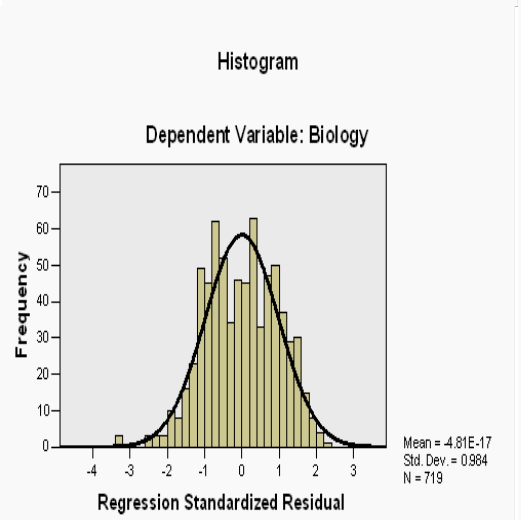
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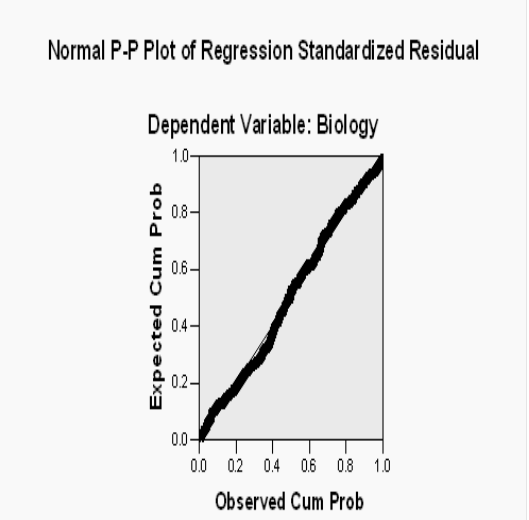
Figure 1 : The Scree Plots to Test for the Number of Factors Retained in the Generalized and Separate PCFA, Respectively

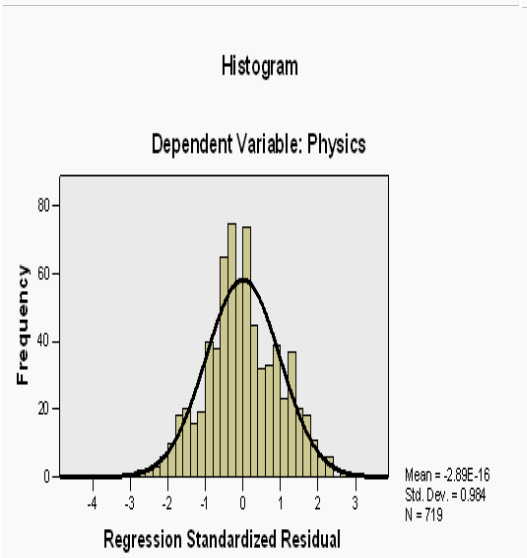
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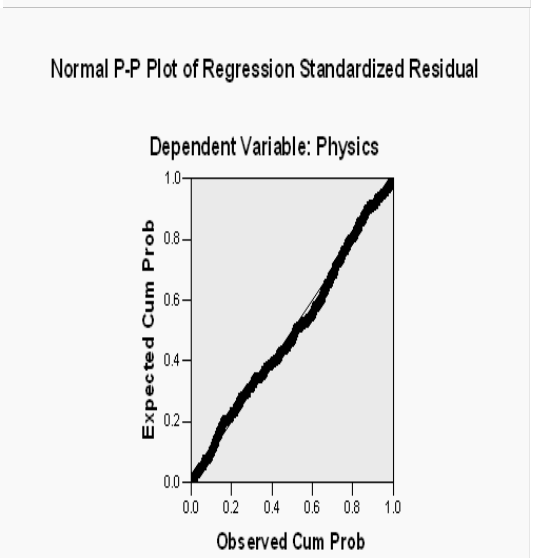












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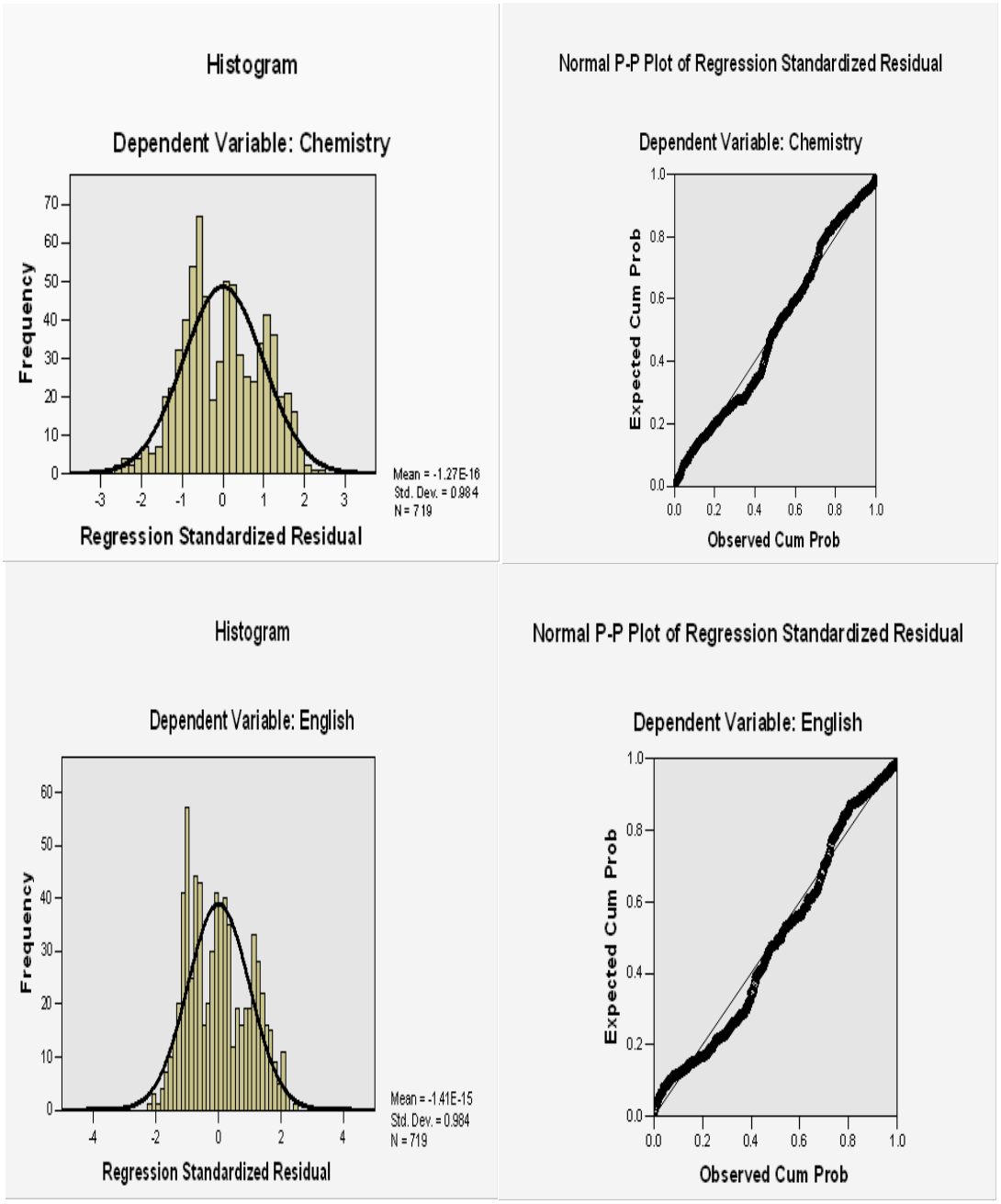


Figure 2 : Checking Model Adequacy of Multivariate (OLS) Multiple Linear Regression for Overall Sample Data

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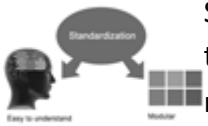


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References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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