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Investigating the Understanding of Basic Elementary Geometry Concepts among Bachelor of Science Graduates in Mathematics Education

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Abstract

The purpose of this study was to investigate BSC graduated mathematics teachers' understanding of some basic elementary geometry concepts. To conduct the study, descriptive survey design and inferential t-test were employed. A total of 53 where 43 males and 10 female mathematics teachers, who came to attend Post Graduate Diploma (PGDT/Teaching) program in 2018/2019 Dilla University Ethiopia, constituted by convenience sampling techniques were participated in the study and completed the achievement test. A 15-item achievement test on basic elementary geometry concepts in Mathematics were used as an instrument for the study. The findings revealed that, out of 15 concepts, 1.55 and 1.85 were answered by female and male teachers respectively. Where it perceived as difficult to understand and solve by BSC graduated Mathematics teachers. Also, there was no significant difference in teachers' gender understanding and solving elementary basic concepts in geometry is p=0.372 greater than p=0.05 level of significant. It is therefore recommended that extremely important BSc holders in mathematics teachers' skill up through their professional development program, the stakeholders and the MOE have to step up conscription efforts and universities have to take an action like workshop to fill the gap.

1 Introduction

1.1 Motivation and Background of the Study

Ethiopia, like many other developing nations in Africa, places high importance on advancing science, technology, agriculture, industry, and education. Within this context, mathematics plays a pivotal role in supporting national development. Its application extends across numerous disciplines, making it not only a language of science but also a unifying tool and an art form with wide-ranging uses. Different branches of mathematics serve as essential foundations for various careers. For instance, algebra supports fields such as computer science, cryptography, and chemistry; analysis and differential equations are crucial in engineering, biology, and business modeling; and geometry provides indispensable tools in both science and art (Asnake, 2016).

Geometry is applied extensively by architects, engineers, and scientists. It enables learners to understand the structure of their environment, from crystal formations to planetary orbits, and it can make mathematics more engaging and enjoyable (Serin, 2018). Therefore, mathematics teachers are expected to possess a thorough understanding of geometry to effectively teach and inspire students. Despite its significance, several studies have noted that geometry remains underemphasized in school curricula, particularly at the early stages of learning (Melo & Martins, 2015).

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1.2 Statement of the Problem

Basic geometry encompasses core ideas such as plane and solid figures, properties of polygons, relationships within triangles, criteria for similarity and congruence, circle properties, and measurement of length, area, and volume of three-dimensional shapes like prisms, cylinders, cones, and spheres (Melo & Martins, 2015). For mathematics teachers, mastering these concepts is vital, as their confidence and clarity directly influence how well students grasp the subject. Unfortunately, research has shown that many high school mathematics teachers struggle with misconceptions or insufficient understanding of geometry. A lack of well-prepared teachers has been identified as a key contributor to students' poor performance in mathematics, given that teachers are the single most important factor influencing achievement (Iheanachor, 2007).

In addition, gender differences in mathematics achievement, particularly in geometry, have received increasing attention in recent studies. Some findings suggest that male students often perform better than females in mathematical reasoning (Kurumeh & Iji, 2009; Wushishi & Usman, 2013), whereas other studies report no meaningful gender gap (Popola, 2008, as cited in Asnake, 2016). This inconsistency underscores the need for further investigation.

Against this backdrop, the present study seeks to examine the extent to which BSc graduates in mathematics education understand fundamental geometry concepts, while also exploring possible gender differences in their performance.

1.3 Purpose of the Study

The main purpose of the study is to investigate mathematics teacher's knowledge or understanding of some basic elementary geometry concepts. Specifically, the study focuses on the adequacy of mathematics teachers in teaching high school geometry. Currently, the graduates of mathematics and natural science teachers are found to be least competent to teach their subjects (MOE, 2016a) as cited in (Tirussew, Amare, Jeilu, Tassew, Aklilu, & Berhannu, 2018). Because of the least competitive mathematics teachers, students may lose the benefit of the investigative process in mathematics that can be used to foster a relatively informal atmosphere in a mathematics classroom in which communication and debate are encouraged. It has been stated "mathematics classrooms were once envisaged as silent places" and communication between children (Quinnell, 2010).

Thus, it seems that teachers' role in teaching geometry lessons in high school is immense. However, teachers seem resistant to committee themselves and apply the principles of geometry lessons. There is no research evidence for why the majority of Ethiopian BSC graduated teacher's feel uncomfortable with this teaching geometry lessons. Therefore, more research is needed on assessing the extent of understanding of BSC graduated teachers on basic geometry concepts. Therefore, this study seeks an answer for the following research questions.

1.4 Research Questions

1. To what extent do BSc-graduated teachers understand and solve some basic elementary geometry concept questions?

2. Does the comprehension and ability to solve simple, elementary geometry problems differ significantly between male and female BSc graduates?

1.5 Objective of the Study

General Objective

The general objective of this study is to assess the extent of understanding of BSC graduated teachers on basic elementary geometry concepts.

Specific Objectives

The specific objectives of the present study are:

1. to explore the extent to which BSc-graduated teachers understand and solve basic elementary geometry concept questions,

2. to assess the gender difference in understanding and solving basic elementary geometry questions among BSc-graduated teachers

1.6 Hypothesis

H_o: There is no significant difference between the two genders of BSc graduate teachers in understanding and solving some basic elementary geometry questions.

1.7 Significance of the Study

This study will benefit different parties. The study will benefit BSC in Mathematics graduating teachers by becoming aware of the principles and practice of geometry lessons and implement it accordingly. Moreover, it will help them move one step ahead from where they are in their professional career. BSC in Mathematics graduating teachers are also expected to reflect on their practice and test theories and hypotheses in practice to become reflective practitioners. Students also benefit from quality instruction teachers deliver and improve their learning process, social skills and achievement when teachers act in principled and informed ways.

2 Methods

2.1 Population and Sample

This study was conducted on BSC in Mathematics graduate teachers of PGDT trainers. Population of the study is Mathematics graduate teachers. There were 53 PGDT trainers which ware the collection of 43 males and 10 females by convenience sampling techniques all of them have participated in the study.

2.2 Design of the Study

This study adopted a quantitative case study design to examine the extent to which BSc mathematics graduates understand core concepts of elementary geometry. Data collection focused on teachers who were enrolled in the Postgraduate Diploma in Teaching (PGDT) program. The analysis relied on both descriptive and inferential statistics.

For descriptive statistics, measures such as percentages, means, and standard deviations were used to summarize participants' responses. To determine whether differences existed between male and female graduates, inferential analysis was performed using an independent samples t-test. Statistical significance was tested at the 0.05 level. This design was intended to provide both an overall picture of participants' understanding of geometry and insights into possible gender-based variations.

Instruments:

A test that was prepared by the researcher from Grade 8 and Grade 10 Mathematics Textbooks, according to Ethiopian education system in 8^{th} grade levels basic geometry concepts such as Similar Plane Figures, Similar Triangles, Further on Circle, Angles in the Circle, Geometry and Measurements (Theorems on the Right Angled Triangle, Introduction to Trigonometry and Solids Figures) (Gebreyes & Basavaraju, 2016) and in 10^{th} grade levels basic geometry concepts such as Coordinate Geometry, Trigonometric function, Plane Geometry and measurement of surface area and volume of prism and cylinder, pyramid, cone and spheres are included (Bansal, Rachel Mary, Mesay, Gizachew, & Tesfa, 2010), which all achievement test of concepts of elementary geometry are included in Grade 8 Mathematics and in Grade 10 Mathematics textbook with detailed notes.

Seven open ended questions with fifteen items of achievement test were prepared. The achievement tests was constituted question one from plane figures, question two from Trigonometric function, question three from Angles in the Circle, question four from Plane Geometry, question five, six and seven with three items each were from measurement of surface area and volume of cone, pyramid and prism. And validity of the test was examined by two of his colleagues.

Test–retest correlation is often used as an indicator of reliability, although the strength of the correlation may vary depending on the time gap between the two administrations. To quantify this type of reliability, statistical analysis produces a coefficient ranging from 0 to 1, where a value of 1 reflects perfect agreement between the test and retest (Jack & Norman, 2009). Since flawless correlation is rarely attainable, most scholars consider values of 0.7, 0.8, or 0.9 as acceptable, depending on the discipline. In this study, the instrument's reliability was examined using a test–retest procedure with a 30-minute interval, yielding a coefficient of 0.998.

This very high positive correlation demonstrates that the test instrument is highly reliable.

2.3 Data Analysis Technique

The achievement tests were distributed to participants, collected, and then analyzed systematically. Responses were first summarized using descriptive statistics including mean, percentage, and standard deviation. Each item was scored numerically, and weighted means were calculated to determine participants' average performance across categories. A grand mean was then computed to provide a general interpretation of their understanding. Standard deviation values were also considered to show the variability of responses around the mean. To assess whether there were significant differences between male and female participants, independent samples t-tests were conducted. The analysis helped to evaluate the extent of variation in understanding of basic geometry concepts across genders. Findings from these statistical procedures formed the basis for interpretation, discussion, and drawing conclusions about the participants' knowledge level.

2.4 Presentation and Analysis of Data

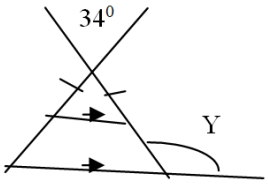
In this section, the analysis and interpretation of data and the major findings are presented.

2.5 Characteristics

A characteristic of the subjects is BSC graduated mathematics teachers who take the training of PGDT in 2019 at Dilla University. BSC graduated mathematics teachers were given basic elementary Geometric questions. Analyses of BSC graduated mathematics teachers' responses to questions items are presented as follows.

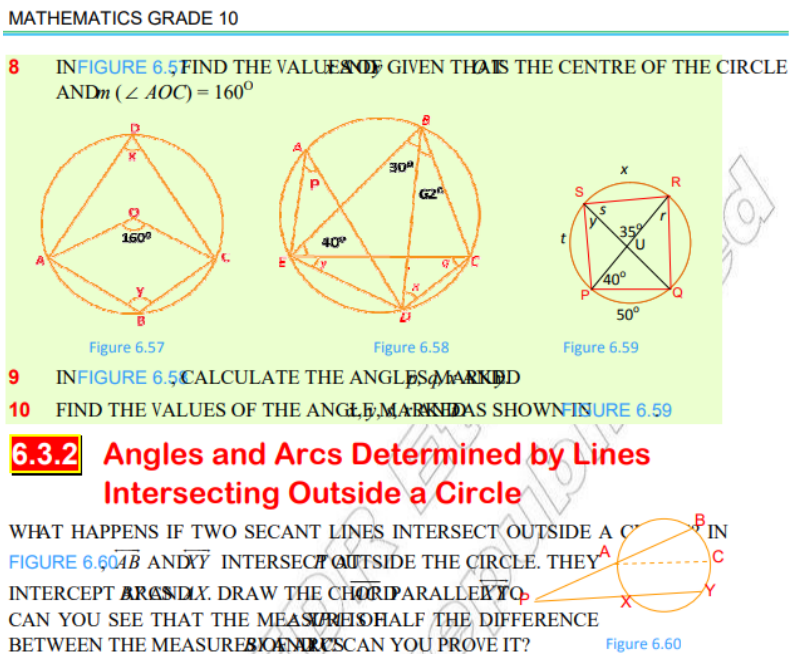
- **For question number one**: To what extent do BSC graduate teachers understand and solve the following basic elementary geometry concept question?

Table 1: BSc teachers' understanding and ability of analysis basic angle and line properties

Item	Male				Female				Total			
Q1	Incorr		Corr		Incorr		Corr		Incorr		Corr	
	f	%	f	%	f	%	f	%	f	%	f	%
1. From the following figure, find the value of Y 	40	93.1	3	6.9	8	81.8	2	18.2	48	90.7	5	9.3

As it can be seen from Table 1, it induces information on the degree of male and female BSC graduated teachers of mathematics solve basic elementary geometry angle question. When asked to find the value of Y of item one (93.1%) of male mathematics teachers and (81.8%) of female mathematics teachers i.e. 90.7% of the total mathematics teachers did not correctly answer that it to $Y = 107^0$. Even though, all required properties that help to solve the equation vertically opposite angle, base angle of isosceles triangle, and supplementary angle are mostly used in grade eight and ten for instance in grade ten the following problems need the above concepts to solve it.

This shows that BSC in mathematics teachers have a lack of understanding of one or more of equality of vertically opposite angles, congruency of base angle of Isosceles triangles and the sum of straight angle is 180^0.


MATHEMATICS GRADE 10

8 IN FIGURE 6.57, FIND THE VALUES OF x AND y GIVEN THAT A IS THE CENTRE OF THE CIRCLE AND $m(\angle AOC) = 160^{O}$

Figure 6.57 Figure 6.58 Figure 6.59

9 IN FIGURE 6.58, CALCULATE THE ANGLES MARKED

10 FIND THE VALUES OF THE ANGLES MARKED AS SHOWN IN FIGURE 6.59

6.3.2 Angles and Arcs Determined by Lines Intersecting Outside a Circle

WHAT HAPPENS IF TWO SECANT LINES INTERSECT OUTSIDE A CIRCLE? IN FIGURE 6.60, $\overline{AB}$ AND $\overline{XY}$ INTERSECT AT P OUTSIDE THE CIRCLE. THEY INTERCEPT ARCS AX AND BY. DRAW THE CHORD BQ PARALLEL TO $\overline{XY}$. CAN YOU SEE THAT THE MEASURE OF $\angle P$ IS ONE-HALF THE DIFFERENCE BETWEEN THE MEASURES OF ARCS BY AND AX? CAN YOU PROVE IT?

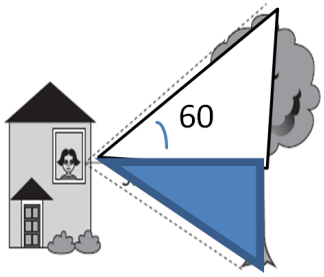
Figure 6.60

(Bansal, Rachel Mary, Mesay, Gizachew, & Tesfa, 2010)

Figure 1: Sample problems in Grade 10 geometry lesson

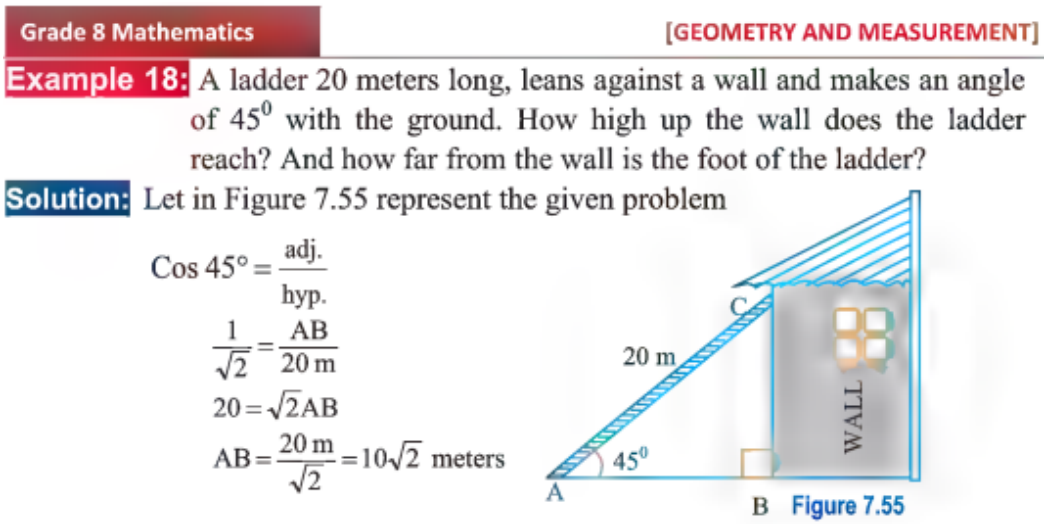
- **For question number two**: To what extent do BSC graduate teachers understand and solve the following basic elementary geometry concept question?

Table 2: BSc Mathematics teachers' ability to synthesis simple geometric concept with trig in real world

Item Q2	Male				Female				Total			
	Incorr		Corr		Incorr		Corr		Incorr		Corr	
	f	%	f	%	f	%	f	%	f	%	f	%
Lula is standing in the building and looking out of a window at a tree. The tree is 20m away from Lula. Lula's line of sight to the top of the tree creates a 60^0 angle elevation, and her line of sight to the base of tree creates a 30^0 of depression. What is the height of the tree? 	43	100	0	0	10	100	0	0	53	100	0	0

As it can be seen from Table 2, it induces information on the degree of male and female BSC graduated teachers of mathematics solve basic elementary geometry elevation question. When asked to find the height of the tree (100%) of male mathematics teachers and (100%) of female mathematics teachers i.e. 100% of the total mathematics teachers did not correctly answer that height of the tree is 20m $\tan(60^0)$ + 20m $\tan(60^0) = \frac{80\sqrt{3}}{3}$. But introduction of Trigonometric concept with brief note and examples are included in grade eight lessons for instance one examplele that founded in grade eight textbook is illustrated as follows.

This shows that BSc in mathematics teachers have an inadequate understanding of applying simple trigonometric functions.

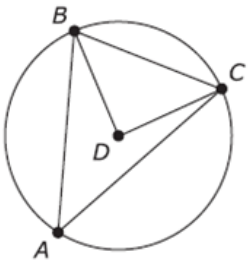


(Gebreyes & Basavaraju, 2016)

Figure 2: Sample problems in Grade 8 geometry lesson

- **For question number three**: To what extent do BSc-graduated teachers understand and solve the following basic elementary geometry concept question?

Table 3: BSc teachers' understanding of property of inscribed triangles in a circle

Item Q3	Male				Female				Total			
	Incorr		Corr		Incorr		Corr		Incorr		Corr	
	f	%	f	%	f	%	f	%	f	%	f	%
The figure shows $\triangle ABC$ inscribed in circle D. If $m < CBD = 34$, then find $m < BAC$ 	41	95.3	2	4.6	9	90.9	1	9.09	50	94.4	3	5.6

As it can be seen from Table 3, it induces information on the degree of male and female BSC graduated teachers of mathematics solve basic elementary geometry inscribed angle in circle question. When asked to find the inscribed angle $m < BAC$ (95.3%) of male mathematics teachers and (90.9%) of female mathematics teachers i.e. 94.4% of the total mathematics teachers did not correctly answer the inscribed angle $m < BAC$, where its answer is 56^0. For instance, the above concepts are found in grade 8 lessons as follows.

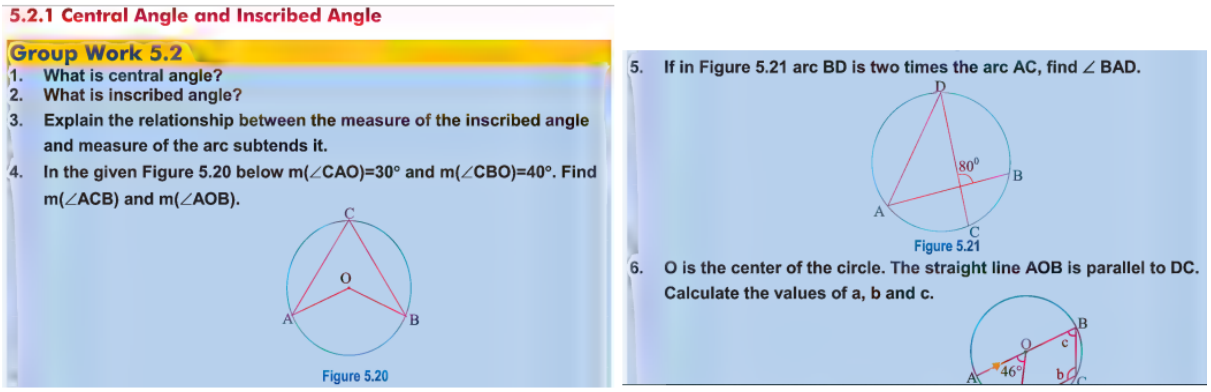
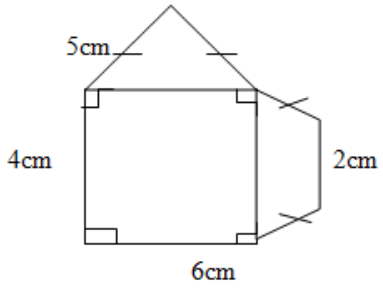


Figure 3: Additional sample problems in Grade 8 geometry lesson (Gebreyes & Basavaraju, 2016)

This shows that BSC in mathematics teachers have a deficit of understanding of properties of inscribed angle in a circle, at the center of a circle and on a circle.

- **For question number four**: What extent does BSC graduate teachers understand and solve the following basic elementary geometry concept question?

Table 4: BSc teachers' understanding of surface area of regular triangles and quadrilateral

Item Q4	Male				Female				Total			
	Incorr		Corr		Incorr		Corr		Incorr		Corr	
	f	%	f	%	f	%	f	%	f	%	f	%
Find a total area of the following figure 	43	100	0	0	10	100	0	0	53	100	0	0

As it can be seen from Table 4, it induces information on the degree of male and female BSC graduated teachers of mathematics solve basic elementary geometry of the above figure. When asked to find the total surface area of the figure (100%) of male mathematics teachers and (100%) of female mathematics teachers i.e. 100% of the total mathematics teachers did not correctly answer the total surface area of the figure where its answer is $36 + 6\sqrt{6}\,cm^2$.

This shows that BSC in mathematics teachers has a lack of skill and understanding of finding total surface area of rectangle, triangle and trapezoid.

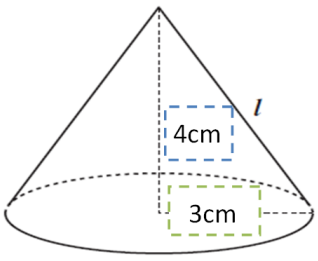
- **For question number five**: What extent do BSC graduated teachers understand and solve the following basic elementary geometry concept question?

As it can be seen from Table 5, it induces information on the degree of male and female BSC graduated teachers of mathematics solve basic solid geometry of conic section slant height, lateral surface area, total surface area, and volume cone.

When asked to find:- slant height of cone (100%) of male mathematics teachers and (90.9%) of female mathematics teachers i.e. 98.15% of the total mathematics teachers did not correctly answer the slant height of the cone where its answer is $10cm$, Lateral surface area of the given cone (100%) of male mathematics teachers and (100%) of female mathematics teachers i.e. 100% of the total mathematics teachers did not correctly answered the Lateral surface area of the given cone where its answer is $60cm^2$, total surface area of the given cone (100%) of male mathematics teachers and (100%) of female mathematics teachers i.e. 100% of the total mathematics teachers did not correctly answer the total surface area of the given cone where its answer is $96cm^2$.

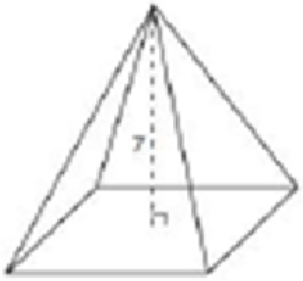
This shows that BSC in mathematics teachers have a huge gap of skill and understanding of finding basic solid geometry of conic section of slant height, lateral surface area, total surface area, and volume cone.

Table 5: BSc teachers' understanding of right circular cone

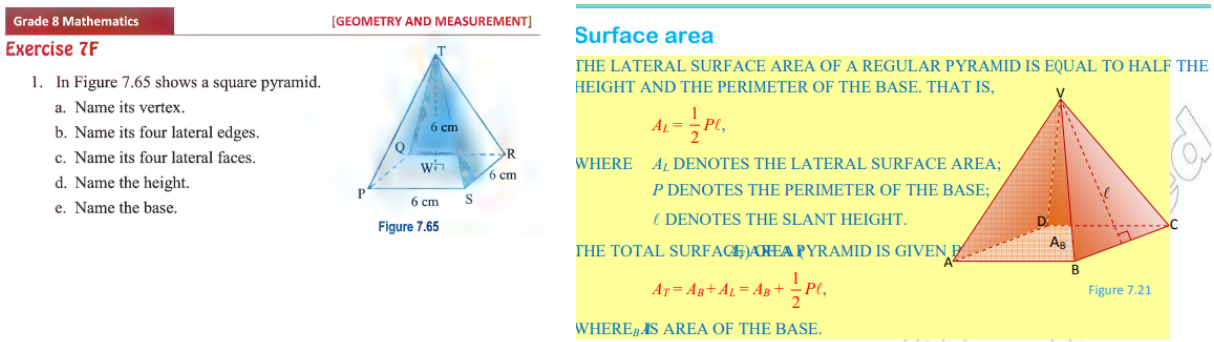
Item	Male				Female				Total			
Q5	Incorr		Corr		Incorr		Corr		Incorr		Corr	
	f	%	f	%	f	%	f	%	f	%	f	%
The altitude of a right circular cone is $4cm$.  If the radius of the base is $3cm$, then find												
Slant height	43	100	0	0	9	90.9	1	9.1	53	98.15	1	0.02
Lateral surface area	43	100	0	0	11	100	0	0	54	100	0	0
Total surface area	43	100	0	0	11	100	0	0	54	100	0	0
Volume of cone	43	100	0	0	11	100	0	0	54	100	0	0

- **For question number six**: What extent do BSC graduate teachers understand and solve the following basic elementary geometry concept question?

Table 6: BSc teachers' understanding of pyramid

Item Q6	Male				Female				Total			
	Incorr		Corr		Incorr		Corr		Incorr		Corr	
	f	%	f	%	f	%	f	%	f	%	f	%
The pyramid shown below has a square base, a length of $8\sqrt{2cm}$ with altitude of $7cm$,  then find												
Slant height	43	100	0	0	10	90.9	1	9.1	53	98.2	1	1.8
Lateral surface area	43	100	0		10	100	0	0	53	100	0	0
Total surface area	43	100	0		10	100	0	0	53	100	0	0
Volume of cone	43	100	0		10	100	0	0	53	100	0	0

As it can be seen from Table 6, it induces information on the degree of male and female BSC graduated teachers of mathematics solve basic solid geometry of pyramid section slant height, lateral surface area, total surface area, and volume cone. When asked to find:- slant height of the pyramid (100%) of male mathematics teachers and (90.9%) of female mathematics teachers i.e. 98.15% of the total mathematics teachers did not correctly answer the slant height of the pyramid where its answer is $9cm$, Lateral surface area of the given pyramid (100%) of male mathematics teachers and (100%) of female mathematics teachers i.e. 100% of the total mathematics teachers did not correctly answered the Lateral surface area of the given pyramid where its answer is $144\sqrt{2}\,cm^2$. The total surface area of the given pyramid (100%) of male mathematics teachers and (100%) of female mathematics teachers i.e. 100% of the total mathematics teachers did not correctly answer the total surface area of the given pyramid where its answer is $62 + 144\sqrt{2}cm^2$. But all the above concepts are found in grade eight and ten lessons for instance.



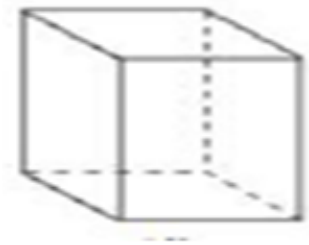
(Gebreyes & Basavaraju, 2016; Bansal, Rachel Mary, Mesay, Gizachew, & Tesfa, 2010)

Figure 4: Sample problems in Grade 8 &10 geometry lesson

This shows that BSC in mathematics teachers has a huge gap of skill and understanding of finding basic solid geometry of section pyramid of slant height, lateral surface area, total surface area, and volume cone.

- **For question number seven**: What extent do BSC graduate teachers understand and solve the following basic elementary geometry concept question?

Table 7: BSc teachers' understanding of rectangular prism

Item Q7	Male				Female				Total			
	Incorr		Corr		Incorr		Corr		Incorr		Corr	
	f	%	f	%	f	%	f	%	f	%	f	%
The rectangular prism shown below has a base, a length of 6cm, width 8cm and height 10cm, then find 												
Diagonal of rectangular prism	40	93.0	3	7.0	10	100	0	0	50	94.4	3	5.6
Total surface area of prism	41	95.3	2	4.7	10	100	0	0	51	96.3	2	3.7
Volume of prism	38	88.4	5	11.6	10	90.1	1	9.9	47	88.9	6	11.1

As it can be seen from Table 7, it induces information on the degree of male and female BSC graduated teachers of mathematics solve basic solid geometry of a diagonal of rectangular prism, the total surface area of prism, and volume of prism.

When asked to find:- a diagonal of rectangular prism (93%) of male mathematics teachers and (100%) of female mathematics teachers i.e. 94.0% of the total mathematics teachers did not correctly answer the diagonal of rectangular prism where its answer is 10$sqrt2cm$.

The total surface area of given a rectangular prism (95.3%) of male mathematics teachers and (100%) of female mathematics teachers i.e. 96.3% of the total mathematics teachers did not correctly answered the total surface area of given rectangular prism where its answer is 416cm^2, the volume of prism of the given rectangular prism (88.4%) of male mathematics teachers and (90.1%) of female mathematics teachers i.e. (88.9%) of the total mathematics teachers did not correctly answer the volume of prism where its answer is 480cm^2.

This shows that BSC in mathematics teachers has a huge gap of skill and understanding of finding basic solid geometry of a diagonal of rectangular prism, the total surface area of prism, and volume of a prism.

- **For research question number two** (Is there a significant difference in understanding and solving basic elementary geometry questions between male and female BSc graduates?)

Table 8: Group Statistics

Group	Code	N	Mean	Std. Deviation	Std. Error Mean
Female	.00	11	1.5455	1.63485	.49293
Male	1.00	60	2.0500	1.85422	.23938

As Table 8 shows as the mean result on basic elementary geometry questions of BSC graduated mathematics female teachers' is 1.55 out of 15 and their standard deviation is 1.63. And mean result on basic elementary geometry questions of BSC graduated mathematics male teachers' is 2.05 out of 15and their standard deviation is 1.85.

Table 9: Independent Samples $t-test$

		Levene's Test for Equality of Variances		$t-test$ for Equality of Means						
									95% CI of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
FM	Equal variances assumed	.008	.931	-.843	69	.402	-.50455	.59827	-1.70	.689
	Equal variances not assumed			-.921	15.130	.372	-.50455	.54798	-2	.663

3 Discussion

The current study contains an analysis of assess the extent of understanding of BSC graduated mathematics teachers on basic elementary geometry concepts.

The results of this study indicate that participants have a gap on solving basic elementary geometry questions.

Basic elementary geometry mathematics knowledge teachers use; students learn in 8th grade levels basic geometry concepts such as Similar Plane Figures, Similar Triangles, Further On Circle, Angles in the Circle, Geometry and Measurements (Theorems on the Right Angled Triangle, Introduction to Trigonometry and Solids Figures) (Gebreyes & Basavaraju, 2016) and in 10th grade levels basic geometry concepts such as Coordinate Geometry, Trigonometric function, Plane Geometry and measurement of surface area and volume of prism and cylinder, pyramid, cone and spheres are included (Bansal, Rachel Mary, Mesay, Gizachew, & Tesfa, 2010), and BSC graduated Mathematics teachers must have adequate knowledge to provide instruction on this topic.

However, certainly all BSC graduated Mathematics teachers would know enough to answer those basic elementary geometry questions correctly; it is communal content knowledge not only for the work of teaching geometry.

Since Mathematics teacher's meaningful understanding of geometry could help them to develop confidence to teach their students (Iheanachor, 2007) students' learning influenced on teacher knowledge and teaching performance.

Teachers' competency and knowledge in using and teaching mathematics are influential factors that can influence students' conceptual understanding in problem posing (Rober, Capraro, & Capraro, 2018). It is necessary to support teachers' professional development.

The findings in this study show that there is disconnect between qualification of BSC graduated mathematics teachers' and teachers' knowledge on basic elementary geometry concepts. And From table 9 the significance level is 0.372 greater than

0.05 this indicates there is no significant difference in gender difference of BSC graduated mathematics teachers on understanding and solving basic elementary geometry questions which agree with null hypothesis.

4 Conclusion

In Ethiopia, all BSC mathematics graduates become high school teachers after they took additional one-year pedagogy course. The focus of this study was on BSC graduated mathematics teachers.

In the present study, the result showed that BSC graduated mathematics teachers do not have sufficient understanding and skills to solve basic elementary geometry questions, even what they teach in grade 8-10. If a teacher does not explain and solve different elementary basic Geometric equations it's not possible to teach the operations to pupils.

The data also revealed that majority of teachers don't know the properties of vertically opposite angles, alternate interior and exterior angles, straight angles, the sum of angle of triangles, area of triangle, area of rectangle, perimeter of triangle and rectangle, volume of cylinder, volume of prism and pyramid, slant high, diagonal and altitude of solid geometry.

5 Recommendations

The study showed that BSC graduated mathematics teachers do not have sufficient understanding and skills to solve basic elementary geometry questions

- Teachers themselves should develop their knowledge through professional development program.
- It is therefore extremely important that the stakeholders and the MOE have to step up conscription efforts.
- In order to strengthen mathematics, universities have to take an action like a workshop to fill the gap.
- It needs further study regarding BSc graduate Mathematics teachers' understanding of basic mathematical concepts.

Conflict of Interest

The authors is affiliated with Dilla University as teaching and research staff. He declared that has thoroughly read and approved the manuscript to be published in this journal.

Ethical Approval

Consent was sought form the research participants. Confidentiality was maintained in reporting information.

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