

**Practices of Gender Responsive Pedagogy in the General Secondary School Science
Teaching and Learning: Challenges
& Opportunities - A Case of North
Wollo Zone, Ethiopia**

Abstract

This study was intended to examine the GSS science teachers' GRP implementation status. To do so, descriptive survey research design was employed. Teachers, department heads and school principals were taken as respondents of the study comprehensively. And students were also participants of the study conveniently. Questionnaire, interview, and FGD were considered as the principal data collection tools. The collected data was analyzed both qualitatively and quantitatively: the data—~~which~~ collected through questionnaire was analyzed via mean, std., one sample t-test. And the data—~~that~~ gathered by open ended items, interview, and FGD as well was analyzed via words, phrases, statements and narration in general. The analyzed data noted that GSS science teachers of the North Wollo Zone had facilitated GRP fairly. Thus, they found as effective in relation to language usage, classroom setups, classroom interaction, and addressing sexual harassment. To do so, availability of qualified school supervisors and principals, realization of NETP, ESDP and GTP were considered as possible opportunities. However, teachers as well ineffective to prepare GR lesson plan, to prepare and use GR instructional materials and to have GR management of sexual maturation. This vanity of teachers was sourced from ranges of challenges: economic related (low economic background parents, girls migration & their over engagement by domestic works); culture related (parents' low attitude for girls' schooling, early marriage, traditionally constructed gender roles, and girls' dependency on boys in science courses work); school related (large class size, lack of resource materials, shortages of sanitary facilities, schools' low commitment for GRP); and teacher related (lack of commitment to work towards gender equality: lack of using GR teaching materials, inadequate time allocation in the lesson planning, teachers' lack of gender skill). Therefore, Extra support in Natural Sciences should be given for girls beginning from lower primary education; Confidence building dialogues through involvement of female role model need to be initiated in schools; Gender based counseling, information and remedial learning programs like tutorial classes should be strengthened in schools; Since they used as experience sharing center, gender-sensitive expansion of ICT facilities, including computer labs and internet delivery infrastructure should be expanded in schools.

Comment [ao1]: No paragraph

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Introduction

Education at all levels promotes health, improves the quality of life, expands access to paid employment, increases productivity, and facilitates social and political participation for men and women (Idowu, Ogunlade, Olatundun, & Afolabi, 2015; Kudjo & Kwasi, 2016). Education can play

great roles for development of a given nation, because it is a means for the wellbeing of individuals in particular and the society in general. It is a corner stone of economic and social development and principal means of improving the welfare of individuals. It advances the productive capacity of society and their political, economic and scientific institutions etc. In its

multiple essences, MoE (2014), education remains to be one of the key instruments to promote gender equality and to enhance equitable growth.

Particularly, as disclosed by Vincent (2015); Ashebir and Bereket (2016), science and technology have immense contributions to the escalation and progress of a country. For example, the Ethiopian science and technology agency (ESTA) (2006) announced that the ability of country to sustain rapid economic growth in the long run is highly dependent on the effectiveness with which its institutions and policies support the knowledge generation, technological transformation, and innovativeness of its enterprises. It is evident that science education contributes to the level of prosperity, welfare, and security of a nation. It is also concerned with the development of technologically literate citizens who understand how science, technology, and society influence one another and who are able to use this knowledge in their everyday activities (Feyera & Genene, 2014).

Accordingly, Ethiopia has played her initiatives. For example, to realize this, the country has designed science curriculum starting from elementary school to university level. In Ethiopian context, the natural science core subject at the secondary level (grades 9-10 and grades11-12) becomes distinctly differentiated as Biology, Chemistry and Physics (Tsegaye, 2012). ESDP III for secondary education (grades 9-12), was designed to expand this level to meet the demand for trained middle and ~~higher-level~~higher-level human power and to reflect the intake capacity of the tertiary level (MoE, 2010). As MoE added, during ESDP III implementation, many new secondary schools were opened. The total number increased from 706 in 2004/05 to 1202 in 2008/2009, which is a 70 % increase over

the four years. And technical training would be provided for those who complete grade ten for the development of middle level manpower (TGE, 1994).

Revising and modernizing of school curriculum has also conducted with an academic focus on mathematics and science in response to economic needs. As TGE added, the new Education Policy and Sector Strategy addresses issues, for example, the purposes of science education, the context for the science curriculum, teacher education, and conditions that foster the development of practical work in school science. As affirmed by MoE (2015), secondary education curriculum update would pay attention to the incorporation of modern technology and vocational topics and education for greater creativity and entrepreneurship. The country gave more emphasis to science fields and students are expected to gain adequate practical knowledge parallel to the theoretical knowledge of science disciplines (Ashebir and Bereket, 2016).

It is widely understood that realizing the goal of development cannot be attained without the very significant component of gender, but the issues of equity in education between male and female groups have been a serious problem in Ethiopian education system at all levels in general, and of secondary education in particular (Amogne, 2015). Improvement in secondary school will be necessary to ensure a skilled workforce, consisting of both males and females, is available for the future but the net enrolment rate of female remains lower than males in the nation (Rose, 2003). The number of admission, retention, and graduates has not been proportional to the size of population when compared to male and female students (Habtamu, 2004). The literacy rate of women with age of 15-24 years in Ethiopia during 2005 and 2011

survey period was 41.6% and 56.9% respectively. The rate for men with the same age interval during the two survey periods was 67.2% and 75% respectively-considerably higher than women's rate (Amogne, 2015).

Science particularly 'hard science' is still also seen by many as a historically male dominated profession to which women have only relatively recently been admitted (Helen, 2010). In high schools of Ethiopia, the number of girls voicing strong support of the importance and relevance of science is much smaller than that of boys. Decreasing interest in science amongst girls was also discovered in extracurricular activities (Yazachew, 2013).

Oli (2014) also conducted a study to investigate status of students' academic achievement in science education across selected preparatory schools of Ethiopia. And the overall academic attainment in science for male was 47.58% and for female was 39.70%. In all the cases, according to him, the mean scores of female were less than that of males.

This gender gap is particularly great in the secondary schools of North Wollo Administrative Zone of Amhara Regional State, because girls are occupied under multidimensional home related activities, they also harassed in their school, and they are migrated in to Arab countries to support their family members etc.

Moreover, cultural factors such as social and family gender role expectations, parents' low commitment to children's education etc. have affected students' learning (Ashebir & Bereket, Kudjo & Kwasi, 2016; MoE, Nyevero & Memory, 2014; Teklu, 2013; FAWE, 2006; Mlama, et al., 2005). This means, the long-standing cultural misconception of the community and the

family such as forced marriage, early marriage, abduction, verbal insult, beating up, insecurity and rape are disturbed students' schooling (UNESCO, 2015; Guday, 2005; Jones, Bekele, Stephenson, Gupta, Pereznieto, Guday, Betlehem & Kiya, Kerebih & Mulunesh, 2014; MoE, 2010). Thus, low completion rate has more implication for girls than boys due to low median age of marriage for girls (16.5) than for boys (21.8). Girls get married before reaching grade eight (MoE, 2014).

Parents also prefer to send girls to Arab countries as home servant than males by considering them as the source of financial income especially in the North Wollo Zone. Karippai and Belay (2010) put their witness by saying that many school going girls from Wollo and other parts of Amhara have migrated to Sudan illegally with the help of illegal agents. On the way, according to them, they have waited for one or two months or more in Gondar or Bahir Dar cities, have worked in hotels or bars to meet daily living costs, and have get trapped into sexual exploitations.

This sexual exploitation activity has far reaching implications for the teaching and learning processes which hamper girls' learning (Mlama, Dioum, Makoye, Murage, Wagah & Washia, 2005). Research output has demonstrated how targets of sexual bullying and harassment experience anxiety, distress, confusion, loss of self-esteem, and depression (NWLC, 2007). So, it is possible to say that a sexually harassed student does not feel safe and cannot perform to his or to her fullest potential.

To realize objective of the study, the authors have conceptualize conceptual framework as follow.

Conceptual Framework of the Study

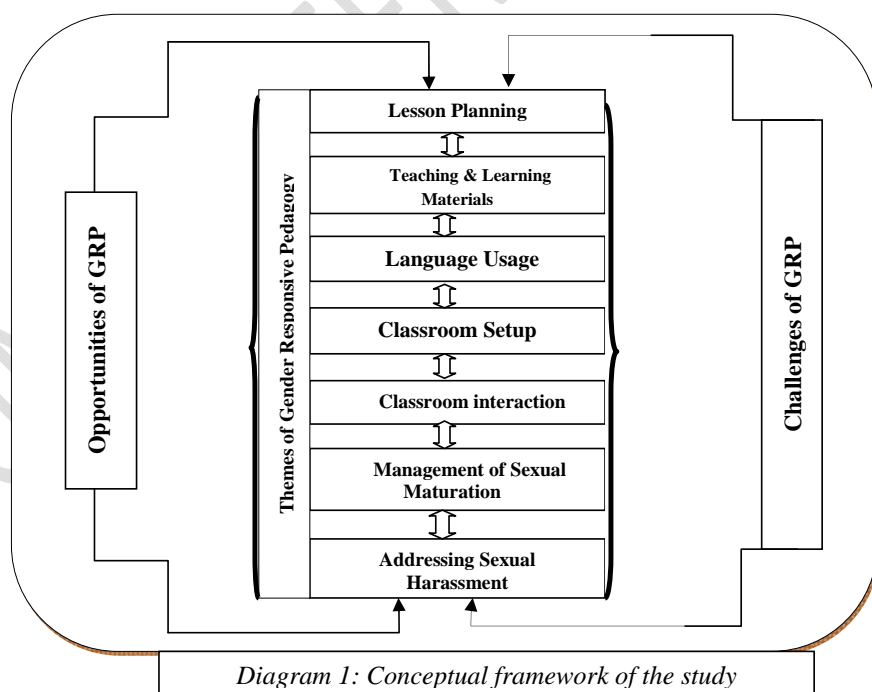
Schools are social sites where the socialization process is reinforced. The

social, physical and academic environments of schools often reinforce the construction of masculine and feminine identity starting from early ages (Mlama, et al., 2005). For example, teachers demonstrate attitudes and expectations that regard women and men differently (MoE, 2014). Many times teachers are not even aware of situations that are discriminatory on the basis of gender. They may use learning materials that depict only one gender performing certain types of activities or they may make disparaging remarks about the capability or characteristics of either gender (Mlama, et al., 2005).

Accordingly, as Duong (2012) asserted, girls are excluded from public activities as a consequence of a patriarchal view of gender roles, insisting that females stay home to care for children and family. These notions suggest that women are both

unfit for and uninterested in the teaching and learning process. Generally, this discourages the students, girls in particular, from participating effectively in the teaching and learning process (Mlama, et al., 2005).

So, gender responsive school environment is required which can give an opportunity for all students to exert out their feeling and can motivate them actively in their learning (Mlama, et al., 2005, FAWE, 2006, & MoE, 2014). A gender fair educational organization, as FAWE (2006) noted, is one where the academic, social and physical environment and its surrounding community take into account the particular desires of both male and female students. Mainly, teachers can get opportunities to treat all students fairly. To suggest solutions of the faced gender inequality science teaching, the researchers developed the following conceptual framework.



As it is displayed in the diagram 1 above, the conceptual framework helps the researchers to identify the major challenges and possible opportunities which could affect teachers' GRP practices. With this concept in mind, the conceptual map of this study is displayed the inter-relationship among the central issues (teachers' GRP practices) of the study.

Specifically, the framework helps the researchers to see how challenges and opportunities can influence the teachers' activities in line with manipulating elements of GRP such as lesson planning, preparation and uses of teaching materials, language use, classroom setup, classroom interaction, management of sexual maturation and addressing sexual harassment. And, it also enables the researchers to conceptualize the cumulative GRP practicing status of science teachers. Accordingly, the following research questions were entertained in this study:

1. What is the present status of science teachers' gender responsive pedagogy (GRP) practices in the general secondary schools of North Wollo Zone?
2. What are the possible opportunities that prompt science teachers' GRP practices?
3. What are the possible challenges that intrude on science teachers' GRP implementation endeavors?

Materials and Methods

In view of the fact that the purpose of the study aimed to assess practices and challenges of GRP in science teaching and learning process, descriptive survey design was employed. It is an appropriate method which enables the researcher to assess the existing practices and challenges of the pedagogy in science instructional process.

North Wollo Administrative Zone is one of the eleven zones in the Amhara National Regional State. It is situated in the

north eastern part of the region. The zone is geographically located between 110N-130N longitudes and 380E - 400E latitudes (Worku, 2004). It is bordered in the north by Wag Hemra Zone and the Tigray National Regional State, in the south by the South Wollo Zone, in the east by the Afar National Regional State, and in the west by the South Gondar Zone. The Zone has an estimated area of 1,902, 200 hectares, which is about 20 per cent of the region (Alemu, 2011). Its administrative town, Woldiya, is located 380km North East of Bahir Dar, and 521km North of Addis Ababa.

This Zone had 14 districts, and four of them (Habru, Kobo, Woldia, and Gubaalafto) were selected purposively since high gender gap was observed there. There are 19 general secondary schools found in these districts. Of these, 8 schools (2 in each district) were selected randomly (lottery method). All 291 science teachers from the 8 schools were part of the study comprehensively and 16 students (2 in each school) also selected conveniently. Moreover, science department heads and school principals were considered as participants of the study comprehensively.

Data Collection Instrument

To gather the required information from respondents, the researchers had administered the following tolls.

Questionnaire

So as to gather data from teacher respondents, questionnaire was developed in relation to practices, opportunities and challenges of GRP. Items of the questionnaire were both close and open-ended types. Statements were constructed by considering frequency and agreement likert scales. The frequency likert scale ranges from always to never (Always = 5,

Often =4, Sometimes =3, Rarely =2, and Never =1) was applied in relation to items of GRP practices. The agreement scale also ranges from strongly agree to strongly disagree (Strongly agree = 5, Agree = 4, Undecided = 3, Disagree =2, and strongly disagree =1) - was applied for items developed with reference to challenges and opportunities of GRP. Furthermore, open ended questions were administered in an attempt to give opportunities for respondents express their additional feelings about the stated themes.

Interview

To collect data from students, the authors had developed semi-structured interview based on the leading research questions. It permits the researcher to explore issues which may be complex to investigate through questionnaire and to allow better flexibility for interviewer and interviewee that in turn it will give him/her better opportunity to explain what he /she feels on the issue more explicitly (Best and kahan, 2003, cited in Dereje, 2012). To have an opportunity to rewind again and again, the interview process was supported by audio recordings.

Focus Group Discussion (FGD)

FGD, as data collection mechanism, is vital, because participants can get an opportunity to exert out their points of view related to GRP in the course of discussing each other with guidance of the researchers. By taking this usage in to account, the authors were collected required information from science department heads and school principals. To do this, they had designed semi structured questions based on the leading research questions. In addition, audio recording had been conducted upon FGD participants that could help the researcher to get an occasion to rewind and

grasp the responded perceptions of respondents.

Pilot Study

To see the validity and test the reliability of the data gathering instruments, a pilot test was conducted in Wurgessa, Genetie and Selam GSSs which were not from the participant schools of the study. To do so, the schools had been selected purposively because of proximity with the residence of the researchers. This closeness schools' location helped him to facilitate the test easily. Moreover, general secondary schools in North Wollo followed similar science syllabus, textbooks and were administered by one education bureau and thus whichever schools selected, far or nearby, can bring no difference in trialing the instruments.

Accordingly, the findings of the pilot study indicated how items in relation to GRP practices, opportunities and challenges of GRP were reliable at .97, .909 and .921 respectively.

Data Collection Procedure

Before the researchers had collected the required data, they needed to get an agreement from participant general secondary schools. To do so, they would submit a letter of authorization from district education offices. And the researcher would approach respondents of the study area accordingly. Then, the researchers briefed objectives of the study to the respondents. And the designed questionnaire was distributed to 291 GSS teachers. To ensure a high return rate of the questionnaire, the researchers had been made personally the distribution and collection processes from respondents. Accordingly, of the 291, 280 questioners were returned back, 9 questionnaires were not returned, and 2 of them were rejected out.

As stated before, science department heads and school principals were the participants of the FGD. To save their time and make easy the process, the discussion was conducted in each school except Kobo and Euketchora schools were considered as one FGD center (there was only one science department in Euketchora school), and the discussion was conducted based on the stated semi structured items. The process had supported by audio recording.

Interview also administered with students of the sample schools. The process was supported by audio recordings. To make the interaction easy and simple, the interview process would be conducted via Amharic language.

Data Analysis Techniques

As stated before, the study aimed to examine practices and challenges of GRP in science teaching. To do this, the collected data was analyzed quantitatively and qualitatively. The data which collected by questionnaire was analyzed quantitatively:

descriptive statistics (percentage, frequency, mean, and standard deviation), and inferential statistics (one sample t-test at the significant level of 0.05). And SPSS 21.0 package program was employed for the statistical analysis.

Specifically, the standard deviation and mean scores were used to interpret data which was collected by the questionnaire. To test the overall GRP implementation status of teachers, and to specify the possible opportunities and challenges of GRP, one sample t-test was applied. In another way, the researcher used words, phrases, and statements etc. to analyze data which was collected by interview, FGD, and open-ended items.

Results

GRP practicing Status of Science Teachers

To identify the recent GRP practicing status of GSS science teachers, the researchers were analyzed the collected data and the output is displayed as follow.

Table 1: One-sample t-test result of teachers' GRP practicing status

Item	Test Value = 3								
	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
								Lower	Upper
GRP themes	280	3.14	.660	3.480	279	.001	.137	.06	.21

*P<0.05

The result of one sample t-test in Table 2 (M=3.14, t = 3.480, p =.001) indicated that there is significant difference between the test value (3) and the observed mean (3.14) in favor of the calculated mean.

This shows that GSS science teachers were practicing GRP in their teaching and learning practices. This, in other words, mean they seem sound in a position of facilitating their instructional activities by considering their male and female students'

specific interest, or their background experiences. Accordingly, it is possible to understand that teachers' GRP endeavor is found in an acceptable status. To do so, as stated here under, teachers have their own opportunities.

The Possible Opportunities that Prompt Teachers' GRP Practices

To gather data in relation to the possible opportunities which enable teachers to facilitate gender responsive

pedagogy in their instructional process, the questionnaire composed of nine items was forwarded to GSS science teachers. And their response was analyzed by using mean, std., and one sample t-test as follow under Table 2.

Table 2: One-sample t-test result on opportunities of GRP

Item	Test Value = 3								
	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Opportunities of GRP	280	3.217	.71905	5.051	279	.000	.21706	.1325	.3017

*P<0.05

There were possible opportunities for teachers to facilitate GRP since the observed mean (3.217), Table 2, was over weighted the test value (3), and the one sample t-test result confirmed the presence of significant relationship at M=3.217; t=5.051; p=.000.

Specifically put, as the finding shows, clustering of schools has helped teachers to treat both boys and girls equally; the trained school principal has enabled teachers to get gender awareness; the trained supervisor of the school has assisted teachers to treat male and female students impartially; and the new education and training policy of Ethiopia has helped teachers to achieve gender equality in their course activities. Equally, the launching of Growth and Transformation Plan (GTP) has enabled teachers to facilitate gender fair instructional activities; and the realization of ESDP within the framework of the education and training policy helped teachers to minimize and get rid of biased attitudes on girls.

The interview output show that availability of toilet for both male and female students; the presence of water service; and the fenced of the school compound help to motivate all students learn safely. In relation to this, FGD participants from Srinka School added that the

educational accessibility for teachers, initiatives of government to provide urban place and loan services for teachers may make them to motivate to teach their students properly.

However, as they added, the presence of girls' club in the school; launching of gender responsive pedagogy (it is new for them), and introduction of National Women's policy in Ethiopia have not any contribution for teachers' efforts of practicing GRP.

Accordingly, it is possible to argue that school clustering, availability of trained school supervisor and principal, realization of NETP, ESDP and GTP were initiated secondary school science teachers to facilitate GRP in their instructional process. In another way, based on the researcher's opinion, girls club in each schools and the GRP need to be functional in the academic environment of the research area so as to have gender fair instructional process.

Challenges that Intrude on Teachers' GRP Implementation Endeavors

To identify the faced problems that could influence teachers to exercise GRP in their science teaching, the researchers had collected data from respondents by developing questionnaire which composed of thirty seven items in relation to economic, school, culture

and teacher related factors. After gathering the required data, they analyzed it via mean, std., and one sample t-test and the detail is briefly stated as follow.

Table 3: One-sample t-test result on challenges of GRP

Item	Test Value = 3								
	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Challenges of GRP	280	3.269	.63126	7.141	279	.000	.26940	.1951	.3437

*P<0.05

As the outcome of one sample t-test in Table 3 (M=3.269, t = 7.141, p =.000) indicated, there is significant difference between the test value (3) and the observed mean (3.269) in favor of the observed mean.

This noted how there were challenges which affected teachers' initiation of facilitating GRP in their instructional activities. This, in other words, mean the problems were appeared as severe to upset teachers' played roles of exercising GRP – they found in a trouble to satisfy students' particular interest or background experiences. As it is specified earlier, Table 3 demonstrated challenges of GRP in cumulative manner. But, the study has motivated to investigate the four GRP

challenges since this would be vital to see effect levels of problems in detail and specifically.

Consequently, challenges of GRP will be displayed independently as economic, school, culture and teacher related as follow.

Economic Related Problems that Challenge Science Teachers' GRP Practices

To identify economic related problems which can challenge science teachers' GRP implementation initiatives, eight items were raised. And as the t-test result outlined (M=3.37, t=7.012, p=.000), Table 4, the obtained score (3.37) was significantly higher than the expected mean (3).

Table 4: One-sample t-test result on the economic related challenges of GRP

Item	Test Value = 3								
	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Economic challenge	280	3.37	.880	7.012	279	.000	.369	.27	.47

*P<0.05

In other words, the finding shows that female students came from low economic parents cannot participate equally in their teaching as their male classmates that have the same family do; girls migration to Arab countries to support their family financially hampered teachers' efforts of getting gender

equality; girls' over engagement by excessive work both at home and for income generating activities affected their attempt of gender equality; and Poverty is one of the most frequently cited barriers for girls' access to education in the school disturbed

their initiation of having gender fair teaching.

Similarly, GSS science teachers also responded that girls from low economic backgrounds would come to school inadequately equipped with sanitary towels could affect their classroom concentration; students of the school who came from low economic parents were not fulfill required instructional materials (pen, pencil, exercise book) that can affect their learning; and Students mainly from low economic parents as well unable to get enough food access and clothing that resulted in quitting their schooling .

As interview respondents argued, students need financial support from parents or caregivers to fulfill required instructional materials. But, some students had lack of helpers to do so, and they were enforced to renounce their schooling. For example, a participant student from Woldia secondary was noted that:

There was my classmate in this school that had not money to buy school uniform. He briefed the faced economic problem to the school by saying “I need to learn without having the uniform”. But, the school did not accept his application, and the student obligated to gave up his schooling. And he remained as a Bajaj driver in the town.

In line with this, FGD respondents from Srinka secondary school noted that students particularly females were found in serious challenge, because they hadn't get secure and safe house to rent. Some of them had been harassed by renters or other misbehaves individuals. As a result, they enforced to migrate to Arab countries by give up their learning.

Participants from Srinka secondary school as well added by saying that:

It was observed how economical or financial challenge had been affected students' learning. To solve it, teachers and the school were tried to help these students by contributing birr and via other mechanisms. For example, there was a student who came from low economic background parent that unable to cover expenses for fulfilling required instructional materials. To solve his problem, the school had hired him as sanitary workers (cleaning classrooms, offices, and the school compound in general) by paying monthly. So, such like challenges could be sourced from the economic problems of parents that unable to safe their children from such malpractices. Accordingly, students enforced to gave up their schooling.

Therefore, the researchers would argued by saying that low economic background of female students, their over engagement by excessive work, and girls migration to Arab countries were remarkable troubles that can influence students, particularly, girls' learning in the GSS schools of the setting.

School Related Problems that Challenge Science Teachers' GRP Practices

So as to identify school related factors which hinder teachers' initiation of exercising GRP, the researcher was requested science teachers to rate ten items and analyzed the data. Accordingly, as stated under Table 5, obtained mean value (3.29) was considerably advanced than the expected mean (3).

Table 5: One-sample t-test result on the school related challenges of GRP

Item	Test Value = 3								
	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
								Lower	Upper
School related challenges	280	3.29	.823	5.958	279	.000	.293	.20	.39

*P<0.05

This significance relationship is confirmed by the t-calculated at $M=3.29$; $t=5.958$; $p=.000$. This, in other words, mean scarcity of resource materials of the school has not initiated teachers to treat girls and boys equally; large class size in the school made them impossible to treat both sexes fairly; and lack of support from the school may make them impossible to treat girls and boys equally.

Similarly, according to the finding, lack of gender-sensitive teaching materials in the school made teachers impractical to have gender fair teaching; lack of commitment from school directors affect teachers' efforts of having gender equivalence instructional process; schools were ineffective mostly to provide rules and regulations that can accommodate for girls who miss school for genuine reasons such as menstruation-related causes; and when parents do not send girls to classroom, the school shouldn't intervene and aware the community about the importance of girls' education.

Furthermore, teachers responded by saying that school's lack of commitment to train them about gender responsive pedagogy affect their initiation of achieving gender reflective teaching; the school has been ineffective to adopt a zero tolerance approach to sexual harassment which could influence their roles of having gender reasonable instruction; and school's

shortages of sanitary facilities - water, sanitary bins, and emergency hygienic wear for females in time of menstruation might disturb their regular classroom attendances.

The interview participants also argued that there were different clubs found in the school: anti HIV/AIDS, mini media, girls' club, peace and security etc., but, as the respondent from Hara secondary argued, none of them were functional. Similarly, a boy from Kobo noted that the school had its own problems which can hamper teachers' effort of achieving gender equality in their instructional activities. For example, as he briefed, there was no lab service, and there was lack of reference books in the library. The respondent also added that the school was ineffective to put in to practice its rules and regulations as intended.

FGD respondents too argued that schools seemed to relinquish their responsibilities. As they briefed, structures of the school such as parent teachers association (PTA), education and training board (ETB) were not functional. The condition made difficult to control misbehave male students (one who harass females, or disturb teachers particularly females etc.). In addition, according to them, there was weak relationship found between the schools and the community which resulted in unable to solve school

related problems by discussing with the society.

Therefore, schools need to work towards making school clubs particular gender club to be functional; schools need to be initiative to train teachers about concept of gender and how they able to treat both male and female students equally. Not only this, but also they are required to exercise the launched rules and regulations which made schools to be trustful by school community members.

Culture Related Problems that Challenge Science Teachers' GRP Practices

To uncover culture associated factors that can hamper teachers' commencement of exercising GRP, the researchers were analyzed the collected data via one sample t-test. And the finding indicated how tradition based challenges have been affected teachers' endeavor of having gender fair instructional activities since the significant relationship is observed at M=. 3.24; t=4.68; p=.000 – see Table 6 below.

Table 6: One-sample t-test result on the culture related challenges of GRP

Item	Test Value = 3								
	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Culture related challenges	280	3.24	.855	4.68	279	.000	.239	.14	.34

*P<0.05

Expressly, according to the finding, girls' early marriage made teachers impossible to have gender fair teaching quality; parents' low attitude for girls' learning made teachers impossible to get gender fair teaching; socially constructed gender roles have enforced girls to stay at home and let boys to school; and girls dependency on boys in science subjects affect their participation since their counterparts are taken themselves as knowledgeable in the courses traditionally.

In relation to this, the interview respondents were argued by saying that there were cultural problems (parents' low attitude towards their children's' schooling; early marriage etc.) which affected students' learning in the schools. For example, respondents from Hara secondary argued that girls have married early and deliver baby by relinquished her learning.

The respondent from Euketchora secondary stated that there were four early marriages had carried out upon the school girls. The condition had been highly aggravated or facilitated by parents, because their fear of having child without husband – locally termed as DIKALA, or they think how she may having said by other as KUMOKER (loosing the normal period of marriage in lacking of husband). If the married girl need to continue her schooling, there are some challenges not let her to do so. For example, some teachers motivated to say 'are you coming with your new born baby?' instead of accepting politely to encourage the girl. This like teachers' argument has broken girls' motivation to continue the schooling.

FGD participants added by supporting the issue by saying that:

Cultural problems are highly observed in the school and in the community in general. This means, parents have a slogan which says “SETN MEDAR, WENDEN MASTERMAR”. To brief, let girls to marry and allow boys to learn. Not only this, but also parents have an attitude to exercise early marriage, because unless girls marry early, they become develop unwanted sexual practices untimely. Moreover, the society has a tendency of sending their girls to Arab countries to have financial wellbeing instead let children to school.

Thus, based on the outcome of one sample t-test, the conducted interview and FGD, cultural problems particularly parents’ low attitude towards girls learning, early marriage, and socially constructed

gender roles were considered has the significant problems to facilitate GRP.

Therefore, it is important to make parents to be aware about importance of educating students particularly girls for national development, since females are one parts of the society. To do so, it is expected to work cooperatively among responsible bodies: schools, district education offices, zonal education departments, Regional education bureaus and the MoE in general.

Teacher Related Problems that Challenge GRP Practices

Although teachers are the notable individuals to lead the instructional activities in the given schools, there are some teacher context problems which obstruct their roles and responsibilities.

Table 7: One-sample t-test result on the teacher related challenges of GRP

Item	Test Value = 3								
	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Teacher related challenges	280	3.19	.671	4.824	279	.000	.194	.11	.27

*P<0.05

In order to specify these problems, the researchers have analyzed the collected data from respondents via using mean and one sample t-test. According to the finding (M=3.19; t=4.824; p=.000, see Table 7, there is a significant difference between the observed mean (3.19) and the test value (3).

Thus, teachers’ lack of gender skill to treat both sexes which helped them to participate students fairly in the instructional process; their usages of few evaluation strategies; their lack of commitment to work towards gender equality in their teaching; and their less initiation to consider whether the teaching materials are gender responsive or not when they stand to use these

instructional aids in their teaching activities were affected GRP practicing status of science teachers.

Likewise, as teachers added, their low consideration of gender when grouping students for assignment or project work purpose that affect their instructional involvement; and their weak commitment to prepare gender fair supportive teaching materials have influenced students not to participate in the teaching and learning process fairly.

In relation to this, the participant students in interview session noted that to teach students by considering gender equality; some teachers have their own

problems. As they briefed, they have knowledge gap; they have weakness to clarify mean concepts of given subject matters; some others also ineffective to teach their students by considering their students' level of understanding (contents are difficult which are out of learners' status). Not only this, as the respondent from Kobo secondary noted, but also some of them as well simply come to the class only to open the plasma (they are not initiated to introduce what the plasma teacher is going to teach and to summarize the main concepts which the plasma had introduced).

The FGD respondents also had shared their belief by saying as:

Not only parental economic challenges, but also teachers recently found under shouldering skyrocketing living conditions. Thus, they think more for having additional income sources to resist this costly world rather teach their students by considering students' particular interest or cultural backgrounds. For example, since teachers found under economic challenge, there is a teacher in our staff who has worked as waiter in his rest time. Accordingly, teachers hate their profession instead of teaching their students lovely by considering what teaching occupation needs to exercise by them.

So, the researchers initiated to argue as lack of commitment to work towards gender equality; knowledge gap; unable to organize contents based on students' level of understanding; living sky cost; teachers' lack consideration of gender; their lack of gender skill; and their low commitment to prepare gender fair supportive instructional materials were regarded as teacher related harms that could affect their played efforts of getting gender equality in the instructional process.

Therefore, it is vital to make teachers to have good economic wellbeing to lead their life without more tightened manner,

and also important to create awareness on teachers how to treat male and female students in their instructional activities.

To summarize, the analyze data outlined that poverty, girls' migration, girls' over work engagement etc. under economic related; low attitude of parents, early marriage, traditional expectations of gender roles etc. under culture related; shortage of gender fair teaching materials, ineffectiveness of the designed rules and regulations, dysfunctional school clubs etc. under school related; and low commitment to have gender fair teaching, inappropriate content usage in teaching etc. under school related had been considered as the notable problems to facilitate GRP.

Discussion and Implication

In relation to having gender responsive academic environment, GSS science teachers of the setting were found in good track since the one sample t-test ($M=2.97$, $t = -.834$, $p = .405$). Inversely, as Nabbuye (2018) noted, findings thus far suggest that GRP approach has not fully translated into changes in the classroom.

Although the current study showed GRP implementation effectiveness of teachers in general manner, the conducted interview and FGD noted that teachers as well vain in line with lesson planning; preparation and utilization of instructional materials; and in the management of sexual maturation.

Thus, FGD respondents argued that teachers are motivated to consider subject matters, teaching methodologies, activities, teaching materials, assessment techniques but not gender while preparing lesson plan. Likewise, the analysis made by National Institute for Excellence in Teaching (NIET) (2018) indicated that instructional plans that designed by teachers include few goals

Comment [ao2]: Check sentence

Comment [ao3]: I Check sentence

aligned to state content standards; activities, materials, and assessments that are rarely aligned to state standards, rarely logically sequenced, rarely build on prior student knowledge, and inconsistently provide time for student work, and lesson and unit closure; and little evidence that the plan provides some opportunities to accommodate individual student needs.

FGD participants on their side argued that teachers did not use teaching aids always, and the school has not resource center which makes the production and utilization of instructional materials to be difficult for teachers. Even though teachers initiated to use the materials sparingly, they will give emphasis for content rather than gender.

This indicates to what extent they were ineffective to modify learning materials so as to reflect all students' feeling in their note preparation, they were also poor to develop GRP encouraging materials to facilitate their classroom practices, and as well, they were unproductive to initiate their students to prepare and use GR instructional materials in the instructional process.

Furthermore, science teachers of the setting were ineffective to play their responsibility of working towards achieving GR management of sexual maturation. FGD respondents added by saying that girls club was not functional and there was no guidance and counseling service, and sanitary assistance service in the school for females in the time of menstruation. As they noted, there were no regular and programmed services in the secondary schools, and students themselves, particularly females have not clearly or explicitly exert out their faced problems in the time of sexual maturation.

This also confirmed by UNESCO (2014) which argued that the full engagement of girls in school activities is

negatively affected, with many girls reporting they stayed home from school due to menstrual cramping, insufficient menstrual hygiene materials, inadequate water and sanitation facilities in schools, unsupportive environments, and fear of a menstrual accident.

Generally, this teachers' ineffectiveness, as the one sample t-test result ($M=3.269$, $t = 7.141$, $p = .000$) briefed at Table 2, has been resulted from economic, school, culture and teacher related factors. To clarify, the finding has conceptualized to what extent girls' over engagement by financial based activities and their migration (economic related); parents' low considerations of their children's' learning, traditional constructed gender roles, early marriage (culture related); knowledge and skill gap, low commitment to practice GRP, inability to prepare and use GR teaching materials etc. (teacher related); and scarcity of GR instructional materials, dysfunctional school clubs (school related) were affected teachers' initiation of facilitating GRP.

In his study, Keski (2018) revealed that existing practical arrangements at the school of Ethiopia do not support the use of a student centered teaching method. For example, a detailed curriculum, annual tests, a high student-teacher ratio and a lack of teaching and learning materials support teacher-led teaching and make it difficult to implement student-centered teaching methods. The study conducted by Jhpiego Ethiopia (2017) also noted that female students face greater financial constraints in paying for their basic needs while in school compared to male students, due to increased obligations to take care of children and families outside of school and less family support for their studies.

The FGD respondents of the current study as well supported the issue by arguing that some students who come from the rural

parents, and learn their schooling by ranting house. This condition leads them to expense more money which has influenced their teaching process. Thus, according to them, some parents cannot cover the require expenses, and accordingly they enforced to give up their schooling.

Equally, the conducted FGD in Kelala by Bekele, Pereznieto and Guday (2013) has confirmed the present study that elaborated as there is a severe economic problem in their community driving youth out-migration:

The economic problem is common for boys and girls. They do not have any alternative options here for them. There is no promising future even after 'completing' their education. Therefore, we let them go freely. The potential negative outcome does not bother them much or hinder them from migrating. They prefer to face the challenges. Young adolescent girl group discussants in Kobo cited at least one person from their families (a sister, brother, aunt or uncle) who had migrated to Saudi Arabia, and most of them had had to dropout from school to migrate (Bekele, Pereznieto & Guday, 2013:21).

Reviewing a large number of different studies relating to young people's experience of violence in Ethiopia, as Mulugeta (2016) argued, traced how dimensions of poverty impacted on young women's experiences of sexual violence. She found that vulnerability to sexual violence was particularly high for young women living away from families, engaged in domestic labor, commercial sex work, or living on the streets rather focusing on their instructional process.

So, according to the one sample t-test result ($M=3.37$, $t=7.012$, $p=.000$) – see Table 3, it is possible to say that economic challenges are the proponent obstacles for

teachers of facilitating their instruction based on particular students' need and experience. Therefore, the country is required to satisfy the economic need of her people by transforming the country's agro economy to industrial economy.

Secondly, this study was tried to dig out school related factors that can affect GSS science teachers' effort of achieving gender fair instructional activities in their science teaching. Accordingly, the t-test finding ($M=3.29$; $t=5.958$; $p=.000$) – see Table 4, indicated that lack of support from the school; lack of gender-sensitive teaching materials; lack of commitment from school directors; ineffectiveness of schools to practice rules and regulations accordingly; and ineffectiveness of schools to create awareness when parents do not send girls to classroom etc. were taken as school challenges that affect instructional activities.

In relation to this, participants in interview noted that launching of school clubs for reporting purpose; ineffective or dysfunctional school rules and regulations, and school leaders' lack of commitment to work towards gender equality were the notable problems that hampered teachers' effort of having gender fair instructional activities. Likewise, FGD respondents briefed the issue as "GSS secondary schools are ineffective to train both teachers and students about concepts of gender and how to get gender fair teaching in schools; and they also weak to put in to practice the rules and regulations of the schools".

The finding supports the research findings of Feyera (2014) which argued that general secondary schools factors at Ilu Aba Bora Zone of Ethiopia such as absence of laboratory chemicals, rooms, apparatuses, technicians and well organized laboratory manuals were negatively affected the effective implementation of science education and students' academic

achievement as well. In their study, Zewde and Adamu (2018) indicated that school facilities which include absence of attractive classrooms, desks, chairs, tables, black board, chalk, stationeries', laboratories, libraries which have direct negative impacts on academic performances of students. For example, according to them, students' cannot concentrate on their studies when there are lacks of enough classrooms which leads to overcrowding and leads to poor performance. The study conducted by Brightone (2017) found that performance in Newala District was low due to; Shortage of teaching and learning materials and physical facilities.

Equally, the research finding by Maikuva (2015) showed that understaffing, overcrowded classrooms, inadequate syllabus coverage, inadequate classrooms, inadequate instructional materials and inadequate lesson preparations were considered as factors that impacted on quality of education in schools. Acharya (2017) was conducted a study to explore the causes of learning difficulties in mathematics, and the finding showed that school management system, lack of infrastructure of school and lack of regular assessment system of school are main causes of difficulties in learning mathematics.

This condition even observed in Ethiopian higher education instructional process. For example, Mulugeta , Solomon and Mathivanan (2018) argued that major factors for implementation of student centered physical education in Kotebe and Addis Ababa universities are lack of swimming pool, large class size, shortage of instructional materials like modules and reference books.

To overcome these challenges, as Shumetie and Wondemu (2015) recommended, concerned bodies should strive to reduce large numbers of students

per class; and school administrators should also initiated to fulfill the required gender responsive instructional materials so as to motivate both male and female students equally.

Thirdly, studies undertaken at various times pertaining to girls' education ensure that the deep rooted misinterpretation and biased attitudes in the community, economic and education inequality related issues, and far less attention are the main causes to the problems of the education of girls (MoE, 2010; UNESCO, 2012). To brief, socio-cultural factors such as social norms and traditional practices about the role and position of women in Ethiopian society, gender-based violence, early marriage and teenage pregnancy are affecting girls' and women's access to and completion of education (UNESCO, 2012).

Based on the analyzed data, ($M= 3.24$; $t=4.68$; $p=.000$ – see Table 5), the current study has find out how socially constructed gender roles; girls dependency on boys in science subjects; and calmness of girls in the instructional process were significant cultural problems in the setting. Thus, as a student from Kobo secondary noted, parents need to get extra labor from their children so as to facilitate home and farm related activities. So, as he added, they initiated not to send children to school. Moreover, a respondent from Merssa secondary school also added as:

Parents have traditional outlook in relation to interaction of opposite sex. For example, if they get a girl with a boy in discussing issues of teaching learning process, parents will link it directly with sexual matters. Not only this, but also they have not any space or value for students who could not pass grade ten national examination.

In the same way, FGD respondents from Sanka secondary school argued that

parents have attitudinal problems that give warning to their daughters not to interact with males since it leads them to develop malpractices (sexual practices). As they tried to clarify, this may be one reason that students not to sit in group work or to make line with males in the schools' anthem ceremony.

Furthermore, parents develop low commitment to control or advise their children especially males to learn properly in the school. According to FGD respondents from Sanka secondary, male students show unethical characteristics in the school than females in terms of wearing styles of their uniforms (made the uniform to be tighten, torn, or made it to have twigs). Not only this, but also hair style of male students as well unacceptable which is not related to the Ethiopian culture. As they added, parents seem to be weak to control or advise their boys not to initiate to facilitate unwanted practices: smoking cigarette, chewing chat, drinking alcohol etc. which in turn the scenario hampered their instructional involvement.

Therefore, parents' low attitude for girls' learning, socially constructed gender roles and early marriage were taken as the major cultural problems which affected students particularly girls' schooling. Thus, as Kudjo and Kwasi (2016) noted, educating the girl child in some African cultural settings is seen to be a taboo even in this twenty-first century. Parents in parts of Africa still feel that by giving the girl child the opportunity to go to school is a waste of resources, but by preparing such girls for marriages are seen to be the most profitable venture because of the expected bridal price.

Traditional stereotypes of what jobs are appropriate for women in one hand and family and environmental influence associated with the traditional role of women on the other hand often discourage

female students from enrolling in science, mechanical and technological courses (MoE, 2014).

In Ethiopia, as UNESCO (2015) argued, women and girls are given low status in society, have a low level of participation in decision-making, and have limited employment opportunities. Many of them are subjected to violence of different kinds ranging from sexual violence to harmful traditional practices such as early marriage, female genital mutilation (FGM), HIV/AIDS, gender-based violence (GBV), etc (UNESCO, 2015; MoE, 2014).

Female trainees who do choose to enroll in non-traditional programs still face discrimination from instructors, employers and the community at large, and they encounter fewer prospects for employment and practical field assignments unlike males (MoE, 2014). The largely impediment to progressing female participation and attainment in education is the cultural misunderstanding of the community and the family more purposely early marriage and verbal upset etc. continue unsolved till at present (MoE, 2010). For example, girls generally find themselves with much less time for other activities than boys. Further, girls often do not have a say in how they allocate their time, following parental orders before marriage and orders from their husbands or parents-in-law after marriage (Bekele, Pereznieto & Guday, 2013). Education for All (2015) briefed that one of the critical problems of the Ethiopian education sector is a high dropout rate in almost all levels. Many students, particularly in emerging regions and pastoralist areas drop out of school at early grades. One of the reasons for this to take place is that parents do not want to send their children to schools since they are using them as a workforce in securing their livelihood.

Thus, parents in the rural communities of Kobo and Kelala used to have very high expectations when they sent their children to school. They hoped their children would be able to obtain gainful employment in the civil service, which would enable them to support themselves and their families. Currently, however, parents have lost hope in formal education when they see formally unemployed youths in their locality who have completed Grades 10 and 12. This lack of hope in the returns of formal education is one of the drivers of migration of adolescent girls and boys in the study communities (Bekele, Pereznieto & Guday, 2013).

Therefore, it is vital to reinforced consciousness raising and capacity development initiatives for students, staff and community members in relation to sexual violence avoidance. To do so, awareness-raising activities and a “zero-tolerance” culture to the violence should be promoted in all school environments and surrounding communities through school festivals, community dialogues, and public and education media. Life skills education, including the topic of harassment prevention, should be provided through expanded co-curricular modalities in schools (MoE, 2014).

Finally, teachers are the major responsible body to facilitate gender responsive instructional activities (MoE, 2014; FAWE, 2006 & Mlana, et al, 2005). However, there are ample challenges which can hinder their motivation. To specify the troubles, this study indicated how skill gap, usage of few evaluation strategies; lack of consideration whether the teaching materials are gender responsive or not; lack of gender fair group formation by teachers; and their low motivation to prepare gender responsive supportive teaching materials were taken as the proponent challenges which hampered

teaching at $M=3.19$; $t=4.824$; $p=.000$, see Table 6.

Feyera's (2014) finding also noted that teachers have not used their maximum potential to implement science education effectively. Thus, as Zewde and Adamu (2018) stated teacher qualification, teachers' working conditions and interests have been affected their students' involvement. Teachers' use of more lecture method rather than student centered method has influenced their students' learning (Mulugeta, Solomon & Mathivanan, 2018). This means, as Acharya (2017) briefed, teachers lack of linkage between new mathematical concept and previously learned mathematics structure, mathematics anxiety, negative felling of mathematics, economic condition and their educational backgrounds are the notable challenges which have disturbed their activities.

Therefore, concerned bodies such as school directors, district education offices, zonal education departments, the regional education bureau and the MoE in general are expected to motivate teachers, and also they need to aware them how to facilitate gender responsive instructional activities in their schools. Thus, trainings on gender-responsive pedagogy will be integrated as part of the pre-service, in-service professional development programs of teacher education. The current GRP training manual will be adapted for educational organizations of Ethiopia (MoE, 2014).

In another way, GRP themes: *language use, classroom setups, classroom interaction and addressing sexual harassment which were facilitated effectively by science teachers. To do so, opportunities such as school clustering, assignation of trained school principals and supervisors; launching of NETP, ESDP, and GTP were initiated to*

facilitate gender fair instructional process.

Conclusions

Based on the conducted data interpretations and discussions above, we initiated to generalize the findings of the study by saying that GSS science teachers of the North Wollo Zone had facilitated GRP fairly. Thus, they found as effective in relation to language usage, classroom setups, classroom interaction, and addressing sexual

harassment. To do so, opportunities such as introduction of NETP, GTP, and ESDP; school clustering; presence of trained school supervisors and principals have been helped them. However, they as well ineffective to prepare GR lesson plan, to prepare and use GR instructional materials and to have GR management of sexual maturation. This ineffectiveness of them was sourced from ranges of challenges: economic related, culture related; school related and teacher related.

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