Does gender inequality influence interest in pursuing a career in science or mathematics teaching?

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The present study explored gender inequality in K to 12 basic education, based on the experiences of first year pre-service science and mathematics teachers. It also determined if pre-service teachers' pursuit of a career in science or mathematics teaching was related to gender influences. A survey instrument was used to gather data for the study. Data were then subjected to descriptive statistics, multiple regression and Pearson moment correlation analyses. Results showed that the majority of students experienced gender inequality in their K to 12 basic education. However, they agreed that they still pursued a career in science or mathematics teaching based on factors such as teacher-student interaction, teaching strategy, verbal teacher response and instructional materials. Gender inequality therefore is not a great predictor of career choice in science and/or mathematics teaching. However, to increase enrolments in the course, in-service science and mathematics teachers should focus on enhancing and developing the factors which influence the students' career choices.

Introduction

Similarly viewed by most countries, UNESCO (2014) foresees quality education as the most dominant force for alleviating poverty, improving health and livelihood, escalating prosperity and shaping more inclusive, sustainable and peaceful societies. Avowed by this agency, education is a right that transforms lives when it is accessible to all, relevant and underpinned by core shared values. Thus, it is everyone's concern that it occupies the core of the post-2015 development agenda. It advocates a general goal: 'Ensure equitable quality education and lifelong learning for ALL by 2030' to achieve just, inclusive, peaceful and sustainable societies. This universal goal is translated into definite global targets to which countries would commit and be held accountable for. Quality education and relevant teaching and learning are some of the post-2015 agenda's priority areas. These priority areas are the means to equipping people with skills, knowledge and attitudes to: obtain decent work; live together as active citizens nationally and globally, understand and prepare for a world in which environmental degradation and climate change present a threat to sustainable living and livelihoods; and understand their rights. Thus, UNESCO (2014) places great importance on the teachers' central role in ensuring good-quality and inclusive education and learning.

Inclusivity as one of the key goals of UNESCO's post-2015 agenda requires a continued attention to gender equality. Connected to aspiring gender equality, a priority area is defined as "quality and relevant teaching and learning" which calls for quality and relevant teaching and learning, in terms of inputs, content, processes and learning environments to support the holistic development of all children, youth and adults. Several key aspects were identified to contribute to quality and inclusive education. These are recruiting and retaining well-trained and motivated teachers who use inclusive, gender-responsive and participatory pedagogical approaches to ensure effective learning outcomes and providing content that is relevant to all learners and to the context in which they live. Thus, as targeted, there is a need to close the gap in teacher training by employing and developing adequate teachers who are well-trained, able to meet national standards and effectively deliver relevant content, with emphasis on gender balance.

Recruiting and developing well-trained and gender-balanced teachers is a tough job. Although there is considerable research on career choices of students and recruitment to teacher education (Padhy, Emo, Djira & Deokar, 2015; Osguthorpe & Sanger, 2013; Topkaya & Uztosun, 2012, Sinclair, 2008; Watt, 2006), enlistment to teacher-training curricula and university courses in sciences and mathematics education is gradually decreasing. There is significant evidence of this decline in the number of candidates entering the teaching profession in most countries, especially in specialised subjects such as science and mathematics (UNESCO, 2001). Thunberg (2009) recounts that in Sweden, as in many other countries, there is a reduced interest in mathematics, science and technology among the youth. Similarly in the context of Australia, Stokes (2007) described shortages in scarce skills areas such as mathematics, science and technology, languages and the arts that were reported in 2006.

In the Philippines, Acedo (2002) reported that only about 25 percent of the high school seniors who have good standing in the National Achievement Test (NAT) opted for teacher education as a career path and about 75 percent go to other career choices. From those who started in teacher education programs, 71 percent completed the degree. The other 29 percent dropped out of the program, mostly due to economic problems or a change in their initial preference for teacher education. The case gets worse in the specialisation subjects. Jalmasco (2014), in his article in a local newspaper accounted that there is a very small fraction of teachers who opt to specialise and teach science and mathematics.

With the need for a gender balance among teachers, the study aims to connect gender gaps, or equality, in science and mathematics education quality offered in the basic education (K-12 level) to influences in the inclination of a student to teaching science and mathematics. Specifically, the study aims to:

1. Determine gender gaps or equality in science and mathematics basic education (K-12) experiences of pre-service students.
2. Find out if gender and gender-related experiences influence career choice specialisation of pre-service students.
3. Relate gender gaps or equality to the inclination to science and mathematics specialisation.

Theoretical framework

On motivation

One of the factors that influence career choice is the motivation emanating from oneself. Topkaya and Uztosun (2012) outlined the motives for selecting a teaching career. Motivation based on attractors, facilitators and self-determination theory. which, in turn can be categorised into intrinsic motivation, extrinsic motivation and amotivation, are the identified correlates to teaching career choices as based on research (Dawson & McInerney 2003, cited in Sinclair 2008, Moran et al., 2001; Wang & Fwu, 2001). Motivation is defined by Kiziltepe (2008) as a natural force that makes us constantly move. It is in fact a motive (e.g. wish, intention or drive) to engage in a specific activity according to Sinclair (2008). In relation to teaching and teacher education, motivation may determine what attracts individuals to teaching and how long they remain in their initial teacher education courses and subsequently the teaching profession, and the extent to which they engage with their courses and their profession.

A review of applications for pre-service teaching course done by Osguthorpe and Sanger (2013) noted that the most commonly identified reasons for applying included making a difference to the lives of the students, being a role model, teaching as a rewarding career, having a love of learning, and working with children. In fact, Lortie (1975) classified these reasons as common attractors to teaching which included interpersonal (to work in the school system), service (service to community), continuation (to remain in the school system), time compatibility (to work for a job that provides time for personal pursuits), and material benefits (for job security). Spittle et al. (2009) argued that facilitators for choosing a teaching career include subjective warrant (belief that they are able to cope with the demands of teaching); identification with teachers (to emulate a good teacher or to be the antithesis of a bad teacher they identify with); family continuity; and blocked aspirations (could not meet the demands of their preferred careers). These attractors to and facilitators of career choice of teaching are best understood (Templin, et al., 1982 and Richardson & Watt, 2006) in terms of self-determination theory.

Self-determination theory suggests that individuals show differing types of motivation depending on the extent to which his or her behaviour is self-determined, and the subsequent manner in which it is regulated. According to Ryan and Deci (2000), self-determination is achieved when an individual perceives that he himself or she herself is the origin of the behaviour. In Ryan and Deci's study in 2002, they categorised motivation into three: intrinsic motivation, extrinsic motivation and amotivation. Vansteenkiste, et al. (2006) described intrinsic motivation as something that refers to initiating an activity for its own sake because it is interesting and satisfying in itself. In addition, these researchers claimed that when individuals experience intrinsic motivation, they engage in the behaviour they perceive as inherently interesting, satisfying, gratifying, enjoyable, fulfilling and absorbing. It is driven by interest and enjoyment in the task itself, and exists in an individual rather than relying on external pressure. Valler and Ratelle (2002) contextualised intrinsic motivation into three parts in order of decreasing self-determination: intrinsic motivation to know (a need or desire to understand and learn), intrinsic motivation towards accomplishments (behaviour undertaken to gain a sense of achievement and capability), and intrinsic motivation to experience stimulation (participating in an activity for pleasure or sensations that will be felt). On the contrary, extrinsic motivation happens when individuals engage in behaviour merely because of the objective consequences or outcomes they might attract, like money, grades, coercion, and threat of punishment or praise (external goal). Valler and Ratelle (2002) stressed that extrinsic motivation relates to activities undertaken for reasons other than inherent interest in an activity and that this kind of motivation can be classified into four in order of decreasing self-determination: integration (activity is recognised as worthwhile and is integrated into the person's behaviour as a means to an end), identification (activity is undertaken because it is identified as worthwhile for some reason), introjections (activity is governed by rewards and restrictions implemented by the individuals themselves, and external regulation (activity is governed by rewards and restrictions implemented by others) while amotivation is the lack of any self-determination.

Gender and culture gaps in science and mathematics

Research suggests that students entering the science and mathematics teaching career are driven by different motivations. Students' motivation to pursue mathematics teaching include passion for mathematics, love for the subject, nature of the subject, and the value and usefulness of the subject in the economy and career options. Yet, Bianco, Leech, and Mitchell (2011) asserted that career choice in science and mathematics is highly influenced by school-related experiences. In addition, Schiebinger (2010) found that other factors may be related to science and mathematics career choices such as gender related issues. Accordingly, girls do not pursue science and technical studies the same way as boys. The report also specified that even parents' attitudes towards boys and girls can be an important factor in helping to explain girls' low rate of participation in science and technology. The gender disparity in science and mathematics may also be attributed to teaching or even to skills and experiences at school which result in more accessibility of science to boys than to girls (Schiebinger, 2010).

In the *EFA Global Monitoring Report* (GMR) 2008 (cited in UNESCO, 2007), gender bias is claimed to exist in teaching. In fact, in many countries, UNESCO (2007) recounted that "boys enjoy more challenging interactions with teachers; they lead classroom activities; and they get more attention than girls." However, girls in the majority of countries outperform male students on student competencies, specifically in literacy skills. The Philippines experiences the same dilemma where underperformance and the high drop-out rate of boys ascribed to child labour, presents a real challenge towards achieving gender equality. Accordingly, UNESCO Institute of Statistics (UIS) 2007 data showed that boys mostly drop-out of primary school and that gender parity in enrolment is missed in both levels (primary and secondary) of education [Gender Parity Index (CPI) of 1.20 in Gross Enrolment Ration (GER) for 2008]. Related to these findings, EFA GMR 2008 (UNESCO 2007) exposed how teachers' expectations of educational outcomes and students' demeanour differ according to gender. If a teacher is convinced that female students in general are inferior to boys in mathematics, all student interactions will probably be influenced by this conviction. This means that learning and teaching processes can lead to the bolstering of gender stereotyping of girls and their right to participate in quality learning. Henceforth, while it is important to assure that buildings, classrooms and school facilities are available and safe for students of both sexes, substantial attention has to be provided to the interaction between teachers and students. In their interface with students, teachers need to ensure that boys and girls feel secure and appreciated, by them and by fellow students. In addition, quality education needs to consider the individual and gendered needs of learners. These two links stress the necessity to address values and equity in the ambiance of education and the learning-teaching processes at the classroom level.

Rosser (1986) argues that the science classroom is also greatly gendered and the masculine nature of science classes contributes to the lack of women in science. The standard model of teacher as the source of wisdom and student as the recipient is very traditional and tends towards the masculine, particularly in light of the shortage of female science teachers. Rosser suggests that if women's studies, methods, theories, and pedagogies were used in the science classroom, these might serve as a way to attract and retain female students (Rosser, 1990). Middlecamp et al. (1999, 2000) applies feminist pedagogies in the sciences by using interactive activities and allowing students to determine both questions and answers, in an effort to make science more open to women and others. In the study of Morales, Avilla, and Espinosa (2015), qualitative assessment of science and mathematics classrooms showed gender-bias in the different aspects of teaching and learning such as classroom environment, teaching and learning processes, instruction, and assessment. It was further found out that most students are motivated to come to school and learn science and mathematics when the teacher exhibits fairness in all aspects of teaching and learning. Furthermore, it was also reported in the study that most students would like female teachers to teach science and mathematics subjects. Students argued that learning science and mathematics is much easier with female teachers as they show deep compassion to their students and exhibit motherly love which contribute to better learning on the part of the students.

In one of the six *Education for All* goals – to eliminate gender disparities in the primary and in the secondary levels by 2005 and to achieve gender equality in education by 2015 – EFA stresses ensuring girls' full and equal access to and achievement in quality basic education (K-12 level). In the *Millennium Development Goal of East Asia and Pacific Regional UN*, Manahan (2010) found the same argument on gender parity in the Philippines. As reported by Mesa (2007), the gender parity status of the country has been stagnant and is believed that as a country, we will not be able to reach the 2015 goal of gender equality. In addition, Mesa (2007) pointed that country studies dominate the research ground on gender disparities and if there is a need to raise the country status to go with the global target, assessing gender disparity within the country is vital.

Even with a good bearing in gender parity which is indicated by overall progress, the Philippines is still far from achieving gender equality in education (UNGEI, 2010). As presented, the post-2015 agenda highlights the need for gender-balanced teachers to furnish the country with young people and adults who are able to experience opportunities to acquire safe, gender-responsive, and inclusive learning environment with relevant knowledge and skills to ensure their personal fulfilment and be able to contribute to peace and the creation of an equitable and sustainable world (Position Paper on Education Post-2015).

The quality of science and mathematics education has an important role in nurturing science and mathematics teachers in the Philippines. This can be attributed to many factors like science and mathematics curriculum in the basic education and the motivation of the students to choose science and mathematics as their career choice. However, gender equity in basic education may somehow contribute to the over-all school-related experiences of students that highly influence their career-choices geared to science and mathematics education which is what this study wants to explore.

Figure 1 shows how motivation, culture and gender, and femininity and masculinity of science and mathematics may influence the development and training of gender-balanced science and mathematics teachers. Furthermore, all correlates are interlinked to each other.

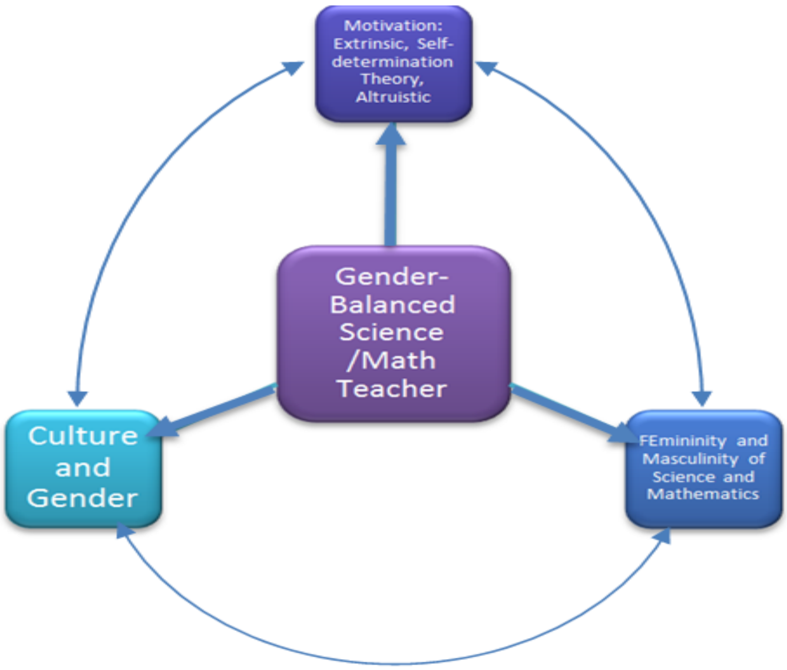

Figure 1: Framework

Methodology

Quantitative research design with qualitative approaches was used in correlating the gender gaps or equality in education quality to the interest of pre-service students in science and mathematics teaching. Interviews and focus-group-discussion with the students gathered pertinent information on the correlation of gender gaps or equality in education quality to the interest of pre-service students in science and mathematics teaching.

In this study, convenient and simple random sampling identified the appropriate participants. From the group of pre-service students in the Philippine Normal University, Manila campus, freshmen students were the conveniently chosen group. The participants of the study took their K-12 (elementary and secondary) education either in private or public schools. From this set of participants, second stage of convenient sampling streamlined the participants to those interested in science and mathematics teaching. From this second set, about 145 pre-service students comprised the participants of this study. The data collection was conducted from October to December of the school year 2014-2015.

The study utilised the research instrument Gender Equity in Classroom Survey (GECS) which was the modified version of the Observation Protocol for Gender Equity in Classroom (OPGEC) developed by Morales and Espinosa (2015). The GECS is in the form of a modified semantic differential scale (1=not applicable; 2=don't know; 3=not at all; 4, 5 and 6=degree of agreement or disagreement; 7=to a great extent) with a Kappa coefficient of 0.83 and a single and average intra-class coefficient of 0.70 and 0.93 respectively. In addition, the reliability coefficient (Cronbach alpha) of the instrument is 0.935. Statistical tests show that the instrument is valid and reliable. After subjecting the GECS to factor analysis, the final instrument yielded eight constructs anchored on the 21st Century Learning Framework:

1) Instruction and assessment (learning actuators, expanding literacies, climate of assessment and transparency);
2) Classroom management and environment (changing habits and roles);
3) Teacher and student interaction (mentoring and community);
4) Medium of instruction (mentoring community);
5) Teaching strategy (self-initiated transfer and thought and abstraction);
6) In loco parentis (changing habits and roles);
7) Instructional material (climate and assessment);
8) Verbal teacher response (changing habits and roles).

Under each of these factors are statements which are coded as B1, B2, C3, C4 and so on for manageable navigation. Table 1 shows the final GECS with sample items in each construct or domain.

Preliminaries included orientation to the instrument with the 145 pre-service student participants. The researchers made sure that the participants understood every detail of the instrument before they started filling in and answering details. Data gathered were subjected to descriptive statistics to determine whether pre-service science or mathematics teachers experienced gender inequality during their basic education (K-12) years. Multiple regression analysis was used to determine if gender predicted domains of gender equity in the classroom while Pearson product moment correlation (ρ) determined the strength of correlation of gender to the eight predictors.

Table 1: Gender equity in classroom survey (Morales & Espinosa, 2015)

Factor 1: Instruction and assessment (learning actuators, expanding literacies, climate of assessment and transparency)

- B5: Expects equal academic achievement between males and females
- B6: Invites both male and female visitors with non-traditional occupations into the classroom.

Factor 2: Classroom management/environment (changing habits and changing roles)

- C13: Practices gender-neutral reading of, and writing on, students' work
- C15: Doesn't ignore sexist remarks made by the students, but challenges them to be gender sensitive instead

Factor 3: Teacher-student interaction (mentoring and community)

- C2: Provides more consideration, acclamation, and constructive feedback to males than with females
- C3: Calls male students by name and asks them more often with complex and abstract questions than female students

Factor 4: Medium of instruction (mentoring and community)

- B3: Balances questions between males and females during class discussions and observes wait-time
- C10: Stereotypes in the language being used.

Factor 5: Teaching strategy (self-initiated transfer and thought and abstraction)

- B1: Encourages cooperative learning in cross-gender groupings by mixing the seating arrangement among males and females and by avoiding dividing students into a single-gender activity groups.

Factor 6: In loco parentis (changing habits and changing roles)

- B4: Gives equal help and in-depth guidance to females as well as with males
- B5: Expects equal academic achievement between males and females

Factor 7: Instructional material (climate of assessment)

- B13: Ensures that books, computer programs, and other curriculum materials are free from stereotyped gender-role behaviour

Factor 8: Verbal teacher response (changing habits and changing roles)

- C1: Uses 'effort-appreciation' statements more often with male than female students.

Results and discussion

Descriptive statistics summarised the experiences of pre-service science and mathematics teachers in the domains of gender equity in the classroom. Table 2 shows the summary of the participants' experiences.

In terms of teacher-student interaction (x=2.350, SD=1.257), and verbal teacher response (x=2.428, SD=1.549), pre-service teachers agreed that they don't really know whether their basic education science and mathematics teachers practiced or showed the predictors under these domains. On the other hand, pre-service teachers agreed that in terms of instruction and assessment (x=3.835, SD=.5504), classroom management/environment

Table 2: Summary of pre-service science and mathematics teachers' experience in K-12 basic education

	Factor/domain	Mean	Standard deviation
1	instruction and assessment	3.835	.5504
2	classroom management/environment	4.280	.6120
3	teacher-student interaction	2.350	1.257
4	medium of instruction	3.786	.8473
5	teaching strategy	4.145	1.067
6	in loco parentis	4.202	.7009
7	instructional material	4.228	1.032
8	verbal teacher response	2.428	1.549

(x=4.280, SD=.6120), medium of instruction (x=3.786, SD=.8473), teaching strategy (x=4.145, SD=1.067), in loco parentis (x=4.202, SD=.7009) and instructional material (x=4.228, SD=1.032), their teachers did not practice or show the predictors under these domains. This shows that these pre-service teachers experienced gender equity in their basic education, in general. Data were subjected to multiple regression analysis and Pearson product moment correlation to verify which domain influenced them in choosing the field.

The multiple regression analysis tested if the gender of students who chose to specialise in science and mathematics education significantly predicted their rating of the domains of gender equity in the classroom. The results of the regression indicated the eight predictors explained 27.7% of the variance (R^2=.077, F (8,136) =1.41, p<.198). It was found that gender significantly predicted domains such as teacher-student interaction (β=-.062, p=0.049), teaching strategy (β=-0.008, p=.039), verbal teacher response (β=-.012, p=.035) and instructional materials (β=.050, p= .047). On the other hand, it was found that gender did not significantly predicted classroom management/environment (β=-.006, p=.087), instruction and assessment (β=-.108, p=.113), medium of instruction (β=-.011, p=.051) and in loco parentis (β=-.016, p= .075).

Analysis using Pearson product moment correlation indicated that the gender of students who chose to specialise in science and mathematics education has significant none to weak negative correlation to instruction and assessment (r=-.188, p=.012), teacher-student interaction (r=-.240, p=0.002) and verbal teacher response (r=-.166, p=.023). On the other hand, it was found that gender has non-significant none to weak negative correlation to classroom management/environment (r=-.057, p=0.247), medium of instruction (r=-.085, p=.155), teaching strategy (r=-0.005, p=.478) and in loco parentis (r=-.057, p= .247). However, it was revealed that gender has non-significant none to weak positive correlation to instructional materials (r=.021, p= .400).

To further analyse the results, individual statistical tests was done for each domain. Multiple regression analysis was used to determine which items in the domains of the Gender Equity in Classroom Survey (GECS) contribute significantly in predicting gender-influenced rating of the 145 pre-service students surveyed. Regression analysis for Domain 1: Instruction and assessment showed that the predictors (B5, B6, B8, B14, C8, C11, C14, C21, C22, C23, C24, C25) accounted only 13.1% of the variance. The regression model does not show a good fit for the data. With a sig. value equal to .163, there is no significant regression relationship between the items in Domain 1 and the gender-influenced ratings of the students. However, it is also noted that item C24 contributed to the regression model. Table 3 shows the regression and correlation coefficients of the predictors for Domain 1.

Table 3: Domain 1: Instruction and assessment
(learning actuators, expanding literacies, climate of assessment and transparency)

Predictors	B	SE	r	sig.
B5: Expects academic achievement between males and females.	-.054	.049	-.133	.062
B6: Invites both male and female visitors with non-traditional occupations into the classrooms.	-.058	.037	-.199	.010
B8: Initiates or discusses gender concerns with students when gender issues arise.	-.035	.046	-.126	.071
B14: Exposes stereotyped gender-role behaviour when encountered in curriculum materials.	.027	.040	-.032	.355
C8: Gives everyone an equal opportunity in all activities.	-.024	.075	.002	.493
C11: Uses degendering terms as 'police officer' and 'fire fighter' rather than 'policeman' or 'fireman'.	-.036	.034	-.163	.029
C14: Does not praise females only for the physical appearance or neatness of work; commends both males and females for their ability.	-.053	.047	-.119	.084
C21: Judges academic achievement of students not based on gender expectations, but rather with the result of equal treatment and evaluation using the same benchmarks or evaluation tools.	.074	.056	-.031	.360
C22: Sets equal goals and try to have all the students meet familiar achievements. (e.g. males should not be expected to do better on science experiments or projects that require hands-on construction and girls should not be expected to do better on written assignments and art projects)	-.029	.042	-.100	.124
C23: Expects that graphical skills and computations are attributed to males.	.093	.054	-.048	.288
C24: Expects that essays and oral discourse are attributed to females.	-.121	.054	-.148	.043
C25: Avoid separating males and females by desk groupings or by pitting the males against the females when forming teams for classroom contest and projects.	.007	.030	-.067	.219

As shown in Table 3, correlation analysis reveals that the predictors have very weak negative correlation to gender. This implies that instruction and assessment inside the classroom are targeted for both genders. This also means that the so-called quality education particularly in instruction and assessment is aiming towards the students' achievement regardless of gender and cultural background. Though the set of predictors has no regression relationships to gender-influenced ratings of the students, it is also noted that there are three predictors in Domain 1, such as B6, C11 and C24 which are significantly related to gender. These findings imply that some activities inside the classroom are stereotyped to either a male or a female.

Regression analysis for Domain 2: Classroom management/environment reveals that predictors (B7, B10, B11, B12, C13, C15, C17, C18, C19 and C20) accounted only 13.6 % of the variance (Table 4). However, it is surprisingly observed that the model is fit for the data. This is revealed from the p-value (sig.) equals to .035 which is lower than the 0.05 level of significance. Thus, there is a significant regression relationship between the predictors in Domain 2 and the gender-influenced ratings of the students. Only item C17 contributed to the regression model. Table 4 presents the regression and correlation coefficients of the set of predictors for Domain 2 in predicting the gender-influenced ratings of students in this domain.

Table 4: Classroom management/environment (changing habits and changing roles)

Predictors		B	SE	r	sig.
B7:	Disciplines male and female students in the same manner and frequency.	.023	.044	-.001	.493
B10:	Constructs test questions in a gender-neutral fashion.	-.0.20	.044	-.068	.212
B11:	Balances or assigns leadership roles and support positions for both males and females.	-.034	.070	-.063	.229
B12:	Balances other assigned classroom jobs (e.g. lifting or moving chairs and desks, clean-up and running errands)	.056	.042	.046	.293
C13:	Practices gender-neutral reading of, and writing on, students' work.	-.002	.063	-.031	.356
C15:	Doesn't ignore sexist remarks made by the students, but challenges them to be gender sensitive instead.	-.060	.048	-.125	.070
C17:	Exhibits instructional styles that match the male and female students' learning styles.	.149	.067	.062	.233
C18:	Gives ample opportunities to students to participate in both methods of learning (collaborative and peer challenge).	.106	.052	.078	.179
C19:	Modifies activity settings and physical layout of call in order to promote gender equity.	-.091	.065	-.135	.055
C20:	Designs instruments with equal representation of roles.	-.115	.060	-.191	.012

As presented in Table 4, the predictors in Domain 2 are weak negatively correlated to gender yet only item C20 is related to gender. These findings somehow verify the study of Morales, Avilla and Espinosa (2015) that students are practically aware and sensitive to gender issues. Learning and achieving do not matter with gender but about hard work and diligence. They can recognise their own capabilities and capacities and respect the competence of others regardless of gender.

For Domains 4 and 6, regression analysis indicates that the predictors on these two domains do not have significant regression relationships in predicting gender-influenced ratings of the students. These findings imply that both male and female students are given equal chances inside the classroom in terms of achievement, medium of instruction and even appreciation. The results further indicate that students are somehow gender sensitive. Table 5 presents the regression and correlation coefficients for the predictors in Domains 4 and 6.

Table 5: Domains 4 and 6

Predictors	B	SE	r	sig.
Domain 4: Medium of instruction (mentoring and community)				
B3: Balances questions between males and females during class discussion and wait-time.	-.020	.039	-.044	.301
C10: Stereotypes in the language being used.	-.024	.029	-.068	.207
Domain 6: In loco parentis (changing habits and changing roles)				
B4: Gives equal help and in-depth guidance to females as well as with males.	.054	.056	-.006	.472
B5: Expects equal academic achievement between males and females.	-.095	.053	-.125	.069
B14: Does not praise females only for the physical appearance or neatness of wok; commends both males and females for their ability.	-.009	.032	-.010	.451

Accordingly, Domains 4 and 6 are very weak or almost negligible and are negatively correlated to gender. This link shows that gender gap and gender-related issues inside the classroom are addressed by both the teachers and the students. This finding further verifies that both male and female students are given equal chances inside the classroom.

The same statistical analysis was used to test which items within each of the identified significant predictors contribute to the model for predicting gender-influenced rating of the students in each of the domains. The results of the regression for the Domain 3: teacher-student interaction indicated that the 6 predictors (C2, C3, C4, C5, C6, C7, and C8) explained 32.5% of the variance (R^2=.106, F (6,136)=2.646, p>.019). Table 6 presents the regression and correlation coefficients of the predictors for the model of Domain 3 as a major predictor of gender-influenced ratings of students in each domain.

Table 6: Domain 3-teacher-student interaction (mentoring and community)

Predictors	β	ρ	R	ρ
C2: Provides more consideration, acclamation, and constructive feedback to males than with females	.016	.036	-.122	.074
C3: Calls male students by name and asks them more often with complex and abstract questions than female students	.027	.050	-.181	.016
C4: Shows that female students are prone to becoming the invisible and losing members of the classroom.	-.110	.049	-.267	.001
C5: Provides academically specific remediation, as well as praises and criticisms to male students.	-.025	.050	-.161	.028
C6: Provides less academically valuable and more superficial feedback to female students.	.047	.055	.136	.055
C7: Keeps a tone of neutrality when commenting on students' performance (e.g., "Yes," "uh-huh", or "fine") rather than calling attention in a way that may perpetuate gender stereotypes.	-.050	.027	-.248	.002

It can be gleaned from Table 6 that Domain 3: teacher-student interaction significantly predicted items such as C2, C3, C4, C5, C6, and C7 with β ranging from -.110 to .047 and $p \leq 0.05$ except for C6. This implies that all items except C6 contribute to Domain 3 as significantly predicted by gender. Analysis using Pearson product moment correlation indicated that Domain 3 has significant weak negative to weak positive correlation to C2, C3, C4, C5, C6 and C7 with $p \leq .05$ except for C6. These results verify the noted experiences of the participants that teacher-student interaction in the classroom is influenced by gender. They think that they encountered in their basic education gender bias in favour of the males in the different aspects of teacher-student interaction such as teacher praises, feedback system, questioning techniques and providing comments on student performance which may have influenced their career-choice of science and mathematics teaching.

Similarly, Table 7 presents the regression and correlation coefficients of the predictors for the model of Domains 5, 7, and 8 as major predictors of gender-influenced ratings of students in each domain.

Table 7: Domains 5, 7 and 8

Predictors	β	ρ	*R*	ρ
Domain 5: Teaching strategy (Self-initiated transfer and thought and abstraction)	-.008	.039	-.005	.478
B1: Encourages cooperative learning in cross-gender groupings by mixing the seating arrangement among males and females and by avoiding dividing students into a single-gender activity groups.				
Domain 7: Instructional material (Climate of assessment)	.050	.047	.21	.400
B13: Ensures that books, computer programs, and other curriculum materials are free from stereotyped gender-role behaviour				
Domain 8: Verbal teacher response (Changing habits and changing roles)	-.012	.035	-.166	.023
C1: Uses "effort-appreciation" statements more often with male than female students.				

Accordingly, Domain 5: teaching strategy, significantly predicted item B1, Domain 7: instructional materials*,* significantly predicted item B13 and Domain 8: verbal teacher response, significantly predicted C1 with β ranging from -.012 to .047 and $p \leq .05$. These findings imply that each item tagged in Domains 5, 7, and 8 contribute to these domains as significantly predicted by gender. However, analysis using Pearson product moment correlation indicated that Domains 5, 7 and 8 have no correlation to the identified item in each domain with $p \leq .05$ except for C1 of Domain 8. These results mean that pre-service students may have experienced group schemes merging all males and separating them from the females. Teachers may have employed seating arrangements where males were delineated from the females. Furthermore, the participants may have encountered curriculum materials that promote stereotyping of gender-role behaviour. While significant correlation of item C1 to Domain 8 suggests that pre-service students may have experienced or encountered teachers who displayed greater effort-appreciation to males than with females. They think that they encountered in their basic education (K-12) gender bias in favour of males in different aspects of teacher-student interaction such as teacher praise, feedback system, questioning techniques and providing comments on student performance which may have influenced their career-choice of science and mathematics teaching.

Conclusion and recommendations

Although the pre-service teachers experienced some gender inequalities in mathematics and science classrooms in K-12 basic education, they still opted to pursue a career in mathematics and science teaching. They agreed that factors such as teacher-student interaction, teaching strategy, verbal teacher response and instructional materials largely affected their career choice. On the contrary, classroom management/environment, instruction and assessment, medium of instruction and in loco parentis did not greatly affect their career choice. With the decreasing number of takers of the science and mathematics education courses, K-12 teachers can focus and improve on the domains or factors which influence students to pursue a career in science and mathematics teaching. It is suggested that gender equality in the K-12 classrooms should be practiced. Classroom management, instructional materials and curriculum should address gender equity.

Due to time constraints, focus group discussion and interviews among selected participants were not conducted. It is therefore recommended that to further validate results, a focus group discussion and interviews should be integrated as part of the methods. Classroom observation and focus group discussion may also be conducted to in-service K-12 basic education teachers. In the future, the study may traverse the field of predicting career-choices of K-12 students for better curricular mapping into tertiary education and for better preparation of students for their predicted track: Academic, STEM, Sports, Humanities and Arts.

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