

# Gender Stereotypes when Applying Bloom's Taxonomy by Preservice Teacher's

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## Research Article

**Keywords:** Gender Stereotypes, Bloom's Taxonomy, Preservice Teacher's

**Posted Date:** March 1st, 2022

**DOI:** <https://doi.org/10.21203/rs.3.rs-1398683/v1>

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# Abstract

The aim of this research was to examine the gender stereotypes between preservice teachers (33 preservice teachers; 4 male, 29 female) by applying Bloom's Taxonomy in their educational course, "Measurement & Evaluation." Each student was assigned to formulate behavioral goals, according to Bloom's six classification levels, and by the end of the course. The research questions for the study were: Do the verbs (actions) and nouns of Bloom's Taxonomy which were written by preservice teachers connotative any gender stereotypes? Were there differences between females and males in their use of gender stereotypes? Were there differences between preservice teachers according to their academic field (13 applied biology, 13 applied mathematics, 6 applied physics, and 1 applied chemistry) toward gender stereotypes? The analysis of the data showed that preservice teachers had gender stereotypes (more than 70% of them are masculine verbs and nouns) in writing verbs (actions), and nouns, during they are designing Bloom's Taxonomy. Moreover, there are no significant differences between females and males in their tendency toward apply gender stereotypes due to males, and their academic field. In light of these findings and results, the scholar powerfully endorses that the course needs to be used to develop a gender balance, and eliminate gender stereotypes.

## 1. Introduction

The issue of gender in the educational system in schools and universities has occupied the minds of many educators and researchers (Apple, M., 2013), as many studies and research have reinforced the need to eliminate gender stereotypes in textbooks, curriculums school and university (Cunningham, S. J., & Macrae, C. N., 2011).

The bias of males in educational curricula has been reflected in curriculum, specifically in measurement and evaluation courses that gets used to Bloom's taxonomy. Researchers (e.g., Belenky et al .1986; Hogsett, C. 1993) found prejudices and stereotypes for males in the formulation of behavioral goals that address males and neglect females. Rogers (2005) argue that females do not participate in writing books or male-dominant factors in societies. In light of this, the purpose of the study focused on a course of measurements and evaluations that teachers took part in before service and before graduation. The course gave them the skills to formulate behavioral goals within the criteria and indicators that depend on quality and quantity, as well as, address females and males alike. This study is one of the rare studies in discussing gender issues, in that it highlights the patterns that females and males think about the gender.

## 2. Framework

### 2.1 Gender

Gender considers one of the most important topics in modern humanity for several aspects such as; cultural, social, political, economic, and biological, moreover, it represents the identities of natural of

female or male in the comprehensive view according to the human type, but not sex classification (Fausto-Sterling, A. 2012, Merry, S. E.,2009).

Gender concept can be used to equality and equity for both female and male at the same level, but educational systems including textbooks, method of teaching and assessment violate this equity by a male bias. For example, Karama (2020) conducted the content analysis for mathematics school textbook from grad1 to grade 12 and confirmed a male bias, many studies confirmed these results such as Zakka, Z. M., &Zanzali, N. A. B. A. (2015), Gharbavi, A., &Mousavi, S. A. (2012), Ariyanto, S. (2018), and Alayan, S., & Al-Khalidi, N. (2010).

Gender bias in textbooks reflected on teacher methods of teaching inappropriate way, for example, Mitchell & Hoff (2006) observed teacher methods are appropriate for male, and not reaching females. Furthermore, Sadker&Sadker (1994) noticed teachers give more attention to boys in teaching science and mathematics and less to girls in the same classroom.

Gender bias in teaching methods appears clearly in the discussion between teachers and students and affect the type of questions posed to students. According to Sandler, et. Al (1996) confirmed that teachers probe open-ended questions to male i.e. higher-ordered thinking skills that need critical, and creative thinking, while they asked female lower-order thinking skills that depend on recalling, retrieving, and memorizing the information from the memory. From the above discussion, its note the bias in textbooks, teaching methods, and questioning, but we do not know about the gender issue during applying Bloom's taxonomy in reality. This research tries to give us more insight into applying Bloom's taxonomy in writing intended learning outcomes (i.e. are preservice teachers aware of the gender issue when applying Bloom's Taxonomy on their final projects in the passing course of measurement and evaluation?)

## **2.2 Blooms Taxonomy**

It is well known that Bloom's Taxonomy (Thompson et. Al.,2008) defines as an organization scheme used to state and separate different stages of human intellect. Educators have classically employed Bloom's taxonomy to tell or monitor the growth of assessment methods, curriculum development, and different teaching methods.

Applying Bloom's Taxonomy by Preservice teacher's on their final projects revealed their ideas and beliefs about writing intended learning outcomes. It supposed to be efficient way that taking on account the gender neutrality in terminology with no specifications of masculine or feminine. Moreover, considering the standard of this efficiency such as Specificity, Measurability, Attainability, Relevantly, and Timeframe (SMART) (Daniela, L., &Lytras, M. D. 2018), Blooms Taxonomy has six levels of intended learning outcomes (Gummineni, M. 2020).The first level is knowledge which depends on recalling and identifying information. The second level is understanding like selections of facts and concepts. The third is an application such as computing and procedural knowledge. The fourth is analysis like critical thinking. The fifth is synthesis such as creative thinking, and the sixth is create, evaluation, and reflective thinking (Katrancı, Y., &Şengül, S. 2020,p56).

Intended learning outcomes was a very important component of the educational system because of the following reasons namely (Omar, N., Haris, S. S., Hassan, R., Arshad, H., Rahmat, M., Zainal, N. F. A., &Zulkifli, R. 2012) ;

- Content analysis of textbooks to measure its quality.
- Building lesson plans.
- Determination of objectives.
- The designing activity of lesson plans and textbooks.
- Using teaching methods
- Building a system of measurement and evaluations.
- Testing student's in different types of emanations.

One more and very important aspect of Bloom's Taxonomy is the writing of verbs that identify the required action from the learner, this verb is SMART (Stanny, C. J. 2016), and it must be free of masculine or feminine, and emphasis gender neutrality. Hogsett, C. (1993) noted in her research, the taxonomy used "he" as referring to teachers and students males, and ignoring females. If this noun male-oriented then the female will not involve in the learning process, and vice versa, unfortunately, there is research evidence show the gender bias of student writing masculine verbs, actions, and nouns (Haswell, R. H., &Haswell, J. T.1996).

Belenky et al (1986) critique Bloom's Taxonomy because it is neglected female's verbs, and nouns in its formulation of intended leaning outcomes, because of its tendency for the male learner.

Belenky et. al. discussed the importance of Bloom's Taxonomy by a male researcher, while the female researcher make their criticism due to the tendency of the structure of Bloom's Taxonomy that focuses on males and harmful to females. So none of these researchers study the issue of utilizing Bloom's Taxonomy, in reality, to see how the female and male apply their knowledge in fine level i.e. research gap still exists, thus this research aimed at brigs this gap and exploring the gender stereotypes when applying Bloom's Taxonomy by Preservice teacher's to decide if gender bias is continued among preservice teachers who will be the future teacher, so our major question for this study is about the tendency of gender: Are the verbs ( actions ), nouns, of Bloom's Taxonomy that's written by preservice teacher's gender bias or not ? are their difference between female and male in a tendency toward gender? are their differences between preservice teachers according to their academic filed toward gender preconception?

### **3. Methodology**

The aim of this research was to explore preservice teacher's awareness of the gender stereotypes when applying Bloom's Taxonomy on their final projects to passing the course of measurement and evaluation.

Data were gathered from 33 preservice teachers (4 male, 29 female ) through their final the academic year at a Palestine Polytechnic University in the college of applied science, were 13 applied biology, 13 applied mathematics, 6 applied physics, and 1 applied chemistry, the researcher checked data collection twice with a period of 15 days between these two times, and got the same data analysis. Since the outbreak of the pandemic of Corona Virus COVID19, then all educational systems face to face shutdown, and distance learning took place. Thus, teaching and learning entered a new era in this century.

As a university professor, the communication that was used with the students were a variety of electronic devices and software such as Zoom, Google Meet, and so on. Thus my university encourages me and staff faculties to teach and engage with students online.

As a result of this dramatic change in educational the system, assessment methods shifted to suit the new situation, and students become more responsible for their own learning (e.g. student-centered learning).

One of the most important methods of assessment I used to assess my student project-based – learning, i.e. students at the end of my course ( my course titled: Measurement and Evaluation, 3 credit hours, this course covered the basic skills and knowledge in measurement and evaluation, and its durations 4 months) to submitted a project that depends on all sections of this course, students in this project need to analysis one textbooks by her/his chosen form grade 1 to grade 12 according to their field of specifications; Biology, Mathematics, Physics, and Chemistry, then the students in this project will utilize Bloom’s Taxonomy, and write down all intended learning outcomes ( some others educationist called it behavioral objective), this mission required many accurate skills from students, they need to be able to discover, deduce, analyze and reflective, and that the result is an accurate, specific and deep decision.

After all preservice teachers submitted their projects, we began to assess them according to the following criteria’s;

Criteria I: Is the project utilize the six levels of Bloom’s Taxonomy (Thompson et al,2008)? i.e. knowledge, comprehension, application, analysis, synthesis, and evaluation. If yes, we moved to the second criteria, if not the project will not pass.

Criteria II: Is each level of Bloom’s Taxonomy utilizing the five conditions of SMART, with regard to their verbs, nouns, and actions usage (Daniela, L., &Lytras, M. D. 2018, Stanny, C. J. 2016)? i.e. specificity, measurability, attainability, relevantly, and timeframe.

If yes, the students passed the course, if not then the project not meet the requirement of passing.

Criteria III: this criteria developed for the purpose of this research, and will not affect preservice teacher final marks in the project, this criteria check if the preservice teacher aware of gender balance on their writing of verbs, actions, and nouns while dealing with Bloom’s Taxonomy (Belenky et al,1986, Hogsett, C. 1993, Haswell, R. H., &Haswell, J. T.1996),

Criteria III aim is to comprehend the degree to which gender stereotypes may play a part in the education field through raising awareness of preservice teachers and policymakers to advance citizenship and boost it for a higher level of society.

## 4. Data Analysis And Results

Analysis of the data showed ( see Table 1) that in the numbers and percentage of actions (verbs), and nouns that are written by preservice teachers on their final projects had a tendency toward gender bias to male in all levels of Bloom's taxonomy. The first level of knowledge in verbs and nouns sum-up to 72% for males, while the same level has just 28% for females.

The tendency in comprehension level showed more gender bias in preservice teachers writing of verbs and nouns, its percentage approaches 73% lifting just 27% to females.

Application-level exceeded the two previous levels, and it can be seen in Table 1 jumped to 77%, lifting very small ratio to a female that approaches 23% in both verbs and nouns, also, analysis level remains in high tendency due to male, so we have 74% of verbs and nouns are masculine, and just 26% are feminine.

The latest two levels (synthesis, and evaluation ) have the highest gender bias, as we can see from Table 1, it was 78% of verbs and nouns are masculine, and little is feminine ( 22%), Detailed evidence about the numbers, and percentages of actions ( verbs), and nouns that written preservice teachers are summarized in Table 1.

Table 1. Numbers, and percentages of actions ( verbs), and nouns that written preservice teachers.

Blooms Taxonomy	Gender dimensions				Total
	Masculine		Feminine		
	Verbs/Actions	Nouns	Verbs/Actions	Nouns	
Knowledge	70 (43%)	46 (29%)	13 (8%)	32 (20%)	161
Comprehension	92 (43%)	63 (30%)	18 (9%)	37 (18%)	210
Application	99 (43%)	80 (34%)	11 (5%)	43 (18%)	233
Analysis	67 (43%)	48 (31%)	11 (7%)	30 (19%)	156
Synthesis	61 (42%)	52 (36%)	9 (6%)	22 (16%)	144
Evaluation	56(46%)	39 (32%)	8 (6%)	19 ( 16%)	122

Table 1, indicate that preservice teachers used male verbs (action) more than male nouns, all verbs and actions have more than 40% of the perceives teacher writing learning intended outcomes, while the nouns of the male are all around 30%, and what remains for female less than 28% for nouns and verbs which are clearly supporting the dominant of Masculine thinking of male and female, although the majority of the preservice teacher as a female of this study.

To answer question two of this study which is “are their difference between female and male in a tendency toward gender?” it is useful to answer it by performing a Chi-Square test, so after we used it we have the following results as seen in table 2.

Table 2. Tendency comparisons between female and male by using Chi-Square test.

Blooms Taxonomy	Gender response	Gender dimensions				P-value
		Masculine		Feminine		
		Verbs/Actions	Nouns	Verbs/Actions	Nouns	
Knowledge	Female	93	68	15	43	0.052
	Male	13	9	0	0	
Comprehension	Female	83	57	18	37	0.125
	Male	9	6	0	0	
Application	Female	88	69	11	43	0.052
	Male	11	11	0	0	
Analysis	Female	62	43	11	30	0.003
	Male	5	5	0	0	
Synthesis	Female	51	42	9	22	0.087
	Male	10	10	0	0	
Evaluation	Female	51	34	8	19	0.313
	Male	5	5	0	0	

From the table above we can see, there are no significant differences between females and males on the level of knowledge, so both of them have a tendency to write actions and nouns in this level in masculine concept neglecting feminine rights.

Although the second level (Comprehension) has an agreement between female and male in a tendency toward the masculine concept, the sample agreed in this type of Blooms Taxonomy (Comprehension),

and which is considered as a lower thinking skill, but they disagree on the rest of higher levels and the consequences of this result put female underestimation of self-confidence, and the highest thinking skills is the business if male alone.

The same results as above for level three (Application), there is no significant difference between female and male in orientation to the direction of masculine concept, and ignoring feminine right on writing their names or verbs.

The only level that has a significant difference in the analysis level, as we can see from the P-value, females try to write nouns and verbs in feminine style, but the male tries to make all of them a masculine tendency.

From the table above we can see, there are no significant differences between females and males on both levels of synthesis and evaluation, so both of them have the tendency to write actions and nouns in this level in masculine concept neglecting feminine nouns and verbs in writing these levels.

Table 3

Tendency comparisons between preservice teachers according to their academic major by using Chi-Square test.

Blooms Taxonomy	Academic Major	Gender dimensions				P-value
		Masculine		Feminine		
		Verbs/Actions	Nouns	Verbs/Actions	Nouns	
Knowledge	Biology	44	18	5	6	0.009
	Physics	20	15	4	4	
	Mathematics	38	40	6	29	
	Chemistry	4	4	0	4	
Comprehension	Biology	43	18	8	8	0.002
	Physics	15	11	8	8	
	Mathematics	30	30	2	17	
	Chemistry	4	4	0	4	
Application	Biology	35	20	3	1	0.002
	Physics	13	8	5	5	
	Mathematics	47	48	3	33	
	Chemistry	4	4	0	4	
Analysis	Biology	25	14	3	7	0.001
	Physics	11	9	3	2	
	Mathematics	27	21	5	17	
	Chemistry	4	4	0	4	
Synthesis	Biology	27	18	3	5	0.001
	Physics	9	9	2	2	
	Mathematics	21	21	4	11	
	Chemistry	4	4	0	4	
Evaluation	Biology	21	11	4	4	0.001
	Physics	7	3	0	0	
	Mathematics	24	21	4	11	
	Chemistry	4	4	0	4	

To answer question three of this study which is “are their difference between female and male in a tendency toward their academic field biology, physics, mathematics, and chemistry?” it is useful to answer it by performing the Chi-Square test, so after we used it we have the following results as seen in Table 3.

From the Table3, it's shown there is a significant difference between the preserves teachers according to their discipline, this significant related to mathematics preservice teachers because they try to write verbs and nouns for females and they may have more awareness form the other colleagues in the gender issues.

In fact, the significant difference related to mathematics perceives teachers, has a lower number of cases comparing with the whole scene.

Meanwhile, the preservice teachers of biology, physics, and chemistry have the same trend as gender bias to males.

## 5. Discussion

This study reinforce us to carefully test the gender stereotypes when applying Bloom's Taxonomy by preservice teacher's from both counterparts females and males.

For real improvement of the educational system in gender issues, we must make sure that our efforts in the right direction of raising gender balance among stakeholders of the whole the educational system, the result of this study ensure the need of reforming our existing educational systems that train females before males to be biased toward males.

The answer to the first question of this study about the numbers, and percentages of actions ( verbs), and nouns that written preservice teachers confirmed gender bias, and this result may due to the men who write the textbooks and make the educational policy, this result aligned with many studies conducted before in different approaches, such as the study of (Belenky et al,1986), (Hogsett, C. 1993), and Haswell, R. H., &Haswell, J. T.(1996), so it is important to have more females and other genders to be engaged in creating curriculum.

Meanwhile, the result of question two about the tendency comparisons between female and male also indicted the deep gap in the culture of the preservice teachers that encourages the stereotype of gender in their daily life, so it is important to make a change in this culture by training and raising awareness of gender balance or gender-neutral.

This result of this study is (which is gender stereotype) similar to many studies that take place before this study like the study of (Haswell, R. H., &Haswell, J. T.1996), and Belenky et al (1986), and they have gender stereotype.

The result of question three considered as a result of the two previous questions and can be considered an extension of masculine educators that decide what types of verbs, action, and nouns to be in the educational system, and in textbooks.

In summary, this research in gender stereotypes when applying Bloom's Taxonomy by preservice Teacher's provide us with more insights about the output of our educational system, that full of contradictions about female statues, and we must act before lost our generation, so it is necessary to conduct educational reforms based on equality of gender, and gender balance.

## Declarations

## Acknowledgment:

The researcher is very grateful to Staci Martin for her generous help in reviewing this research.

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