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Exploring the Impact of Gender and Academic Program on University Students' Engagement

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ABSTRACT

A quantitative and cross-sectional research design was used in this study to determine the effect of gender and academic program on the academic engagement of university students. The number of undergraduate and postgraduate students was 400 (160 males and 240 females) and 283 BS students and 117 M.Phil/PhD students. The rated academic engagement was measured using a standardized Likert scale instrument that has a strong reliability (> .70). Two-way between subjects ANOVA was used to test main and interaction effects of gender and academic program on engagement. The findings showed that the total model was found to have statistically significant value that was F (3, 396) = 8.91, p = <.001, and the model explained 6.3% of academic engagement. The main effects were found to be significant according to gender, F(1, 396) = 5.65, p =.018 and according to academic program, F(1, 396) = 8.46, p =.004, which implied that the levels of engagement between males and females and between BS and M.Phil/ PhD students were different. The gender-Academic program interaction was however not relevant, F(1, 396) = 3.50, p =.062 meaning that there was no gender difference in the engagement level among different program levels. On the whole, the results indicate that gender and academic program factors separately affect the academic engagement in students, which makes it necessary to provide the latter with special

instructions and support programs to promote the engagement of the student body of various types.
Keywords: Academic Engagement; Gender Differences; Academic Program; Higher Education; ANOVA

INTRODUCTION

The involvement of students has turned out to be a key concern in modern higher education as it determines the quality of learning directly, academic achievements, and student retention. Engagement is a good predictor of performance and retention since it shows how behaviorally, cognitively and emotionally students are engaged in their academic experiences. With universities becoming more and more student-centered in the learning process, it is important to understand what motivates or restricts student engagement so that the instruction may be enhanced. In the contemporary competitive academic world, academic institutions need to build up learning environments that encourage curiosity, motivation, involvement, and sense of belonging. Due to the impact of engagement on academic and personal growth, researchers note that it is necessary to study demographic and contextual conditions that could influence it. It has ensured that engagement is one of the most studied fields over the past ten years (Bond et al., 2020).

Gender remains a significant factor that has an impact on the interaction of students with academic materials and in-class settings. According to the recent research, it is possible that males and females have various learning behaviors, patterns of participation, and outcomes of engagement because of the presence of social expectations, levels of confidence, and academic self-concepts. It is also reported that female students are more frequently reported to be more behaviorally and emotionally engaged whereas male students may be more involved in competitive or technology-oriented learning activities. Such differences underscore the necessity to study gender disparities in present-day universities, particularly in times when higher education is increasingly becoming diverse and inclusive. The knowledge of gender-based interaction patterns enable the educators to develop instructional strategies that accommodate all learners in an equal manner (Dlamini & Mbodila, 2021).

The academic programs are another factor that influences the performance of the students since the different disciplines have their own teaching styles, modes of assessment and modes of learning. A course like engineering, medicine or the natural sciences can be a hands-on practical course whereas social sciences and humanities are more focused on reading, critical thinking, writing, and discussion. Such variations affect the way students engage, cooperate and react into academic obstacles. As an illustration, learners in STEM can do more tasks of problem-solving, and learners in arts and social sciences can do more reflective or analytical learning. Thus, knowledge of the engagement in different academic programs can help in determining instruction strength and weakness in each discipline (Bai et al., 2022).

The analysis of the collective impact of gender and academic program can help to learn more information about the patterns of engagement that are not always noticeable in the situations when the variables are considered separately. Some academic courses are skewed towards one gender and this would influence the classroom dynamics, group interactions and peer relationships. Moreover, the teaching style that is applied in other disciplines can harm the other gender without the intention of doing so, and as a result, it would lead to disparities in motivation and levels of engagement. This interaction can be understood to enable universities to create inclusive learning plans that would enable them to promote equity in academic institutions. Such experiences can be used to change the way teaching is conducted and the outcomes of students in various learning settings (Huang et al., 2020).

Since the issue of enhancing the learning outcomes in higher education is gaining attention, it is necessary to explore the role of gender and academic program in the difference in engagement among students. The ability to recognize these differences helps educators to develop specific interventions like mentorship, academic advising, discipline-based teaching developments, and gender-sensitive support services. This may improve the learning process, increase the sense of belongingness among the students and decrease the level of engagement between the various groups of students. Moreover, the knowledge of these relationships will help institutions formulate policies that foster inclusiveness, academic achievements, and student welfare. This study thus adds to an emerging field of study on the determinants of engagement in contemporary higher education institutions (Yang et al., 2021).

Statement of the Problem

Student engagement is also known to be a major predictor of achievement and even in universities, it has been realized that there are still high levels of engagement that differ among various groups of students. Although there has been a growing concern in improving learning environments, little has been done in terms of comprehending the impact of demographic (gender) and academic (program of study) factors on students engagement in higher learning. Such difference can influence the participation of students, learning behavior, academic motivation and performance of the students over-all but the magnitude and nature of the variation is not well understood in many universities. Unless the engagement is analyzed concerning academic program and gender, the institutions might not be in position to develop effective engagement teaching, fair learning and support systems that are responsive to diverse learners. Thus, the proposed research aims to examine the role of gender and academic program in the engagement of university students and determine possible gaps that need to be addressed with special consideration.

Significance of the Study

The research is very relevant to the universities, educators, and policymakers since the knowledge of the effect of gender and academic program on student engagement can create a better and more inclusive way of providing education. The

results can be used to develop institution-specific interventions by showing disparities in engagement between groups of students, including gender-responsive pedagogy, discipline-specific support groups and academic advising. The research will also play a commendable role to the curriculum developers who want to improve classroom engagement, motivation, and learning. Also, the study adds to the expanding body of knowledge regarding what factors can influence the participation in contemporary higher education, providing evidence that can inform institutional policy, faculty training and quality assurance efforts. Finally, the research is expected to help universities to promote fair learning conditions in which every student, irrespective of gender and academic program, could reach his/her potential in studies.

LITERATURE REVIEW

Korhonen et al. (2024) note that student involvement in higher education is a dynamic concept based on the time and various academic settings. It comprises behavioral, emotional and cognitive investment in learning. Similarly, the national policy and quality assurance agencies do underline the active engagement in the classroom, association with other students, and staff, and counseling on extracurricular activities as the important aspects of the quality of learning and student achievement. The context-dependent and situational nature of the engagement processes is also evidenced by the current cross-national study that indicates that the rate of engagement is radically lower across institutions, majors, and years of study. This literature offers the conceptual framework on how the structural factors such as gender and academic program influence patterns of participation of university students.

Santos et al. (2021) report that gender participation is an orderly pattern with women reporting more engagement scores overall, and higher scores of emotional and self-regulatory engagement during adolescence and early adulthood. Wider statistics of higher education participation show that women are increasingly more likely than males to attend university courses and complete the courses. This implies that the gendered paths of engagement could begin before university and continue during the degree courses. Nonetheless, recent studies in senior high schools show that the differences between genders may be domain-specific: emotional engagement may not be much higher or lower between the genders, but female students sometimes show a superior behavioral and cognitive engagement. Studies of motivating variables in education also further elaborate the boy paradox wherein males often report lower involvement as well as less pleasant judgements of the learning environment yet they have the same aptitude. This observation indicates the existence of intricate sociocultural expectations regarding masculinity and studying.

Banihashem and colleagues (2021) carry these patterns into the context of technology-intensive higher education, showing gender variations in engagement and self-regulation, where the female graduate students often show more stable agentic engagement than males in a constructivist learning-analytics-supported

course. Alternatively, in a supposedly fair setting, male students are more likely to be vocal than would be the case given the class composition, research on science classes based on active-learning has shown. Gender gaps can partially be overcome by using digital tools, as it is reported by more recent research on online learning. As an example, a study of the use of ChatGPT in university courses had substantial positive effects on academic outcomes and engagement across all students, but no statistically significant difference was found concerning reported engagement between male and female learners. This body of conflicting findings suggests that the design of education, modality (in-person, hybrid, online) and the specific engagement measures under consideration all have an impact on gendered patterns of involvement.

Isaeva et al. (2024) attribute a lot of diversity to the types of collaborative learning opportunities and student-staff contact, as well as deep learning methods available across majors and institutions, meaning that it is not just gendered but highly academic-program-based as well. Prior studies of disciplinary cultures have created a distinction between hard and soft disciplines (such as the natural sciences and engineering and the social sciences and humanities respectively), arguing that the former often need less discursive and collaborative work in the classroom and the latter more discussion, introspection, and integrative activity.

According to the recent research paper on the smart and technology-enhanced education, curriculum design, teaching techniques, and assessment practices vary depending on the discipline and determine the opportunities of students to engage actively in the learning process and with their peers. Students using generative AI also demonstrate knowledge, adoption, and task-specific differences in usage, which are discipline-specific and imply that educational programs can alter how students select their learning activities and also what qualifies as learning activity.

Comparing students of STEM and non-STEM schools, (Ghawas et al., 2025) give quantitative proofs of the differences in engagement due to the program. They discover that interest, participation, and perceived teacher support are more in STEM environments and engagement is positively related to academic performance in both scenarios. All these gaps are linked to stereotypes, absence of role models, and institutional cultures that do support or inhibit the ability of students to perceive their presence, and to feel that they are a part of science, and STEM solutions research. Combined, these strands suggest that the connection between gender and type of program (STEM or non-STEM, professional or academic majors) could be a key factor to understand why some groups appear to be more engaged than others in academia.

In particular, Liu (2025) considers gender and major in academics, proving that the academic outcomes and self-efficacy vary across disciplinary groups and differences between self-beliefs can be partially attributed to the interaction between gender and major. The qualitative evaluations of student-based programs in STEM also indicate that the classroom setting and pedagogic patterns could promote

the sense of belonging and involvement of women and men differently. Greater participation of underrepresented groups is connected with student-centered and equity-oriented teaching. Longitudinal research of engagement patterns reveals that patterns vary with years of study with some cohorts becoming increasingly engaged with time of study and others de-escalating. These subtle differences in engagement with learning platforms, persistence, and interaction may suggest that there are differences in the experience of engagement across programs and gender groups, regardless of achievement disparities being statistically significant (or even non-significant).

Wester et al. (2021) also note that structural changes of learning contexts, including the transition to emergency remote learning during the COVID-19, led to the notable decline in the engagement of STEM students, particularly in the emotional and collaborative areas. These disruptions are likely to be related to gender and program peculiarities, bearing in mind that students in laboratory-intensive and clinically oriented programs might have dissimilar constraints compared to those in lecture-based majors. In addition, the age and life-stage studies demonstrate that the participation is more likely to be higher within some age groups and among the female students, which suggests that program structure can be sensitive to maturation and gendered ideas of responsibility and study behaviors. Notwithstanding these advances, the literature continues to point at the gaps in what we know about the joint prediction of the behavioral (participation, attendance), emotional (interest, belonging), and cognitive (deep learning) factors of engagement in specific cultural and institutional context.

According to (Isaeva et al., 2024), therefore, more detailed, multi-level studies should be conducted that take into account individual traits and program-specific aspects in the examination of the engagement. Current studies are inclined to study gender alone (or academic discipline alone) or to study discipline as a control variable but not a subject of interest, which can hide significant effects of interaction. Even non-Western and emerging higher-education systems involve comparative work which is not fully represented, despite the fact that it is known that engagement is influenced by the national, institutional and cultural norms. It is in this context that a specific study examining the combined effect of gender and academic program on the engagement of university students can be of value in trying to answer the question of whether the gender gaps observed are uniform across the programmes or are limited in particular subject areas and also to examine under what circumstances the various student groups will engage fairly in different programmes.

METHODOLOGY

The section gives an account of how the data was collected, how the research was done, the study population samples, the research instrument, data collection procedure, data investigation procedure, and research tool validity. The research design utilized in this study was a quantitative, cross-sectional study design to

establish the influence of gender and academic program on academic engagement of university students. The research employed between-subjects factorial (2 2) design, in which two factors were conducted including gender (two levels male and female) and academic program (two levels BS, M.Phd). No overlap of categories resulted in the fact that factors were all treated as independent and non-overlapping categories due to the fact that the participants were limited to a single gender group and a single program group. To establish (a) the overall effect of gender, (b) the overall effect of academic program, and (c) the overall interaction between gender and academic program on academic engagement, a two-way, Analysis of Variance (ANOVA) was performed, which involved the target population of students who are pursuing undergraduate and postgraduate programs at a public university. The convenience sampling method was adopted to select a sample of N= 400 students. The distribution of the sample is presented below:

Gender:

- Male = 160
- Female = 240

- **Academic Program:**

- BS = 283
- M.Phil/PhD = 117

The sample size meets the recommended requirements for ANOVA (i.e., at least 20 respondents per cell), allowing adequate statistical power to detect medium-sized effects. Academic engagement was measured using a **standardized and validated academic engagement scale** consisting of multiple Likert-type items assessing behavioral, emotional, and cognitive aspects of engagement. Participants responded on a **five-point Likert scale**, where higher scores indicated greater engagement. Reliability analysis conducted prior to main analysis showed that the instrument possessed **high internal consistency** (Cronbach's alpha > .70). Data were collected through self-administered questionnaires distributed both physically and digitally. Participants were informed about the purpose of the study, assured confidentiality, and participation was voluntary. Responses were screened for missing data and inconsistencies. After cleaning, all 400 responses were retained for analysis.

RESULT AND DISCUSSION

The Impact of Gender and Academic Program on University Students' Engagement

The participation of university students has become a vital factor in determining the quality of academic success, academic persistence and the overall quality of learning and researchers have increasingly focused on the variables that influence the involvement of students in the higher education setting. Of these factors, gender and academic program have always been found to be influential variables that can shape the student participation, interaction and cognitive and emotional investment in the course of studies. The dissimilarity in the motivational orientations and cultures of discipline, strategies of learning and the expectations of

the institutions affirming that male and female students, undergraduate and postgraduate students will engage in different ways. The examination of these differences is critical in crafting a fair teaching process and creating positive learning experiences that promote the interaction of diverse student groups. (Korhonen et al., 2024)

Table 1

Between-Subjects Factors			
		Value Label	N
Gender of respondent	1	Male	160
	2	Female	240
Program of respondent	1	BS	283
	2	M.phill/PHD	117

Two between-subjects factors were included in the analysis: gender and academic program. The gender factor consisted of two levels, male (n = 160) and female (n = 240). The academic program factor also included two levels: students enrolled in BS programs (n = 283) and students enrolled in M.Phil/PhD programs (n = 117). Each participant belonged to only one level of each factor, allowing these variables to function as independent groups within a 2 × 2 factorial design. This structure enabled the examination of the main effects of gender and academic program, as well as their interaction effect, on students' academic engagement.

Table 2

Tests of Between-Subjects Effects					
Dependent Variable: Academic Engagement					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	8.764[a]	3	2.921	8.909	.000
Intercept	4555.116	1	4555.116	13891.228	.000
Gender	1.852	1	1.852	5.648	.018
Program	2.774	1	2.774	8.460	.004
Gender * Program	1.147	1	1.147	3.498	.062
Error	129.854	396	.328		
Total	5688.454	400			
Corrected Total	138.618	399			
a. R Squared = .063 (Adjusted R Squared = .056)					

Between-subjects ANOVA was used to test the effect of gender and academic program on academic engagement in a two-way ANOVA. The general model was found to be statistically significant, $F(3, 396) = 8.91$, $p < .001$, which means that the total predictors were significant in explaining a significant amount of variance in engagement. This model explained about 6.3% of the academic engagement (R 2

=.063 Adjusted R 2 =.056). It was found that the main effect of gender was significant, F(1, 396) = 5.65, p =.018, and the male and the female students were not similar in their levels of academic engagement. Academic program was also a significant main effect F(1, 396) = 8.46, p =.004, meaning that students who enrolled in BS programs and students who enrolled in M.Phil/ Phd programs had different levels of engagement. The effect between gender and academic program was not significant, F(1, 396) = 3.50, p =.062 and it can be said that the impact of gender on engagement was not dependent on the academic program the student was enrolled in. In general, gender and academic program alone had significant differences in academic engagement but the interaction between these two did not lead to a substantial effect.

Practical Recommendations:

- Academic support should be made gender responsive to deal with high disparities in engagement between male and female students which have been evident in institutions.
- To implement the varied engagement-focused programs to suit the unique academic requirements of the BS and M.Phil/PhD students, the universities should reflect the wide program-level engagement difference.
- The evidence-based and student centered pedagogies should be emphasized in all faculty development programs which can reliably enhance greater engagement among different student groups.
- Frequently checking the student engagement with the help of the validated assessments should be introduced to the existing set of rules, as it would help recognize the at-risk groups and direct them on the timely and data-based interventions.

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