A Comparative Study on Engineering Student's Performance between the Single-Gender Classroom and Co-educational Classroom: A Case Study of Islamic University of Technology

Faruq Bashir Iron-Baba¹*, Farouque Ahmed Haolader²

¹Department of Technical Education, College of Technical and Vocational Education, Hassan Usman Katsina Polytechnic, Katsina, Nigeria
²Department of Technical and Vocational Education, Islamic University of Technology (IUT) Board Bazaar Gazipur-1704, Bangladesh

Corresponding Author: Faruq Bashir Iron-Baba, Department of Technical Education, College of Technical and Vocational Education, Hassan Usman Katsina Polytechnic, Katsina, Nigeria. Email: ironbabafaruq@gmail.com

Copyright: © the author(s), publisher, and licensee OIRT. It is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium provided there is a proper citation for the original work.

ABSTRACT
The purpose of this research was to conduct a comparative study to find out which setting performs better between students in the Co-educational Instruction setting and Students in the Single-gender Instruction set. In this research process, the researchers compared the performance of students who receive instruction in a single-gender classroom with the performance of other students who receive instruction in a co-educational classroom. The study population was 756 students of single and mixed-gender streams, classified into two groups (A & B). Out of this, one single-gender male class of 268 students (group A) and one COED class of 488 students (group B) were sampled from the Islamic University of Technology (IUT) in Bangladesh. The research adopted a quasi-experimental research design. The instruments used for data collection were the summative assessment of both groups' first and second-semester results that serve as test instruments. Frequency counts and the Arithmetic means were used for descriptive analysis. The independent sample t-test was used to test the hypotheses. Social learning theory emphasizes the importance of biological, social, and cultural impacts on human behavioral development and learning, especially on gender and genders specific traits and roles. Based on the analyses and interpretation of the data, the researcher found that male students perform better academically in single-gender classes, contrary to their academic performance when mixed with females in the same classes. Thus, single-gender instruction could be a more favorable environment for male students than a co-educational instruction environment.

Keywords: Coeducational Instruction, Single-Gender Instruction, Organization of Islamic Cooperation, Student’s Performance

Article History
Received: October 04, 2021  |  Revised: December 06, 2021  |  Accepted: December 09, 2021
INTRODUCTION

Classroom coordination has a significant influence on student achievement; several debates from different angles around the world have been made about the impact of classroom arrangement on students' performance. For example, some scholars are proponents of same-gender classrooms performing better in instructional settings, while others contradict that the CO-ED classroom performs better in instructional environments (Keri, 2002; Pellegrini & Bohn, 2005; Rex & Chadwell, 2009).

Since the establishment of IUT in 1981, the University has run in an SGI education setting that used to admit only male students in every academic year for more than three decades. Issues start rising, advising the Organization of Islamic Cooperation (Armbrust et al., 2010) to provide necessary facilities in the University to make it a co-educational institution to remove the gender segregation in education. Also, to help develop human resources on both genders (male and female) in the member countries of OIC (in the fields of engineering and technology and technical education and management). The general assembly of OIC discussed the issue afterward and resolved to make the institution a co-educational institution. From academic session 2016/2017, the University has begun to admit female students and male students at the undergraduate level, which has brought the topic of discussion within individuals. Some people are proponents that the SGI classroom is better for the University, while their opponents disagree by stating that the CEI classroom will perform better for the University (Keri, 2002; Pellegrini & Bohn, 2005; Rex & Chadwell, 2009). Thus, the study aims to solve the above debate among individuals and strengthen the current knowledge base regarding the effect of SGI and CEI on students' performance.

On this hypothesis, various researches worldwide have been made to determine the most effective classroom arrangement between SGI and CEI settings. The benefits and risks of single-gender instruction (SGI) and single-gender education (SGE) as opposed to co-educational instruction (CEI) have long been debated. In SGI settings, students are taught in single-gender classrooms within a comprehensive co-educational education (CE) setting. In SGE settings, the school comprises one gender (Hoffman et al., 2008). Like G. Stanley Hall, some researchers state that both boys and girls do their best work in gender-segregated environments (Graebner, 2006), while other studies have found that girls excel more in single-sex schools. Still, boys do best in co-educational schools (Wong et al., 2002). Little research, however, has been done on how the effects of classrooms with different gender compositions may carry over into freshman year of college, specifically in a co-ed college setting. Findings show that female students learn best in SGI environments while male students perform better in CEI environments (O'Malley, 2011). However, in contrast to the study, the SGI settings could be a more favorable academic environment for male students than the CEI environment (Gwarjiko, 2015). Most of the researches conducted on this comparison is based on colleges and high schools, and only a few types of research are in context to university-level education. Therefore, this research was conducted to determine if there is any significant difference in the academic performance of IUT students between single-gender and co-ed classes.

Research Hypothesis:
The following hypothesis was formulated to guide the research: "There is no significant difference in the academic performance of IUT students between single-gender and co-ed classes."

METHODOLOGY

The target population for this study was students from IUT. The institution is a subsidiary organ of the Organization of Islamic Cooperation OIC situated in Dhaka, Bangladesh. The research includes students from SGI class of 2015-2016 and students from the CEI class of 2016-2017 sessions. It was conducted to study the academic performance between the two groups using their summative assessment of the first and second semesters. The Groups sample includes all students on both lists, as portrayed in Table 1, a total of 756 students.

The instrument used in this research was the Database of students' academic performance for both groups in the first and second semesters. The data were collected and compared the academic performance of students who enrolled in the 2015-2016 academic session (SGI) and those in the 2016-2017 academic session (CEI) in
IUT using their summative assessment of first and second semesters.

### Table 1: 2015/2016 & 2016/2017 Session Enrollment (SGI & CEI classes)

| Class      | Male | Female | Total |
|------------|------|--------|-------|
| SGI Class  | 268  | -      | 268   |
| (Group A)  |      |        |       |
| CEI Class  | 398  | 90     | 488   |
| (Group B)  |      |        |       |
| GT: 756    |      |        |       |

Data was gathered based on the variables dictated by the research objective. Frequencies and percentages were recorded for all items on the student's assessment DATABASE. The statistical test was evaluated at an alpha level of $p<0.05$. In addition, an independent samples t-test was used to determine whether the difference between the means of student scores in SGI classroom and CEI classroom will be statistically significant.

### SUMMARY, ANALYSES, AND DISCUSSIONS

The statistical methods presented were used to prove the null hypothesis was rejected or accepted.

### Table 2: Mean (x) scores for the first-semester academic performance of Single Gender Instruction (SGI) and Coed Instruction (CEI)

| Group          | N   | Mean  | SD   | Std. Error Mean |
|----------------|-----|-------|------|-----------------|
| Group A (SGI)  | 237 | 3.386 | 0.405| 0.026           |
| Group B (CEI)  | 437 | 3.335 | 0.404| 0.019           |

### Table 3: T-test scores for the first-semester academic performance of Single Gender Instruction (SGI) and Coed Instruction (CEI)

| Variable      | Levene's Test for Equality of Variances | t-test for Equality of Means |
|---------------|----------------------------------------|-----------------------------|
| Score         | F          | Sig. | t    | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% CI          |
|               |            |      |     |               |                |                     | Lower | Upper   |
| Equal variances assumed | 0.104 | 0.747 | 1.565 | 0.118 | 0.051 | 0.0326 | -0.013 | 0.115 |
| Equal variances not assumed |            |      |     |               |                |                     | Lower | Upper   |
| Score         | 1.565      | 0.118 | 0.051 | 0.0327 | -0.013 | 0.115 |

The "two-sample t-test" was used to see if the difference between the average values of the two groups determined above was statistically significant and unlikely to have happened by coincidence. The findings of this "t-test" are given in Table 3.

The researcher evaluates the t-test result. Here, alpha=0.05, using the upper row, t=1.565, the significance (two-tailed), $p=0.118$. In this case, the estimated $p$ is higher than the normally accepted significance level of 0.05 (significance) (Haolader, 2010; Bortz & Weber, 2005; Diehl & Staufenbiel, 2001). This proves that the null hypothesis failed to reject. In other words, there is no significant difference between the academic performance of students in the SGE classroom and students in the CEI classroom.

### Table 4: Mean (x) scores for the second-semester academic performance of Single Gender Instruction (SGI) and Coed Instruction (CEI)

| Group          | N   | Mean  | Std. Deviation | Std. Error Mean |
|----------------|-----|-------|----------------|-----------------|
| Group A (SGI)  | 209 | 3.371 | 0.403          | 0.028           |
| Group B (CEI)  | 407 | 3.216 | 0.437          | 0.022           |
To verify if the difference between the mean values of the two groups determined above is statistically significant and is unlikely to have occurred by chance, the "two-sample t-test" was carried out. The findings of this "t-test" are given in Table 5.

Table 5: T-test scores for the second-semester academic performance of Single Gender Instruction (SGI) and Coed Instruction (CEI)

| Variable       | Levene's Test for Equality of Variances | t-test for Equality of Means |
|----------------|----------------------------------------|-----------------------------|
|                | F    | Sig. | t     | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% CI       |
| Score          |       |      |       |                |                |                       |              |
| Equal variances assumed | 1.953 | 0.163 | 4.284 | 0.000          | 0.155           | 0.036                  | 0.084 - 0.226 |
| Equal variances not assumed | 4.394 | 0.000 | 0.155 | 0.035          | 0.086           | 0.225                  |              |

Now, we evaluate the t-test result. Here, alpha=0.05, using the upper row, t=4.284, the significance (two-tailed), p=0.00. In this case, the estimated p is much less than the commonly accepted significance level of 0.05 (Haolader, 2010; Bortz & Weber, 2005; Diehl & Staufenbiel, 2001). This proves that the null hypothesis is rejected. In other words, there is a significant difference between the academic performance of students in the SGI classroom and students in the CEI classroom. This result indicates that students in SGI perform significantly better than those in CEI.

CONCLUSION
From the findings of this study, it can be concluded that male students perform better academically in SGI classes, contrary to their academic performance in CEI classes. Thus, SGI could be a more favorable environment for male students than the CEI environment.

RECOMMENDATION
The governing board of the Organization of Islamic Cooperation (OIC) and the management of the Islamic University of Technology (IUT) should provide good instructional settings that will help to improve the performance of male students in the co-educational classroom, according to the findings of this study.

Limitations
The limitations of this study are as follows:
1. Because the study focuses on only one University, the data gathered and any conclusion generated will apply only to this particular institution or similar institutions.
2. Because the study focuses on only two years of data (one year of CEI classes and one year of SGI classes), the result generated will be limited in scope to these two years.
3. Another limitation to the study is that in IUT, the SGI classroom exists among male students only.

Conflict of Interest: None

Funding/Support: None

REFERENCES
Armbrust, M., Fox, A., Griffith, R., Joseph, A. D., Katz, R., Konwinski, A., Lee, G., Patterson, D., Rabkin, A., Stoica, I., & Zaharia, M. (2010). Communications of the ACM, 53(4), 50-58. DOI: 10.1145/1721654.1721672
Bortz, J. & Weber, R. (2005). Statistik für Human- und Sozialwissenschaftler: Mit 242 Tabellen. Heidelberg: Springer Medizin.
Diehl, J. M., & Staufenbiel, T. (2001). Statistik mit SPSS Version 10.0: Verlag: Klotz, Eschborn.
Graebner, W. (2006). "Back-fire to lust": G. Stanley Hall, sex-segregated schooling, and the engine of sublimation. History of Psychology, 9(3), 236–246. https://doi.org/10.1037/1093-4510.9.3.236
Gwarjiko, U. (2015). Gender Streaming and Secondary School Female Students' Performance in the English Language in Niger State, Nigeria. *International Journal of Innovative Research and Development, 3*(5), 12-18.

Haolader, F. (2010). *Technical and Vocational Education and Training—Curricula Reform Demand in Bangladesh. Qualification Requirements, Qualification Deficits, and Reform Perspectives*. Ph.D. Thesis, Stuttgart University, Germany. Submitted in July.

Hoffman, B. H., Badgett, B. A., & Parker, R. P. (2008). The effect of single-sex instruction in a large, urban, at-risk high school. *The Journal of Educational Research, 102*(1), 15-36.

Keri, G. (2002). Male and female college students' learning styles differ An opportunity for instructional diversification. *College Student Journal, 36*(3), 433-442.

O'Malley, L. (2011). Same-sex vs. co-ed classrooms: do gender differences carry over Into a co-ed college?

Pellegrini, A. D., & Bohn, C. M. (2005). The role of recess in children's cognitive performance and school adjustment. *Educational researcher, 34*(1), 13-19.

Rex, J., & Chadwell, D. (2009). Single-Gender Classrooms. *School Administrator, 66*(8), 28-33.

Wong, K.-C., Lam, Y. R., & Ho, L.-M. (2002). The effects of schooling on gender differences. *British Educational Research Journal, 28*(6), 827-843.