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A Study on Curriculum Fidelity of Prospective Teachers in Relation to Their Gender and Academic Stream

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Abstract
The aim of this study is to examine the factors affecting the curriculum fidelity of prospective teachers in relation to their gender and academic stream. The survey study and quantitative research design was opted for the present study. The objective of the study was to assess the influence of gender on curriculum fidelity of prospective teachers, and to assess the influence of academic stream on curriculum fidelity of prospective teachers. The study was conducted on a sample of 60 prospective teachers enrolled in the Faculty of Education at ICFAI University, Tripura, during the academic year 2025–2026. The participants were selected using the purposive sampling technique, ensuring that the sample was appropriate for the objectives of the study. The data of the study were obtained through an Inventory of Curriculum Fidelity of prospective teachers. Developed and Standardized by Sumanya Debbarma, Dr. Priyank Kumar Shivam & Dr. Priyank K M. The research data were analyzed using the Descriptive Statistics (Mean, Median, SD, Skewness, Kurtosis); Assumption Analysis (Normality analysis, Test or on for homogeneity variance); Testing of Hypothesis (Mann Whitney U test and One-way ANOVA).

The major findings of the study are there is no significant influence of gender on the curriculum fidelity of prospective teachers, as indicated by the Mann-Whitney U test ($U = 363$, $p = 0.567 > 0.05$). Mean scores were similar between females (154) and males (155), and there is a significant influence of academic stream on the curriculum fidelity of prospective teachers, as indicated by Welch's one-way ANOVA ($F = 4.15$, $df1 = 2$, $df2 = 29.4$, $p = 0.026 < 0.05$). Prospective teachers from the Science stream had the highest mean score (164), followed by Social Science (155) and Language (150).

Keywords: Curriculum, Curriculum Fidelity, Prospective Teachers, Academic Stream, and Gender.

1. Introduction
Curriculum fidelity refers to the extent to which educators adhere to the intended design, content, and implementation of a curriculum in their teaching practices. For prospective teachers, who are pre-service educators still in training, curriculum fidelity encompasses their understanding, commitment, and anticipated adherence to curricular guidelines during teacher preparation programs. This concept is crucial because it influences how future teachers will deliver education effectively, ensuring consistency in learning outcomes for students. Factors such as curriculum characteristics, institutional support, student demographics, and external conditions like high-stakes testing can impact fidelity levels. In the context of prospective teachers, high curriculum fidelity during training can foster better pedagogical skills, leading to improved classroom management and student engagement once they enter the profession.

Gender plays a potential role in curriculum fidelity among prospective teachers, as societal norms, teaching styles, and attitudes toward education may differ between males and females. Research suggests that gender can influence instructional preferences, with some studies indicating that female prospective teachers may exhibit stronger attitudes toward clarifying concepts and cognitive activation, potentially leading to higher fidelity in certain contexts. Conversely, male prospective teachers might favor interactive or media-based approaches, which could affect adherence to structured curricula. However, many investigations, including those on commitment to teaching and pedagogical practices, have found no significant gender differences, implying that fidelity may be more tied to individual experiences than inherent gender traits. Understanding this connection helps in designing gender-inclusive teacher training programs that mitigate any subtle biases.

Academic stream, such as Language, Science, or Social Science, connects to curriculum fidelity by shaping prospective teachers' disciplinary knowledge, methodological approaches, and perceptions of curriculum relevance. Science stream students often emphasize precision, empirical evidence, and structured implementation, which may align closely with high fidelity to curricula demanding rigor. In contrast, Language stream prospective teachers might adopt more interpretive and flexible methods, potentially resulting in lower adherence to rigid guidelines. Social Science streams could fall in between, focusing on contextual and societal factors. Studies highlight that academic backgrounds influence curriculum literacy and integration, with science-oriented teachers showing higher fidelity due to subject-specific pressures like standardized testing. Exploring these links is essential for tailoring teacher education to enhance fidelity across diverse streams.

2. Design of the Study

The study employed a survey method with a quantitative research design to examine the influence of gender and academic stream on curriculum fidelity among prospective teachers. This approach involved collecting numerical data through structured instruments and analyzing it statistically to test hypotheses objectively. The design was descriptive and inferential, focusing on assessing differences without experimental manipulation.

The sample consisted of prospective teachers enrolled in the Faculty of Education at ICFAI University, Tripura, during the academic year 2025–2026. Purposive sampling technique was used to select participants who were deemed appropriate for the study's objectives, ensuring relevance to teacher training contexts. The total sample size was 60 prospective teachers, with breakdowns by gender (40 females and 20 males) and academic stream (32 in Language, 13 in Science, and 15 in Social Science).

Data were collected using the Inventory of Curriculum Fidelity of Prospective Teachers, a tool developed and standardized by Sumanya Debbarma, Dr. Priyank Kumar Shivam, and Dr. Priyank K M. This inventory measured fidelity scores through self-reported items assessing adherence to curriculum elements.

Statistical techniques included descriptive statistics (mean, median, standard deviation, and standard error) to summarize data; assumption analyses such as Shapiro-Wilk test for normality and Levene's test for homogeneity of variances; and hypothesis testing. For gender influence, a Mann-Whitney U test was applied (due to normality violation) after confirming homogeneity. For academic stream influence, Welch's one-way ANOVA was used

(accounting for unequal sample sizes) following satisfied assumptions of normality and homogeneity. All analyses were conducted using software jamovi (Version 2.6) and set at $p < 0.05$.

3. Analysis and Interpretation of the Data

The objective 1 of this analysis is to assess the influence of gender on the curriculum fidelity of prospective teachers. The null hypothesis states that there is no significant influence of gender on the curriculum fidelity of prospective teachers.

Objective 1: To assess the influence of gender on curriculum fidelity of prospective teachers

Hypothesis 1: There is no significant influence of gender on curriculum fidelity of prospective teachers

Group Descriptives

	Group	N	Mean	Median	SD	SE
Curriculum Fidelity Score	**Female**	40	154	158	16.0	2.53
	Male	20	155	159	17.4	3.89

Table 1: Descriptives of Curriculum Fidelity Score of Female and Male Prospective Teachers.

This table presents summary statistics for the curriculum fidelity scores divided by gender groups. For females (N=40), the mean score is 154, with a median of 158, standard deviation (SD) of 16.0, and standard error (SE) of 2.53. For males (N=20), the mean score is 155, with a median of 159, SD of 17.4, and SE of 3.89.

The mean and median scores are very similar between genders, with males showing slightly higher values but also greater variability (higher SD). This suggests that, on average, curriculum fidelity does not differ markedly by gender.

Homogeneity of Variances Test (Levene's)

	F	df	df2	p
Curriculum Fidelity Score	0.809	1	58	0.372

Note. A low p-value suggests a violation of the assumption of equal variances

Table 2: Homogeneity of Variance Test of Curriculum Fidelity Score of Female and Male Prospective Teachers.

This table reports Levene's test for equality of variances in curriculum fidelity scores between genders. The test statistic (F) is 0.809, with degrees of freedom df1=1 and df2=58, and a p-value of 0.372.

The p-value (0.372) is greater than the conventional alpha level of 0.05, indicating no significant difference in variances between the female and male groups. Thus, the assumption of homogeneity of variances is met, meaning the spread of scores is comparable across genders.

Normality Test (Shapiro-Wilk)

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	W	p
Curriculum Fidelity Score	0.942	0.007

Note. A low p-value suggests a violation of the assumption of normality

Table 3: Normality Test of Curriculum Fidelity Score of Female and Male Prospective Teachers.

This table shows the Shapiro-Wilk test for normality of the combined curriculum fidelity scores. The test statistic (W) is 0.942, with a p-value of 0.007.
The p-value (0.007) is less than 0.05, indicating a significant deviation from normality. This suggests that the distribution of curriculum fidelity scores across the sample is not normally distributed, which could be due to skewness, outliers, or other non-normal patterns in the data.

Selection of Mann-Whitney U Test Over Independent Samples t-Test

The independent samples t-test assumes that the data are normally distributed and that variances are homogeneous across groups. While the homogeneity of variances assumption is satisfied (as shown in Table 2, $p=0.372 > 0.05$), the normality assumption is violated (as shown in Table 3, $p=0.007 < 0.05$). Due to this violation of normality, the parametric t-test is not appropriate, as it could lead to inaccurate p-values and increased risk of Type I or Type II errors. Instead, the non-parametric Mann-Whitney U test was selected, as it does not require normality and compares distributions between groups.

Mann-Whitney U -Test

		Statistic	p
Curriculum Fidelity Score			
	Mann-Whitney U	363	0.567

Table 4: Mann-Whitney U -Test for Comparing Curriculum Fidelity Score of Female and Male Prospective Teachers.

This table presents the results of the Mann-Whitney U test for comparing curriculum fidelity scores between female and male prospective teachers. The test statistic (U) is 363, with a p-value of 0.567.
The p-value (0.567) is greater than 0.05, indicating no statistically significant difference in curriculum fidelity scores between genders. Therefore, the null hypothesis is not rejected, supporting the conclusion that gender does not significantly influence curriculum fidelity among prospective teachers.

Objective 2. To assess the influence of academic stream on curriculum fidelity of prospectiveteachers.

Hypothesis 2: There is no significant influence of academic stream on curriculum fidelity of prospective teachers

Group Descriptives

	Academic Stream	N	Mean	SD	SE

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Group Descriptives

	Academic Stream	N	Mean	SD	SE
Curriculum Fidelity Score	**Language**	32	150	16.9	2.98
	Science	13	164	13.9	3.85
	Social Science	15	155	14.0	3.62

Table 5: Descriptives of Curriculum Fidelity Score of Prospective Teachers in relation to their Academic stream.

This table provides summary statistics for the curriculum fidelity scores across the three academic streams. It includes the sample size (N), mean score, standard deviation (SD), and standard error (SE) for each group.

- Language stream: N=32, Mean=150, SD=16.9, SE=2.98
- Science stream: N=13, Mean=164, SD=13.9, SE=3.85
- Social Science stream: N=15, Mean=155, SD=14.0, SE=3.62

The Science stream shows the highest average curriculum fidelity score (164), followed by Social Science (155) and Language (150), suggesting that prospective teachers from the Science stream may exhibit greater fidelity to the curriculum on average. The standard deviations are relatively similar across groups (ranging from 13.9 to 16.9), indicating comparable variability in scores within each stream. Sample sizes are unequal, with the Language stream having the largest group (32 participants) and Science the smallest (13).

Homogeneity of Variances Test (Levene's)

	F	df1	df2	p
Curriculum Fidelity Score	0.920	2	57	0.404

Table 6: Homogeneity of Variance Test of Curriculum Fidelity Score of Prospective Teachers in relation to their Academic stream.

This table presents the results of Levene's test for homogeneity of variances, which checks whether the variances in curriculum fidelity scores are equal across the academic streams.

- F=0.920, df1=2, df2=57, p=0.404

The p-value (0.404) is greater than the conventional significance level of 0.05, indicating no significant differences in variances among the groups. This suggests that the assumption of homogeneity of variances is met, supporting the use of parametric tests, though adjustments may still be applied for robustness.

Normality Test (Shapiro-Wilk)

	W	p
Curriculum Fidelity Score	0.975	0.247

Note. A low p-value suggests a violation of the assumption of normality

Table 7: Normality Test of Curriculum Fidelity Score of Prospective Teachers in relation to their Academic stream.

This table shows the results of the Shapiro-Wilk test for normality, which assesses whether the curriculum fidelity scores are normally distributed across all groups combined.

- W=0.975, p=0.247

The p-value (0.247) exceeds 0.05, indicating that the data do not significantly deviate from a normal distribution. This supports the normality assumption required for parametric statistical tests like ANOVA.

Selection of One-Way ANOVA (Welch's) Over Alternatives

The Kruskal-Wallis test (a non-parametric alternative to ANOVA) was not chosen because the assumption checks confirmed that the data met the requirements for a parametric test: normality was satisfied (Shapiro-Wilk p=0.247 > 0.05) and homogeneity of variances was met (Levene's p=0.404 > 0.05). Parametric tests like ANOVA are generally more powerful than non-parametric ones when assumptions are held.

Welch's ANOVA was specifically used (instead of standard ANOVA) to provide robustness against any potential violations of equal variances, especially given the unequal sample sizes across groups (32, 13, and 15). Even though Levene's test did not detect significant heterogeneity, the combination of unequal group sizes and slight differences in standard deviations (e.g., Language SD=16.9 vs. Science SD=13.9) can make standard ANOVA sensitive, so Welch's adjustment (with its fractional degrees of freedom) ensures more reliable results.

One-Way ANOVA (Welch's)

	F	df1	df2	p
Curriculum Fidelity Score	4.15	2	29.4	0.026

Table 8: One-Way ANOVA Test for Comparing Curriculum Fidelity Score of Prospective Teachers in relation to their Academic stream.

This table reports the results of Welch's one-way ANOVA, which compares the mean curriculum fidelity scores across the three academic streams while accounting for potential unequal variances.

- F=4.15, df1=2, df2=29.4, p=0.026

The p-value (0.026) is less than 0.05, indicating a statistically significant difference in curriculum fidelity scores among the academic streams. This leads to the rejection of Hypothesis 2, suggesting that academic stream does have a significant influence on curriculum fidelity among prospective teachers. The Science stream's higher mean (from Table 5) likely contributes to this difference, though post-hoc tests would be needed to identify specific pairwise contrasts.

4. Major findings of the Study

1. There is no significant influence of gender on the curriculum fidelity of prospective teachers, as indicated by the Mann-Whitney U test (U = 363, p = 0.567 > 0.05). Mean scores were similar between females (154) and males (155).
2. There is a significant influence of academic stream on the curriculum fidelity of prospective teachers, as indicated by Welch's one-way ANOVA (F = 4.15, df1 = 2, df2 = 29.4, p = 0.026 < 0.05). Prospective teachers from the Science stream had the highest mean score (164), followed by Social Science (155) and Language (150).

5. Discussion

The first findingindicates no significant influence of gender on curriculum fidelity among prospective teachers, as evidenced by the non-significant Mann-Whitney U test result (U = 363, p = 0.567). This suggests that male and female prospective teachers exhibit similar levels of adherence to curriculum implementation, aligning with several studies that have explored gender's role in teaching-related constructs without finding substantial differences.
Research on student-teachers in Tanzania revealed no significant gender differences in commitment to teaching, though gender roles (e.g., androgyny) played a more prominent role in influencing commitment levels. This parallels the present results, as commitment to teaching may indirectly relate to fidelity in curriculum delivery, implying that gender alone does not dictate prospective teachers' dedication or implementation practices. Similarly, a study of primary school teachers in Pakistan found no significant gender differences in overall pedagogical practices or attitudes toward student learning, except for classroom management where males performed better. These findings reinforce the notion that gender may not broadly impact curriculum fidelity, but specific subdomains like management could warrant further exploration in teacher training programs for prospective educators.

There are contrasting evidence from other studies that highlights contexts where gender does influence teaching practices, potentially affecting curriculum fidelity. A pilot study on gender differences in teaching methods showed that male educators preferred interactive and media-based approaches (e.g., films, discussions) more than females, which could imply variations in how curriculum is delivered if fidelity involves engaging instructional strategies. In Saudi Arabia, analysis of TIMSS 2019 data indicated that female teachers exhibited more positive attitudes toward teaching and were rated higher on practices like clarifying concepts, correlating with better student outcomes in math and science. This suggests that in certain cultural or subject-specific settings, gender-linked attitudes might enhance fidelity through improved instructional quality, though the present study's focus on prospective teachers in a general curriculum context did not replicate such disparities.
The gender differences in readiness for online teaching have been observed, with women reporting higher readiness for cognitive activation practices but men showing greater self-efficacy in technological knowledge, partially explained by experience gaps. As curriculum fidelity increasingly incorporates digital elements, these findings imply that gender could indirectly influence implementation in modern educational environments, particularly if prospective teachers' training does not address such variances.
The objective 1 of this analysis is to assess the influence of of academic stream (Language, Science, Social Science) on the curriculum fidelity of prospective teachers. The null hypothesis states that there is no significant influence of academic stream on the curriculum fidelity of prospective teachers.

The second finding of the present study indicate a significant influence of academic stream on the curriculum fidelity of prospective teachers, with those from the Science stream demonstrating the highest mean score (164), followed by Social Science (155) and Language (150). This rejection of the null hypothesis (p = 0.026) suggests that academic background plays a pivotal role in how pre-service teachers adhere to and implement curricula. These results align with broader research exploring how disciplinary backgrounds shape teachers' engagement with curriculum materials and instructional practices. For instance, studies have shown that teachers' academic disciplines can affect their literacy and fidelity to curricula,

often due to varying emphases on subject-specific methodologies, content depth, and perceived relevance to core educational outcomes.
One key connection emerges from research on primary teachers' curriculum fidelity, where differences in adherence were observed across subject areas. Teachers exhibited higher fidelity to curricula in core disciplines like Mathematics, Science, and Turkish compared to elective or less exam-oriented subjects, attributed to external pressures such as standardized testing and societal expectations (Süer & Kinay, 2022). This mirrors the present findings, as prospective teachers from the Science stream often associated with rigorous, empirical content may inherently prioritize structured curriculum implementation, leading to higher fidelity scores. Similarly, in a study examining teachers' curriculum literacy and fidelity, variations by field of teaching were noted, with Turkish Language and Literature teachers displaying higher literacy levels, potentially due to the discipline's focus on interpretive and communicative skills (Gürbüz & Şen, 2023). This suggests that language-oriented streams, like in the current study, might foster a more flexible approach to curricula, resulting in lower fidelity compared to science streams that emphasize precision and adherence.

Further supporting the influence of academic background, an integrative review of STEM education for pre-service teachers highlighted challenges in interdisciplinary implementation, with discipline-specific knowledge affecting how teachers integrate concepts across subjects (Nugraha et al., 2023). Pre-service teachers from science backgrounds, for example, often dominated STEM activities, while those from other disciplines struggled with engineering or technology integration, implying that stream-specific training can enhance or hinder curriculum fidelity in multifaceted educational contexts. This resonates with the present results, where Science stream participants showed superior fidelity, possibly due to their discipline's alignment with systematic curriculum enactment.

In contrast, some research indicates that academic discipline may not always yield significant differences in curriculum-related perceptions. A study on pre-service teachers' views of AI integration in education found no statistically significant variations by discipline (science vs. non-science), though it acknowledged that background could subtly influence perceptions of technological implementation in curricula (Talluri, 2025). This partial divergence from the current findings underscores that while discipline impacts fidelity in traditional curriculum contexts, emerging areas like technology may require additional training to manifest differences.
In the realm of inclusive education, significant differences in implementation perceptions were observed based on major or specialization, with high school and primary education specialists scoring higher than those in special education or kindergarten (Xiao, 2024). This suggests that academic streams oriented toward broader or advanced content levels foster greater confidence in curriculum adaptation, akin to the higher fidelity among Science stream prospective teachers in the present study.

These studies collectively reinforce the present findings by illustrating that academic stream shapes curriculum fidelity through discipline-specific competencies, external pressures, and integration challenges. However, they also highlight the need for targeted teacher preparation programs to mitigate disparities, ensuring equitable implementation across streams. Future research could explore interventions to enhance fidelity in lower-performing streams, such as Language, by drawing on the strengths observed in Science backgrounds.

6. Conclusion

Based on the findings, the study concludes that gender does not significantly influence curriculum fidelity among prospective teachers, as evidenced by the non-significant Mann-Whitney U test results (U = 363, p = 0.567). Mean scores were similar between females (154) and males (155), with comparable medians and variability, supporting the null hypothesis. This aligns with discussions referencing studies from Tanzania and Pakistan, where no broad gender differences were found in teaching commitment or pedagogical practices, though subtle variations in subdomains like classroom management or online readiness may exist in specific contexts. Overall, the results suggest that teacher training programs should focus on individual factors rather than gender-specific interventions to enhance fidelity.

In contrast, academic stream significantly influences curriculum fidelity, leading to the rejection of the null hypothesis via Welch's ANOVA (F = 4.15, df1 = 2, df2 = 29.4, p = 0.026). Prospective teachers from the Science stream exhibited the highest mean score (164), followed by Social Science (155) and Language (150), indicating greater adherence in science-oriented backgrounds. Discussions connect this to discipline-specific emphases, such as precision in Science versus flexibility in Language, corroborated by research on curriculum literacy and STEM integration challenges. This implies that academic streams shape fidelity through content depth and external pressures like testing, recommending targeted training to address disparities, particularly elevating fidelity in Language streams.

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