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Research Paper

Gender Differences in Match and Mismatch of Aptitude, Interests and Professional Course Choice

Mr. Ranjith K.[1]*, Dr. B. Selvaraj[2]

ABSTRACT

The research focuses on identifying Gender differences in Match and Mismatch of Aptitude, Interests and Professional Course choice among Engineering students. The sample for the research comprises 56 Engineering students who were selected through the convenient sampling method across the Coimbatore district. Descriptive research design which used a survey method to explore gender differences in the alignment of aptitude, interests, and professional course choices was applied to the research. The psychological measures used were David's Battery of Differential Abilities (DBDA) and The Thurstone Interest Schedule (TIS). After sample collection, the data was subjected to descriptive and inferential statistical techniques, including t-tests, which helped to conclude the study. In this research, there is a slight gender difference in the cognitive skills. Results: The research found that females demonstrated a notable benefit in verbal ability. The Aptitude differences have a limited influence on gender-specific professional course preferences. Interest levels in physical science, business, computational, and biological fields showed no significant gender differences. Females demonstrated significantly higher interest in literary and musical domains.

Keywords: *Aptitude, Interests, Professional Course choice, Gender difference*

Numerous factors, including ability, personal interests, and societal expectations, influence the selection of professional paths among college students. Nonetheless, gender disparities play a crucial role in these decisions, frequently resulting in a lack of harmony or discord between a student's skills, passions, and educational selections. Interest refers to an individual's natural inclination toward specific subjects or activities, whereas talent signifies a person's inherent capability to excel in particular domains. When these traits match their selected path, students are more inclined to succeed academically and experience greater overall happiness in their lives. Aptitude significantly impacts academic and career development, especially in difficult fields like engineering. It refers to a person's natural ability to acquire the skills and knowledge needed to perform a variety of tasks, making it a key factor in determining eligibility for various professional programs. Assessing aptitude among engineering students is valuable for identifying skill gaps between

[1]Research Scholar, Dept. of Psychology, Government Arts College, Coimbatore- 18, Tamil Nadu, India.
[2]Controller of Examinations, Government Arts College, Coimbatore- 18, Tamil Nadu, India.
*Corresponding Author

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learners and the skill requirements of their chosen fields, thus improving academic readiness and preparing learners for their careers.

Aptitude plays a key role in influencing the success of students in both education and career, especially in challenging fields such as engineering. It refers to an individual's inherent ability to understand the skills and knowledge required for specific tasks, making it a significant determinant of their suitability for various professional programs. Recognizing the competency levels of engineering college students can provide valuable insight into their cognitive strengths and areas for growth. This understanding allows educators to develop personalized teaching strategies and helps students make informed career choices that align with their abilities. Assessing aptitude among engineering students helps identify potential mismatches between their abilities and the demands of their chosen careers, thus fostering improved academic outcomes and enhancing career readiness.

Furthermore, interest plays a key role in academic engagement, career outcomes, and sustained professional achievement, especially in specialized fields such as engineering. It influences the motivation, persistence, and overall satisfaction of students with their chosen fields. Assessing the interest levels of engineering college students is crucial for understanding their career options and matching educational programs to their goals. These assessments help teachers and career counsellors tailoring support and direction, ensuring that students follow paths that align with their interests and abilities. Furthermore, assessing interest levels can reveal potential discrepancies between the preferences of students and their current academic endeavours, allowing institutions to adopt strategies that promote better alignment and enhance overall educational experiences.

Exploring differences in cognitive abilities and job preferences between male and female students can help identify trends that affect course choices, academic success, and career paths. This analysis can help educational institutions develop specific strategies to address gender disparities and create an environment where students of all genders can succeed equally in their chosen fields, thereby improving motivation and reducing job dissatisfaction in the future.

Understanding these gender-related trends is essential in creating educational systems that encourage thoughtful course choices and align interests and abilities across genders. This alignment will lead to a more diverse and inclusive workforce, enhancing career success, academic achievement, and personal growth.

REVIEW OF LITERATURE

Hussain and Faiz (2024) examined the relationship between career personalities and career interests, emphasizing the importance of aptitude assessments before university admission. Their research, conducted in Pakistan, found that students in fields such as pure sciences, social sciences, architecture, fine arts, and psychology generally aligned their academic outcomes with their career-oriented personalities. In comparison, individuals in computer science, management science, engineering, accounting and finance, and mathematics did not do so frequently. Gender differences were noted, with male students being more realistic and entrepreneurial, while female students were more exploratory and creative.

Barth et al. (2017) analyzed gender stereotypes associated with STEM career interests among American students. Their study showed that perceptions of ability were important predictors of career aspirations, while gender stereotypes played a lesser role. College

students exhibited increased stereotyping in assessing the interests of others but showed no gender differences in their self-efficacy related to STEM.

Addison (2020) examines disparities in occupational skills using data from the O*NET and the National Youth Prospective Survey (NLSY79 and NLSY97). The study finds significant gender differences in the quality of matches, showing that college-educated women are more likely to experience mismatches compared to their male counterparts. A significant portion of the gender wage gap among college graduates arises from these discrepancies. Finally, cohort effects were noted, with younger college-educated men (NLSY97) exhibiting a worse quality of match than their older counterparts (NLSY79), while younger women performed better on average.

Aim:

This research aimed to identify Gender differences in Match and Mismatch of Aptitude, Interests and Professional Course choice among Engineering students.

Objectives:

- To determine the aptitude of engineering students.
- To assess the level of interest among engineering students.
- To compare the study variables by gender.

METHODOLOGY

The present research employed a descriptive research design utilising a survey method to explore gender differences in the alignment of aptitude, interests, and professional course choices

Sample:

The sample of this research comprises 56 engineering students selected through the convenient sampling method across Coimbatore.

Tools:

This research used two psychological scales as follows

1. **David's Battery of Differential Abilities (DBDA)** is a comprehensive assessment tool that aims to assess eight cognitive abilities. It serves as a useful tool for assessing a wide range of cognitive abilities and is commonly used in educational, career guidance, and industrial contexts. The DBDA demonstrates high reliability, with internal consistency coefficients typically varying between 0.70 and 0.90. Its validity is supported by a strong theoretical foundation, relationships with recognized assessments, and some evidence of its predictive abilities for educational and occupational achievement. Furthermore, the assessment provides age-adjusted and academic STEN scores, making it a reliable tool for assessing differential abilities across different groups and situations.
2. **The Thurstone Interest Schedule (TIS)** is a standardized vocational interest instrument developed to assess interests in 10 career fields using 100 paired-choice questions. Originally developed by L. L. Thurstone in 1925, the assessment takes approximately 10 minutes to complete and 2–3 minutes to score. The TIS has demonstrated strong reliability, with test-retest coefficients of 0.83 over 15 days and 0.77 over 30 days. Its validity is supported by face validity and criterion-related validity, demonstrating correlations with other well-known assessment instruments.

The TIS produces a profile of 10 scores that indicate relative interest levels in areas such as physics, business, and art. While the TIS can serve as a useful resource for career counselling, it is important to recognize that TIS generally shows limited predictive validity for long-term career outcomes, underscoring the need for further studies to validate its long-term predictive validity.

Hypotheses:

- **H_o1:** There is no significant difference in aptitude among engineering students based on gender.
- **H_o2:** There is no significant difference in interest among engineering students based on gender.

Procedures:

The Participants were approached and a rapport was built before the data collection. Students were made aware of the purpose of the study and the importance of carefully responding to the items of the scale. After the essential guidelines were clarified, students received the research instruments. Only those individuals who were willing and agreed to participate in the study were considered. Data were collected under standardized conditions, participants understood and confidentiality was assured. Ethical standards were followed, ensuring informed consent, and protecting the rights of participants.

Statistical Analysis:

After sample collection, the data was subjected to descriptive and inferential statistical techniques, including t-tests, which helped to conclude the study.

RESULTS

Table: 1 Gender Difference in Abilities

	Gender	N	Mean	Std.	t	Sig.
PSYCHO-MOTOR ABILITY	MALE	28	27.07	13.086	-0.694	0.491
	FEMALE	28	29.18	9.314		
VERBAL ABILITY	MALE	28	4.46	1.856	-2.524	0.015
	FEMALE	28	5.75	1.956		
NUMERICAL ABILITY	MALE	28	6.29	2.522	-1.166	0.249
	FEMALE	28	7.04	2.285		
CLOSURE ABILITY	MALE	28	7.21	2.500	0.643	0.523
	FEMALE	28	6.79	2.485		
SPATIAL ABILITY	MALE	28	31.68	8.354	0.509	0.613
	FEMALE	28	30.14	13.591		
MECHANICAL ABILITY	MALE	28	5.07	2.324	0.060	0.952
	FEMALE	28	5.04	2.117		
CLERICAL ABILITY	MALE	28	37.14	11.834	-1.323	0.191
	FEMALE	28	41.82	14.486		
REASONING ABILITY	MALE	28	3.64	2.498	-0.545	0.588
	FEMALE	28	4.00	2.404		

The aptitude scores were assessed in eight mental abilities: psychomotor, verbal, numerical, closure, spatial, mechanical, clerical, and reasoning.

Table: 1 provides a summary of the results with the main findings:
The study of aptitude scores shows the significance of gender differences in various cognitive abilities. In psychomotor ability, males (mean = 27.07) had slightly lower scores than females (mean = 29.18); however, this difference was not statistically significant (p = 0.491), indicating similar performance between the genders in this domain. A significant gender difference was observed in verbal ability, with females (mean = 5.75) scoring higher than males (mean = 4.46), resulting in a statistically significant difference (p = 0.015). This indicates that female students have superior verbal abilities, which may affect their academic and professional outcomes.

In terms of numerical skills, females (mean = 7.04) performed better than males (mean = 6.29), but the difference was not statistically significant (p = 0.249) indicating, comparable numerical skills between the genders. In terms of closure ability, males (mean = 7.21) showed a slightly higher than females (mean = 6.79), although this difference was not statistically significant (p = 0.523).

Examining gender differences in spatial ability it was revealed that males (mean = 31.68) scored slightly higher than females (mean = 30.14); however, this difference was not statistically significant (p = 0.613), indicating that both genders showed similar spatial skills. Regarding mechanical ability, men (mean = 5.07) and women (mean = 5.04) exhibited almost identical performance, with no significant difference (p = 0.952), indicating similar proficiency in mechanical reasoning.

In terms of clerical skills, females (mean = 41.82) scored slightly higher than males (mean = 37.14); however, this difference was not statistically significant (p = 0.191), indicating a very small gender gap in tasks requiring attention to detail and accuracy. Finally, in terms of reasoning skills, females (mean = 4.00) performed slightly better than males (mean = 3.64), although the difference was not statistically significant (p = 0.588).

In general, the findings indicate that gender differences in spatial, mechanical, clerical, and reasoning skills were trivial and not statistically significant. Both male and female students show comparable cognitive abilities in these areas, suggesting that gender may have minimal impact on patterns in professional subject choices.

In general, verbal skills show a significant gender gap favouring women. Other cognitive skills do not show significant gender-related differences, indicating that gender differences do not significantly affect the level of skill. In general, the results suggest that there are small gender disparities in most cognitive skills, with only verbal skills reflecting a significant advantage for women. This suggests that aptitude differences have a limited impact on gender-specific professional course choices.

Table: 2 Gender Difference in Interest

	Gender	N	Mean	Std.	t	Sig.
PS	MALE	28	6.61	3.583	-.343	.733
	FEMALE	28	6.93	3.420		
BS	MALE	28	5.64	4.048	-1.126	.265
	FEMALE	28	6.82	3.782		
C	MALE	28	6.64	3.724	-.358	.722
	FEMALE	28	7.00	3.752		
B	MALE	28	8.54	3.863	.767	.447
	FEMALE	28	7.86	2.649		
E	MALE	28	8.68	4.173	-.283	.778
	FEMALE	28	8.96	3.339		
P	MALE	28	6.86	3.759	-.769	.445
	FEMALE	28	7.57	3.167		
L	MALE	28	6.64	3.937	-1.844	.021
	FEMALE	28	8.46	3.437		
H	MALE	28	5.11	3.794	-1.647	.105
	FEMALE	28	6.64	3.153		
A	MALE	28	6.07	3.800	-1.670	.101
	FEMALE	28	7.68	3.389		
M	MALE	28	4.89	3.645	-3.589	.001
	FEMALE	28	8.43	3.726		

Table 2 shows that the assessment of interest levels in ten career fields – physics, business, computing and biology – shows trivial gender differences, none of which are statistically significant. Female students (mean = 6.93, SD = 3.420) indicated slightly higher levels of interest than male students (mean = 6.61, SD = 3.583). However, the difference (t = -0.343, p = 0.733) did not reach statistical significance, indicating that both genders express comparable levels of interest in the physical sciences. Females expressed slightly higher levels of interest in business (mean = 6.82, SD = 3.782) than males (mean = 5.64, SD = 4.048). Even with this significant difference, the findings (t = -1.126, p = 0.265) did not reach statistical significance, indicating that gender did not significantly affect interest in business studies among participants. In the computational subjects, female students again showed a slightly higher mean score (mean = 7.00, SD = 3.752) compared to male students (mean = 6.64, SD = 3.724). This difference (t = -0.358, p = 0.722) was not statistically significant, indicating that both genders showed similar levels of interest in computational subjects. Unlike the previous subjects, male students (mean = 8.54, SD = 3.863) showed a higher level of interest in biological subjects than female students (mean = 7.86, SD = 2.649). However, this difference (t = 0.767, p = 0.447) was not statistically significant.

In the Literary department, females (mean = 8.46, SD = 3.437) scored significantly higher than males (mean = 6.64, SD = 3.937), t-value -1.844 and p = 0.021, indicating a significant gender gap. This indicates that female students have a greater inclination towards literary pursuits, which may affect their engagement in professional programs that involve reading, writing, and communication skills. Educational efforts could explore adding more opportunities for literary creativity to maintain female engagement in engineering departments.

Similarly, the music department showed a clear gender difference. Females (mean = 8.43, SD = 3.726) scored significantly higher than males (mean = 4.89, SD = 3.645), t-value -3.589 and p = 0.001. This indicates that female students show a significantly greater inclination towards musical activities. This finding suggests the potential benefits of incorporating music-related applications into engineering classes, such as audio engineering or sound designing, to improve engagement among female students.

In the areas of Executive (women: mean = 8.96, men: mean = 8.68), Persuasive (women: mean = 7.57, men: mean = 6.86), Humanitarianism (women: mean = 6.64, men: mean = 5.11), and Artistic (women: mean = 7.68, men: mean = 6.07), women repeatedly scored higher. However, these differences were not statistically significant ($p > 0.05$). Although the differences did not reach statistical significance, the consistently higher mean scores for women may indicate an inherent gender bias. This trend suggests that female students may gravitate toward professions involving leadership (Executive), interpersonal skills (Persuasive), social welfare (Humanitarian), and creativity (Artistic).

The findings show negligible gender differences in interest levels within most job sectors, with no significant disparities found in Physical Science, Business, Computational, and Biological fields. Nonetheless, female students show markedly greater interest in the Literary and Musical fields, indicating a tendency towards careers that involve creative and expressive endeavors. These results suggest that although gender has little impact on vocational interests in technical areas for engineering students, incorporating literary and musical aspects into engineering programs may foster a more inclusive educational atmosphere that supports various interests.

CONCLUSION

- Slight gender differences were found in the cognitive skills.
- Females demonstrated a notable benefit in verbal ability. Aptitude differences have a limited influence on gender-specific professional course preferences.
- Interest levels in Physical Science, Business, Computational, and Biological fields showed no significant gender differences.
- Females demonstrated significantly higher interest in Literary and Musical domains.

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Conflict of Interest
The author(s) declared no conflict of interest.

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