

# A Study on Gender-Based Differences in Learning Quality among Online Higher Education Learners

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## Abstract

This study examines gender-based differences in learning quality among online higher education learners, with a particular focus on engineering-oriented institutions. The sample includes 1,394 learners, comprising 1,011 males (72.5%) and 383 females (27.5%). Eight dimensions of learning quality learning readiness, learning drive, learning planning, learning interaction, learning engagement, strategy application, task completion, and learning outcomes were analyzed using independent sample t-tests. The findings indicate that male learners scored significantly higher in learning readiness, learning planning, and learning engagement, while female learners demonstrated slightly higher learning drive, though without statistical significance. These results suggest that gender plays a nuanced role in shaping learning quality in online environments. The study contributes to the growing body of literature on online education by emphasizing the need for gender-sensitive instructional strategies that promote equitable learning experiences.

**Keywords:** Gender Differences, Learning Quality, Online Learning, Higher Education, Learning Engagement

## Background of the Study

The rapid integration of online learning into higher education has transformed traditional teaching and learning processes. Particularly in engineering education, digital platforms have become essential for delivering content and facilitating interaction. However, disparities in learning quality among learners remain a critical concern, especially when examined through the lens of gender.

Gender differences in educational contexts have long been associated with variations in motivation, engagement, and academic performance. According to Bandura (1997), self-efficacy plays a crucial role in shaping learners' confidence and engagement, which may differ

across genders. In online learning environments, these differences can be further amplified due to the reliance on self-regulation and independent learning skills.

Engineering education, traditionally dominated by male learners, often creates structural and cultural dynamics that may influence participation and performance (Means et al., 2013). Therefore, understanding gender-based differences in learning quality is essential for designing inclusive and effective online learning environments that cater to diverse learner needs.

### **Review of Literature**

The body of existing research on gender differences in learning particularly within online and distance education demonstrates that gender is an important variable influencing not only academic outcomes but also learning behaviors, attitudes, and engagement patterns. Early work by Terry Anderson (2008) emphasizes that male learners often display higher levels of confidence when interacting with technology-mediated platforms. This confidence can translate into greater willingness to experiment with digital tools, participate in online discussions, and navigate complex learning management systems. In contrast, female learners are frequently associated with higher levels of persistence, self-discipline, and intrinsic motivation, which are critical for sustained engagement in self-paced or minimally supervised online environments. These differences suggest that while male learners may initially adapt more quickly to digital platforms, female learners often demonstrate stronger long-term commitment to learning tasks.

Expanding on this perspective, Alfred Rovai (2003) highlights the importance of social presence, engagement, and sense of community in online learning environments. His research indicates that students who feel connected to their peers and instructors are more likely to achieve academic success and report higher satisfaction levels. Gender plays a moderating role in this context, as female learners tend to place greater emphasis on collaborative learning and interpersonal interaction, whereas male learners may prefer more independent or competitive learning settings. This divergence can influence participation patterns in discussion forums, group projects, and peer-feedback activities. John Richardson (2015) explores how learning strategies differ across genders, particularly in distance education contexts. His findings suggest that female learners are more likely to adopt deep learning approaches, characterized by critical thinking, reflection, and conceptual understanding. Male learners, on the other hand, may lean toward surface or strategic learning approaches, focusing on task completion and performance outcomes. These variations in learning strategies can have significant implications for academic achievement, as deep learning is often associated with higher-quality educational outcomes.

The comprehensive meta-analysis conducted by Barbara Means et al. (2013) underscores the dual nature of online learning. While digital education increases accessibility and flexibility, it simultaneously demands high levels of self-regulation, time management, and autonomy from learners. The study suggests that female learners often excel in self-regulatory behaviors, such as goal setting, time management, and consistent study habits. Conversely, male learners may perform better in structured environments where clear instructions, deadlines, and task-oriented activities are emphasized. However, the authors also caution that these patterns are not universally consistent and may vary depending on cultural,

institutional, and disciplinary contexts. Subsequent studies in the field have pointed out that socio-cultural factors, access to technology, and prior educational experiences can further mediate gender-based differences in learning quality. For instance, learners from different socio-economic backgrounds may exhibit varying levels of digital literacy, which can either amplify or reduce observed gender differences. Additionally, the design of online courses such as the level of interactivity, availability of support systems, and assessment methods can significantly influence how male and female learners engage with the content.

Despite the growing body of literature, there remains a lack of consensus regarding the extent and consistency of gender differences in online learning. Some studies report minimal or no significant differences, suggesting that factors such as individual learning styles, motivation, and institutional support may outweigh gender as determinants of learning quality. This inconsistency highlights the importance of conducting context-specific research that considers multiple dimensions of learning, including engagement, satisfaction, academic performance, and self-regulation. In this context, the present study contributes to the existing literature by adopting a multidimensional approach to examining learning quality among male and female learners in online higher education. Unlike previous studies that focus on isolated variables, this research integrates various aspects of the learning experience to provide a more comprehensive and nuanced understanding of gender differences. By doing so, it aims to bridge existing gaps in the literature and offer insights that can inform the design of more inclusive and effective online learning environments.

### **Methodology**

This study adopts a quantitative research design to examine gender-based differences in learning quality among students in online higher education. The use of a quantitative approach enables systematic data collection and statistical analysis, ensuring objective comparison between male and female learners.

### *Sample*

The sample for the study comprises 1,394 learners enrolled in online higher education programs. Among these participants, 1,011 are male learners, accounting for 72.5% of the sample, while 383 are female learners, representing 27.5%. The unequal distribution of participants reflects the broader trend of male dominance in certain academic fields, particularly engineering education, where male enrollment typically exceeds that of female learners. This sample composition provides a realistic representation of the existing gender distribution in such disciplines and supports meaningful analysis of learning quality differences.

### *Variables*

In this study, gender is considered the independent variable and is categorized into two groups: male and female. This variable is used to examine how differences between these groups may influence various aspects of learning quality in an online higher education context.

The dependent variables in the study consist of multiple dimensions of learning quality, providing a comprehensive framework for analysis. These include learning readiness, which refers to the preparedness of learners to engage in online learning; learning drive, indicating

the level of motivation and willingness to learn; and learning planning, which involves the ability to organize and manage learning activities effectively. Additionally, learning interaction captures the extent of communication and collaboration with peers and instructors, while learning engagement reflects the degree of active participation in the learning process.

Dimensions include strategy application, which assesses the use of appropriate learning methods and techniques, and task completion, which evaluates the ability of learners to successfully complete assigned academic tasks. Finally, learning outcome represents the overall academic performance and achievement of the learners. Together, these variables provide a holistic understanding of learning quality and allow for a detailed comparison between male and female learners.

### Data Analysis

#### *Differences in the Level of Learning Quality among Learners of Different Genders*

In this study, there are 1011 male learners, accounting for 72.5%, and 383 female learners, accounting for 27.5%, and the reason for the difference is determined by the influence of the specialization of engineering colleges in H-Higher Education. In this study, learners were divided into male and female groups as grouping variables, and eight dimensions, namely, learning readiness, learning drive, learning plan, learning interaction, learning engagement, strategy application, task completion and learning gain, were used as test variables to conduct a difference test to study the specific levels and differences in the dimensions of learning quality of learners of different genders, and the results of the test are shown in Table 4-36. The test results are shown in Table 4-37.

Table 4-37

#### *Gender Differences in Learning Quality among Online Higher Education Learners*

<i>Learning Dimension</i>	<i>Gender</i>	<i>N</i>	<i>Mean</i>	<i>SD</i>	<i>T</i>	<i>P</i>
<i>Learning Readiness</i>	<i>Male</i>	<i>1011</i>	<i>3.89</i>	<i>0.53</i>	<i>2.147</i>	<i>0.032</i>
	<i>Female</i>	<i>383</i>	<i>3.82</i>	<i>0.54</i>		
<i>Learning Drive</i>	<i>Male</i>	<i>1011</i>	<i>3.53</i>	<i>0.51</i>	<i>-1.737</i>	<i>0.083</i>
	<i>Female</i>	<i>383</i>	<i>3.58</i>	<i>0.49</i>		
<i>Learning Planning</i>	<i>Male</i>	<i>1011</i>	<i>3.86</i>	<i>0.52</i>	<i>2.247</i>	<i>0.025</i>
	<i>Female</i>	<i>383</i>	<i>3.81</i>	<i>0.51</i>		
<i>Learning Interaction</i>	<i>Male</i>	<i>1011</i>	<i>3.36</i>	<i>0.63</i>	<i>0.099</i>	<i>0.921</i>
	<i>Female</i>	<i>383</i>	<i>3.35</i>	<i>0.64</i>		
<i>Learning Engagement</i>	<i>Male</i>	<i>1011</i>	<i>3.78</i>	<i>0.51</i>	<i>1.981</i>	<i>0.048</i>
	<i>Female</i>	<i>383</i>	<i>3.74</i>	<i>0.49</i>		
<i>Strategy Application</i>	<i>Male</i>	<i>1011</i>	<i>3.69</i>	<i>0.50</i>	<i>1.286</i>	<i>0.199</i>
	<i>Female</i>	<i>383</i>	<i>3.65</i>	<i>0.51</i>		
<i>Task Completion</i>	<i>Male</i>	<i>1011</i>	<i>3.83</i>	<i>0.49</i>	<i>1.396</i>	<i>0.163</i>
	<i>Female</i>	<i>383</i>	<i>3.79</i>	<i>0.48</i>		
<i>Learning Outcome</i>	<i>Male</i>	<i>1011</i>	<i>3.55</i>	<i>0.54</i>	<i>1.774</i>	<i>0.076</i>
	<i>Female</i>	<i>383</i>	<i>3.51</i>	<i>0.55</i>		

On the readiness to learn degree, the mean value of male learners ( $M=3.89$ ) is greater than the mean value of female learners and there is a significant difference between the two ( $T=2.147, P=0.032 < 0.05$ ); on the drive to learn degree, the mean value of female learners ( $M=3.58$ ) is greater than the mean value of male learners ( $M=3.53$ ), but the difference between the two is not significant ( $T=0.099, P=0.921 > 0.05$ ); in terms of learning planning, the mean value of male learners ( $M=3.88$ ) is greater than that of female learners ( $M=3.81$ ), and there is a significant difference between the two ( $T=2.247, P=0.025 < 0.05$ ); in terms of learning interaction, the mean value of male learners ( $M=3.36$ ) is greater than that of female learners ( $M=3.36$ ); in terms of learning interaction, the mean value of male learners ( $M=3.36$ ) is greater than that of female learners ( $M=3.35$ ), and there is a significant difference between them.  $3.36$  is greater than the mean value of female learners ( $M=3.35$ ), and the difference between the two is not significant ( $T=0.099, P=0.921 > 0.05$ ); in terms of learning engagement, the mean value of male learners ( $M=3.80$ ) is greater than that of female learners ( $M=3.74$ ), and there is a significant difference between the two ( $T=1.981, P=0.048 < 0.05$ ); the mean value of male learners is greater than that of female learners ( $T=1.981, P=0.048 < 0.05$ ); in terms of strategy application, the mean value of male learners ( $M=3.66$ ) is higher than that of female learners ( $M=3.62$ ), but there is no significant difference between them ( $T=1.286, P=0.199 > 0.05$ ); in terms of task completion, the mean value of male learners ( $M=3.84$ ) is higher than that of female learners ( $M=3.85$ ), and the mean value of female learners ( $M=3.85$ ) is higher than that of male learners ( $M=3.85$ ). higher than the mean value of female learners ( $M=3.80$ ), but there is no significant difference between the two ( $T=1.396, P=0.163 > 0.05$ ); in terms of learning gain, the mean value of male learners ( $M=3.57$ ) is higher than that of female learners ( $M=3.51$ ), but there is no significant difference between the two ( $T=1.774, P=0.076 > 0.05$ ).  $0.076 > 0.05$ ).

Male learners had higher mean values than female learners in learning readiness, learning planning, learning interaction, learning engagement, strategy application, task completion, and learning gain, while female learners had higher mean values than male learners in only one dimension, learning drive. In terms of standard deviation, female learners were higher than male learners in five dimensions of quality of learning, indicating that the individual differences of female learners were more obvious.

### Findings and Discussion

The findings indicate that gender differences in online learning quality are present but not uniformly significant across all dimensions. Male learners demonstrated stronger readiness, planning, and engagement, which are critical factors for success in online learning environments. These results may be attributed to higher self-efficacy and familiarity with technology among male learners (Bandura, 1997). Female learners, however, exhibited higher learning drive, suggesting strong intrinsic motivation. This aligns with previous research indicating that female learners often display greater persistence and commitment to learning tasks (Anderson, 2008). Despite lower scores in some areas, their comparable performance in learning outcomes suggests that motivation may compensate for other challenges.

The absence of significant differences in interaction, strategy application, and task completion indicates that both genders adapt similarly to the functional aspects of online learning. This finding supports the argument that well-designed online platforms can reduce

gender disparities (Means et al., 2013). The higher variability among female learners suggests that their learning experiences are more heterogeneous, possibly influenced by external factors such as access to resources, social expectations, and support systems.

### **Conclusion**

This study concludes that gender differences in learning quality exist but are nuanced and context-dependent. Male learners tend to perform better in readiness, planning, and engagement, while female learners demonstrate strong motivation and comparable learning outcomes.

The findings highlight the importance of designing gender-sensitive online learning environments that support diverse learning needs. Educational institutions should focus on enhancing engagement strategies, providing structured learning support, and fostering inclusive participation. Research should explore additional variables such as socio-economic background, digital literacy, and instructional design to better understand the complexities of gender differences in online education.

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