## *Gender Differences in Perceptions of Digital Device Use and Reading Literacy: Insights From PISA 2018*

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**Abstract**

Gender gaps in literacy arise from ingrained perceptions of masculinity and femininity dictating gender-specific activities in children. While digital literacy enhances classroom engagement, its impact on higher education learning outcomes remains inconclusive. The purpose of this study was to investigate whether there are differences in the perceptions of male and female students regarding the use of digital devices in reading literacy, based on the PISA 2018 test. A quantitative method, using T-test analysis, was employed for the research. The population of this study consisted of 15-year-old students in 2018, with a sample of 15-year-old students who participated in the PISA test across 80 countries. Data for this study were gathered through questionnaires answered by 612,004 students from 80 countries. The research found significant differences between male and female students in the use of digital devices for reading literacy. Female students tend to be less digitally active, influenced by financial constraints, educational disparities, and social norms. The increasing use of information and communication technology (ICT) indicates the complexity of its relationship with reading literacy. The importance of specific online activities and motivational strategies in enhancing reading skills and students' confidence highlights the key role of a holistic approach. The gender gap in technology utilization underscores the need for improving female literacy to address disparities in technology adoption.


Keywords: Gender Differences, Perception, Reading Literacy, PISA 2018 Test

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**Introduction**

The research findings of Kong et al. (2022) reveal that students' attitudes towards the use of digital devices are positively correlated with digital reading achievement. This is linked to the need for proficient readers in the digital world with a strong foundation in reading, as well as the critical thinking abilities of students (Suarez-Alvarez et al., 2022). Additionally, a disciplinary climate is required to facilitate the formation of students' reading self-concept, impacting the improvement of their reading performance at the school level (Ma et al., 2022).

Nevertheless, several studies (Delgado et al., 2018; Kong et al., 2018; Clinton, 2019; Singh & Alexander, 2022) indicate that paper media supports better comprehension than screen media, especially when reading longer and more complex texts. Meanwhile, according to the results of the 2018 PISA survey, reading performance has declined in many countries. At the adolescent level, there is a reported significant decline in leisure reading, combining readings, and digital technology skills (Weel and Mangen, 2022).

Concerning gender issues, Ritonga and Sutapa (2021) state that during the preschool period, gender roles influence children in choosing daily activities, including the selection of reading materials. Furthermore, based on the World Economic Forum's report (2021), gender inequality in the future is associated with employment, with the factor of lower wage inequality for women compared to men.

In responding to various findings, there is a need for research with more universal data. One option is to utilize data from the PISA survey. In line with the issues raised, this research aims to investigate whether there are any differences in the perceptions of male and female students regarding the use of digital devices in reading literacy based on the PISA 2018 test. The significance of this research lies in providing valuable insights that can be used by teachers and students as a reference for school policies.

**Research Method**

It used a quantitative research methodology. This strategy was chosen because it aligns with the study's primary objectives, which are to gather data from observed symptoms and utilize the study's data. The study employed PISA 2018 data, which is freely accessible and can be used for research and development (source: https://www.oecd.org/pisa/data/).

The sample consisted of pupils who had completed the PISA exams at the age of 15 in 80 different countries, representing the group of 15-year-olds who attended school in 2018. These pupils participated in the study by responding to a five-option survey. The optional answers included categories such as "I spend 1 to 30 minutes a week," "31 to 60 minutes a week," and "more than 60 minutes a week" (alternatively, "I don't study this subject" or "I don't have time"). These questions pertained to "Time spent using digital devices during classroom courses in a typical school week (test language classes)" in the 2018 PISA assessment.

This pertains to the literacy exam for reading. According to the analysis conducted using Mplus, the Chi-Square Test of model fit yielded a P-value of 0.000, and the Root Mean Square Error of Approximation (RMSEA) estimate in this study was 0.000. The 90% confidence interval for this result ranged from 0.000 to 0.000. These results suggest that, even if the study's instruments were well-fitted to the model, they had very low explanatory value.

The results from the standard model are presented in Table 1 and Figure 1, further supporting this conclusion.

| Variable | Estimate | Est./S.E. | P-Value | Decision |
|---|---|---|---|---|
| Digital | 0,885 | 579,121 | 0.000 | Valid |
| Gender | 0,428 | 316,274 | 0.000 | Valid |

Table 1: Results from a Standardized Model Using Mplus

As shown in Figure 1, the individual dependability for the instrument used in this study was 0.09, while the instrument's perfect reliability value was 1.00. This demonstrates that an object possesses a higher reliability value than a human being. It also reveals that the majority of survey respondents in this study provided low and medium scores, reflecting the realities of everyday school life.

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-------------------------------------------------------------------------
| PERSON  612003 INPUT  612003 MEASURED              INFIT       OUTFIT  |
|           TOTAL      COUNT    MEASURE  REALSE    IMNSQ  ZSTD  OMNSQ  ZSTD|
| MEAN       42.2        2.0      -1.68    1.10      .51   -.5    .77   .0|
| P.SD       46.9         .2       1.41     .77      .84    .9    .89   .8|
| REAL RMSE  1.35 TRUE SD          .43  SEPARATION   .32  PERSON RELIABILITY  .09|
|-----------------------------------------------------------------------|
| ITEM        2 INPUT       2 MEASURED               INFIT       OUTFIT  |
|           TOTAL      COUNT    MEASURE  REALSE    IMNSQ  ZSTD  OMNSQ  ZSTD|
| MEAN   12854480   601006.0       .00     .00      .16  -9.6    .77   .0|
| P.SD   11935436    10995.0      1.02     .00      .14    .3    .36   9.9|
| REAL RMSE    .00 TRUE SD       1.02  SEPARATION  1039  ITEM  RELIABILITY 1.00|
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Figure 1: Analysis outcomes for Winsteps version 5.2.2.0:
Individual and Equipment Dependability

T-test analysis was the chosen method of analysis for this investigation. The primary objective of this study is to examine potential disparities in how male and female students perceive the use of digital devices for reading literacy in the 2018 PISA test.

To ensure the accuracy of the research analyst's conclusions and to analyze all of the study's data, we utilized the SPSS 22.00 application. Winsteps, Mplus, and SPSS 22.00 were employed to assess instrument and person reliability tests, instrument fit models, and the t-test (Safari, 2022a; Safari, 2022b).

**Result**

The data below pertains to 612,004 students from 80 different countries, based on the percentage of students who responded to the survey.

| Gender | Time spent using digital | | | | | Total |
|---|---|---|---|---|---|---|
| | No time | 1 - 30 minutes a week | 31 - 60 minutes a week | More than 60 minutes a week | I do not study this subject | |
| Female | **93429** **(27,5%)** | 40619 (11,9%) | **17869** **(5,3%)** | 19179 (5,6%) | 1150 (0,3%) | 172246 (50,6%) |
| Male | **89997** **(26,4%)** | 36915 (10,8%) | **18762** **(5,5%)** | 20280 (6,0%) | 2084 (0,6%) | 168038 (49,4%) |
| Total | 183426 (53,9%) | 77534 (22,8%) | 36631 (10,8%) | 39459 (11,6%) | 3234 (1,0%) | 340284 (100,0%) |

Table 2: The Proportion of Students Who Use Digital Devices in Class During a Typical School Week for Test Language Lessons

According to Table 2, the majority of male students who answered "31-60 minutes a week" were 5.3% female and 5.5% male, whereas the majority of female students who responded with "No time" were 27.5% and 26.4% for male.

| Gender | N | Mean | Std. Deviation | Std. Error Mean |
|--------|-----|------|----------------|-----------------|
| Female | 172246 | 1,80 | 1,055 | 0,003 |
| Male | 168038 | 1,85 | 1,105 | 0,003 |

Table 3: The gender-specific average and standard deviation for the pupils

Male students used digital devices for a longer duration of time than female students, according to Table 3; (mean 1.85, standard deviation 1.105) and (standard deviation 1.055, mean 1.80).

| t | df | Sig. (2-tailed) |
|--------|--------|-----------------|
| -13,668 | 340282 | 0,000 |

Table 4: Results of a two-tailed T-test

According to Table 4, male and female students held different opinions about using digital devices to improve their reading skills on the 2018 PISA test (P < 0.000).

**Discussion**

The findings of this study indicate differences in perceptions between male and female students regarding the use of digital devices for reading literacy in PISA 2018. Female students tend to use digital devices less regularly compared to male students.

Referring to the results of PISA 2018, differences were also found in the assessment of male and female students regarding the use of digital devices for reading literacy. According to the analysis of this study, male students are more inclined to use digital devices than female students (mean 1.85, standard deviation 1.105).

The results of the data analysis need to be reinforced by qualitative data that can explain why such differences occur. Unfortunately, obtaining direct answers as to why these differences exist is not easy. One way to address this is for researchers to utilize several research findings that can support the results of the analysis.

The findings of this study align with the OECD ABC analysis (2015) in the Gender Equality in Education Report, which found that some female students participating in formal education seem to lack confidence in using ICT. Various variables, such as financial constraints, educational gaps, lack of technical understanding, and social norms, impact gender-based digital exclusion (Borgonovi et al., 2018; OECD, 2018; OECD, 2015; Hilbert, 2011; Cooper, 2006; Krupp, 2005). These are some of the main causes of gender gaps in the digital industry.

The use of information and communication technology (ICT) among students is becoming increasingly common, both at home and in school. This study modifies the intensity of ICT use and mediates metacognition to explain the ambiguous relationship between students' ICT use and reading literacy, revealing inconsistent results. The relationship between all forms of ICT use and reading literacy, as well as the growth of ICT use, follows a dynamic pattern starting with a positive effect, then declining to less positive, becoming negative and fluctuating, and ultimately ending with a persistent decline (Li and Wang, 2022).

The research findings from Alharbi (2022) suggest that reading emails, participating in online conversations (such as WhatsApp), reading online news, searching for material online to investigate specific subjects, and seeking practical information (such as schedules) online are significant predictors of improved reading skills and grades. According to the findings of Navarro-Martinez and Pena-Acuna published in 2022, there is a relationship between students' use of technology and social media with their academic progress.

Results from the study by Du et al. (2022) reveal that the confidence level of successful students increases after reading one story about a role model and further improves after reading five stories. According to research conducted in 2022 by Martin et al., reading aloud to others can provide benefits in relationships and socioemotional aspects.

Regarding the design of large-scale assessments and data interpretation, it can have an impact if these findings are confirmed in other countries. According to these findings, students' responses to PISA test items indicate broad abilities rather than specific domain talents (Pokropek et al., 2022). Additionally, motivation and socioeconomic levels are crucial indicators of students' success in reading. Economic inequality may be a factor in the variation of students' reading abilities (Yeung et al., 2022).

According to the investigation by Cai and Yang in 2022, reading strategies—such as comprehension techniques and memorization—are related to the ability to understand mathematics through reading. The findings of the study by Hu and Wang in 2022 indicate positive effects from students' perceptions of instructional adaptation, stimulation of reading engagement, disciplinary atmosphere, teacher involvement, and teacher support.

A student's reading ability is influenced by other students and their schools (Qian and Lau, 2022). This is reinforced by the research results by Tan et al. (2022) based on a questionnaire from 11,364 15-year-old students distributed among 332 schools (5,455 females and 5,909 males) participating in PISA 2018. The results show that students' feelings about school have a direct and beneficial impact on their reading literacy.

According to the study by Marcq and Braeken in 2022, the cognitive aspect of reading in PISA 2018 shows significant differences related to variations in students, schools, and items. The findings of the research by Kaya et al. (2022) indicate that motivational and metacognitive reading characteristics have an impact on PISA reading performance.

According to the research findings of Clavel and Flannery in 2022, there are significant differences between the scores of male and female students in mathematics, reading, and science in single-sex schools and coeducational schools. However, after considering various personal, family, and institutional variables, both male and female students attending single-sex schools generally do not perform worse than their peers attending coeducational schools.

The ideal learning time at the school level has a significant impact, where the time spent on learning and discipline in the classroom is the most crucial factor (Liu, 2012). Additionally, support for teacher autonomy has a positive relationship with the motivation and emotional factors of adolescents. This has important practical implications for educators who want to use various teaching techniques to enhance the confidence, self-esteem, and happiness of teenagers (Wang and Hu, 2022).

There is also a weak positive correlation between reading ability and growth mindset, according to hierarchical analysis by Berardo et al. (2022). Furthermore, Gerstner and Tsyawo (2022) show that there is a spatial dependence in student performance between countries related to the proximity between countries.

With the increasing use of smart mobile devices, our daily internet usage has significantly increased. Prawesti's research (2018), which examines the use of digital reading apps and digital reading activities in elementary schools, is one study related to the use of digital reading apps.

According to the research, a noticeable improvement occurs when students participate in digital reading activities using digital reading media. Students who participate in digital reading programs show greater reading motivation than their peers. Long and Szabo (2016) also suggest the idea that students using digital reading are more motivated than those who do not. Students who read using digital reading programs claim that it enhances their motivation to read.

Digital reading applications have the potential to have either positive or negative effects on a person's reading habits, especially in terms of their interest in reading. Compared to teachers in countries below the average PISA score, teachers in countries with above-average PISA scores often provide feedback to their students and give them access to better reading materials (Safari, 2020).

According to Borgonovi et al. (2018), another reason why women use digital technology at a lower rate than men is because they are not aware of its potential benefits. Dalberg (2012) found that 25% of women who rarely use the internet have no desire to do so, and almost all of them believe that it will not help them.

According to UNESCO, only 83% of women worldwide are literate, compared to 90% of men. Because they are more familiar with this technology or because it is easier to use and access, literate women often use internet platform services such as Skype and YouTube.

Examining the social-cultural aspects of gender gaps in technology is also crucial. About one-fifth of women in India and Egypt believe that the internet is not suitable for them due to many cultural considerations (Borgonovi et al., 2018). In India, 12% of women say they avoid using the internet because of unfavorable social perceptions, while 8% claim their families do not approve of internet use (Dalberg, 2012b).

In general, research findings indicate variations in reading achievement as well as metacognitive strategies and reading attitudes between boys and girls. To reduce gender gaps in reading achievement, it is suggested that teachers help students develop reading-related attitudes and metacognitive skills. This research also provides limitations, practical implications, and suggestions for further research (Acar-Erdol and Akin-Arikan, 2022).

**Conclusion**

This study reveals significant differences between male and female students in the use of digital devices for reading literacy based on PISA 2018. Female students tend to be less digitally active, and this is found to be associated with factors such as financial constraints, educational gaps, and social norms. The increasing use of information and communication

technology (ICT) indicates the complexity of its relationship with reading literacy, emphasizing the need for understanding the evolution of ICT usage in the educational context.

The study highlights specific online activities that can predict improvements in reading skills and student grades. Additionally, motivational strategies, such as reading inspirational stories, prove effective in boosting students' confidence in reading literacy. The connection between reading ability and achievement in mathematics and science underscores the necessity of a holistic approach to enhance student outcomes.

Gender gaps in the utilization of digital technology, particularly digital reading applications, reflect the socio-cultural challenges faced by women. Therefore, improving literacy levels among women is identified as key to addressing gender disparities in technology adoption. In conclusion, this research provides in-depth insights into the complex interaction between gender, technology, and reading literacy, emphasizing the importance of a holistic approach and the need for further detailed research to understand the dynamics of this phenomenon.

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