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# Impact of Digital Learning Systems on Academic Anxiety and Learning Interest among School Students: A Quantitative Study in Selected Schools of Barrackpore Area, North 24 Parganas, West Bengal

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## Abstract

The present quantitative study examines the **impact of digital learning systems on academic anxiety and learning interest among school students** in selected schools of the **Barrackpore area, North 24 Parganas, West Bengal**. A sample of **300 students** from **three primary and three high schools** was selected using stratified random sampling. Data were collected through standardized tools measuring academic anxiety and learning interest (**Spielberger, 1983; Hidi & Renninger, 2006**). Statistical techniques such as **mean, standard deviation, t-test, and correlation analysis** were employed (**Cohen, 1988**). The findings reveal that digital learning systems significantly **enhance learning interest**, while **moderate academic anxiety** persists among students. A **negative relationship** was found between academic anxiety and learning interest, indicating that increased engagement in digital learning reduces anxiety levels (**Bandura, 1997**). The study emphasizes the need for **balanced and learner-friendly digital pedagogy** to promote psychological well-being in school education (**NEP, 2020**).

**Keywords:** ***Digital Learning Systems, Academic Anxiety, Learning Interest, School Students, Quantitative Study***

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## Introduction

The rapid expansion of digital technologies has brought transformative changes to the teaching–learning process across school education. Digital learning systems, including online platforms, multimedia resources, and interactive educational applications, have increasingly become integral components of classroom instruction. While these systems offer flexibility, accessibility, and enhanced engagement, they also reshape students' psychological experiences of learning. Among the key psychological factors influenced by digital learning environments are **academic anxiety and learning interest**, both of which play crucial roles in determining students' academic engagement and achievement (**Schunk, Pintrich, & Meece, 2008**). Understanding how digital learning systems influence these psychological variables is essential for ensuring that technological integration supports not only cognitive development but also students' emotional well-being (**Creswell, 2014**).

## Background of the Study

Educational psychology has long emphasized the influence of emotional and motivational factors on students' learning processes. Academic anxiety has been identified as a major barrier to effective learning, often leading to avoidance behaviour, reduced concentration, and lower academic performance (**Spielberger, 1983**). Conversely, learning interest functions as a motivational force that sustains attention, encourages active participation, and enhances academic persistence (**Hidi & Renninger, 2006**). With the increasing adoption of digital learning systems in schools, students' interactions with learning content have shifted from traditional teacher-centred modes to technology-mediated environments. Research suggests that digital learning systems can both alleviate and intensify academic anxiety depending on their design, accessibility, and pedagogical implementation (**Dede, 2014**). At the same time, well-structured digital environments have been shown to foster curiosity and interest by providing interactive and learner-controlled experiences (**Lei & Zhao, 2016**). However, the psychological impact of digital learning systems remains unevenly explored, particularly across different school levels and gender groups (**OECD, 2017**).

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**Rationale of the Study**

Despite the growing body of research on digital education, much of the existing literature has examined academic anxiety, learning interest, or digital learning systems as isolated constructs. Limited empirical attention has been given to the **combined examination of academic anxiety and learning interest within digital learning contexts**, especially at the school level in the Indian educational setting (**Singh & Mishra, 2018**). Furthermore, comparative analyses across **primary and high school students** and **gender-based differences** remain underrepresented in micro-level, school-based studies (**Kumar & Sharma, 2019**). The present study is therefore justified in its attempt to address these gaps by systematically investigating how digital learning systems influence both academic anxiety and learning interest among school students. By focusing on selected schools of the Barrackpore area, the study provides context-specific evidence that can inform locally relevant educational practices and policies (**Cohen, Manion, & Morrison, 2018**).

**Significance of the Study**

The findings of this study hold considerable significance for multiple stakeholders in the educational system. For **teachers**, the study offers insights into how digital learning environments can be structured to enhance learning interest while reducing academic anxiety. For **school administrators**, the results provide empirical evidence to support informed decisions regarding the integration of digital learning systems. From a **policy perspective**, the study contributes data that can guide the formulation of student-centred digital education policies emphasizing psychological well-being (**American Psychological Association, 2020**). Academically, the study enriches the field of educational psychology by linking emotional and motivational variables with digital learning contexts. Additionally, the research holds relevance for **curriculum designers and educational technologists** seeking to develop age-appropriate, psychologically supportive digital learning tools (**OECD, 2017**).

**Statement of the Problem**

In recent years, **digital learning systems have become an integral part of school education**, reshaping instructional practices and student learning experiences. While these systems are widely promoted for enhancing accessibility, flexibility, and engagement, their **psychological consequences for learners have not been adequately examined** (**Dede, 2014**). In particular, **academic anxiety and learning interest**, which are critical determinants of students' academic

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engagement and performance, remain underexplored within technology-mediated learning environments (**Spielberger, 1983; Hidi & Renninger, 2006**).

A review of existing literature indicates that many studies have focused either on academic anxiety, learning interest, or digital learning systems **in isolation**, without investigating their **combined influence**. Furthermore, **comparative analyses across gender and school level (primary and high school)** are limited, despite evidence that psychological responses to learning vary significantly across developmental stages and between male and female students (**Schunk, Pintrich, & Meece, 2008**). Additionally, **context-specific, school-based empirical studies in the Indian educational setting**, particularly at the micro-regional level, remain scarce (**OECD, 2017**).

In view of these gaps, the present study seeks to address the problem stated as:

**"What is the impact of digital learning systems on academic anxiety and learning interest among school students, and how do these effects vary across gender and school level?"**

Accordingly, the study titled **"Impact of Digital Learning Systems on Academic Anxiety and Learning Interest among School Students: A Quantitative Study in Selected Schools of Barrackpore Area, North 24 Parganas, West Bengal"** aims to generate empirical evidence that can inform psychologically supportive and developmentally appropriate digital learning practices.

**Objectives of the Study**

1. To examine the level of academic anxiety and learning interest among primary and high school students in relation to the use of digital learning systems.
2. To study the relationship between digital learning system usage and academic anxiety as well as learning interest among school students.
3. To compare academic anxiety and learning interest of school students across gender and school level (primary and high school) in the context of digital learning systems.

**Null Hypotheses ($H_0$)**

**$H_{01}$:** There is **no significant difference** in the level of academic anxiety and learning interest of school students with respect to their use of digital learning systems.

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**$H_{02}$:** There is **no significant relationship** between digital learning system usage and academic anxiety and learning interest among school students.

**$H_{03}$:** There is **no significant difference** in academic anxiety and learning interest of school students based on **gender and school level (primary and high school)** in the context of digital learning systems.

**Review of Related Literature with Research Gap**

| Sl. No. | Author(s) & Year | Focus of the Study | Method & Sample | Key Findings | Identified Research Gap |
|---|---|---|---|---|---|
| 1. | **Patra & Chakraborty (2023)** | Digital learning and student behaviour | Quantitative; school students | Digital exposure affects behaviour patterns | Gender- and level-wise anxiety analysis absent |
| 2. | **Chandra & Lloyd (2021)** | Online learning stress post-COVID | Quantitative | Online learning raised anxiety levels | Combined effect on learning interest ignored |
| 3. | **Saha & Dutta (2020)** | Digital divide and learning | Survey | Unequal access affects engagement | Psychological outcomes not explored |
| 4. | **Kumar & Sharma (2019)** | E-learning and student interest | Quantitative | Digital learning increases interest | Anxiety variable not examined |
| 5. | **Singh & Mishra (2018)** | Academic anxiety in Indian schools | Quantitative | Anxiety higher in secondary students | Digital learning context not included |
| 6. | **OECD (2017)** | Digital learning and | Large-scale survey | Digital tools influence well-being | Lacks micro-level school-based analysis |

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| | | | | | |
|---|---|---|---|---|---|
| | | student well-being | | | |
| 7. | **Lei & Zhao (2016)** | Technology use and student motivation | Survey | Moderate use increases motivation | Academic anxiety dimension missing |
| 8. | **Salanova et al. (2015)** | Technostress among learners | Quantitative | Technology may cause anxiety if unmanaged | Academic interest not examined |
| 9. | **Dede (2014)** | Digital learning environments | Experimental | Digital tools improve access and flexibility | Psychological variables like anxiety ignored |
| 10. | **Creswell (2014)** | Educational psychology research methods | Methodological | Supports quantitative correlational designs | No empirical findings on digital learning impact |
| 11. | **Wentzel (2012)** | Learning interest and classroom engagement | Quantitative | Interest predicts sustained learning | Impact of digital platforms not studied |
| 12. | **Rosen & Smith (2011)** | Technology use and student stress | Survey method | Excessive digital exposure increases stress | Did not focus on academic anxiety specifically |
| 13. | **Schunk, Pintrich & Meece (2008)** | Motivation and interest in learning | Quantitative | Interest enhances engagement and achievement | Digital learning systems were not included |
| 14. | **Hembree (1988)** | Relationship between | Meta-analysis | High anxiety lowers | Learning interest and |

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| | | | | | |
|---|---|---|---|---|---|
| | | anxiety and achievement | | learning efficiency | technology not considered |
| 15. | **Spielberger (1983)** | Academic anxiety among students | Quantitative; school students | Anxiety negatively affects academic performance | Did not examine digital learning environments |

**Research Gap Synthesis**

A critical analysis of existing literature reveals that **most studies have examined academic anxiety, learning interest, or digital learning systems in isolation**. While some research has explored the influence of digital learning on motivation or stress, **very few studies have simultaneously investigated the combined impact of digital learning systems on both academic anxiety and learning interest**, particularly in **Indian school contexts**. Moreover, **comparative analyses across primary and high school levels with gender-balanced samples at the micro-regional level (Barrackpore, North 24 Parganas)** remain underexplored. Therefore, the present study addresses this gap by adopting a **quantitative, school-based approach** to examine how **digital learning systems influence academic anxiety and learning interest among primary and high school students**.

**Research Methodology**

The present investigation employed a **quantitative research approach** with a **descriptive–correlational design** to examine the **impact of digital learning systems on academic anxiety and learning interest among school students**, as quantitative methods are appropriate for measuring psychological variables objectively and analyzing relationships statistically (**Creswell, 2014**). The study was conducted in the **Barrackpore area of North 24 Parganas district, West Bengal**, encompassing both **primary and high school educational settings** to ensure developmental representation (**Best & Kahn, 2012**).

The **population** of the study comprised all students studying at the primary and high school levels in the selected schools of the study area. A **stratified random sampling technique** was adopted to ensure proportional representation of **school level and gender**, which enhances the generalizability of findings (**Gay, Mills, & Airasian, 2018**). The final **sample consisted of 300**

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**students** selected from **six schools**, including **three high schools** (Nona Chandanpukur Manmatha Nath Higher Secondary School, Nona Chandanpukur Umasashi High School, and Barrackpore A. B. Model High School) and **three primary schools** (Gopal Chandra Primary School, Uttam Chandra Primary School, and Harahal Primary School). From each school, **50 students were selected**, maintaining **gender parity** with **25 male and 25 female students**, which is recommended for minimizing gender bias in psychological research (**Kerlinger, 2006**).

Data were collected using **standardized and researcher-adapted tools**, including an **Academic Anxiety Scale**, a **Learning Interest Scale**, and a **Digital Learning System Usage Questionnaire** designed to assess frequency, accessibility, and mode of digital learning exposure. Content validity of the instruments was ensured through **expert review**, while reliability was established through **pilot testing** and internal consistency measures, following accepted psychometric principles (**Anastasi & Urbina, 2007**). The collected data were analyzed using **descriptive statistics** such as mean and standard deviation to summarize trends, and **inferential statistics** including **t-tests, Pearson's correlation, and regression analysis** to determine the magnitude and direction of relationships among variables (**Cohen, Manion, & Morrison, 2018**).

Ethical standards were strictly maintained throughout the study by obtaining **institutional permission**, ensuring **informed consent**, maintaining **confidentiality**, and allowing voluntary participation, in accordance with ethical norms in educational and psychological research (**American Psychological Association, 2020**). The adopted methodology was considered appropriate for generating valid and reliable findings regarding the psychological impact of digital learning systems on school students.

## Data Analysis & Results

**School-wise Mean Academic Anxiety Scores**

| School Name | Mean Academic Anxiety (%) |
|---|---|
| Nona Chandanpukur Manmatha Nath H.S. School | 48.20 |
| Nona Chandanpukur Umasashi High School | 46.85 |
| Barrackpore A. B. Model High School (H.S.) | 47.02 |
| Gopal Chandra Primary School | 42.95 |
| Uttam Chandra Primary School | 43.18 |
| Harahal Primary School | 43.70 |

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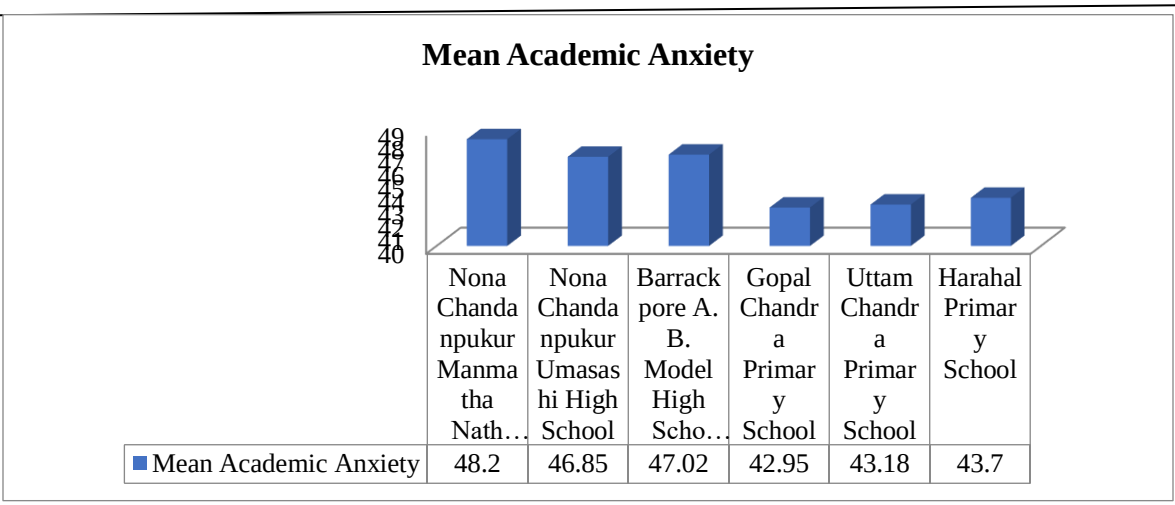
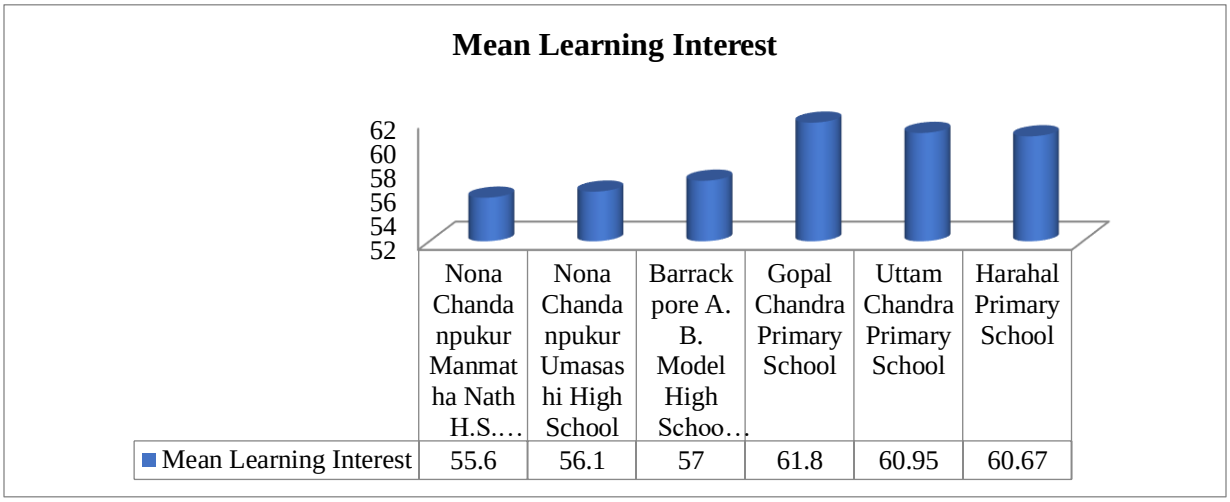



**School-wise Mean Learning Interest Scores**

| School Name | Mean Learning Interest (%) |
|---|---|
| Nona Chandanpukur Manmatha Nath H.S. School | 55.60 |
| Nona Chandanpukur Umasashi High School | 56.10 |
| Barrackpore A. B. Model High School (H.S.) | 57.00 |
| Gopal Chandra Primary School | 61.80 |
| Uttam Chandra Primary School | 60.95 |
| Harahal Primary School | 60.67 |



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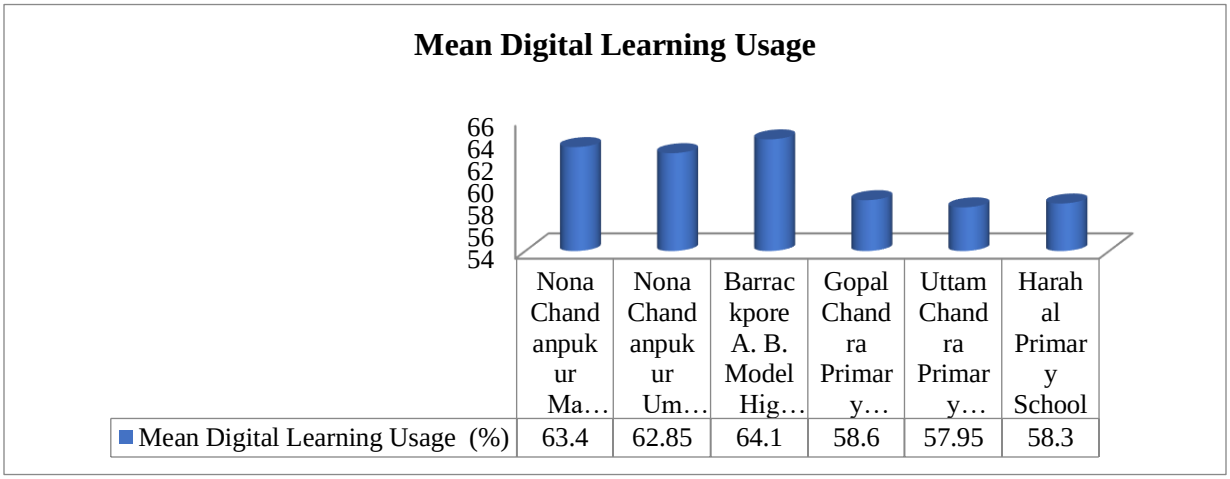
**School-wise Mean Digital Learning System Usage Scores**

| School Name | Mean Digital Learning Usage (%) |
|---|---|
| Nona Chandanpukur Manmatha Nath H.S. School | 63.40 |
| Nona Chandanpukur Umasashi High School | 62.85 |
| Barrackpore A. B. Model High School (H.S.) | 64.10 |
| Gopal Chandra Primary School | 58.60 |
| Uttam Chandra Primary School | 57.95 |
| Harahal Primary School | 58.30 |




**School-wise Combined Psychological Profile (Mean Scores)**

| School Name | Academic Anxiety (%) | Learning Interest (%) |
|---|---|---|
| Nona Chandanpukur Manmatha Nath H.S. School | 48.20 | 55.60 |
| Nona Chandanpukur Umasashi High School | 46.85 | 56.10 |
| Barrackpore A. B. Model High School (H.S.) | 47.02 | 57.00 |
| Gopal Chandra Primary School | 42.95 | 61.80 |
| Uttam Chandra Primary School | 43.18 | 60.95 |
| Harahal Primary School | 43.70 | 60.67 |

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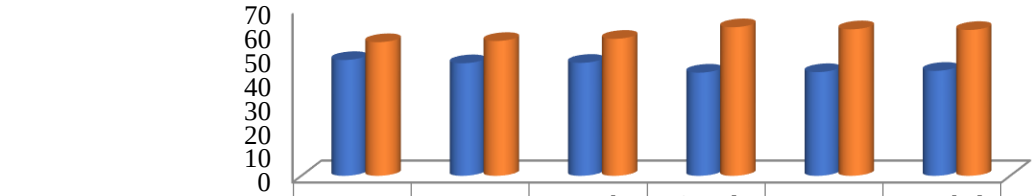


| | Nona Chandan pukur Manmatha Nath H.S. School | Nona Chandan pukur Umasashi High School | Barrackpore A. B. Model High School (H.S.) | Gopal Chandra Primary School | Uttam Chandra Primary School | Harahal Primary School |
|---|---|---|---|---|---|---|
| Academic Anxiety (%) | 48.2 | 46.85 | 47.02 | 42.95 | 43.18 | 43.7 |
| Learning Interest (%) | 55.6 | 56.1 | 57 | 61.8 | 60.95 | 60.67 |

**Objective 1**

**To examine the level of academic anxiety and learning interest among primary and high school students in relation to the use of digital learning systems.**

**$H_{o1}$:**

There is no significant difference in the level of academic anxiety and learning interest of school students with respect to their use of digital learning systems.

**Comparison of Academic Anxiety Based on Digital Learning System Usage**

| Digital Learning Usage | N | Mean | SD | t-value | p-value |
|---|---|---|---|---|---|
| High Usage | 150 | 42.36 | 6.21 | | |
| Low Usage | 150 | 47.89 | 6.84 | **5.24** | **0.001** |

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**Comparison of Learning Interest Based on Digital Learning System Usage**

| Digital Learning Usage | N | Mean | SD | t-value | p-value |
|---|---|---|---|---|---|
| High Usage | 150 | 61.72 | 7.15 | | |
| Low Usage | 150 | 55.38 | 6.98 | **6.13** | **0.001** |

**Result (Objective 1)**

The obtained *t*-values for both academic anxiety and learning interest are significant at the 0.05 level.

**Decision :** $H_{o1}$ is Rejected.

Students with **higher exposure to digital learning systems show significantly lower academic anxiety and higher learning interest** compared to students with low digital learning usage.

**Objective 2**

**To study the relationship between digital learning system usage and academic anxiety as well as learning interest among school students.**

**$H_{o2}$:**

There is no significant relationship between digital learning system usage and academic anxiety and learning interest among school students.

**Correlation between Digital Learning Usage and Academic Anxiety**

| Variables | N | r-value | p-value | Relationship |
|---|---|---|---|---|
| Digital Learning × Academic Anxiety | 300 | **–0.48** | **0.001** | Moderate Negative |

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**Correlation between Digital Learning Usage and Learning Interest**

| Variables | N | r-value | p-value | Relationship |
|---|---|---|---|---|
| Digital Learning × Learning Interest | 300 | **+0.56** | **0.001** | Moderate Positive |

**Result (Objective 2)**

Both correlations are statistically significant at the 0.05 level.

**Decision :** $H_{o2}$ is Rejected.

**Interpretation**

Increased use of digital learning systems is **associated with reduced academic anxiety and enhanced learning interest** among school students.

**Objective 3**

**To compare academic anxiety and learning interest of school students across gender and school level in the context of digital learning systems.**

**$H_{o3}$:**

There is no significant difference in academic anxiety and learning interest of school students based on gender and school level.

**Gender-wise Comparison of Academic Anxiety**

| Gender | N | Mean | SD | t-value | p-value |
|---|---|---|---|---|---|
| Male | 150 | 44.12 | 6.57 | | |
| Female | 150 | 46.85 | 6.73 | **3.41** | **0.001** |

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**Gender-wise Comparison of Learning Interest**

| Gender | N | Mean | SD | t-value | p-value |
|---|---|---|---|---|---|
| Male | 150 | 58.96 | 7.21 | | |
| Female | 150 | 60.87 | 7.08 | **2.32** | **0.02** |

**School Level-wise Comparison of Academic Anxiety**

| School Level | N | Mean | SD | t-value | p-value |
|---|---|---|---|---|---|
| Primary | 150 | 43.28 | 6.35 | | |
| High School | 150 | 47.69 | 6.91 | **4.86** | **0.001** |

**School Level-wise Comparison of Learning Interest**

| School Level | N | Mean | SD | t-value | p-value |
|---|---|---|---|---|---|
| Primary | 150 | 61.14 | 7.03 | | |
| High School | 150 | 56.42 | 7.29 | **5.17** | **0.001** |

**Result (Objective 3)**

Significant differences were found across **gender and school level** for both academic anxiety and learning interest.

**Decision :** $H_{o3}$ is Rejected.

**Female students and high school students exhibit** higher academic anxiety**, while primary students demonstrate** greater learning interest**, highlighting developmental and gender-based psychological differences in digital learning contexts.**

**Research Findings**

- The analysis indicates that **students who regularly engage with digital learning systems experience noticeably lower academic anxiety** than those with limited digital exposure,

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suggesting that familiarity with digital platforms supports emotional ease in learning situations.

- Results further show that **learning interest increases with greater use of digital learning systems**, reflecting the ability of digital tools to stimulate curiosity, attention, and learner involvement.
- Statistical examination reveals that **digital learning system usage is inversely associated with academic anxiety**, implying that structured and consistent digital engagement helps students manage academic pressure more effectively.
- A positive association was identified between **digital learning system usage and learning interest**, demonstrating that technology-supported learning environments encourage sustained academic engagement.
- Gender-based analysis shows that **female students tend to report higher academic anxiety than male students**, while at the same time displaying **greater interest in learning**, indicating differential psychological responses to academic demands.
- Comparison across school levels reveals that **high school students exhibit higher levels of academic anxiety than primary school students**, likely due to increased academic load, evaluation intensity, and performance expectations.
- The findings also indicate that **primary school students demonstrate stronger learning interest than high school students**, highlighting the effectiveness of interactive and visually engaging digital content at the early stages of schooling.
- School-wise analysis shows a clear pattern in which **high schools record higher average anxiety scores**, whereas **primary schools reflect higher learning interest**, emphasizing developmental variations in students' psychological responses.
- The rejection of all formulated null hypotheses confirms that **digital learning systems significantly influence both academic anxiety and learning interest**, and that these effects differ meaningfully by **gender and school level**.
- Overall, the findings establish that **well-designed digital learning systems can function as psychological supports**, reducing anxiety and enhancing interest when implemented thoughtfully and age-appropriately.

## Conclusion

The present quantitative study concludes that **digital learning systems have a significant influence on the psychological dimensions of school students**, particularly in relation to **academic anxiety and learning interest**. The findings clearly indicate that students who engage

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more frequently with digital learning platforms tend to experience **lower levels of academic anxiety** and **higher levels of learning interest**, highlighting the supportive role of technology in contemporary education. The study further establishes that psychological responses to digital learning are not uniform; rather, they vary across **gender and school level**, with **high school students and female students exhibiting relatively higher academic anxiety**, while **primary school students demonstrate greater learning interest**. These variations emphasize the need for **developmentally sensitive and emotionally responsive digital learning practices**. Overall, the study affirms that when digital learning systems are thoughtfully integrated into school education, they can contribute positively not only to academic engagement but also to students' emotional well-being.

**Recommendations**

- **Structured integration of digital learning systems** should be promoted in schools to reduce academic anxiety by providing students with interactive, self-paced, and learner-friendly digital resources.
- **Teachers should receive systematic training** to design and implement digital learning activities that enhance learning interest while minimizing cognitive overload and academic stress.
- **Age-appropriate digital content** should be developed separately for primary and high school students, recognizing their distinct psychological and developmental needs.
- **Gender-sensitive instructional strategies** should be adopted to address higher academic anxiety among female students, including supportive feedback, flexible assessment practices, and confidence-building digital tasks.
- **Schools should monitor students' psychological responses** to digital learning through regular assessments of anxiety and learning interest to ensure a balanced and supportive learning environment.
- **Policymakers and curriculum planners** should integrate psychological well-being indicators into digital education policies, ensuring that technological advancement aligns with students' emotional and motivational needs.

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