WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Decoding Distraction: Analysing Factors Influencing Student Attention in Modern Classrooms

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ABSTRACT :

This study investigates the influence of gender and age on students' perceptions of various classroom factors, including noise levels, temperature, material relevance, technology usage, motivation, social media engagement, and active learning. Utilizing a descriptive research design, data were collected from 85 students through structured questionnaires. Non-parametric statistical analyses, specifically the Mann-Whitney U test, Chi-Square test, and Kruskal-Wallis test, were employed to examine the relationships between demographic variables and classroom experiences. Findings indicate no significant differences between male and female students across the assessed factors, suggesting that gender does not substantially influence classroom perceptions. Conversely, age demonstrated a significant effect on perceptions of noise levels, temperature, and material relevance, with older students exhibiting heightened sensitivity to these environmental factors. Additionally, the Chi-Square test revealed that postgraduate students engage with technology more frequently than their high school and undergraduate counterparts. These results underscore the importance of implementing gender-neutral teaching strategies, enhancing technological resources across all educational levels, and adopting age-sensitive approaches to address environmental preferences in learning environments.

Key words: Student Perceptions, Classroom Environment, Technology Integration in Education, Demographic Influences on Learning

I INTRODUCTION

In the modern educational landscape, capturing and maintaining student attention in the classroom has become an increasingly challenging task. With the advent of digital technology and the resulting shifts in learning environments, educators are facing new obstacles in engaging students effectively. Attention is a critical factor in the learning process, as it directly impacts comprehension, retention, and overall academic performance. However, various factors, both internal and external, influence a student's ability to focus during classroom activities. These factors range from individual characteristics such as cognitive abilities, motivation, and emotional state, to external elements including classroom environment, teaching methods, and the presence of distractions. Understanding the intricate dynamics of these influences is essential for educators striving to create conducive learning environments that promote sustained attention and enhance educational outcomes. This paper seeks to explore the key factors that affect student attention in the classroom, providing insights that could help in the development of strategies to optimize student engagement and academic success.

II LITERATURE REVIEW

1. Dividing attention in the classroom reduces exam performance Arnold L. Glass, Mengxue Kang:

This study measured the effect of using an electronic device for a non-academic purpose during class on subsequent exam performance. In a two-section college course, electronic devices were permitted in half the lectures, so the effect of the devices was assessed in a within-student, within-item counterbalanced experimental design. Dividing attention between an electronic device and the classroom lecture did not reduce comprehension of the lecture, as measured by within-class quiz questions. Instead, divided attention reduced long-term retention of the classroom lecture, which impaired subsequent unit exam and final exam performance. Students self-reported whether they had used an electronic device in each class. Exam performance was significantly worse than the no-device control condition both for students who did and did not use electronic devices during that class.

2.Cognitive Load Theory, Sweller, J., Ayres, P., & Kalyuga, S. (2019):

Cognitive Load Theory: They emphasize that managing cognitive load is crucial for maintaining students' attention. High cognitive demands can reduce the ability to focus effectively on learning tasks.

3. The Role of Nature in Fostering Students' Attention and Engagement,Kaplan, R. (2017):

Attention Restoration Theory: Kaplan explores how natural elements in classroom environments can help restore students' attention, suggesting that incorporating nature can lead to better focus and engagement.

4. Bakhshaei et al. (2019):

highlight that effective technology integration fosters collaborative learning environments, enabling students to engage more deeply with content.

5. Impact on Student Engagement and MotivationA study by Alrahmi et al. (2019):

Found that incorporating technology in the classroom significantly increased students' motivation and participation. Similarly, a 2022 meta-analysis by Koutsouba et al. revealed that interactive technologies, such as gamification, boost engagement and improve academic performance.

6. Barriers to Technology Adoption A study by Baran et al. (2020):

Identified significant obstacles, including limited access to resources and insufficient teacher training. Their research suggests that overcoming these barriers is crucial for maximizing the potential of educational technology.

7. Defining Relevance in Educational Materials

Relevance in educational materials is often framed in terms of alignment with learners' needs, interests, and real-world applications. According to a study by Kauffman (2016), relevant materials not only enhance student engagement but also promote deeper learning by connecting academic content to students' lived experiences.

8. Impact on Student Motivation and Engagement

Research has shown that when educational materials are perceived as relevant, students are more motivated to engage with the content. A meta-analysis by Jansen et al. (2018) found that relevance significantly influences student motivation and achievement. Relevant materials help students see the value in what they are learning, leading to increased persistence and effort.

9. Cultural and Contextual Relevance

The importance of cultural relevance in educational materials is emphasized by Gay (2018), who argues that culturally responsive pedagogy enhances learning for diverse student populations. Materials that reflect students' cultural backgrounds and experiences can foster a more inclusive learning environment and improve educational outcomes.

10.Active learning increases student performance in science, engineering, and mathematics. Freeman, S., et al. (2014).

This meta-analysis found that students in active learning environments performed significantly better than those in traditional lectures. The authors concluded that active learning is essential for improving educational outcomes in STEM fields.

11.Does Active Learning Work? A Review of the Research. Prince, M. (2015)

Prince discusses how active learning fosters deeper understanding and retention of material, suggesting that it is more beneficial than traditional instructional methods.

12.Where's the evidence that active learning works? Michael, J. (2016)

Michael challenges the traditional lecture format, providing evidence from various studies that demonstrate the advantages of active learning in fostering engagement and improving student performance. He advocates for widespread adoption of these methods in higher education.

13.Motivation and Self-Regulated Learning: Theory, Research, and Applications. Schunk, D. H., & Zimmerman, B. J. (2015).

Schunk and Zimmerman emphasize the role of intrinsic motivation in promoting self-directed learning and achievement, providing insights into various motivational theories.

14. The role of interest in learning: A theoretical perspective: Dewitt, D., & Da Costa, P. (2016):

The authors propose a model illustrating how both situational and individual interest can enhance engagement, motivation, and ultimately, learning outcomes.

15. Interest and Motivation: An Overview. Renninger, K. A., & Hidi, S. (2017)

This review synthesizes research on the relationship between interest and motivation, highlighting how fostering student interest can lead to greater motivation and persistence in learning. The authors outline strategies for educators to cultivate interest in various subjects.

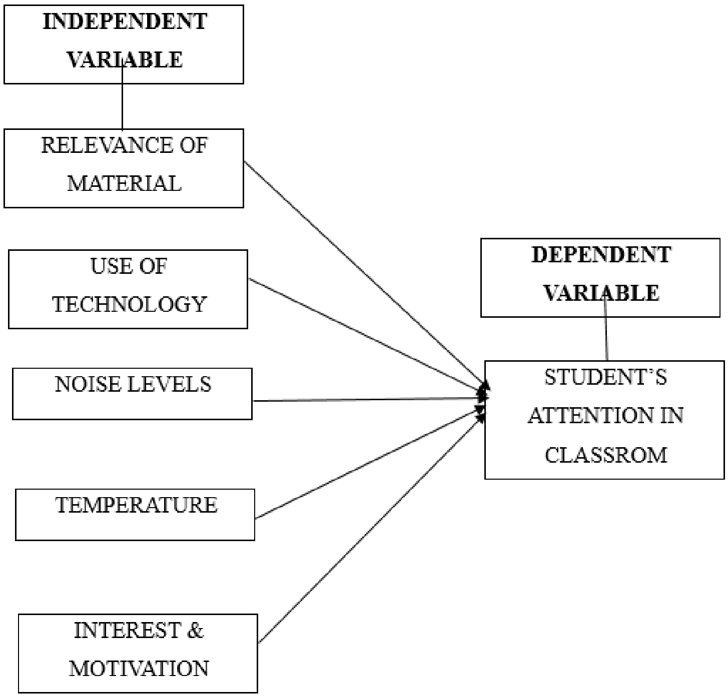
16.The role of motivation in learning and performance. Pintrich, P. R. (2018)

Pintrich discusses different types of motivation (intrinsic and extrinsic) and their impact on learning outcomes. The article highlights how a motivational framework can inform instructional design and improve student performance.

OBJECTIVES

Assess Gender-Based Perceptions in Classroom Environments
Examine Technology Usage Across Educational Levels
Investigate Age-Related Sensitivities to Classroom Conditions

CONCEPTUAL FRAMEWORK



III RESEARCH DESIGN

The study employs a **Descriptive Research Design**, aiming to provide a snapshot of the current state of affairs without manipulating variables. It focuses on understanding and measuring phenomena as they naturally occur, commonly referred to as "ex post facto research"

Sampling Methodology

- **Population**: Students enrolled in educational institutions.
- **Sampling Frame**: Lists of students who use software applications.
- **Sampling Unit**: Individual students utilizing software tools.
- **Sampling Technique**: **Quota Sampling**, a non-probability method combining stratified and judgment sampling to ensure representation from specific groups.
- **Sample Size**: 85 respondents.

Data Collection Methods

- **Primary Data**: Collected through structured questionnaires comprising various question types (open-ended, dichotomous, ranking, multiple-choice).
- **Secondary Data**: Sourced from institutional records, books, government reports, journals, and reputable websites.

Reliability Analysis

To ensure consistency and reproducibility, the study utilizes **Cronbach's Alpha** and **Composite Reliability** measures. A Cronbach's alpha value above 0.70 indicates acceptable internal consistency of the measurement instruments.

Statistical Tools Employed

1. **Mann-Whitney U Test**: A non-parametric test used to compare differences between two independent groups when the data does not necessarily follow a normal distribution.
2. **Kruskal-Wallis Test**: An extension of the Mann-Whitney U Test for comparing more than two independent groups. It assesses whether there are statistically significant differences between the medians of three or more unrelated groups
3. **Chi-Square Test**: Evaluates the association between categorical variables by comparing observed frequencies with expected frequencies under the assumption of independence

LIMITATIONS OF THE STUDY

- **Data Constraints**: Limited availability and diversity of data may affect the comprehensiveness of the findings.
- **Researcher Experience**: The relative inexperience of the researcher could impact the precision of the analysis compared to studies conducted by seasoned professionals.
- **Geographical Scope**: The study is confined to India, which may limit the generalizability of the results to other contexts.
- **Response Bias**: Reliance on self-reported data introduces the possibility of individual biases influencing the responses.

IV DATA ANALYSIS AND INTERPRETATION

Mann-Whitney Test

RANKS

Particulars	Gender	N	Mean Rank	Sum of Ranks
NOISE LEVELS	MALE	43	39.57	1701.50
	FEMALE	42	46.51	1953.50
	Total	85		
TEMPERATURE	MALE	43	43.28	1861.00
	FEMALE	42	42.71	1794.00
	Total	85		
RELEVANCE OF MATERIAL	MALE	43	41.56	1787.00
	FEMALE	42	44.48	1868.00
	Total	85		
USE OF TECHNOLOGY	MALE	43	42.36	1821.50
	FEMALE	42	43.65	1833.50
	Total	85		
	MALE	43	44.21	1901.00

INTEREST AND MOTIVATION	**FEMALE**	**42**	**41.76**	**1754.00**
	Total	**85**		
SOCIAL MEDIA & TECHNOLOGY	**MALE**	**43**	**44.48**	**1912.50**
	FEMALE	**42**	**41.49**	**1742.50**
	Total	**85**		
ACTIVE LEARNING	**MALE**	**43**	**42.73**	**1837.50**
	FEMALE	**42**	**43.27**	**1817.50**
	Total	**85**		

	nl	**tp**	**rm**	**ut**	**im**	**st**	**al**
Mann-Whitney U	**755.500**	**891.000**	**841.000**	**875.500**	**851.000**	**839.500**	**891.500**
Wilcoxon W	**1701.500**	**1794.000**	**1787.000**	**1821.500**	**1754.000**	**1742.500**	**1837.500**
Z	**-1.355**	**-.111**	**-.581**	**-.258**	**-.487**	**-.591**	**-.107**
Asymp. Sig. (2-tailed)	**.175**	**.911**	**.561**	**.797**	**.627**	**.555**	**.915**

Inference:

The Mann-Whitney test was used to compare male and female responses for **noise levels (nl), temperature (tp), relevance of material (rm), use of technology (ut), interest and motivation (im), social media & technology (st),** and **active learning (al)**.

- None of the **Asymp. Sig. (2-tailed)** values fall below **0.05**, indicating that **there are no statistically significant differences** between male and female students' perceptions for any of these factors.
- The lowest p-value is for **noise levels (p = 0.175)**, which suggests a potential difference, but it is not statistically significant.

This indicates that both male and female students perceive these classroom factors similarly

Interpretation:

The Mann-Whitney test shows **no significant differences** between male and female students across all factors (noise levels, temperature, relevance of material, use of technology, interest, social media, and active learning). Gender does not impact how students perceive these factors.

Null hypothesis (Ho): There is no significant difference between use of technology and designation (level of education)

Alternate hypothesis (H1): There is a significant difference between use of technology and designation (level of education)

Chi-Square Test

Test Statistics		
	ut	**Level of study**
Chi-Square	**25.259[a]**	**75.129[b]**
df	**3**	**2**
Asymp. Sig.	**.000**	**.000**

Inference:

For **use of technology (ut)**:

- The Chi-Square value is **25.259** with a **p-value of 0.000**, indicating a **statistically significant difference** between observed and expected frequencies.
- Students rated technology as **highly effective (5.00)** more often than expected (+16.8), while lower effectiveness ratings like **2.00** and **3.00** were observed much less than expected (-14.3 and -6.3).

For **designation** (student levels):

Use of technology			
	Observed N	**Expected N**	**Residual**
2.00	**7**	**21.3**	**-14.3**
3.00	**15**	**21.3**	**-6.3**
4.00	**25**	**21.3**	**3.8**
5.00	**38**	**21.3**	**16.8**
Total	**85**		

Level of Study			
	Observed N	**Expected N**	**Residual**
H.sc student	**10**	**28.3**	**-18.3**
UG student	**9**	**28.3**	**-19.3**
PG student	**66**	**28.3**	**37.7**
Total	**85**		

- The Chi-Square value is 75.129 with a p-value of 0.000, indicating a statistically significant difference.
- PG students are overrepresented (+37.7) compared to H.sc and UG students, who are underrepresented (-18.3 and -19.3).

These results suggest strong variations in students' perception of technology's effectiveness and their level of study

Interpretation:

The Chi-Square test shows that students use technology more frequently than expected, with significant differences across usage levels. Additionally, postgraduate students are overrepresented compared to high school and undergraduate students. Both results are statistically significant ($p < .001$).

Kruskal Wallis Test

Test Statistics[a,b]							
	nl	**tp**	**rm**	**ut**	**im**	**st**	**al**
Chi-Square	**12.323**	**7.046**	**7.982**	**2.947**	**1.625**	**2.490**	**3.510**
df	**2**	**2**	**2**	**2**	**2**	**2**	**2**
Asymp. Sig.	**.002**	**.030**	**.018**	**.229**	**.444**	**.288**	**.173**

Ranks			
	Age	**N**	**Mean Rank**
nl	**15-18**	**9**	**18.28**
	19-22	**42**	**43.17**
	23-26	**34**	**49.34**
tp	**15-18**	**9**	**59.06**
	19-22	**42**	**44.77**
	23-26	**34**	**36.56**
rm	**15-18**	**9**	**45.50**
	19-22	**42**	**49.40**
	23-26	**34**	**34.43**
ut	**15-18**	**9**	**34.17**
	19-22	**42**	**46.95**
	23-26	**34**	**40.46**
im	**15-18**	**9**	**40.28**
	19-22	**42**	**40.40**
	23-26	**34**	**46.93**
st	**15-18**	**9**	**45.17**
	19-22	**42**	**46.48**
	23-26	**34**	**38.13**
al	**15-18**	**9**	**30.06**
	19-22	**42**	**42.94**
	23-26	**34**	**46.50**
	Total	**85**	

Inference:

- For **noise levels (nl)**, **temperature (tp)**, and **relevance of material (rm)**, the p-values are **0.002**, **0.030**, and **0.018** respectively, indicating **statistically significant differences** across age groups.
    - Older students (**23-26**) perceive noise levels and relevance of material more intensely, while younger students (**15-18**) rate temperature as a more significant factor.
- For **use of technology (ut)**, **interest and motivation (im)**, **social media & technology (st)**, and **active learning (al)**, the p-values are greater than **0.05**, indicating **no significant differences** between age groups.

This suggests that perceptions of noise levels, temperature, and material relevance differ by age, but technology use, motivation, and learning engagement are relatively similar across age groups.

Interpretation:

The Kruskal-Wallis test shows that age significantly influences the variables **nl (NOISE LEVELS), tp (TEMPERATURE), and rm (RELEVANCE OF MATERIAL)**, with noticeable differences in scores across the three age groups. However, age does not have a significant impact on the variables **ut (USE OF TECHNOLOGY), im (INTEREST & MOTIVATION), st (SOCIAL MEDIA & TECHNOLOGY), and al (ACTIVE LEARING)**, as there are no meaningful differences between the groups for these variables.

V. FINDINGS, SUGGESTIONS AND CONCLUSIONS

FINDINGS

- **Mann-Whitney Test**: The results show that there are **no significant differences** between male and female students across all the factors tested (noise levels, temperature, relevance of material, use of technology, interest and motivation, social media, and active learning). This finding suggests that gender does not play a meaningful role in how students perceive or experience these factors in the classroom, indicating similar experiences across genders.

- **Chi-Square Test**: The Chi-Square test reveals that students use technology more frequently than expected. Additionally, **postgraduate students** are significantly overrepresented compared to high school and undergraduate students, suggesting that PG students may be more inclined to use technology in learning or are more likely to be involved in studies that emphasize tech usage. Both findings are statistically significant ($p < .001$), reinforcing the relevance of technology in higher education settings.

- **Kruskal-Wallis Test**: Age is shown to have a **significant effect** on the variables **noise levels (nl)**, **temperature (tp)**, and **relevance of material (rm)**, meaning students in different age groups perceive these factors differently. For instance, older students may be more sensitive to noise or temperature variations, or they may find the material more or less relevant compared to younger students. However, age does **not significantly affect** the variables **use of technology (ut)**, **interest and motivation (im)**, **social media and technology (st)**, and **active learning (al)**, indicating that these factors are experienced similarly across age groups.

SUGGESTIONS

- **Gender-Neutral Approaches**: Since the Mann-Whitney test found no significant differences in how male and female students perceive key classroom factors, teaching strategies should remain inclusive and gender-neutral. Efforts should focus on addressing the overall needs of the student population, without overemphasizing gender distinctions.

- **Enhancing Technology Use**: The Chi-Square test shows that technology use is significantly higher than expected, particularly among postgraduate students. Institutions should continue to leverage this enthusiasm by expanding the availability of digital resources, online platforms, and virtual classrooms. However, efforts should also be made to ensure that students at all educational levels have equal access to and proficiency with technology.

- **Age-Sensitive Strategies**: Based on the Kruskal-Wallis test findings, age influences student perceptions of noise levels, temperature, and material relevance. It is recommended that educators adopt more flexible approaches that consider these age-related sensitivities. For instance, younger students may benefit from more interactive, engaging lessons, while older students might appreciate content that is more closely aligned with real-world applications and relevance.

CONCLUSION

The study reveals that gender does not significantly influence students' perceptions of key classroom factors, suggesting that inclusive, gender-neutral teaching methods are appropriate. However, a notable disparity exists in technology usage, with postgraduate students engaging more frequently with digital tools, highlighting the need for equitable access and training across all educational levels. Additionally, age impacts perceptions of environmental conditions, indicating that educators should consider age-specific preferences when designing learning environments to enhance comfort and engagement.

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