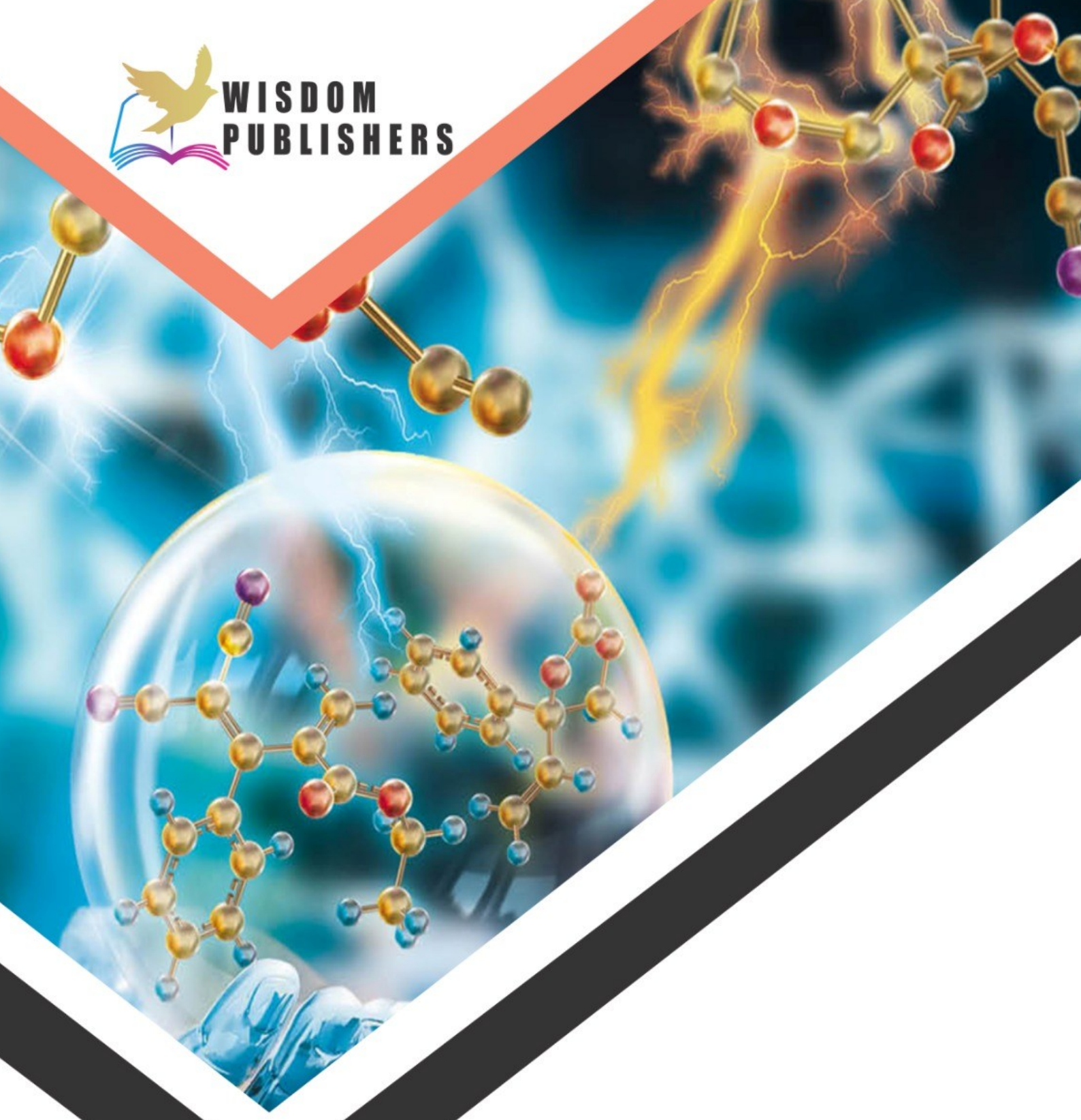
WISDOM PUBLISHERS



WISDOM JOURNAL OF SCIENCE AND TECHNOLOGY

Editorial Board

Table of Contents (Volume 2, Issue 1, May 2026)

Wisdom Journal of Science and Technology 2(1), 106-118, May 2026
https://doi.org/10.64848/WJST.2.1.2026.106-118

WISDOM JOURNAL of Science & Technology

RESEARCH ARTICLE

A study on experiential learning through AI tools: Impact on student engagement and learning effectiveness

Susan Diana S.[1*], Catherine Vino F.[2] and Jenifer D.[3]
Department of Commerce, St Joseph's University, Bengaluru
E-mail: [1]dianasusan144@gmail.com, [2]catherinevino03@gmail.com, [3]djenifer069@gmail.com

Abstract: The study aims to analyze how AI-powered tools enhance experiential learning and impact effective student engagement and learning, in an effort to fill the existing gaps regarding the influence of AI-driven learning platforms on student motivation, participation, interaction, and practical understanding. The paper focuses on the quantitative method of primary data collection through a structured Google Form administered to college students, representing their perceptions related to AI-enabled experiential learning. Findings reveal that AI-powered tools have improved practical understanding among students by making hands-on activities much clearer, interactive and easily applicable in real life. Student engagement was found to increase, reflected in heightened motivation and participation, and improved collaboration with peers and AI Systems. AI-aided learning also led to improved academic performance, thanks to clearer concepts, enhanced analysis, and more effective problem-solving. On the other hand, despite these advantages, student's reported variable comfort levels, citing challenges like unfamiliarity with tools, technical complexity and dependence on AI. Further, unequal device and internet access, issues of privacy and fears of algorithmic bias hampered engagement for some groups of students. Nobody, not all learning styles benefited equally from the AI-powered tools; technical and visual learners adapted more easily than theoretical ones. This analysis comprehensively provides evidence regarding AI's Influence on experiential learning and student engagement, which is relatively unexplored.

Keywords: *AI tools, Experiential learning, Student engagement*

Introduction

The rapid proliferation of AI in higher education has revolutionized teaching and learning globally (Bond et al., 2024; Zawacki-Richter et al., 2019). In recent years, there has been a gradual shift towards active, student-centered hands-on learning modes, and it is in this respect that experiential learning becomes a significant educational modality (Aithal and Mishra 2024; Mamatha 2021; Wang and Wen 2023). Experiential learning involves direct experience, real-world application and self-reflection, which help students acquire practical skills and sharpen their critical thinking (Aqaie 2023; Bradberry and De Maio 2019). The emergence of AI-powered tools offers unparalleled opportunities to enhance experiential learning in ways that were difficult to imagine until now. AI-powered tools, such as adaptive learning systems, intelligent tutoring platforms, and simulations, promote more active content engagement by students (Lin et al., 2023; Sari et al., 2024; Yaseen et al. 2025). These technologies offer students a personalized learning experience, an identification of their strengths and weaknesses, and real-time feedback. This facilitates the comprehension of complex concepts by students more effectively. Therefore, with greater use of AI-powered tools within the higher education sector, a need arises to understand its effect on learning outcomes, student engagement and other aspects that define the students' experience.

[*]Corresponding author: Department of Commerce, St Joseph's University, Bengaluru
E-mail: dianasusan144@gmail.com
Received: 17/04/26, Accepted: 29/04/26, Published Online: 02/05/26

Meanwhile, considering the significant recent developments in AI in education, substantial research gaps remain. Many studies are solely focused on an isolated tool or a narrow academic context, which does not consider the broader ramifications that AI has on engagement factors like behavior, motivation, emotional involvement and peer collaboration. Other key issues, such as digital inequality, privacy, bias in AI, and overreliance, have also not been properly researched. With the inclusion of AI in modern classrooms, understanding, benefits as well as the challenges is paramount. This paper investigates how AI tools support experiential learning and impact students' engagement and effective learning. It further examines the challenges of the students coming from diverse academic backgrounds and learning styles. The identification of trends in students' perceptions contributes to the Nascent literature on AI – AI-supported learning, in the context of Indian higher education.

The paper analyzed how AI tools improve experiential learning activities and support the practical understanding of students. It also investigated the effect of AI-enabled learning tools on key dimensions of student engagement, such as motivation, participation, and interaction. Further, it also assessed the effectiveness of AI-supported experiential learning on the enhancement of students' learning outcomes and academic performance.

Research Methodology

Research Design

The quantitative research design and online survey method were used in the study. Data were collected through structured questionnaires via Google Forms from the college students. A descriptive and analytical approach was used to investigate the relationship between AI tools, experiential learning and students' engagement.

Participants

The sample population consisted of undergraduate and postgraduate from the commerce, management, technology, and humanities-related streams. A sample of 58 respondents was obtained through the convenience-sampling technique to facilitate data Collection.

Data Collection Tool

The research tool was a structured questionnaire to measure student's practical understanding after using AI Tools, motivation, participation and interaction levels, comfort levels with AI tools as well as academic performance and learning outcomes. The instrument included questions and the responses of the participants were measured using a Likert scale, ranging from Strongly Agree to Strongly Disagree, along with categorical response items where appropriate.

Data Analysis Techniques

Frequencies, percentages, and graphical representations were used in the descriptive statistics analysis of the data. Comparative analysis highlighted the difference across learning styles and academic backgrounds. Trends of correlation were also checked in order to find patterns between AI usage and engagement created among students.

Results

The chart shows that most respondents are young. More than half of them, 51.7% are between 21 to 30 years old, and 39.7% are under 20. Cumulatively, these two age groups total over 90% of the participants. Very few responded for the 31 to 40 age brackets, and even fewer for the 41 to 50 age bracket with very few over 50. Thus, this survey is representative of the younger student population, but other age brackets are underrepresented.

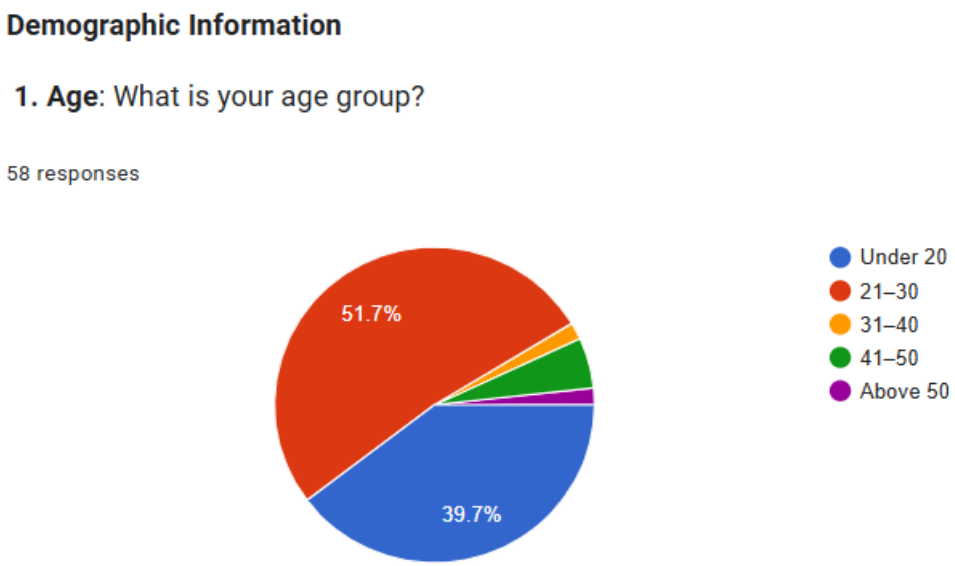


Figure 1: Age of participants

From the chart we can observe that the majority of the respondents are female, comprising about 74.1% of the sample, while only 25.9% are Male. This means the survey is primarily representative of the female students, since there were far fewer males.

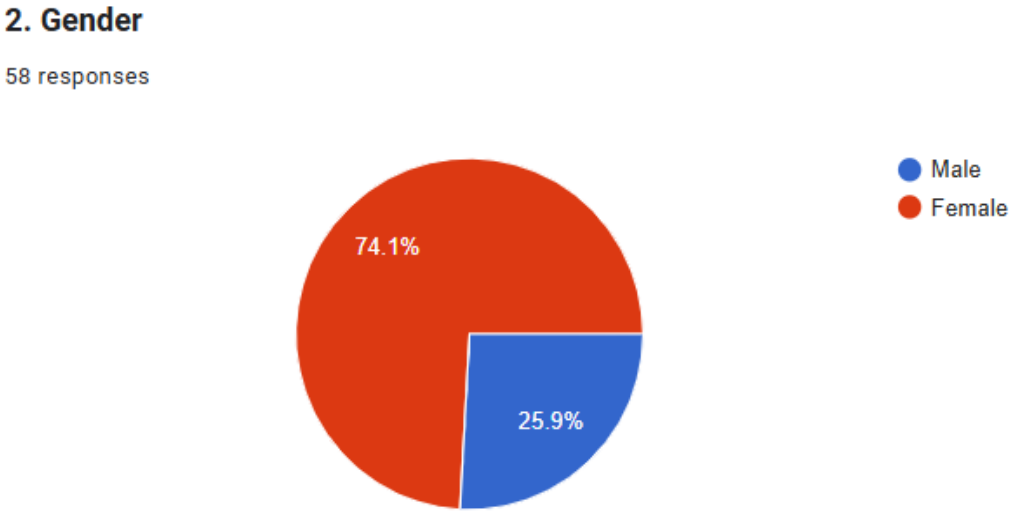


Figure 2: Gender of participants

It can be observed from the chart that 79.3%of the respondents were graduates or had higher education, while 15.5% had completed higher secondary and few of them had finished secondary school. Thus, the survey reflects the views of well-educated students with strong academic backgrounds.

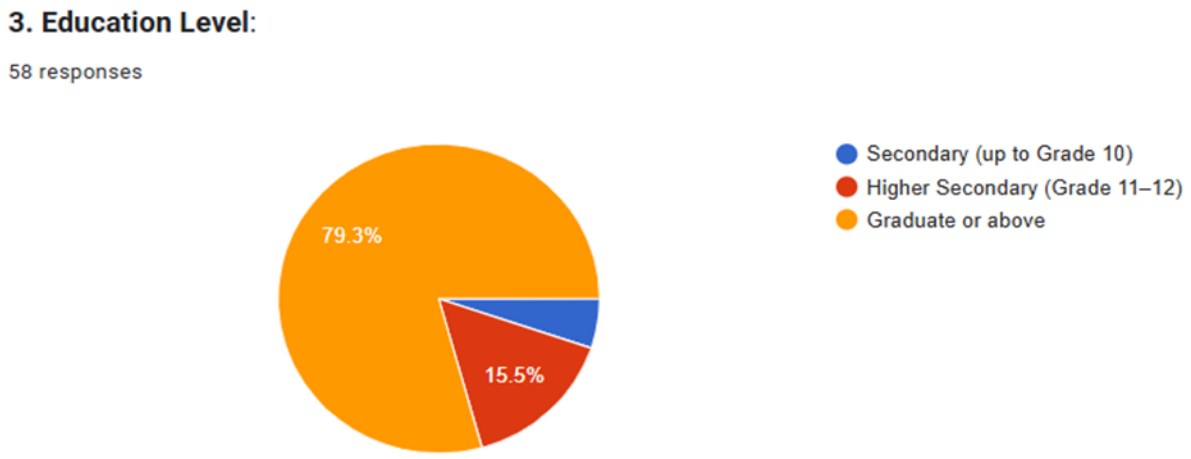


Figure 3: Education level of participants

The chart shows that most students believe AI tools help them understand practical topics better. More than half agreed or strongly agreed. About 29.3% were neutral, which means they are unsure. Only a small number disagreed. Overall, students find AI useful for improving their practical understanding.

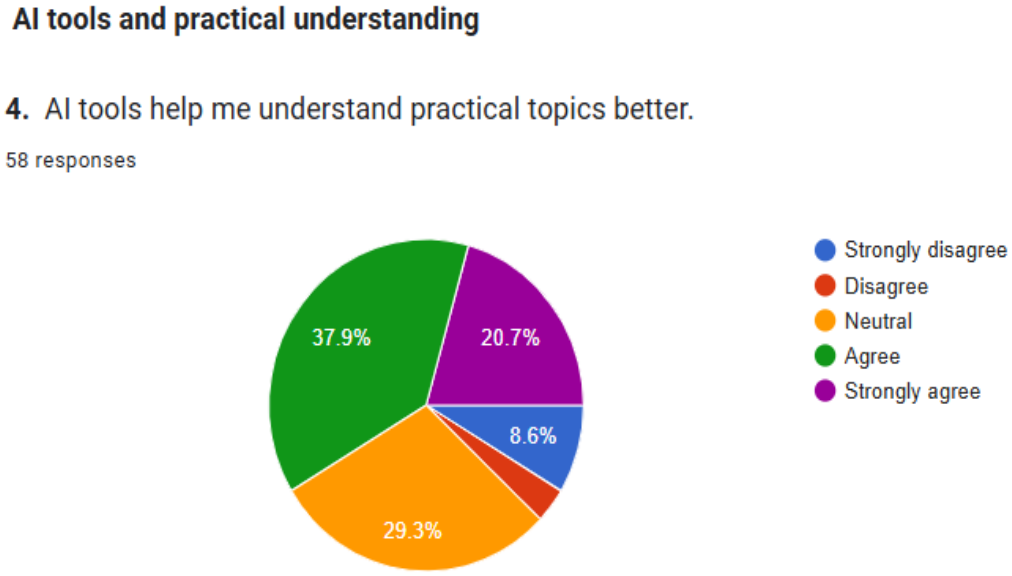


Figure 4: AI tools and practical understanding

The chart shows that most students believe AI activities make learning easier. About 55.9% agreed, and 15.3% strongly agreed. Some students, 23.7%, were neutral, indicating they are unsure or haven't used AI much. Very few disagreed. Overall, students generally view AI as helpful for making learning easier.

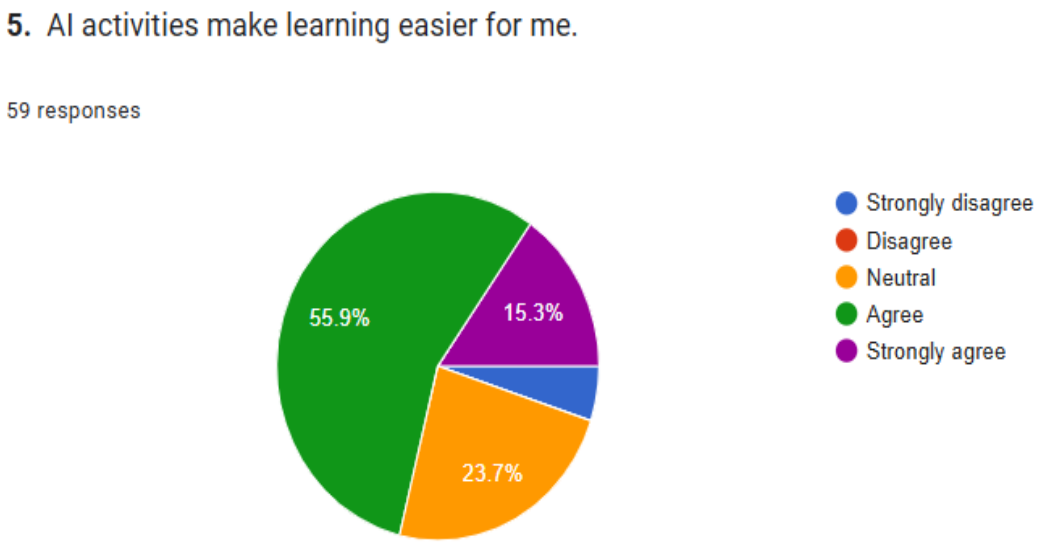


Figure 5: AI activities make learning easier for me

The chart shows that many students feel AI tools help them learn by doing, not just by reading. More than half agreed or strongly agreed. About 28.8% were neutral, which means they are unsure or haven't fully experienced this yet. Only a few disagreed. Overall, students generally believe AI supports active, hands-on learning.

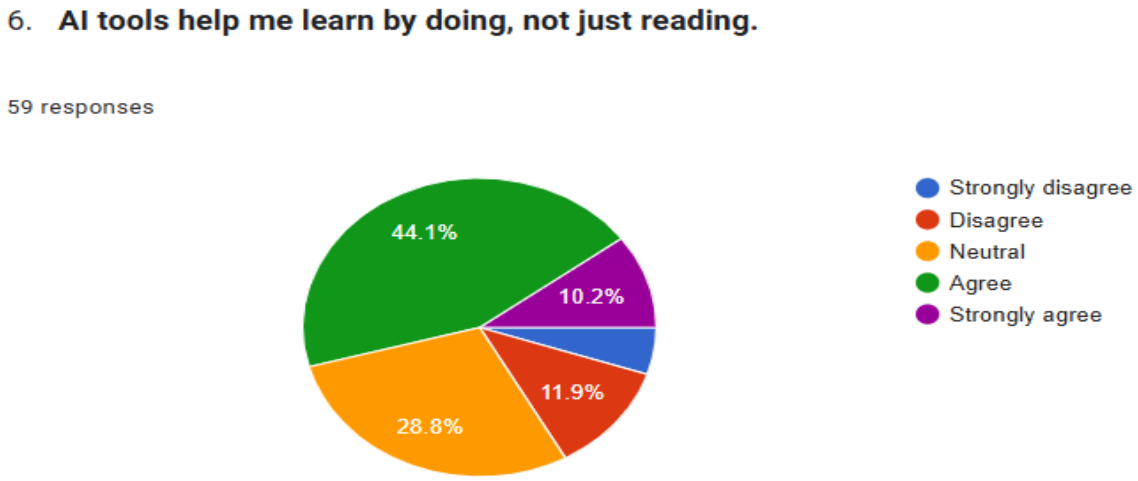


Figure 6: AI tools help me learn by doing, not just reading

This is reflected in the chart, as most students feel that AI provides clear and easy-to-understand explanations. Almost half agreed to this, while 17.2% strongly agreed. About 25.9% were neutral, meaning they find the explanation provided by AI decent but not outstanding, while very few disagreed. Overall, students tend to find AI explanations clear and useful.

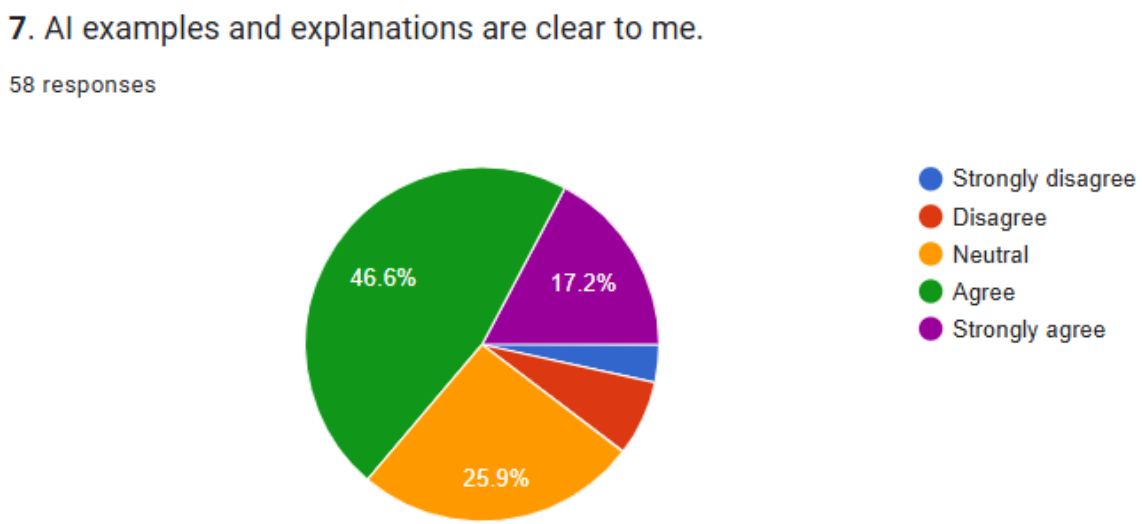


Figure 7: AI examples and explanations are clear to me

The chart shows that most students believe AI tools help them understand lessons better. About 37.3% agreed, and 15.3% strongly agreed. This adds up to more than half of the respondents. Around 33.9% felt neutral, meaning they are unsure or think AI's impact depends on how it is used. Very few students disagreed. Overall, students usually view AI as helpful for improving their understanding of lessons.

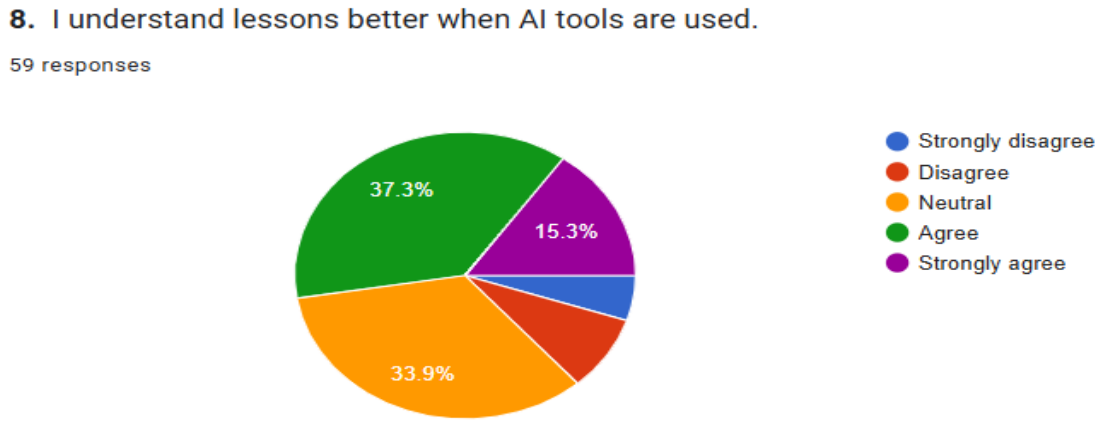


Figure 8: I understand lessons better when AI tools are used

The chart shows that many students find learning more interesting when AI tools are used. Nearly half agreed or strongly agreed. About 37.3% were neutral, meaning they are unsure or feel it depends on how AI is used in class. Only a few students disagreed. Overall, AI tools are often viewed as helpful for making learning more engaging.

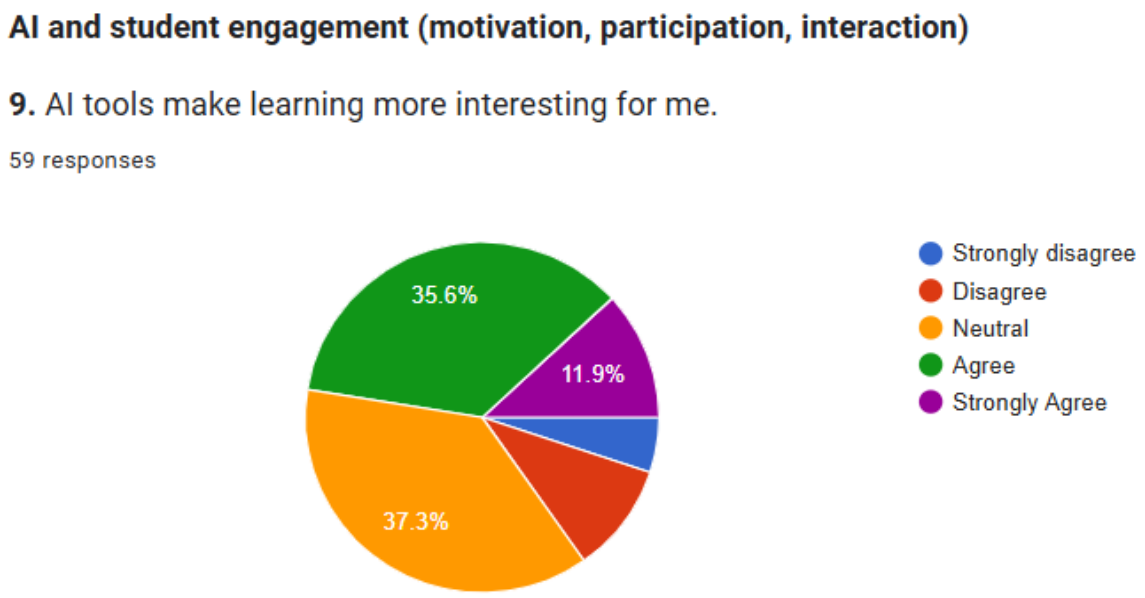


Figure 9: AI tools make learning more interesting for me

The chart shows that many students believe AI tools help them participate more in class. About 36.2% agreed, and a few strongly agreed. However, the largest group, at 37.9%, was neutral, indicating that AI does not significantly affect everyone. Around 19% disagreed, saying AI does not boost their involvement. There were no strong negative responses. Overall, AI has a mostly positive or neutral effect on class participation.

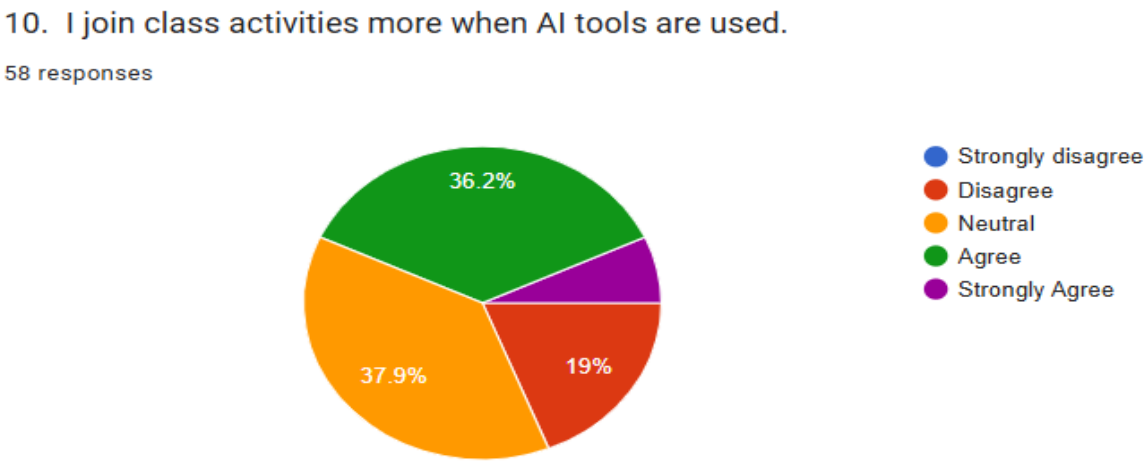


Figure 10: I join class activities more when AI tools are used

The chart shows that many students believe AI tools increase their desire to learn. About 39.7% agreed and 13.8% strongly agreed, so more than half feel motivated by AI. Around 32.8% were neutral, indicating that AI doesn't significantly affect their motivation. Only a small number disagreed. Overall, AI tools positively influence students' motivation to learn.

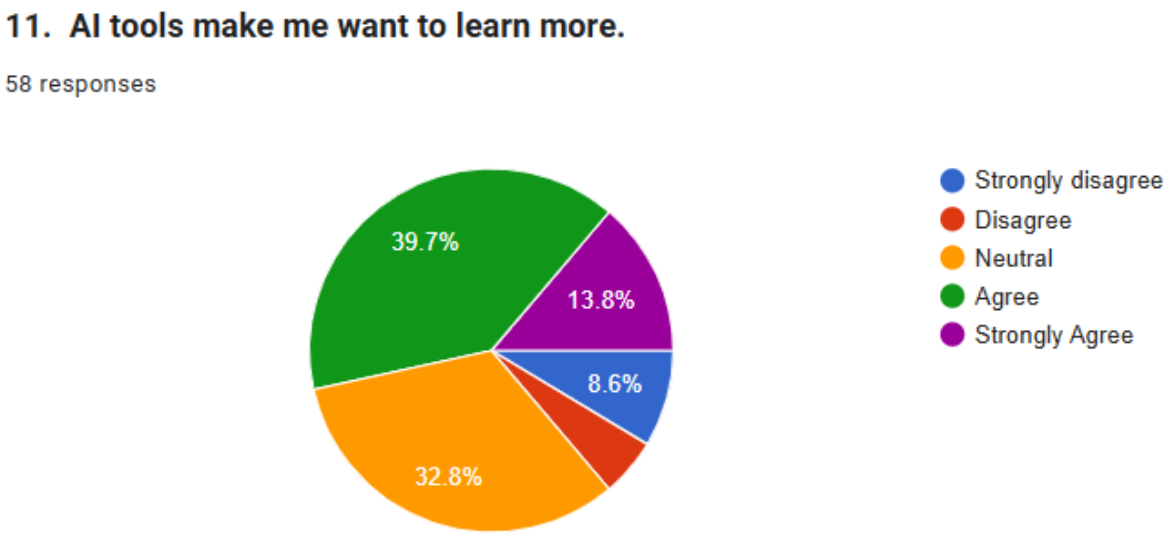


Figure 11: AI tools make me want to learn more

The chart shows different opinions on whether AI tools improve interaction with friends and teachers. The biggest group, 33.9%, is neutral, indicating that AI does not significantly change their interaction. However, 30.5% agreed and 10.2% strongly agreed, which shows some students believe AI helps them communicate better. A smaller group disagreed. Overall, the results are slightly positive, but many students feel AI does not have a strong impact on their interaction.

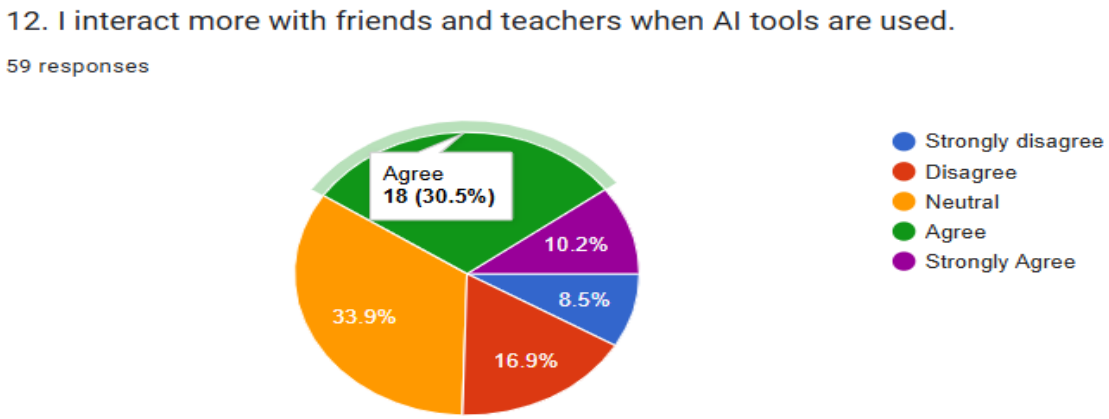


Figure 12: I interact more with friends and teachers when AI tools are used

The chart shows that many students believe AI tools help them stay more active and involved in learning. About 49.2% agreed, indicating a strong positive response. Around 30.5% felt neutral, meaning they don't notice a big change but also don't view AI negatively. Only a small group, about 17%, felt that AI does not increase their involvement. Overall, the results suggest that AI generally improves student engagement, though some students may need more experience with AI to feel the benefits.

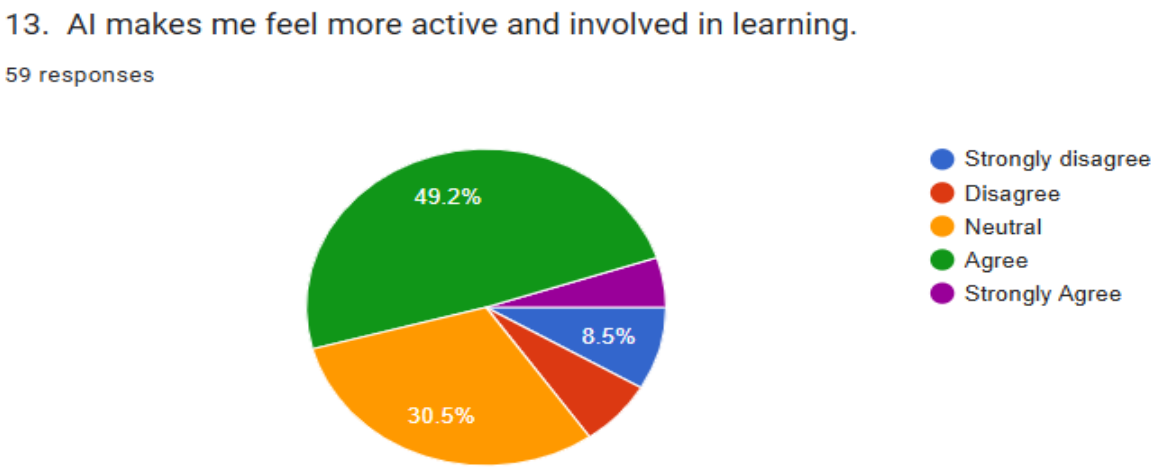


Figure 13: AI makes me feel more active and involved in learning

The chart indicates that many students believe that AI tools help them to get better marks. About 47.5% agreed and 11.9% strongly agreed, showing that more than half see a positive effect. Around 30.5% were neutral, which suggests some students are uncertain or don't notice much difference. Very few disagreed. Overall, students feel that AI helps them to get more marks.

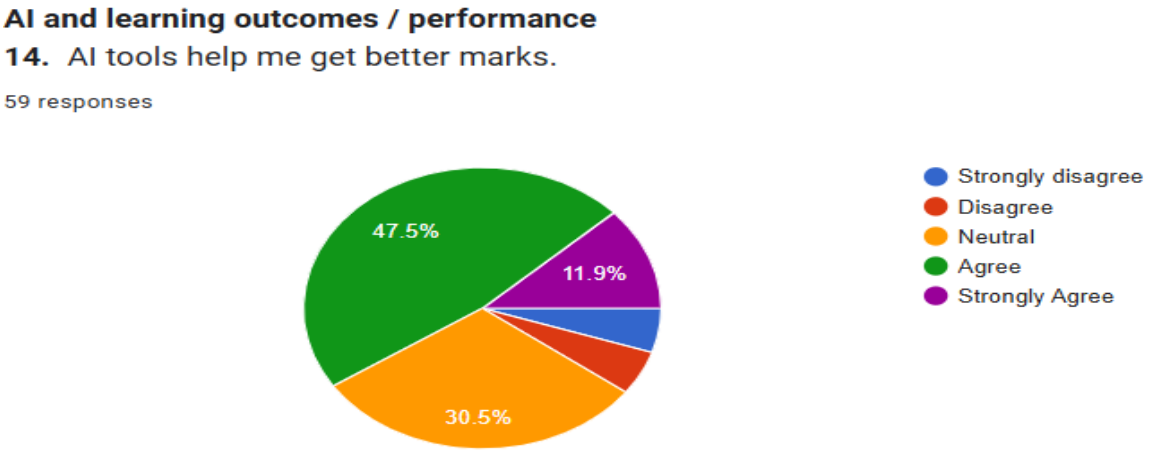


Figure 14: AI tools help me get better marks

The chart indicates that many students believe that AI tools improve their thinking and problem-solving skills. About 44.1% agreed and 11.9% strongly agreed, showing that more than half see a positive effect. Around 33.9% were neutral, which suggests some students are uncertain or don't notice much difference. Very few disagreed. Overall, students feel that AI helps them to remember lessons more effectively.

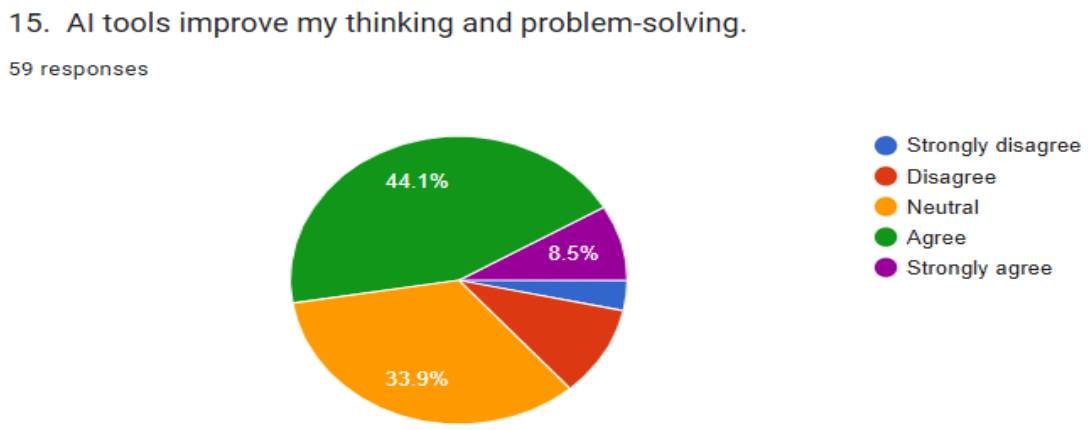


Figure 15: AI tools improve my thinking and problem-solving

The chart indicates that most students believe AI tools help them remember lessons better in their studies. About 44.1% agreed, and 8.5% strongly agreed. Around 33.9% were neutral, which means the effect is not the same for everyone. Only a few students disagreed. Overall, students see AI as helpful for improving their critical thinking and problem-solving abilities.

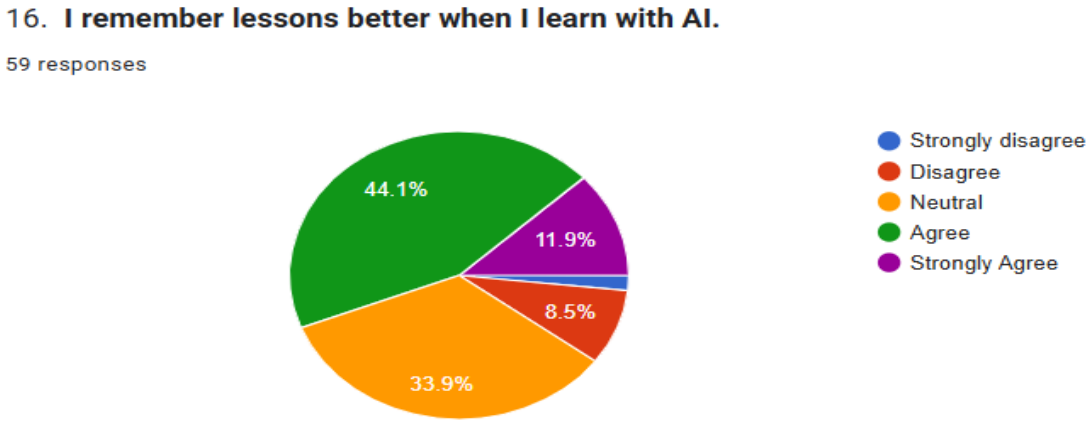


Figure 16: I remember lessons better when I learn with AI

The chart shows that many students think AI tools help their overall learning. About 35.6% agreed and 11.9% strongly agreed. However, the largest group, 37.3%, felt neutral. This means many students are still unsure about AI's full impact. Only a few disagreed. Overall, most students view AI as helpful, but still feel uncertain.

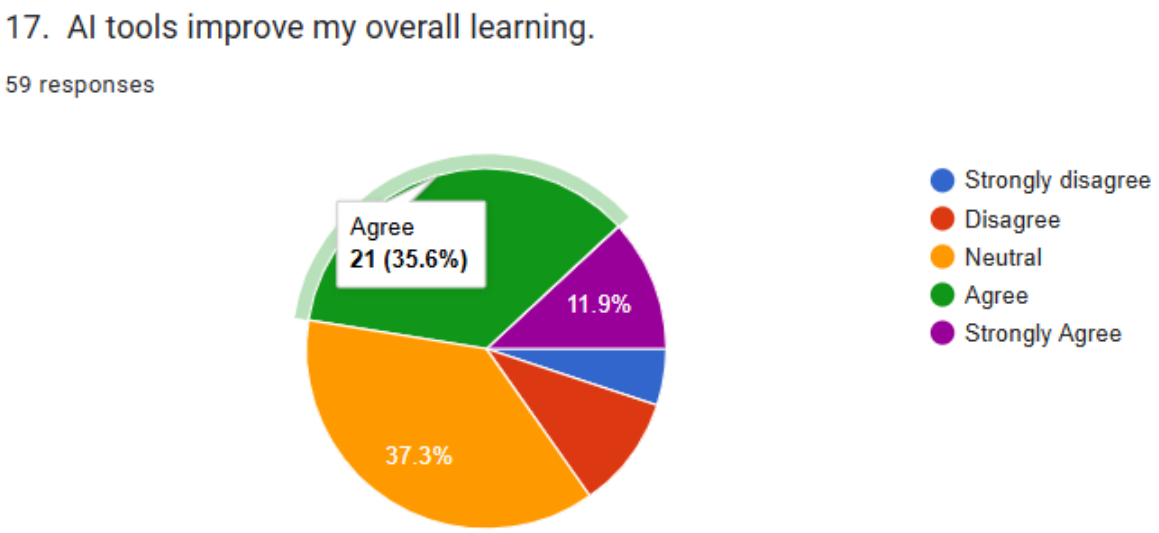


Figure 17: AI tools improve my overall learning

The chart shows that many students believe AI helps them connect lessons to real-life situations. Nearly half agreed or strongly agreed. However, the largest group, 39%, was neutral, indicating that many students are unsure or have mixed experiences. Only a small number of students disagreed. Overall, most students find AI examples useful for relating classroom learning to real life.

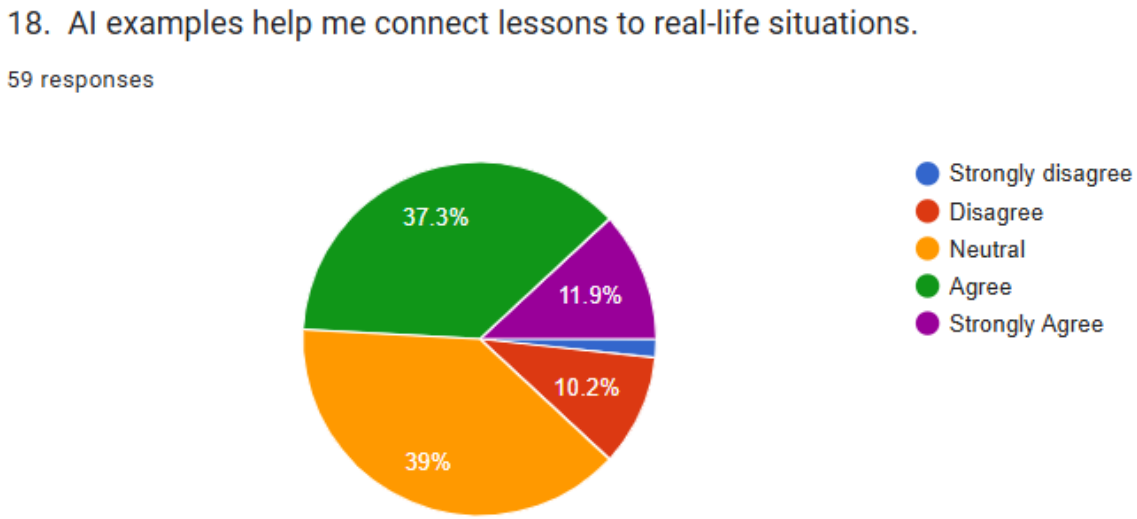


Figure 18: AI examples help me connecr lessions to real-life situations

The chart indicates that many students believe AI tools help them understand class concepts better. Around 33.9% agreed, while 10.2% strongly agreed. The largest group, at 40.7%, remained neutral, suggesting that many students are uncertain or feel AI's value depends on its usage. A smaller group disagreed, and very few strongly disagreed. Overall, students generally have a positive outlook, but many have not yet formed a clear opinion.

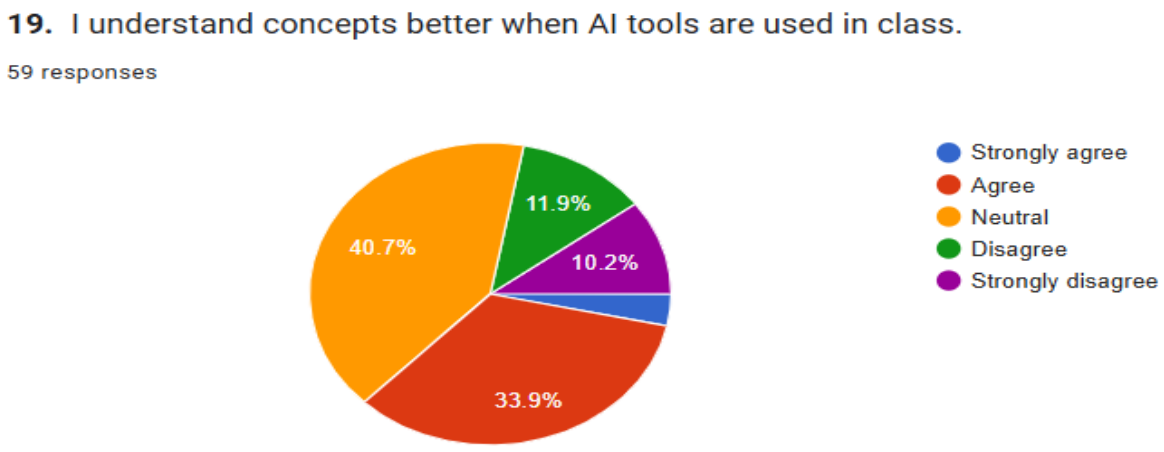


Figure 19: I understand concepts better when AI tools are used in class

The chart shows that most students believe AI helps them understand difficult topics more easily. About 45.8% agreed, and 16.9% strongly agreed, indicating solid support. Around 30.5% were neutral, meaning they are unsure or not fully convinced yet. Very few students disagreed. Overall, students typically find AI useful for learning challenging concepts.

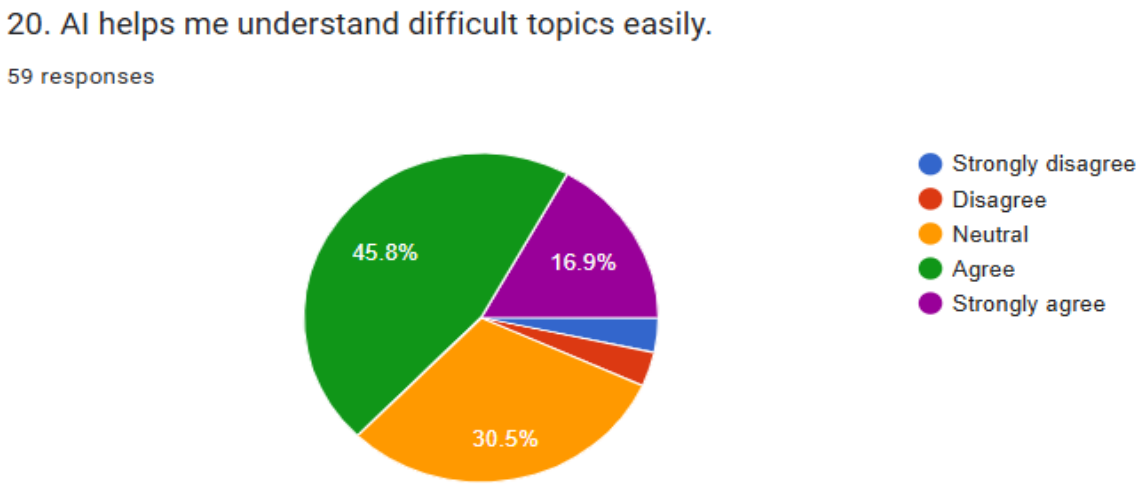


Figure 20: AI helps me understand difficult topics easily

Discussion

AI usage made the subject more interesting, motivation participation. However, some students remained neutral, indicating that engagement depends on how well AI is used. Students fared better academically with clearer explanations, better analysis, better analysis, and real-time feedback on their results through AI-powered tools. Many students found AI easy to use, although some described discomfort due to technical difficulties or fear of overdependence. More digital training is needed. Several students reported issues such as poor internet access, lack of devices, privacy concerns, and doubts about the fairness of AI. While more visually and technically oriented students adjusted to AI with ease, theoretically oriented students found it difficult due to a lack of customization in AI usage. Students developed overdependence on AI, therefore diminishing their own independent thinking. It is important that the use of AI be made in a balanced way so that critical thinking skills are maintained.

The study findings have several implications. First, Artificial Intelligence tools make the knowledge delivered more interactive and relatable to student's lives. They help students understand concepts much better. Teachers can integrate these into lessons and track student progress with AI-based feedback. Second, AI enhances students 'motivation and participation. Students will be more active and confident. Colleges

should train students on the use of AI tools comfortably. Third, challenges like poor internet access, device deficit, and issues of the policy indicate that colleges need clear policies on this. The institutions should improve the digital facilitates and introduce guidelines on safe and fair usage of AI. Last, various learners react differently to AI tools. The visual and technical needs to be al learners are benefited more. Therefore, AI tailored for each subject and learning style.

The sample size for the future research needs to include more students from different colleges. The research might compare the use and benefits of AI tools across students in different streams, such as commerce arts, and science. Longer- term studies can indicate exactly how AI influence learning and skills over time. More revealing information about students' experience of AI may emerge through interviews and group discussions. Further research is needed regarding privacy concerns, fairness, and unequal access to technology. In the future, studies can be conducted to understand how VR/XR tools help with Learning and also how discomfort is minimized.

Conclusion

This paper proves that AI tools have a positive impact on the experiential learning process for the college students. AI platforms, simulations and tutoring systems facilitated the ability to understand complex topics and engage students in the learning process. Students showed enhanced motivation, participation, and Academic achievement when using these tools properly. However, the students did not have all benefits at the same level. Some found the shortfalls in device access, unstable internet, privacy and unfamiliarity with AI tools as challenges. The visual and technical learner adapted more quickly, while a theoretical learner adapted more quickly while a theoretical learner needed extra support. These differences make a point of proper training in addition to strong digital infrastructure and guidelines for using AI safely and fairly. Overall, the findings indicate that AI has the potential to significantly enhance learning and engagement when used thoughtfully. If appropriately supported, AI hold the potential to make education for all learners more practical, accessible and future- ready.

References

[1] Aithal, P. S., & Mishra, N. (2024). Integrated framework for experiential learning: Approaches & impacts. International Journal of Case Studies in Business, IT and Education (IJCSBE), 8(1), 145-173.

[2] Aqaie, M. F. (2023). The impact of experiential learning on the development of practical skills in internships. Journal of Study and Innovation in Education and Development Учредители: KMAN Publication Incorporation, 3(2), 31-40.

[3] Bond, M., Khosravi, H., De Laat, M., Bergdahl, N., Negrea, V., Oxley, E., ... & Siemens, G. (2024). A meta systematic review of artificial intelligence in higher education: A call for increased ethics, collaboration, and rigour. International Journal of Educational Technology in Higher Education, 21(1), 4.

[4] Bradberry, L. A., & De Maio, J. (2019). Learning by doing: The long-term impact of experiential learning programs on student success. Journal of Political Science Education, 15(1), 94-111.

[5] Lin, C. C., Huang, A. Y., & Lu, O. H. (2023). Artificial intelligence in intelligent tutoring systems toward sustainable education: a systematic review. Smart Learning Environments, 10(1), 41.

[6] Mamatha, S. M. (2021). Experiential learning in higher education. International Journal of Advance Research and Innovation, 9(3), 1-9.

[7] Sari, H. E., Tumanggor, B., & Efron, D. (2024). Improving educational outcomes through adaptive learning systems using AI. International Transactions on Artificial Intelligence, 3(1), 21-31.

[8] Wang, T., & Wen, J. (2023). Experiential teaching is more conducive to student learning than traditional teaching. Journal of Education and Culture Studies, 7(1), 100.

[9] Yaseen, H., Mohammad, A. S., Ashal, N., Abusaimeh, H., Ali, A., & Sharabati, A. A. A. (2025). The impact of adaptive learning technologies, personalized feedback, and interactive AI tools on student engagement: The moderating role of digital literacy. Sustainability, 17(3), 1133.

[10] Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education–where are the educators?. International Journal of Educational Technology in Higher Education, 16(1), 39.

Wisdom Journal of Science and Technology 2(1), 119-124, May 2026
https://doi.org/10.64848/WJST.2.1.2026.119-124

WISDOM JOURNAL of Science & Technology

RESEARCH ARTICLE

Educational reform in practice: A dual perspective of policy outcomes for students and faculty

Sheikh Nida Afreen A.*
Assistant Professor, Sambhram Institute of Technology, Bengaluru 560 097

Abstract: Higher education reforms have drawn a lot of attention from throughout the world, especially in light of policy initiatives meant to increase employability, accessibility, and inclusivity. Reforms like the National Education Policy (NEP) 2020 in India place a strong emphasis on outcome-based education, digital integration, and transdisciplinary learning. However, how these innovations are perceived by important stakeholders—faculty and students—will determine how effective they are. This study looks at the results of recent changes to educational policies from the views of both teachers and students at Bengaluru, Karnataka's higher education institutions. Data was gathered from 200 participants (100 faculty members and 100 undergraduate and graduate students) chosen through purposive sampling from particular institutions using a cross-sectional quantitative research approach. Google Forms was used to administer structured questionnaires with a five-point Likert scale. Stakeholder perceptions of the efficacy of the reform were assessed using one-sample t-tests. The results show that while faculty members report greater workload and implementation issues, students perceive notable increases in accessibility and diversity. The report emphasizes the need for inclusive and balanced reform initiatives by highlighting a gap between policy goals and actual implementation. It supports stakeholder-centered policy evaluation and offers policymakers and institutional administrators practical insights to enhance the efficacy and sustainability of educational changes.

Keywords: *Educational reform, Policy outcomes, Student perspective, Faculty perspective*

Introduction

Improving employability, global competitiveness, and the quality of higher education all depend on educational reform (Dill, 2013; Datnow, 2020). The goal of modern policies like India's National Education Policy (NEP) 2020, outcome-based education frameworks, digital learning projects, and skill development programs is to match academic systems with inclusive growth goals and labor market demands (Gupta & Zhao, 2024; Nix et al., 2023). Although flexibility, interdisciplinary learning, and skill development are emphasized in these reforms, stakeholder experiences play a major role in their efficacy (Burch, 2007). Despite frequently encountering difficulties with workload, training, and institutional support, faculty members are essential in putting policy into reality (Harris et al., 2017; Datnow, 2020). Conversely, students assess reforms based on learning outcomes quality, employability, and accessibility (Mitra, 2012). Even while stakeholder participation is becoming more and more important in policy, there is still little empirical data that looks at teacher and student viewpoints at the same time. To ascertain whether reforms accomplish desired results without placing undue obligations on stakeholders, it is imperative to close this gap.

Objectives

This study aims to examine the challenges faced by faculty and students in adapting to policy-driven reforms, evaluate stakeholder perceptions of reform effectiveness, assess outcomes related to accessibility,

*Corresponding author: Assistant Professor, Sambhram Institute of Technology, Bengaluru 560 097
Phone: 8105650879 E-mail: nidaafreensheikh@gmail.com
Received: 17/04/26, Accepted: 29/04/26, Published Online: 02/05/26

quality, and inclusivity, and provide evidence-based recommendations for improving educational policy implementation.

Literature Review

Research on educational reform highlights the complex interaction between policy design and implementation realities. Institutional and policy analyses emphasize that reforms often encounter capacity constraints and contextual variations influencing outcomes (Cohen et al., 2018; Burch, 2007). Teacher-centered studies indicate that professional beliefs, workload, and institutional support significantly shape reform adoption and sustainability (Datnow, 2020; Harris et al., 2017; Gupta & Zhao, 2024). Concurrently, student-focused research underscores the importance of incorporating student voice to enhance policy responsiveness and equity (Mitra, 2012). Empirical evidence also demonstrates that assessment reforms and curriculum restructuring require strong faculty engagement and training to achieve intended learning outcomes (Berry & Adamson, 2011; Nix et al., 2023). However, existing literature predominantly examines either faculty or student experiences independently, leaving limited understanding of their combined influence on policy effectiveness.

Research Gap and Hypotheses

Research gap

Only a few studies have taken a dual-stakeholder approach, despite the fact that educational reform implementation has been the subject of much research. Studies by Nix et al. (2023) and Gupta and Zhao (2024), for example, mostly concentrate on teacher experiences while indirectly taking institutional and stakeholder elements into account. In a similar vein, Mitra (2012) stresses student voice without considering the ramifications for faculty effort. A thorough assessment of the efficacy of reform is hampered by this lack of integrated analysis. In order to close this gap, this study looks at both student result perceptions and faculty workload difficulties at the same time.

Hypotheses

H_1 - Faculty members perceive significant challenges and increased workload due to educational policy reforms.

H_2 - Students perceive significant improvement in accessibility and inclusivity, but not in the quality of learning, due to recent educational reforms.

Methodology

A cross-sectional descriptive-analytical research design was used in the study. Purposive sampling was used to gather data from 200 participants—100 faculty members and 100 students—from particular higher education institutions in Bengaluru, Karnataka, India.

Inclusion Criteria

- Faculty with at least 1+ year of teaching experience in post-reform implementation
- Students enrolled in undergraduate and postgraduate programs who are exposed to recent reforms

Exclusion Criteria

- Participants without any exposure to recent policy changes
- Administrative staff members and non-academic personnel

Structured questionnaires constructed on a five-point Likert scale were administered through Google Forms.

Findings of the study

Faculty Perspective

H_0 - Faculty members do not perceive significant challenges or workload changes due to educational policy reforms.

H_1 - Faculty members perceive significant challenges and increased workload due to educational policy reforms.

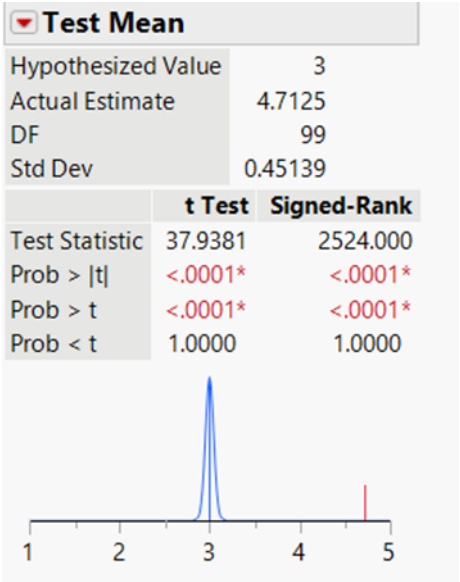


Figure 21: T-test for faculty POV

Data Anlaysis

In this case, a One-Sample t-test was performed in JMP using a hypothesized mean of 3, which denotes a neutral opinion about the difficulties and workload associated with educational changes.

Table 1: Values of t-test for faculty POV

Statistic	Value
Hypothesized Value	3
Actual Mean Estimate	4.7125
DF (Degrees of Freedom)	99
Standard Deviation	0.45139
t-Statistic	37.9381
p-value (Prob >	t

Interpretation

The observed mean perception score of faculty members (Mean = 4.71) is substantially higher than the proposed neutral value of 3, according to the findings of the one-sample t-test. This significant disparity indicates that faculty members strongly believe that obstacles and workload have increased as a result of educational reforms. The results are statistically significant and not the result of random variation, as indicated by the high t-statistic (37.9381) and very low p-value (< 0.0001). These results, which emphasize issues with workload management, training requirements, and institutional support systems, unequivocally show that the adoption of policies has put a great deal of strain on professors. As a result, the null hypothesis is disproved, demonstrating that faculty members believe that educational reforms present serious difficulties.

Student Perspective

H_0 - Students do not perceive any significant improvement in accessibility, quality, or inclusivity due to recent educational reforms.

H_2 - Students perceive significant improvement in accessibility and inclusivity, but not in the quality of learning, due to recent educational reforms.

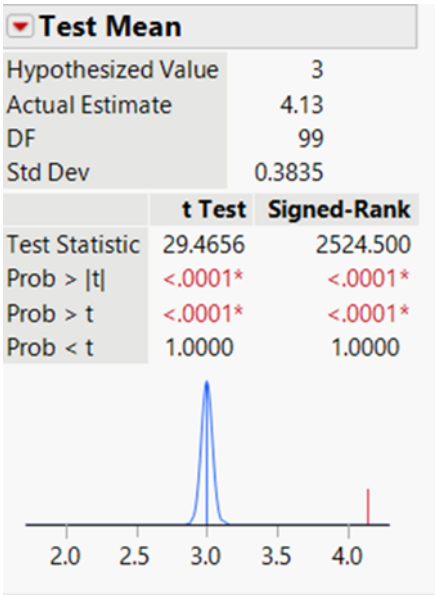


Figure 22: T-test for student POV

Data Analysis

In this case, a One-Sample t-test was performed in JMP using a hypothesized mean of 3, which denotes a neutral opinion on the difficulties and workload associated with educational changes.

Table 2: T-test for student POV

Statistic	Value
Hypothesized Mean	3
Observed Mean (Actual Estimate)	4.13
Sample Size (DF = 99 → n = 100)	100
Standard Deviation	0.3835
t Statistic	29.4656
p-value (two-sided)	< 0.0001

Interpretation

The observed mean score (Mean = 4.13) is substantially higher than the neutral value of 3, according to the results of the one-sample t-test. This suggests that students believe educational reforms have led to a discernible improvement in accessibility and inclusivity. These impressions are consistent throughout the sample, as indicated by the high t-value (29.4656) and statistically significant p-value (< 0.0001). However, worries about the caliber of education are still apparent despite advancements in diversity and access. The conclusion that students believe reforms are only partially beneficial is thus supported by the rejection of the null hypothesis.

Findings

The results of this study are in line with recent research emphasizing the difficulties in implementing educational reform. Increased teacher workload continues to be a major obstacle to successful reform adoption, according to studies by Datnow (2020) and Gupta and Zhao (2024). According to Nix et al. (2023), faculty members frequently suffer from implementation fatigue as a result of ongoing policy modifications. Research by Gess-Newsome et al. (2003) and Harris et al. (2017) bolsters the claim that professional development and institutional support are essential for the successful implementation of reforms. Findings from the perspective of students are consistent with Mitra (2012), who emphasizes the value of student voice in enhancing accessibility and inclusivity. Digital and flexible learning changes have

enhanced access, but they have also highlighted concerns about learning quality and engagement, according to recent studies like the OECD (2022) and UNESCO (2023) assessments. Furthermore, Berry and Adamson (2011) stress that in order to achieve the intended results, curricular and assessment modifications require significant faculty involvement. This study illustrates the disparity between the benefits of policy for students and the load on instructors by incorporating both faculty and student opinions. This dual viewpoint offers a more thorough comprehension of the efficacy of reform.

Recommendations

The results suggest that institutions should implement targeted faculty support mechanisms, including professional development initiatives and workload redistribution strategies, to mitigate implementation challenges. Continuous student feedback systems should be institutionalized to maintain improvements in accessibility while addressing learning quality concerns. Policymakers are advised to adopt phased reform implementation strategies and strengthen institutional resource allocation to ensure balanced stakeholder experiences and sustainable policy outcomes.

Limitations and Future Scope

The study is limited by its cross-sectional design, reliance on self-reported data, and restricted institutional sample, which may affect generalizability. Future research should adopt longitudinal approaches to capture evolving stakeholder perceptions, incorporate qualitative methodologies for deeper insights, and conduct comparative institutional analyses to explore contextual variations in reform outcomes.

Conclusion

By highlighting the disparate perspectives of teachers and students, the study offers important insights into the practical ramifications of educational innovations. Reforms have successfully boosted student accessibility and inclusion, but they have also made faculty members' workloads and implementation more difficult. This study's dual-stakeholder approach, which provides a more impartial assessment of policy success, is what makes it significant. The results highlight that without addressing the needs of both instructors and students, educational reforms cannot be considered successful. The study indicates that comprehensive reform measures that include teacher support mechanisms, sufficient training, and reasonable workload distribution are necessary from a policy standpoint. To close the gap between policy design and execution, institutional administrators must give top priority to resource allocation and ongoing feedback mechanisms. By proving that stakeholder alignment is crucial for long-term reform results, the study also adds to the body of scholarly literature. In order to ensure that teachers and students are actively participating in the reform process, future policies should take a participatory approach.

Bibliography

[1] Berry, R., & Adamson, B. (Eds.). (2011). Assessment reform in education: policy and practice (Vol. 14). Springer Science & Business Media.

[2] Burch, P. (2007). Educational policy and practice from the perspective of institutional theory: Crafting a wider lens. Educational researcher, 36(2), 84-95.

[3] Datnow, A. (2020). The role of teachers in educational reform: A 20-year perspective. Journal of Educational Change, 21(3), 431-441.

[4] Dill, D. D. (2013). Public policy design and university reform: Insights into academic change. Reforming higher education: Public policy design and implementation, 21-37.

[5] Gess-Newsome, J., Southerland, S. A., Johnston, A., & Woodbury, S. (2003). Educational reform, personal practical theories, and dissatisfaction: The anatomy of change in college science teaching. American Educational Research Journal, 40(3), 731-767.

[6] Gupta, A., & Zhao, X. (2024). Teachers' work under responsibilising policies: An analysis of educators' views on China's 2021 educational reforms. Journal of Education Policy, 39(4), 622-639.

[7] Malen, B., & Knapp, M. (1997). Rethinking the multiple perspectives approach to education policy analysis: implications for policy-practice connections. Journal of Education Policy, 12(5), 419-445.

[8] Mitra, D. L. (2012). Student voice and student roles in education policy and policy reform. In Handbook of education policy research (pp. 819-830). Routledge.

[9] Nix, A. N., Bertrand Jones, T., & Hu, S. (2023). The perceptions and experiences of faculty implementing Florida's developmental education reform. Educational Policy, 37(4), 953-979.

[10] Wiseman, D. L. (2012). The intersection of policy, reform, and teacher education. Journal of Teacher Education, 63(2), 87-91.

Wisdom Journal of Science and Technology 2(1), 125-128, May 2026
https://doi.org/10.64848/WJST.2.1.2026.125-128

WISDOM JOURNAL of Science & Technology

RESEARCH ARTICLE

Revolutionizing education through AI: Connecting physical and digital classrooms for equal opportunity for all

Mallavarapu Joe Alok Raj[1] and Sameeksha G.S.[2*]
Post-graduate research students
E-mail: [1]joealokr@gmail.com, [2]sameeksha.gs5@gmail.com

Abstract: Artificial Intelligence (AI) is transforming the global education landscape by bridging the gap between offline and online learning, ensuring equitable access to quality education. This paper explores how AI-driven tools, such as adaptive learning platforms, virtual tutors, and automated assessment systems, can support Sustainable Development Goal 4 (SDG 4) by making education more inclusive and accessible. AI enhances personalized learning, assists educators in optimizing teaching strategies, and expands educational opportunities for students in remote and underprivileged areas. However, challenges such as digital divide, affordability, and ethical concerns must be addressed to maximize AI's potential in education. By integrating AI with sustainable learning models, governments and institutions can create an education system that is both inclusive and future-ready, ensuring lifelong learning opportunities for all.

Keywords: *AI in education, SDG 4 (Quality education), Digital divide, Personalized learning, EdTech innovations*

Introduction

Artificial Intelligence (AI) is revolutionizing the education sector by addressing disparities in access to quality learning. By integrating AI-powered tools, such as adaptive learning platforms and virtual tutors, education systems can bridge the gap between offline and online learning

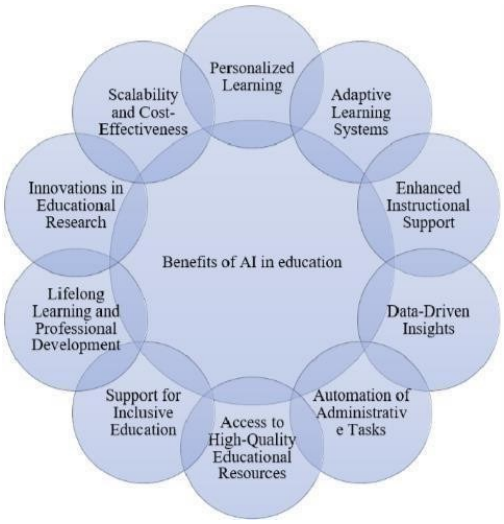


Figure 23: AI help in SDG 4 quality education
Source: Secondary data

*Corresponding author: Mallavarapu Joe Alok Raj, E-mail: joealokr@gmail.com
Received: 20/04/26, Accepted: 29/04/26, Published Online: 02/05/26

Aligning with Sustainable Development Goal 4 (SDG 4) to ensure inclusive and equitable education for all. This study explores how AI can enhance learning experiences, support educators, and expand educational opportunities for underprivileged communities. Despite advancements in digital education, a significant gap exists between offline and online learning, particularly in remote and economically disadvantaged regions. The challenge lies in providing equal access to quality education while addressing infrastructure limitations, digital literacy, and affordability. This study focuses on the impact of AI-powered education on accessibility, personalized learning, and digital inclusivity. It covers AI-driven tools, EdTech solutions, and policies promoting sustainable learning models, with a special focus on developing economies and marginalized communities. The objectives of the study is to examine how AI enhances personalized learning experiences, analyze the role of AI in bridging the digital divide in education, evaluate challenges in implementing AI-based education in underprivileged regions and explore policy recommendations for sustainable and inclusive AI-driven education.

Variables

Independent Variables: AI-driven Learning Technologies, Digital Infrastructure, Government Policies Dependent Variables: Accessibility to Quality Education, Learning Outcomes, Student Engagement and Performance.

Research Hypothesis

Hypothesis (H_0)

AI-Driven Learning technologies, digital infrastructure, and government Policies do not lead to significant improvements in accessibility to quality education, learning outcomes, or student engagement/performance compared to traditional learning settings, particularly in undeserved communities.

Alternative Hypothesis (H_1)

AI-Driven Learning technologies, supported by adequate digital infrastructure and enabling government policies, significantly improve accessibility to quality education, learning outcomes, and student engagement/performance compared to traditional learning settings, particularly in underserved communities, in line with SDG 4.

Review of Literature

Java, S., Mohammed, H., Bhardwaj, A. B., & Shukla, V. K. (2021) explored the impact of Education 4.0 and Web 3.0 applications on learning management systems post-COVID-19. The study highlights how AI-driven tools, virtual classrooms, and data integration have transformed the education sector. The research underlines the need for strategic planning to implement AI- powered educational models effectively.

Pegrum, M., Hockly, N., & Dudeney, G. (2022) examined the role of digital literacies in modern education, emphasizing the shift from print-based learning to digital competency. The study provides a theoretical framework for understanding digital literacies and their integration into language teaching. It discusses pedagogical implications and practical methodologies for equipping educators and learners with essential digital skills. The research highlights the importance of professional development for teachers to incorporate digital literacies effectively into the curriculum.

Chisom, N. O. N., Unachukwu, N. C. C., & Osawaru, N. B. (2024) reviewed AI's transformative impact on education in Africa, focusing on personalized learning and technological integration. how AI-powered adaptive learning platforms, virtual tutors, it also acknowledges challenges such as infrastructure limitations and the digital divide that must be addressed for AI adoption to be successful.

Ziemba, E. W., Duong, C. D., Ejdys, J., Gonzalez-Perez, M. A., Kazlauskaitė, R., Korzynski, P., Mazurek, G., Paliszkiewicz, J., Stankevičienė, J., & Wach, K. (2024) analyzed AI's role in achieving Sustainable Development Goals (SDGs). Their study provides a framework that details how AI can be leveraged to

address global challenges, The study contributes valuable insights into policymaking and AI governance to enhance societal progress.

Salisu and Samuel (2025) examined the application of AI in peace, conflict, and security education, with a focus on skill development and economic empowerment. The study highlights AI-driven personalized learning, predictive analytics, and simulation-based training as transformative tools in education. It discusses the challenges of AI implementation, such as algorithmic bias, access inequality, and data privacy concerns.

Methodology

Research Design

This study employs a mixed-method approach to ensure a comprehensive analysis. The research utilizes primary data collected from classrooms through surveys, assessments, and student performance records. Surveys were conducted among students and teachers to understand the impact of AI-powered education on learning experiences. Student performance was also tracked before and after the integration of AI tools in the learning process. In addition, a comparison was made between traditional learning environments and AI-enhanced learning environments to evaluate differences in outcomes. The study included a sample size of 250 responses collected from students across different colleges in Bengaluru, and the snowball sampling method was used to recruit participants for the research.

Results and Discussion

The results show that AI-powered education significantly improves both access to quality education and learning outcomes compared to traditional learning methods. AI-based learning platforms effectively bridge educational gaps, especially for underserved communities, reducing disparities in education access. AI-driven personalized learning, interactive content, and adaptive teaching methods result in better student performance and engagement. Based on the statistical analysis conducted, the following findings are derived:

T-Test

[DataSet0]

Group Statistics

	Learning Type	N	Mean	Std. Deviation	Std. Error Mean
Access to Quality Education	Traditional	5	48.8000	3.83406	1.71464
	AI	5	79.2000	5.11859	2.28910
Learning Outcomes	Traditional	5	61.4000	2.88097	1.28841
	AI	5	80.2000	4.14729	1.85472

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Access to Quality Education	Equal variances assumed	.813	.394	-10.629	8	.000	-30.40000	2.86007	-36.99533	-23.80467
	Equal variances not assumed			-10.629	7.414	.000	-30.40000	2.86007	-37.08720	-23.71280
Learning Outcomes	Equal variances assumed	1.161	.313	-8.325	8	.000	-18.80000	2.25832	-24.00769	-13.59231
	Equal variances not assumed			-8.325	7.131	.000	-18.80000	2.25832	-24.12021	-13.47979

Figure 24: Test run in SPSS to check the paper and digital usage impact

Since both p-values are highly significant ($p = 0.000$), the study strongly supports H_1, confirming that AI-powered education plays a transformative role in aligning with SDG 4 (Quality Education) by fostering inclusivity and lifelong learning.

Impact of AI-Powered Education on the Access to Quality Education

The mean difference in accessibility scores between AI-powered education and traditional learning is -30.40, with a highly significant p-value of 0.000. The 95% confidence interval (-36.99, -23.80) does not cross zero,

meaning the improvement is statistically significant. Therefore, AI-driven learning tools greatly enhance educational accessibility by reducing barriers, particularly in underserved communities. AI-powered education strongly improves accessibility, making quality learning more inclusive.

Impact of AI-Powered Education on Learning Outcomes

The mean difference in learning outcomes between AI-based and traditional learning is - 18.80, with a highly significant p-value of 0.000. The 95% confidence interval (-24.00, -13.59) confirms a strong positive impact, as it does not include zero. Thus, AI-based education leads to superior learning outcomes through personalized learning, adaptive assessments, and real-time feedback. AI-powered education is highly effective in enhancing student performance and engagement.

Statistical Strength and Reliability

The t-values (-10.629 for accessibility and -8.325 for learning outcomes) indicate a large effect size, proving that the differences are not due to random chance. The Levene's test shows equal variances can be assumed, confirming the reliability of the t-test results. AI-powered education plays a transformative role in bridging the gap between offline and online learning, significantly improving access and learning outcomes, fully aligning with SDG 4 (Quality Education).

Conclusion

AI has the potential to transform education by bridging offline and online learning gaps, promoting inclusivity and quality education. However, challenges such as infrastructure, affordability, and teacher training must be addressed. Strategic policy interventions and sustainable EdTech solutions can ensure AI-powered education aligns with SDG 4 objectives. However, the present study has certain limitations. The study design cannot fully control for confounding factors that may influence the results. The reported scores may not be highly reliable due to potential referencing bias and the sampling method used. In addition, the short observation window and limited indicators do not adequately capture the long-term or broader impacts related to SDG 4. Although key barriers such as infrastructure limitations, affordability, and the need for teacher training were identified, an in-depth analysis of these factors was not conducted due to the short duration of the observation period. Institutions should integrate AI to improve accessibility and learning quality. Policymakers should promote AI adoption in education to reduce disparities.

References

[1] Chisom, N. O. N., Unachukwu, N. C. C., & Osawaru, N. B. (2024). Review of AI in education: Transforming learning environments in Africa. International Journal of Applied Research in Social Sciences, 5(10), 637–654. https://doi.org/10.51594/ijarss.v5i10.725

[2] Java, S., Mohammed, H., Bhardwaj, A. B., & Shukla, V. K. (2021). Education 4.0 and Web 3.0 applications in enhancing learning Management System: Post-Lockdown Analysis in COVID-19 Pandemic. In De Gruyter eBooks (pp. 85–110). https://doi.org/10.1515/9783110722789-006

[3] Pegrum, M., Hockly, N., & Dudeney, G. (2022). Digital Literacies (2nd ed.). Routledge. https://doi.org/10.4324/9781003262541

[4] Salisu, N. M. A., & Samuel, N. I. R. (2025). Utilizing artificial intelligence in peace, conflict, and security education for skill development and economic empowerment. International Journal of African Innovation and Multidisciplinary Research. https://doi.org/10.70382/mejaimr.v7i2.034

[5] Ziemba, E. W., Duong, C. D., Ejdys, J., Gonzalez-Perez, M. A., Kazlauskaitė, R., Korzynski, P., Mazurek, G., Paliszkiewicz, J., Stankevičienė, J., & Wach, K. (2024). Leveraging artificial intelligence to meet the sustainable development goals. Journal of Economics and Management, 46, 508–583. https://doi.org/10.22367/jem.2024.46.19

Wisdom Journal of Science and Technology 2(1), 129-133, May 2026
https://doi.org/10.64848/WJST.2.1.2026.129-133

WISDOM JOURNAL of Science & Technology

RESEARCH ARTICLE

Comparison of the upper extremity and lower extremity coordination in normal and obese children aged 9-12 years - A cross-sectional study

Jude John D'souza[1*], Priyadarshani Katalkar[2], Siddharth S Mishra[3] and Yash Anil Gaba[4]

[1]Assistant Professor, Department of Neurosciences Physiotherapy, Mahatma Gandhi Mission's College of Physiotherapy, Navi Mumbai, India E-mail: juded40@gmail.com
[2]Assistant Professor, Department of Neurosciences Physiotherapy, Mahatma Gandhi Mission's College of Physiotherapy, Navi Mumbai, India, E-mail: priyadarshanik@mgmcopnm.edu.in
[3]Associate Professor, Department of Neurosciences Physiotherapy, Mahatma Gandhi Mission's College of Physiotherapy, Navi Mumbai, India E-mail: sm@mgmcopnm.edu.in
[4]Intern, Department of Neurosciences Physiotherapy, Mahatma Gandhi Mission's College of Physiotherapy, Navi Mumbai, India. E-mail: yashgaba005@gmail.com

Abstract: *Background:* This study aimed to compare upper and lower extremity coordination in normal and obese children and to establish a relationship between motor coordination and BMI. *Methods:* Data were collected from 100 children aged 9 to 12 years. BMI was calculated, and participants were divided into two groups: normal (n1 = 50) and obese (n2 = 50). Both groups were assessed for motor coordination: the Plate Tapping Test (PTT) for upper extremity coordination and the Lower Extremity Motor Coordination Test (LEMCOT) for lower extremity coordination. The time to complete PTT and the number of taps in LEMCOT were recorded. *Results:* A statistically significant difference in motor coordination scores was observed between the two groups. Additionally, a strong negative correlation was found between BMI, PTT, and LEMCOT scores in the obese group. *Conclusion:* Our study demonstrated that obese children of both sexes have significantly lower motor coordination than normal-weight children, with an inverse relationship between motor coordination and BMI in the obese group.

Keywords: *Motor coordination, Obesity, Body mass index, Adolescents, Correlation, Children*

Introduction

Obesity in children is among the world's biggest public health problems, and the formative years of life are crucial for the development of overweight and obesity. According to the World Health Organization, the prevalence of overweight and obesity in children and adolescents has been rising quickly, and there will be about 70 million overweight or obese children by 2025.[1] The high prevalence of obesity is linked to a higher risk of developing certain medical conditions, including stroke, insulin resistance, and systemic arterial hypertension.[2] Apart from these conditions, obesity may also affect physical attributes such as gross motor coordination and motor performance, as these traits appear to be closely linked to children's and adolescents' regular physical activity and body composition.[3]

Literature has explored the potential relationship between adherence to physical activity during adolescence and gross motor coordination. Motor coordination refers to the coordinated interactions between the nervous, skeletal, and sensory muscle systems, which are required to produce precise motor actions and

[*]Corresponding author: Assistant Professor, Department of Neurosciences Physiotherapy, Mahatma Gandhi Mission's College of Physiotherapy, Navi Mumbai, India E-mail: juded40@gmail.com
Received: 30/04/26, Accepted: 30/04/26, Published Online: 02/05/26

quick reactions to everyday situations. This involves the proper development of muscle strength and the targeted selection of muscles that control the movement's performance. [4] Motor skills are a set of coordinated movements that children learn in their early years, encompassing object control and locomotor skills. They are obtained through the physiological maturation of the neuromuscular system and environmental factors. [5] The body can move through space by using locomotor skills, which include running, galloping, and jumping. The ability to manipulate and project objects in various ways, such as throwing, catching, dribbling, kicking, hitting, and rolling, is known as object control. [6] Notably, the programming of physiological systems in adult life may be correlated with motor performance during childhood and adolescence. Better performance in gross motor coordination and engagement in physical activities have been positively correlated. Lubans [7] in his recent review on the connections between motor coordination (MC) and health benefits stated that individuals' motor coordination levels are inversely correlated with weight status. Stodden et al. [8] suggested that low MC will cause adolescents to fail at sports and movement play activities in adulthood, setting off a vicious cycle of disengagement from an active lifestyle. Due to the increased difficulty of physical activity, it is plausible that kids and teenagers with low gross motor skills will not want to engage in it. It is also conceivable that sedentary pursuits, such as watching TV and playing computer games, would appeal to kids with limited gross motor skills. Evidence suggests that regardless of gender or baseline body mass index, children who develop physical fitness and motor competence at a slow or medium pace are more likely to become overweight or obese by the end of primary school. [9]. It is also important to understand the connection between overweight and obesity in children and their motor development. [10],[11],[12] Therefore, the present study aimed to compare the upper extremity and lower extremity coordination in normal and obese children and establish a relationship between motor coordination and body mass index in children aged 9-12 years.

Methodology

Before the study commenced, approval was obtained from the Institutional Research Committee, and the study was conducted by the STROBE checklist. A cross-sectional design with convenience sampling was employed, and the sample size (n = 100) was calculated using the formula $n = (z1- \alpha/2^2P(1- P)/d^2)$, where the prevalence of obesity was considered to be 19.3%. Participants were boys and girls aged 9-12 years, with BMI scores ranging from the 5th percentile to less than the 85th percentile, and from the 95th percentile and above. Children with corrected vision and hearing were also included in the study. Children enrolled in competitive sports under a professional trainer or those with any neurological, musculoskeletal, cardiorespiratory disorder, or medical and surgical condition were excluded from the study. The participants have explained the study procedure, and a consent form was obtained from a parent/teacher, and an assent form was obtained from the child. The body weight was calculated using a digital weighing scale, and the participant was asked to stand erect without footwear and empty pockets. The stature was measured using a stadiometer, for which the participant stood erect, touching their heels to the wall, and without footwear. The BMI was calculated, and children were stratified into normal (n1=50) and obese groups (n2=50) using the Centers for Disease Control and Prevention Guidelines (CDC). [13],[14] Each group underwent upper and lower extremity coordination tests.

Procedure to assess upper extremity coordination using Plate Tapping Test [15]

The plate tapping test is a valid and reliable method for assessing upper extremity coordination. The apparatus of the plate tapping test included two yellow-colored paper discs of diameter 20 cm, placed (60 cm) apart from their centre point, and a blue-colored rectangle (30x20cm) placed between the two discs at an equal distance. All this was mounted on a sheet of cardboard. The child was standing erect in front of the table, placing their non-preferred hand over the blue rectangle cut out, and their preferred hand relaxed beside their body. Upon the command "to start," the participant moved their preferred hand back and forth, alternately tapping 25 times over each disc, and the time for this action was recorded using a stopwatch. Before the actual test, a short practice session of 4-5 taps was given.

Procedure to assess lower extremity coordination using LEMOCOT [14]

The LEMOCOT is a valid and reliable tool to assess lower extremity motor Coordination. The test was conducted using a chair with a backrest featuring two red-colored discs of 6 cm diameter, which were placed 30 cm away from their center. The child was seated in a comfortable position on a chair with knees flexed at 90°, with the great toe over the proximal target. They were instructed to alternately touch the distal and proximal targets with the great toe (hallux) for 20 seconds, which was observed using a stopwatch/phone. The total number of taps was counted. Before the actual test, a practice of 4-5 taps was given.

Results

Data were coded, compared, tabulated, and analyzed using the Statistical Package for the Social Sciences (SPSS version 24). The Mann-Whitney U test was performed to compare the median values, and a p-value of <0.05 was set as the statistical significance threshold. Table 3 provides descriptive statistics for age, gender, hand dominance, and BMI for normal and obese groups. Tables 4 and 5 present the median scores of the normal and obese groups for the Plate Tapping test and LEMOCOT, respectively. Table 6 represents the correlation between BMI and PTT and LEMOCOT in the normal and obese groups.

Table 3: Demographic details of the participants

Variables	Normal (n1=50)		Obese (n2=50)	
Age (years)	11.50± 0.505		12.32± 0.471	
Gender n(%)	Boys 25(50%)	Girls 25(50%)	Boys 28(56%)	Girls 22(44%)
Hand dominance	4 left (8%) 46 right (92%)		4 Left 8% 46 Right 92%	
Body Mass Index (kg/m^2)	15.99±1.493		23.72± 2.1076	

Table 4: Median scores of PTT

Plate tapping test	Normal (n1=50)	Obese (n2=50)
Median	21.31(20.55, 25.31) sec	30.1(28.15, 32.39) sec
Mann-Whitney U	1125	
p-value	0.05*	

**Significance was considered at p<0.05*

Table 5: Median scores of LEMOCOT

LEMOCOT	Normal (n1=50)	Obese (n2=50)
Median	23 (21.01, 29.25) taps	32 (23.75,33) taps
Mann-Whitney U	1064	
p value	0.02*	

**Significance was considered at p<0.05*

Table 6: Correlation of BMI with PTT and LEMOCOT in the normal and obese group

Spearman's Rank Correlation	PTT	LEMOCOT	p-value
Normal BMI	0.00	0.0	0.08
Obese group	-0.65	-0.68	0.00*

**Correlation is significant at the 0.05 level (2-tailed).*

Discussion

The present study aimed to compare upper and lower extremity motor coordination in normal-weight and obese children aged 9-12 years. There was a statistically significant difference between the median values of PTT and LEMOCOT for both groups. Normal-weight children could perform the PTT within a shorter time and with more taps in LEMOCOT than obese children. Obesity is associated with the accumulation of visceral body fat and is associated with low-grade inflammation in young obese children. Inflammatory responses activated in the body promote obesity-driven dysfunction that affects the nervous system, including alterations in learning and memory, axonal degeneration, and Schwann cell dysfunction. [16],[17] Muscle strength is altered by fat accumulation in the muscle, which makes the muscle stiffer and resists muscle shortening and its transverse bulging. [18] Another reason why the obese group in our study took

a longer time to complete the PTT and a lesser number of taps in LEMOCOT we attribute to findings by Bushbacher [19] who stated that sensory-motor latencies of the peripheral nerves in the upper limb and lower limb and sensory latencies were increased in obese Indian individuals as compared to healthy control due to endoneurial edema of the peripheral nerves due to the metabolic effect of obesity.

Our study also found moderately negative correlations between MC and BMI. Additionally, compared to children of normal weight, the data show significantly poorer MC for obese children of both sexes. According to Onur Akin [20], obese children may have peripheral sensory and motor nerve pathology when compared to normal healthy children, and a more significant difference was obtained in obese children with insulin resistance. Due to high insulin concentration, the receptors undergo downregulation, leading to dysfunction, as insulin is essential in the mechanisms of synapse formation, nerve regeneration, neural plasticity, gene expression, neurotransmitter production, and myelination. Hyperinsulinism and resistance to it cause basal membrane dysfunction, leading to obstruction in the vasa nervorum, reduced endoneurial perfusion, and hence axonal degeneration. [21]

Puberty-related changes occur in the age range of 9-12 years, which influences motor coordination based on the intensity of the growth spurt and biological age, and this may have also impacted the outcome of our study. [22][23] At any age, the connection between motor coordination (MC) and BMI may also be impacted by the additive effects of increased weight on MC. These proposed positive or negative spirals of MC reinforcement, which could indirectly result in long-term changes in body composition throughout childhood, are similar to the stronger negative correlation values we observed in our data. [24] Overall, our study findings are consistent with most other studies, which show a negative correlation between childhood body weight status and various measures of coordination. Our study had limitations; however, we are unable to conclude the causality of the relationships between BMI and coordination due to the cross-sectional nature of the data. Furthermore, body fat percentages cannot be most accurately predicted by BMI. Additionally, a more thorough MC assessment might offer a better understanding of how MC and body composition trajectories change over time.

Conclusion

Our findings support the hypothesis that children and adolescents who are obese perform poorly on tasks requiring motor coordination. Therefore, it is essential to prevent childhood obesity, reduce the weight of affected children, and promote physical activity.

Ethical consideration

The IEC approved this study, vide letter no. MGM/COP/IRRC/8/2022, dated 14/07/2024.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

[1] Akın O, Eker İ, Arslan M, Taşdemir S, Taşçılar ME, Ulaş ÜH, Yeşilkaya E, Ünay B. Association of nerve conduction impairment and insulin resistance in children with obesity. Childs Nerv Syst. 2016;32:2219-2224.

[2] Anderson SE, Dallal GE, Must A. Relative weight and race influence average age at menarche: results from two nationally representative surveys of US girls studied 25 years apart. Pediatrics. 2003;111:844-50.

[3] Belcher BR, Berrigan D, Dodd KW, Emken BA, Chou CP, Spruijt-Metz D. Physical activity in US youth: effect of race/ethnicity, age, gender, and weight status. Med Sci Sports Exerc. 2010;42:2211-21.

[4] Buschbacher RM. Body mass index effect on common nerve conduction study measurements. Muscle Nerve. 1998;21:1398-404.

[5] Cairney J, Hay J, Veldhuizen S, Missiuna C, Mahlberg N, Faught BE. Trajectories of relative weight and waist circumference among children with and without developmental coordination disorder. CMAJ. 2010;182:1167-72.

[6] Catenassi FZ, Marques I, Bastos CB, Basso L, Ronque ER, Gerage AM. Relationship between body mass index and gross motor skill in four to six year-old children. Rev Bras Med Esporte. 2007;13:203e-206e. https://doi.org/10.1590/S1517-86922007000400003

[7] Chivers P, Larkin D, Rose E, Beilin L, Hands B. Low motor performance scores among overweight children: poor coordination or morphological constraints? Hum Mov Sci. 2013;32:1127-37.

[8] Deutsche Gesellschaft für Kinderheilkunde. Monatsschrift für Kinderheilkunde. Springer-Verlag.; 1912.

[9] Díaz-Rodríguez M, Pérez-Muñoz C, Lendínez-de la Cruz JM, Fernández-Gutiérrez M, Bas-Sarmiento P, Ferriz-Mas BC. Effectiveness of a Multifactorial Intervention in the First 1000 Days of Life to Prevent Obesity and Overweight in Childhood: Study Protocol. Int J Environ Res Public Health. 2020;17:2239. doi: 10.3390/ijerph17072239.

[10] Flegal KM, Wei R, Ogden C. Weight-for-stature compared with body mass index-for-age growth charts for the United States from the Centers for Disease Control and Prevention. Am J Clin Nutr. 2002;75:761-6.

[11] Hampl SE, Hassink SG, Skinner AC, Armstrong SC, Barlow SE, Bolling CF, et al. Clinical Practice Guideline for the Evaluation and Treatment of Children and Adolescents With Obesity. Pediatrics. 2023;151:e2022060640. doi: 10.1542/peds.2022-060640.

[12] Lessard I, Lavoie C, Côté I, Mathieu J, Brais B, Gagnon C. Validity and reliability of the LEMOCOT in the adult ARSACS population: A measure of lower limb coordination. J Neurol Sci. 2017;377:193-196..

[13] Lopes VP, Stodden DF, Bianchi MM, Maia JA, Rodrigues LP. Correlation between BMI and motor coordination in children. J Sci Med Sport. 2012;15:38-43.

[14] Lubans DR, Morgan PJ, Cliff DP, Barnett LM, Okely AD. Fundamental movement skills in children and adolescents: review of associated health benefits. Sports Med. 2010;40:1019-35.

[15] Malina RM, Beunen GP, Classens AL, Lefevre J, Vanden Eynde BV, Renson R, Vanreusel B, Simons J. Fatness and physical fitness of girls 7 to 17 years. Obes Res. 1995;3:221-31.

[16] O'Brien PD, Hinder LM, Callaghan BC, Feldman EL. Neurological consequences of obesity. Lancet Neurol. 2017;16:465-477.

[17] Polsky S, Ellis SL. Obesity, insulin resistance, and type 1 diabetes mellitus. Current Opinion in Endocrinology, Diabetes Obes. 2015;22:277-82.

[18] Rahemi H, Nigam N, Wakeling JM. The effect of intramuscular fat on skeletal muscle mechanics: implications for the elderly and obese. J R Soc Interface. 2015;12:20150365. doi: 10.1098/rsif.2015.0365.

[19] Rodrigues LP, Stodden DF, Lopes VP. Developmental pathways of change in fitness and motor competence are related to overweight and obesity status at the end of primary school. J Sci Med Sport. 2016;19:87-92.

[20] Seravalle G, Grassi G. Obesity and hypertension. Pharmacol Res. 2017;122:1-7. doi: 10.1016/j.phrs.2017.05.013.

[21] Stodden DF, Goodway JD, Langendorfer SJ, Roberton MA, Rudisill ME, Garcia C, et al. A developmental perspective on the role of motor skill competence in physical activity: an emergent relationship. Quest 2008;60:290–306.

[22] Utley A, Astill SL. Developmental sequences of two-handed catching: how do children with and without developmental coordination disorder differ? Physiother Theory Pract. 2007;23:65-82.

[23] Van Der Horst K, Paw MJ, Twisk JW, Van Mechelen W. A brief review on correlates of physical activity and sedentariness in youth. Med Sci Sports Exerc. 2007;39:1241-50.

[24] Zhu YC, Wu SK, Cairney J. Obesity and motor coordination ability in Taiwanese children with and without developmental coordination disorder. Res Dev Disabil. 2011;32:801-7.

Wisdom Journal of Science and Technology 2(1), 134-138, May 2026
https://doi.org/10.64848/WJST.2.1.2026.134-138

WISDOM JOURNAL of Science & Technology

REVIEW ARTICLE

The power of perception in marketing strategy: A literature review

Belayihun Shewangzaw[1*] and Amana Omer[2]
[1]Marketing Management, Wolkite University, Wolkite, Ethiopia, E-mail: belayshewa4@gmail.com
[2]Tourism and Hotel Management, Madda Walabu University, Robe, Ethiopia

Astract: This study reviews the role of consumer perception in shaping effective marketing strategies. While traditional marketing approaches emphasize product features and quality, contemporary perspectives argue that success in the marketplace is largely determined by how products and brands are perceived in the minds of consumers. Drawing on seminal and recent literature, including positioning theory and consumer behavior frameworks, this paper examines the shift from product-centered to perception-driven marketing. The review explores how perception influences brand positioning, purchase decisions, and competitive advantage. It also highlights the growing importance of digital platforms in shaping consumer perceptions through social media, online reviews, and brand communication. The findings suggest that organizations that strategically manage consumer perception are more likely to achieve sustainable market success, even in highly competitive environments. The study concludes by emphasizing the need for marketers to prioritize perception management as a core component of marketing strategy.

Keywords: *Consumer perception, Marketing strategy, Brand positioning, Consumer behavior, Digital marketing*

Introduction

Marketing has traditionally been defined as the process of creating, communicating, and delivering value to customers while managing relationships in ways that benefit the organization and its stakeholders (Kotler & Keller, 2016). For many years, marketing strategies were primarily product-oriented, focusing on improving product quality, features, and functional performance to gain a competitive advantage. This product-centric approach assumed that superior products would naturally lead to customer preference and market success. However, the evolution of markets and increasing competition have shifted this perspective toward a more consumer-centered approach. Modern marketing emphasizes that success is not determined solely by the objective characteristics of a product, but by how consumers perceive it. Consumer perception shaped by experiences, beliefs, branding, and communication plays a critical role in influencing purchasing decisions and brand loyalty (Solomon, 2018). As a result, organizations are increasingly focusing on managing perceptions rather than merely improving product attributes. This shift is strongly captured in the work of Ries and Trout (2001), who argue that "marketing is not a battle of products, but a battle of perceptions." Their positioning theory highlights that the key to marketing success lies in securing a distinctive and favorable position in the minds of consumers, rather than competing solely on product features. In this view, perception becomes the primary battlefield where brands compete for attention, trust, and preference. Given these developments, the purpose of this paper is to review existing literature on the role of perception in marketing strategy. Specifically, it aims to examine how consumer perception

[*]Corresponding author: Marketing Management, Wolkite University, Wolkite, Ethiopia
E-mail: belayshewa4@gmail.com
Received: 17/04/26, Accepted: 29/04/26, Published Online: 02/05/26

influences marketing outcomes, explore key theoretical contributions, and highlight the growing importance of perception-driven strategies in contemporary marketing practice.

Objectives of the Study

The main objective of this study is to examine the significance of consumer perception in shaping modern marketing strategies. Specifically, the study aims to review existing literature on the concept of perception in marketing, analyze the role of consumer perception influencing decision-making processes and examine how perception affects the development and effectiveness of marketing strategies.

Concept of Consumer Perception

Consumer perception refers to the process by which individuals select, organize, and interpret information to form a meaningful understanding of products and brands (Solomon, 2018). It is a subjective process influenced not only by external stimuli but also by internal psychological factors such as beliefs, attitudes, and prior experiences. Several factors shape consumer perception. Culture plays a significant role by influencing values, preferences, and interpretations of marketing messages. Experience also affects perception, as past interactions with a product or brand can shape expectations and future evaluations. Additionally, branding elements such as logos, packaging, and advertising contribute to how consumers perceive a product, often creating associations that go beyond its functional attributes (Kotler & Keller, 2016). These factors collectively determine how consumers interpret and respond to marketing efforts.

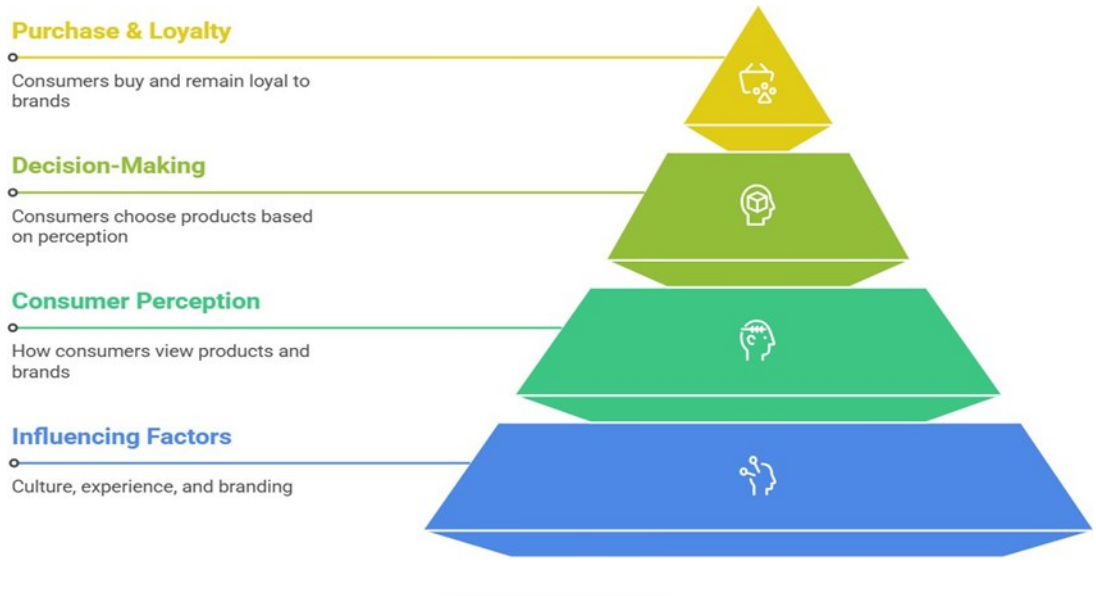


Figure 25: Consumer perception framework

Source: Adapted from Solomon (2018) and Kotler and Keller (2016)

Marketing as a Battle of Perception

The idea that marketing is a battle of perception rather than products is strongly emphasized by Ries and Trout (2001) in their positioning theory. According to them, the primary objective of marketing is not to change the product, but to influence how the product is perceived in the minds of consumers. This perspective shifts the focus from objective product features to subjective consumer interpretations. Mental positioning is therefore critical in competitive markets. Brands that successfully occupy a distinct and favorable position in consumers' minds are more likely to achieve recognition and preference. For example, a brand perceived as "high quality" or "affordable" can dominate a category even if competing products offer similar or superior features. Thus, perception becomes the key driver of competitive advantage.

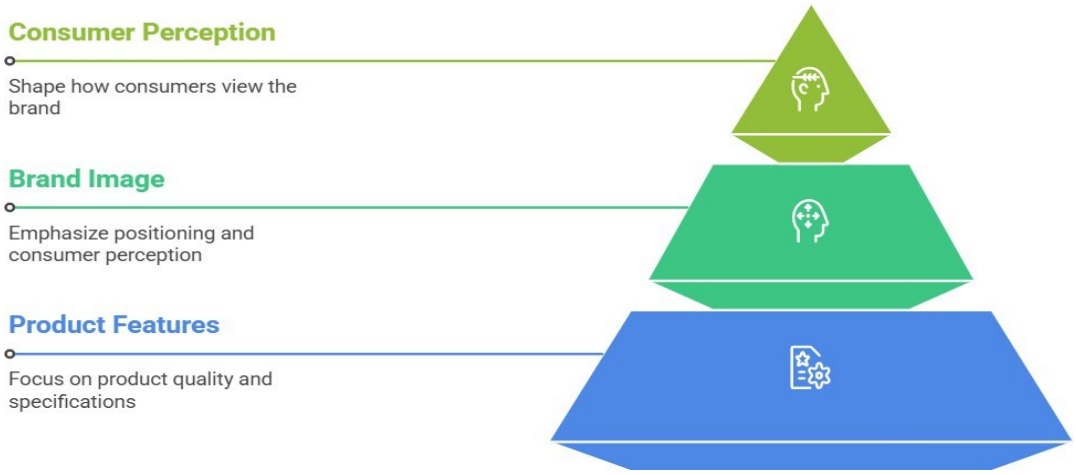


Figure 26: Marketing as a battle of perception versus product

Branding and Perception

Branding plays a central role in shaping consumer perception. Brand image refers to the set of beliefs and impressions that consumers hold about a brand, which may not always reflect the product's actual performance (Keller, 2013). In many cases, perception outweighs reality, as consumers base their decisions on what they believe rather than objective facts. Furthermore, modern marketing highlights the importance of emotional value alongside functional value. While functional value relates to product performance, emotional value is associated with feelings, identity, and personal connection. Brands that successfully create emotional resonance such as trust, prestige, or belonging can influence perception more effectively and build long-term customer loyalty.

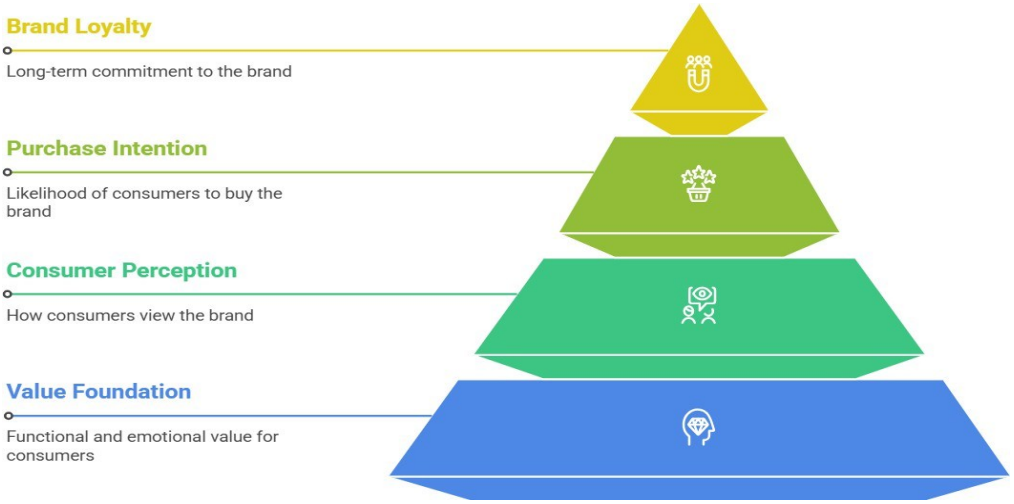


Figure 27: Brand perception and consumer behavior model

Consumer Behavior and Decision-Making

Consumer perception significantly influences buying behavior and decision-making processes. Before making a purchase, consumers interpret available information based on their perceptions, which guides their preferences and choices (Solomon, 2018). Even when presented with similar products, consumers may choose differently based on how they perceive each option. Trust, awareness, and cognitive biases also play important roles. Trust reduces perceived risk and increases the likelihood of purchase, while brand awareness ensures that a product is considered during decision-making. Additionally, biases such as confirmation of bias and brand loyalty can reinforce existing perceptions, making them resistant to change. These elements highlight the complexity of consumer decision-making and the importance of perception in shaping outcomes.

Digital Marketing and Perception

The rise of digital marketing has significantly amplified the role of perception. Social media platforms allow consumers to share opinions, experiences, and feedback, which can influence the perceptions of a wider audience. As a result, brand perception is no longer controlled solely by organizations but is co-created with consumers. Online reviews and ratings are particularly influential in shaping perception and purchase decisions. Positive reviews can enhance credibility and trust, while negative feedback can damage brand reputation. Moreover, digital communication enables brands to actively manage perception through targeted advertising, influencer marketing, and real-time engagement (Chaffey & Ellis-Chadwick, 2019). In this environment, perception management has become more dynamic and critical than ever before.

Discussion

The reviewed literature consistently highlights the central role of consumer perception in shaping marketing outcomes, although different authors approach the concept from varying perspectives. Kotler and Keller (2016) emphasize a holistic marketing approach, where perception is one of several elements influencing customer value, including product quality and service delivery. In contrast, Ries and Trout (2001) place stronger emphasis on perception as the primary battlefield, arguing that success depends less on objective product superiority and more on how a brand is positioned in the consumer's mind. Similarly, Keller (2013) focuses on brand image and equity, suggesting that perception is built through consistent brand associations and experiences. While these perspectives differ in emphasis, they collectively reinforce the idea that perception is a fundamental component of marketing strategy. There is a strong consensus among scholars that perception plays a critical role in influencing consumer behavior and competitive advantage. Studies in consumer behavior (Solomon, 2018) demonstrate that purchasing decisions are largely driven by subjective interpretations rather than objective evaluations. In addition, research in digital marketing (Chaffey & Ellis-Chadwick, 2019) shows that perception is increasingly shaped by online interactions, peer reviews, and social media engagement. This agreement across theoretical and empirical studies suggests that managing perception is not optional but essential for organizations seeking to remain competitive in modern markets. Despite this broad agreement, several gaps remain in the literature. First, much of the existing research is based on developed market contexts, with limited focus on developing countries where cultural, economic, and technological factors may influence perception differently. For example, consumers in emerging markets may rely more on price cues or social influence due to limited access to information. Second, while digital marketing has been widely discussed, the rapid evolution of digital platforms presents ongoing challenges that are not fully addressed in current literature. Issues such as misinformation, fake reviews, and algorithmic bias can significantly distort consumer perception and require further investigation. Finally, there is a need for more empirical studies that measure the direct impact of perception management strategies on long-term business performance. Overall, the discussion confirms that while the importance of perception in marketing is well established, there are still areas that require deeper exploration, particularly in relation to contextual differences and the dynamic nature of digital environments.

Based on the findings of this study, several recommendations can be proposed for marketers and organizations aiming to enhance their competitive position through effective perception management. First, firms should focus on strong brand positioning by clearly defining and consistently communicating their unique value in the minds of consumers. Establishing a distinctive position helps organizations stand out in crowded markets and reinforces positive associations with the brand. Second, organizations need to invest in effective communication strategies. This includes the use of integrated marketing communications, storytelling, and digital engagement to shape and reinforce desired perceptions. Consistent messaging across all channels is essential to build trust and credibility among consumers. Third, it is important for firms to continuously monitor consumer perceptions. This can be achieved through market research, customer feedback, and analysis of online reviews and social media interactions. Regular monitoring enables organizations to identify shifts in perception and respond proactively to maintain a favorable brand image.

Finally, organizations should adapt to the evolving digital environment by leveraging social media platforms and influencer marketing to actively manage and shape consumer perceptions in real time.

Conclusion

This study has demonstrated that marketing success increasingly depends on the effective management of consumer perception rather than solely on the improvement of product features. While traditional marketing emphasized product quality and functional attributes, contemporary perspectives highlight how consumers perceive a product or brand plays a more decisive role in influencing their preferences and purchase decisions. The review of existing literature confirms that perception shapes brand positioning, customer loyalty, and overall market performance. Firms that successfully create and maintain positive perceptions are better positioned to differentiate themselves, even in highly competitive and saturated markets where product differences are minimal. In such environments, perception becomes a key source of competitive advantage. In conclusion, marketing is no longer simply a competition of products but a strategic effort to influence consumer minds. Organizations that prioritize perception management through effective branding, communication, and customer engagement are more likely to achieve sustainable success in today's dynamic marketplace.

Conflicts of Interest

The authors declare no conflicts of interest.

References

[1] Chaffey, D., & Ellis-Chadwick, F. (2019). *Digital Marketing* (7th ed.), United Kingdom: Pearson.

[2] Keller, K. L. (2013). *Strategic Brand Management* (4th ed.). United States: Pearson.

[3] Kotler, P., & Keller, K. L. (2016). *Marketing Management* (15th ed.). India: Pearson.

[4] Ries, A., & Trout, J. (2001). *Positioning: The Battle for Your Mind.* New York: McGraw-Hill.

[5] Solomon, M. R. (2018). *Consumer Behavior: Buying, Having, and Being.* (12th ed., Global ed.) Boston: Pearson.

Published by Wisdom Consulting Services, Bengaluru, India