

Enhancing Students' Academic Engagement Through Magic School. Ai Among The Students Of 8th Grade

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Abstract

This experimental study measured the effect of MagicSchool.AI, an AI-based learning tool, on academic engagement among 8th graders. The one-group pre-test post-test research design was implemented among 37 participants of the 8th¹ grade from a private middle school. MagicSchool was embedded in lessons to support lesson planning, adaptive learning, and formative assessment within a 24-day intervention. Pre-test and post-test academic engagement among students was measured using an adapted version of the Student Engagement Scale (Doğan, 2014), which consisted of behavioral, emotional, and cognitive components. The test analyses from the Paired-sample t-test revealed statistically significant changes in behavioral engagement, emotional engagement, and cognitive engagement. Overall engagement was improved markedly too. The results imply that MagicSchool.AI might work effectively to improve students' engagement and encourage active learning in 8th-grade classrooms.

Keywords: academic engagement, artificial intelligence, MagicSchool.AI, middle school, educational technology.

Background of the Study

Academic engagement has been widely recognized as a key predictor of academic achievement among students (Fredricks et al., 2004). Academic Engagement refers to the degree to which students are involved in learning with behavioral, emotional, and cognitive dimensions (Appleton et al., 2008). In the context of elementary education, particularly in 8th grade, enhancing the level of academic engagement is significant because this level typically marks the beginning of complex curriculum demands, and increased social expectations (Wang & Eccles, 2012). However, research has highlighted that student engagement in the middle school context tends to decrease with low motivation, underachievement, and increased risk for school dropout (Marks, 2000).

Integration of educational technologies and artificial intelligence (AI), advanced pedagogical tools have become within reach, which have the potential to restructure instruction to enhance academic engagement. One of the innovative solutions is that of MagicSchool.AI, a generative AI system that has the capability to assist educators in lesson planning, instruction differentiation, formative assessment, and student support (MagicSchool.AI, 2024). Through

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content differentiation and automation based on the needs of the students, MagicSchool.AI enables the teacher to spend more time planning meaningful interactions and shaping an engaging environment.

The existing studies began to examine the influence of AI-based teaching on students' engagement with positive outcomes. For instance, Holmes et al. (2021) concluded that meaningfully integrated AI tools in the instructional process can enhance students' motivation, provide immediate feedback, and support individualized learning. Likewise, Luckin et al. (2016) found that AI-assisted tools can enhance teacher efficiency as well as student autonomy, both are significant components of students' engagement.

Despite these innovations, empirical research with a specific interest in AI tools like MagicSchool.AI and their intervention in student engagement at the middle school level is less focused, particularly in third-world countries like Pakistan. There is a pressing need to examine the effectiveness of such tools in fostering academic engagement among 8th-grade learners, who are at a pivotal stage in their educational journey. Understanding how MagicSchool.AI can affect behavioral and cognitive engagement in actual classroom settings can contribute to both academic research and instructional practice.

Objectives of the Study

1. To measure the baseline level of academic engagement among 8th-grade students before the intervention of MagicSchool AI.
2. To compare pre- and post-intervention academic engagement scores of 8th-grade students.

Research Questions

1. What is the baseline level of academic engagement among 8th-grade students before the intervention of MagicSchool.AI?
2. Is there a statistically significant difference between the pre- and post-intervention academic engagement scores of 8th-grade students after the use of MagicSchool.AI?

Rationale of the Study

Academic engagement predictably leads to high academic achievement and classroom retention (Fredricks et al., 2004). However, levels of engagement is lower in middle school learners because curricula are complex, social expectations increased, and instruction lacks individualization (Marks, 2000; Wang & Eccles, 2012). For this problem, educators and researchers are increasingly looking towards technological interventions, in particular artificial intelligence (AI), in efforts to maximize learning experiences and maintain engagement.

MagicSchool.AI is a newly designed AI-powered tool designed for teachers' support in developing individualized lesson plans, formative assessments, behavior remarks, and differentiated instruction (MagicSchool.AI, 2024). Although such tools are growing in popularity in classrooms, there has been less focused research regarding their real-world efficacy in enhancing student engagement, specifically in the middle school environment. Furthermore, there has been limited empirical work regarding the influence of AI resources such as MagicSchool.AI in several dimensions of engagement, behavioral, emotional, and cognitive, when implemented in daily classroom instruction.

This research has significance in the sense that it meets current learning demands in response to new technologies and contributes to frameworks in terms of applying AI in middle school learning. It also has real-world applicability for teachers who desire increased student engagement with minimal administrative demand, ultimately benefiting instruction quality and student achievement.

Materials and Methods

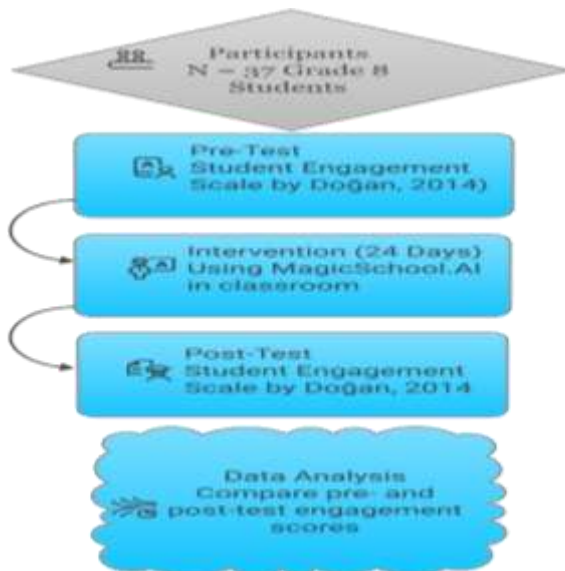
This research applied the one-group pre-test post-test experimental research design in determining the effect of MagicSchool.AI in the learning of 8th-grade students. Participants were 37 Grade 8 private school students. They were selected because they can be representative of any general middle school class environment in which it is possible to include the use of technology.

This study employed a one-group pre-test. For the measurement of academic engagement, the respondent employed a modified copy of the Student Engagement Scale originally developed by Doğan (2014). There are three dimensions of engagement in this scale: behavioral, emotional, and cognitive, and it was employed as pre-test and post-test in order to reflect changes that had been introduced through the intervention. The tool had been vetted for contextual relevance and readability before administration.

The intervention involved the infusion of MagicSchool.AI into ordinary class instruction, with the tool being used by the teacher in lesson planning, instructional support, and individualized learning activities. All this time, the total length of the intervention spanned 24 school days. For the full period, the learners were consistently subjected to instruction mediated by AI in their daily learning schedule. After the full extent of the intervention had been completed, the same scale of engagement was again conducted in the process of determining any critical shift in levels of engagement by the learners. Data thus obtained were thereafter analyzed in quantitative terms in establishing the effectiveness of the intervention.

Figure 1.

Flow Chart for One Group Pre-test Post Experimental Design



Data Analysis

This section gives the analysis of the gathered data in terms of examining the effectiveness of improving 8th-grade students' academic engagement through MagicSchool.AI. Overall objective was the comparison between pre- and post-intervention levels of the engagement of students using one-group pre-test post-test experimental design. Data were collected using the adapted version of the Student Engagement Scale (Doğan, 2014), which has three dimensions of engagement: behavioral, emotional, and cognitive.

Table 1 Paired t-test for Mean Comparison of Pre-Test and Post-Test Scores on Academic Engagement Dimensions

Variables	Pre-Test		Post-Test		t (36)	p	r	Cohen's d
	M	SD	M	SD				
Behavioral Engagement	3.21	0.56	3.85	0.49	5.62	.000	.68***	0.78
Emotional Engagement	3.09	0.61	3.78	0.55	6.01	.000	.72***	0.85
Cognitive Engagement	3.15	0.59	3.88	0.53	6.45	.000	.75***	0.92
Overall Engagement	3.15	0.58	3.84	0.52	6.57	.000	.76***	0.95

***p < .001.

Table 1 displays the mean comparison of students' academic engagement before and after intervention using MagicSchool.AI. The results showed significant mean differences on all three dimensions of engagement. On behavioral engagement, there was a significant improvement, $t(36) = 5.62$, $p < 0.001$. The mean ($M = 3.21$, $SD = 0.56$) on the pre-test showed an increase to a mean ($M = 3.85$, $SD = 0.49$) on the post-test. The scores had a significant correlation ($r = 0.68$, $p < 0.001$), and the effect size was large to very large (Cohen's $d = 0.78$). On emotional engagement, there was a significant improvement from pre-test ($M = 3.09$, $SD = 0.61$) to post-test ($M = 3.78$, $SD = 0.55$), $t(36) = 6.01$, $p < 0.001$, strong correlation ($r = 0.72$), and large effect size (Cohen's $d = 0.85$). There was also significant improvement on cognitive engagement, $t(36) = 6.45$, $p < 0.001$, where scores improved from ($M = 3.15$, $SD = 0.59$) to ($M = 3.88$, $SD = 0.53$), and a large effect size (Cohen's $d = 0.92$). The overall engagement indicated a statistically significant difference, $t(36) = 6.57$, $p < 0.001$, and mean scores improving from 3.15 to 3.84, strong correlation ($r = 0.76$), and large effect size (Cohen's $d = 0.95$). These findings appear to show that there was a significant positive effect from using MagicSchool.AI on students' academic engagement.

Discussion

The findings of this work offer strong evidence that employing MagicSchool.AI had positively impacted 8th-grade learners' educational engagement significantly. Statistically significant improvements were unveiled in all three measured engagement facets behavioral, emotional, and cognitive after 24 days' in-class deployment of the AI system.

Higher behavioral engagement thus means there had been greater work participation in class, active class participation, and instruction-following. This can be concretized in simplified and

interactive support which had been conveyed through the sequencing of lessons and communication of specific expectations by MagicSchool.AI. This follows previous research which shows improved class participation through the implementation of digital support (Holmes et al., 2021).

Higher emotional engagement indicates that there was increased interest and positive emotional reaction towards learning processes. This can be attributed to the individualized and adaptive characteristics in MagicSchool.AI, which can make the learning environment as student-centered and accommodating. Previous studies cited that emotional engagement has been increased when there has been relevance and enjoyment in the teachings (Fredricks et al., 2004; Wang & Eccles, 2012).

The greater increase in cognitive engagement indicates deeper learning, increased attention, and greater deployment of learning strategies. This indicates that the tool assisted in surface-level adherence as well as in promoting critical and reflective thinking among students. This potential of MagicSchool.AI in creating differentiated questions, prompts, and learning tasks may have aided this deeper level of engagement, as reported in similar research with intelligent tutoring systems (Luckin et al., 2016).

Overall, this study confirms the potential in using AI-powered interventions like MagicSchool.AI in sustaining learning in the middle school grade level, especially in private schools where utilization and access of information technology are possible. It should be kept in mind, however, that this study used one group alone and did not utilize any control group and so its findings apply only in the situation in which it was applied. Owing to this, though there is promise in the findings, it must be received with reservation.

Conclusion

This study attempted to examine the influence of MagicSchool.AI on 8th-grade students' learning engagement using a one-group pre- and post-test research design. Statistically significant improvements were identified in students' behavioral, emotional, and cognitive engagement in the post-test after a 24-day intervention. This finding provides support for the proposition that the application of AI-powered teaching assistance during class can improve student engagement and promote active learning.

This study contributes to the existing literature on applications of artificial intelligence research and falls particularly within the scope of applications regarding middle schools. It also provides education practitioners with practical knowledge on how to use intelligent planning and support systems to enhance instruction delivery and reduce teacher workload.

Due to a single-group experimental design and small, context-based sample size, future studies should explore larger and more diverse populations and control samples to verify and extend these results. In spite of these limitations, this research establishes how AI technology such as MagicSchool.AI can contribute to student-centered, engaging, and effective learning spaces.

Recommendations

1. Future researchers should include control groups and larger samples to strengthen the generalizability of findings.
2. Future studies should integrate MagicSchool.AI into classroom instruction to enhance student engagement effectively.
3. Teacher training should be provided on the optimal use of AI tools for personalized and engaging instruction.

4. The intervention in other schools may be replicated to validate and expand the study's findings.

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