INFLUENCE OF ARTIFICIAL INTELLIGENCE ON ADOLESCENTS' COGNITION, CREATIVITY AND MOTIVATION

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Abstract

This study examines the influence of artificial intelligence (AI) on adolescents' cognition, creativity, and motivation. It explores how AI tools influence cognitive flexibility, creativity, and intrinsic motivation to learn. A sample of 120 college adolescents from Thiruvananthapuram, Kerala, participated in the study, with measurements taken using the Cognitive Flexibility Inventory (CFI), Torrance Tests of Creative Thinking (TTCT), and the Academic Motivation Scale (AMS). The findings revealed significant positive effects of AI usage on cognitive development, creativity, and motivation, indicating that AI tools can enhance adolescents' cognitive and creative abilities while fostering greater intrinsic motivation.

Keywords:- Artificial Intelligence, Cognition, Creativity, Motivation, Adolescents, AI Tools, Intrinsic Motivation, Cognitive Flexibility.

*I*n the 21st century, Artificial Intelligence (AI) has transitioned from a futuristic concept to an integral component of daily life. From personalized content on social media to intelligent learning platforms in classrooms, AI technologies are increasingly embedded in the routines and experiences of today's adolescents. As digital natives, adolescents are particularly susceptible to the influence of such technologies, which not only shape how they interact with the world but also how they think, learn, and create. This transformation calls for a deeper examination of the cognitive, creative, and motivational impacts that AI may have

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on young people navigating their formative years.

Cognition, or the mental process of acquiring knowledge and understanding, is highly responsive to environmental stimuli during adolescence. AI-powered tools such as adaptive learning systems, recommendation algorithms, and voice assistants can personalize information delivery, enhance comprehension, and provide instant feedback.

However, the ease of access to information and the automation of cognitive tasks might also contribute to superficial learning, reduced memory retention, or overreliance on external systems. This duality highlights the need to evaluate whether AI technologies are enriching or impairing cognitive development among adolescents.

Similarly, the relationship between AI and creativity in adolescents presents a complex dynamic. On one hand, AI tools like generative art programs, music composition algorithms, and storytelling bots can serve as platforms for imaginative exploration and novel expression. These tools often encourage students to experiment and think divergently by offering new possibilities and perspectives. On the other hand, concerns arise regarding originality, dependence on pre-trained models, and the potential decline in traditional creative practices. It becomes imperative to investigate whether AI is serving as a muse or a crutch in the developmental stages of adolescent creativity.

Motivation, both intrinsic and extrinsic, plays a critical role in adolescent learning and achievement. AI systems,

particularly those used in educational technologies, frequently employ gamification, feedback loops, and adaptive challenges to foster engagement. While these strategies can boost motivation in the short term, there is an open question about their long-term efficacy and impact. The rapid integration of AI into educational and recreational environments means that its impact is no longer hypothetical but observable and measurable. Schools, parents, and policymakers must therefore understand the nuanced effects of AI on adolescents' psychological and intellectual development.

This study aims to explore the multifaceted influence of AI on adolescents' cognition, creativity, and motivation. By analysing both the benefits and the potential drawbacks of AI interactions, this study seeks to provide a balanced view of how intelligent technologies are shaping the minds of future generations. The findings are expected to contribute valuable insights for educators, developers, and caregivers, helping them make informed decisions about the role of AI in adolescent lives.

Significance of the Study

This study is significant as it explores how artificial intelligence (AI) influences key aspects of adolescent development - cognition, creativity, and motivation - during a critical stage of learning and identity formation. As AI tools become more common in educational and creative contexts, it is essential to understand their impact on how adolescents think, solve problems, express ideas, and stay motivated to learn. The findings will

provide valuable insights for educators, parents, and developers on how to use AI in ways that support rather than hinder mental growth, original thinking, and meaningful engagement with learning.

Furthermore, by examining both the positive and potentially adverse effects of AI, this study aims to inform the development of age-appropriate, ethically designed AI tools that align with educational goals. Understanding the influence of AI on adolescents will help shape future teaching practices, technology integration strategies, and policy decisions. It will also contribute to the growing body of knowledge on how emerging technologies interact with human development, particularly during such a formative stage of life.

Statement of the Problem

The increasing integration of artificial intelligence (AI) into educational, social, and creative platforms has significantly altered the developmental environment of adolescents, yet its specific effects on their cognition, creativity, and motivation remain insufficiently understood. While AI technologies offer potential benefits such as personalized learning, creative assistance, and increased engagement, concerns persist regarding overreliance, reduced critical thinking, diminished originality, and altered motivational patterns. The lack of comprehensive research focused specifically on adolescents - a group undergoing crucial cognitive and emotional development - creates a critical gap in understanding how these technologies are shaping their mental processes and behaviours. This study seeks to address this gap by investigating the complex and nuanced ways AI influences adolescents' cognitive development, creative expression, and motivational dynamics.

Objectives

1. To examine the influence of artificial intelligence on adolescents' cognitive development.

2. To investigate the relationship between adolescents' use of AI technologies and creative thinking abilities.

3. To assess how AI-based educational tools influence adolescents' intrinsic motivation to learn.

4. To explore the overall influence of artificial intelligence on the interaction between cognition, creativity, and motivation in adolescent learners.

Hypotheses

H01. There will be significant influence of AI in adolescent cognitive development.

H02 - There will be significant positive relationship between adolescents' use of AI and creativity.

H03 - There will be significant difference in intrinsic motivation to learn between adolescents' who use AI tools frequently and those who do not.

H04 - There will be significant influence of AI on the interaction between cognition, creativity, and motivation in adolescent learners.

Scope of the Study

The scope of this study focuses on investigating the influence of artificial

intelligence (AI) on adolescents' cognition, creativity, and motivation, specifically targeting late adolescents. It examines how interactions with AI-driven tools and platforms, including educational applications and creative technologies, influence cognitive abilities, creative expression, and learning motivation.

Review of Literature

Artificial intelligence is increasingly integrated into modern education, significantly influencing the cognitive development of adolescents. Cognitive flexibility—adapting thinking and behaviour to changing situations, is essential during this developmental stage. AI-powered platforms like adaptive learning systems offer personalized content, promoting problem-solving and deeper understanding (Holmes et al., 2019). However, concerns persist about over-reliance on these tools potentially reducing adolescents' critical thinking and independent learning (Richtel, 2020).

AI's influence on adolescent creativity is equally significant. Tools such as generative art and music software can inspire new forms of self-expression, encouraging originality and divergent thinking (Boden, 2016). Yet, excessive dependence on AI-generated outputs may hinder independent creative thinking (Elgammal et al., 2017).

Motivation is another key area where AI has an impact. AI-driven platforms enhance engagement through personalized learning and gamification, boosting intrinsic motivation by aligning with learners' interests (Baker et al., 2019). However, reward-based systems may encourage short-term extrinsic motivation without fostering sustained interest (Ryan & Deci, 2000; Vansteenkiste et al., 2004).

Beyond academics, AI influences adolescent decision-making by offering data-driven support that improves efficiency (Keller et al., 2019). Still, an over-dependence on AI tools can limit critical evaluation and autonomous decision-making (Schneider et al., 2020). These developments highlight the need for a balanced approach to integrating AI in education—maximizing its benefits while safeguarding adolescents' cognitive, creative, and motivational growth.

Research Methodology

Research Design:

This study employs a quantitative, correlational research design to examine the relationship between AI usage and adolescent cognitive flexibility, creativity, and motivation.

Data Sources:

Data were collected using standardized tools:

- Cognitive Flexibility Inventory (CFI)

- Torrance Tests of Creative Thinking (TTCT)

- Academic Motivation Scale (AMS), adapted for Indian adolescents

- Investigator-prepared AI Usage Questionnaire

Sampling Techniques:

Purposive sampling was used to select adolescents aged 18–22 from colleges in Thiruvananthapuram, Kerala, who regularly use AI-based educational or creative platforms.

Analytical Tools:

- Independent Samples t-test to compare cognitive outcomes between frequent and infrequent AI users.

- Pearson's Correlation Analysis to assess the relationship between AI usage and creativity.

- One-Way ANOVA to evaluate differences in intrinsic motivation across AI usage groups.

- Multiple Regression Analysis to determine the predictive value of AI usage on cognitive flexibility, creativity, and motivation, while controlling for demographic variables.

Procedures Followed:

After obtaining informed consent, participants completed the assessment tools in a controlled setting during setting during a single session. Data were collected electronically via secure online forms, anonymised and analysed statistically to explore the impact of AI usage on adolescent development outcomes.

Result and Interpretation

Hypothesis 1: There will be a significant influence of artificial intelligence on adolescent cognitive development (Table 1).

The Independent Samples t-test revealed a statistically significant difference in cognitive flexibility scores between adolescents who frequently use AI and Non AI users, $t(118) = 3.21$, $p = .002$. As shown in Table 1, frequent AI users reported higher cognitive flexibility compared to their peers with limited AI exposure. This result indicates that AI engagement has a significant positive impact on cognitive development, particularly on adolescents' ability to shift thinking, adapt to new information, and manage cognitive tasks—core functions measured by the Cognitive Flexibility Inventory (CFI).

This finding aligns with the theoretical premise that interactive AI environments, which adapt to users' inputs and provide immediate feedback, can foster mental flexibility and problem-solving skills. Such systems may simulate real-world complexities, encouraging learners to reconsider strategies and adjust their cognitive approaches dynamically.

Supporting this view, Luckin et al. (2016) emphasized the role of AI in enhancing learners' metacognitive abilities through personalized learning systems. Similarly, Kose and Sert (2020) reported that students exposed to AI-enhanced instruction displayed improvements in adaptive thinking and decision-making skills, which are components of cognitive flexibility. These findings bolster the current study's conclusion that AI usage is significantly associated with higher levels of cognitive flexibility among college adolescents.

Hypothesis 2: There will be a significant positive relationship between adolescents' use of AI and creativity. (Table 2)

The Pearson product-moment correlation analysis revealed a significant positive relationship between adolescents' use of AI tools and their creativity,

Table 1

Independent Samples t-test Comparing Cognitive Flexibility Scores Between AI Users and Non AI Users

Group	N	Mean	Standard Deviation	t value	p value
AI users	60	42.15	5.20	3.21	0.002*
Non AI Users	60	38.40	6.10		

Source: Primary Data

Table 2

Pearson Product-Moment Correlation between AI Usage and Creativity Scores

Variables	Mean	Standard Deviation	r value	p value
AI usage	3.72	0.85	0.47	0.001**
Creativity	34.85	7.20		

Source: Primary Data

$r = .47$, $p = .001$. The results indicate that as the frequency and intensity of AI usage increase, so do adolescents' creativity scores on the Torrance Tests of Creative Thinking (TTCT), which measures fluency, originality, and flexibility in thought.

This significant positive correlation suggests that AI tools may be enhancing creative thinking in adolescents by providing them with novel, interactive, and stimulating learning environments. These tools often encourage users to think outside the box, solve problems in innovative ways, and explore new possibilities - key components of creativity. The adaptive nature of AI systems could also provide individualized challenges and feedback that push learners to expand their thinking beyond traditional boundaries.

The current findings are consistent with previous research on the relationship between digital technologies and creativity. Sawyer (2017) argued that digital tools, including AI, facilitate creativity by offering opportunities for exploration and iteration. Additionally, studies like those by Kose and Sert (2020) have highlighted that AI-supported environments can promote both convergent and divergent thinking—important dimensions of creativity—by allowing users to engage with open-ended tasks and complex problems that require creative solutions.

This study contributes to the growing body of literature suggesting that AI usage can fostercreative abilities, particularly in adolescents, by providing an engaging and dynamic platform for creative exploration. The significant correlation observed in this study reinforces the idea that AI can be a useful tool for stimulating creative thinking in educational settings.

Hypothesis 3: There will be a significant difference in intrinsic motivation to learn between adolescents who use AI tools frequently and those who do not (Table 3).

The One-Way ANOVA indicated a significant difference in intrinsic motivation to learn between adolescents who frequently use AI tools ($M = 65.80$, $SD = 7.35$) and those who do not ($M = 61.90$, $SD = 8.40$), $F(1, 118) = 5.62$, $p = .020$. This result suggests that frequent users of AI tools report higher levels of intrinsic motivation to learn compared to their counterparts who use AI tools infrequently.

The difference in intrinsic motivation highlights the positive effect of AI tools on adolescents' motivation. AI systems often provide a personalized and adaptive learning experience, which may increase students' feelings of competence, autonomy, and relatedness - factors that are central to intrinsic motivation (Ryan & Deci, 2000). The interactive, engaging, and rewarding nature of AI-based educational tools may help foster a deeper interest in learning, leading to increased intrinsic motivation.

These findings are consistent with previous research, such as Deci et al. (1991), which found that personalized learning experiences contribute to enhanced intrinsic motivation. In a study by Kose and Sert (2020), students who used AI-powered educational tools exhibited higher engagement and motivation, particularly in contexts requiring critical thinking and problem-solving. The current study builds on this by showing that AI tools can have a similar impact on intrinsic motivation among Indian adolescents, emphasizing the role of AI in fostering a genuine desire to learn.

This study highlights the importance of integrating AI in educational practices, especially in fostering intrinsic motivation, which is linked to better learning outcomes. The results support the use of AI tools as a motivational strategy to promote more effective learning experiences among adolescents.

Hypothesis 4: There will be significant influence of AI on the interaction between cognition, creativity, and motivation in adolescent learners (Table 4).

The results of the Multiple Regression Analysis reveal that the overall model significantly predicted the interaction between cognition, creativity, and motivation in adolescent learners who use AI tools, $F(3, 116) = 28.67$, $p < .0001$, $R^2 = 0.58$. The individual predictors — cognitive flexibility ($\beta = 0.45$, $p = .001$), creativity ($\beta = 0.32$, $p = .001$), and intrinsic motivation ($\beta = 0.38$, $p = .001$) - were all significant, indicating that AI usage positively influences each of these domains.

The significant positive â values suggest that greater AI use is associated with higher cognitive flexibility, enhanced creativity, and stronger intrinsic motivation. In essence, AI usage is having a compounding effect on adolescents' cognitive and creative capabilities, while also fostering a deeper, self-driven interest in learning. These findings align with the theoretical framework suggesting that AI systems, by offering personalized, dynamic interactions, promote adaptive

Table 3

One-Way ANOVA Comparing Intrinsic Motivation between Frequent and Infrequent AI Users

Group	N	Mean	Standard Deviation	F value	p value
AI users	60	65.80	7.35	5.62	0.20**
Non AI Users	60	61.90	8.40		

Source: Primary Data

Table 4

Multiple Regression Analysis for the Influence of AI on the Interaction Between Cognition, Creativity, and Motivation

Predictor Variables	β	SE β	t-value	p-value
Cognitive Flexibility	0.45	0.12	3.75	.001
Creativity	0.32	0.09	3.56	.001
Intrinsic Motivation	0.38	0.11	3.44	.001
R²	**0.58**			
F-value	28.57			.001

Source: Primary Data

thinking, innovative problem-solving, and intrinsic motivation in users (Ryan & Deci, 2000).

The study's results are consistent with findings by Kose and Sert (2020), who reported that AI-supported learning environments improve both cognitive flexibility and creativity. Similarly, Luckin et al. (2016) discussed how AI tools enhance motivation by providing immediate feedback and tailored learning experiences, which are crucial for developing intrinsic motivation in educational settings.

The findings provide strong evidence that AI tools significantly influence the interaction between cognition, creativity, and motivation among adolescent learners, suggesting that integrating AI into educational contexts could foster a more engaging and effective learning environment. These results emphasize the potential of AI to enhance various cognitive and motivational outcomes simultaneously, benefiting adolescents' holistic development.

Conclusion

The findings of this study highlight the significant positive influence of artificial intelligence (AI) on adolescents' cognitive development, creativity, and motivation. AI tools were shown to enhance cognitive flexibility, foster creativity, and increase intrinsic motivation to learn, suggesting that AI can play a crucial role in shaping educational experiences for adolescents. These results emphasize the potential of AI to provide personalized, engaging, and adaptive learning environments that stimulate both

cognitive and motivational growth. Integrating AI in educational settings could therefore be a valuable strategy for supporting holistic development in adolescent learners, promoting not just academic success but also creative and intrinsic engagement with learning.

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