Optimizing Student Success: The Impact of Generative AI in Teaching and Learning


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Unveiling the Power of This Study

This study delves into the transformative potential of generative artificial intelligence (AI) in reshaping educational methodologies in higher education course design.

By integrating AI technologies into teaching and learning, educators can create personalized and adaptive learning experiences that enhance student success.

Centered on mastery learning course design principles, this research investigates how AI tools can streamline curriculum development, generate impactful teaching materials, and boost student engagement.

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Purpose of the Study

This study aims to answer the following research question:

What are the perceptions and experiences of higher education faculty using generative AI tools to influence the development of online courses?

Mastery Learning: A Foundational Framework

1

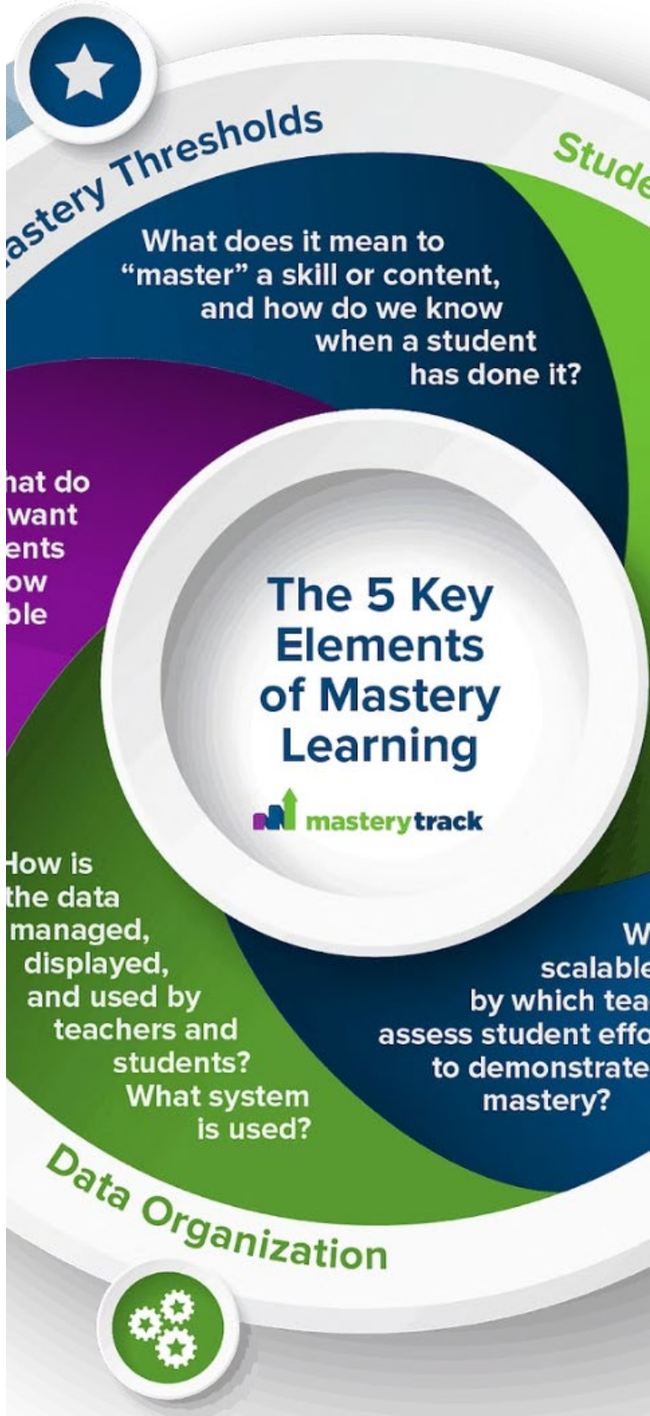
Ensuring Competence

Mastery learning, as described by Bloom (1968), emphasizes the importance of ensuring that every student attains a predetermined level of competence before progressing to the next level of instruction. This concept forms the foundation for contemporary discussions on personalized and adaptive learning.

2

Positive Outcomes

Johnson (2019) indicated that mastery learning has shown positive outcomes regarding student achievement and engagement, making it a valuable framework for integrating AI technologies in education.



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Artificial Intelligence (AI) in Education

1 Skill Development

AI promotes skill development in communication and collaboration, enhancing teaching and learning through innovative, personalized approaches.

2 Instructional Design

AI's integration in instructional design leverages data for improved learning environments and outcomes, fostering student engagement.

3 Personalized Learning

Generative AI revolutionizes education through personalized learning pathways, increasing student engagement and success.

Generative AI in Mastery Learning and Course Design

Personalized Pathways

Generative AI bridges the gap between student needs and educational content, enabling faculty to continuously adapt and enhance course materials, thus aligning with personalized mastery learning principles.

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Instructional Design Impact

AI influences instructional and course design, integrating tools like speech recognition, plagiarism detection, and video editing. These tools facilitate innovative course development, aligning learning outcomes, personalizing assessments, and enhancing overall design.

Chatbots in Education

1

Virtual Tutors

AI transforms the vision of a virtual tutor, accessible anytime, into reality, redefining learning approaches with chatbot systems.

2

Personalized Assistance

These AI-enabled courses offer insights into student engagement, allowing course modification based on data analysis. AI tutors provide personalized academic assistance, adapting to each student's progress.

3

Adaptive Learning

Chatbots facilitate adaptive learning environments, providing timely feedback and support to guide students toward mastery.

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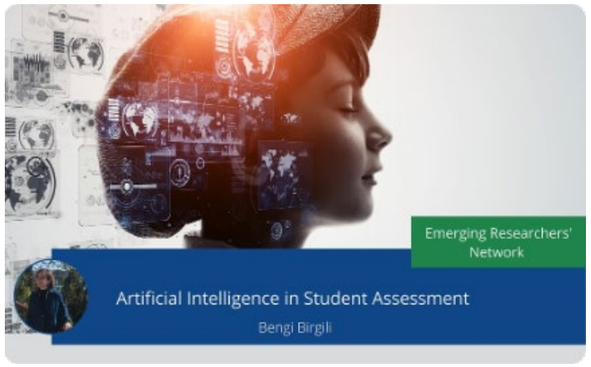
AI and Personalized Learning Experiences

Virtual Tutors

AI-powered chatbots act as virtual tutors, providing personalized academic assistance and adapting to each student's progress and learning needs.

Adaptive Content

Generative AI enables the creation of adaptive educational content, tailored to diverse learning styles and preferences, enhancing student engagement and success.



Data-Driven Insights

AI analyzes student data and learning patterns, providing insights for educators to make informed decisions about instructional strategies and personalized assessments.

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AI-Driven Assessments

Personalized Assessments

AI analyzes learning patterns to tailor assessments, enhancing accuracy and supporting diverse learning styles.

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Efficient Question Generation

AI improves efficiency in education by creating efficient short-answer questions, while teachers ensure alignment with learning objectives.

Inclusivity

AI-generated assessments promote inclusivity by catering to diverse learning needs and preferences.

Timely Feedback and Adaptive Learning Environments

AI-Driven Feedback

AI can provide immediate and targeted feedback, guiding students toward mastery and helping educators make data-informed decisions about instructional strategies.

Personalized Learning Experiences

Machine learning and AI are central to 21st-century education, supporting educators in creating personalized, adaptive, and mastery-based learning experiences.

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Theoretical Framework and Mixed Methods Approach

Quantitative

The quantitative part involves Likert-scale questions assessing AI's efficacy in various aspects of higher education.

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Qualitative

The qualitative segment includes open-ended responses for in-depth analysis, uncovering key patterns and themes related to AI's influence on course design and student success.

Survey Results: Effectiveness of AI Tools

Category (Rated Strongly Agreed)	Percentage
Streamline the curriculum development process for quicker content production	80.95%
Create effective teaching materials	71.43%
Integrate with adult learning theories to increase student success	71.43%
Integrate with adult learning theories to increase student engagement	66.67%
Improve the quality of learning	66.67%
Provide enhanced student interaction and support using chatbots and AI tutors	57.14%
Accommodate student's diverse learning styles and needs	52.38%

Benefits of AI in Higher Education

1 Streamline Course Development

AI tools expedite course design and development, conserving time and resources.

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2 Efficiency and Time-Saving Content Creation

Faculty can create educational content, presentations, and videos more quickly with AI assistance.

3 Prompt Student Support

Chatbots offer students 24/7 assistance, promptly answering questions and increasing accessibility.

4 Creativity and Personalization

AI tools enable creative and personalized content, catering to diverse learning needs and preferences.

Challenges of AI in Higher Education

Accuracy and Verification

AI tool accuracy requires verification to avoid compromising information quality.

Critical Thinking Impact

AI use raises concerns about diminishing critical thinking and student cheating.

Faculty Training

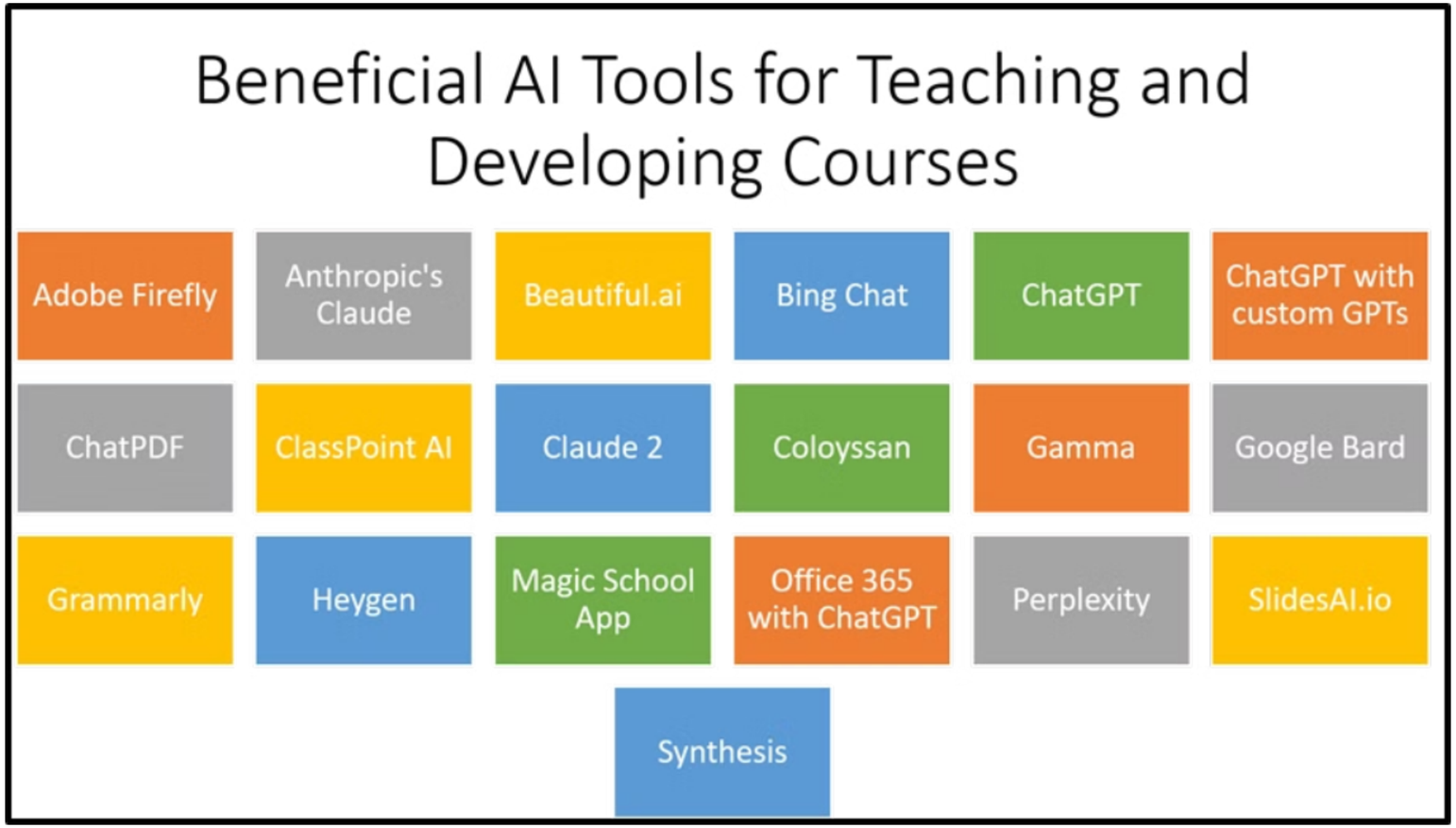
Faculty need training on AI tools and best practices for effective teaching integration.

Lack of Guidance and Direction

Need to address how to incorporate AI into the teaching and learning process.

Lack of direction from universities and administrators.

Beneficial AI Tools for Higher Education



Adobe Firefly	Provides different visual examples of ideas and quickly creates images without having experience with the tools.
Anthropic's Claude	Use for writing. Very concise and professional.
Beautiful.ai	Create presentations
Bing Chat	Use for research
ChatGPT	Creates course content and learning materials. Create outlines for seminars. Rewords or rephrase sentences to help clarify thoughts and ideas.
ChatPDF	Summarize PDF files.
ClassPoint AI	Generate questions from PowerPoint presentations.
Claude 2	Create outlines for seminars and course structure
Coloyssan	Create multimedia/video presentations.
Google Bard	Helps reword or rephrase sentences to help clarify thoughts and ideas
Heygen	Used for videos and voice

Most Beneficial AI Tools for Higher Education

ChatGPT

ChatGPT emerged as the most cited valuable tool by 57% of the respondents.

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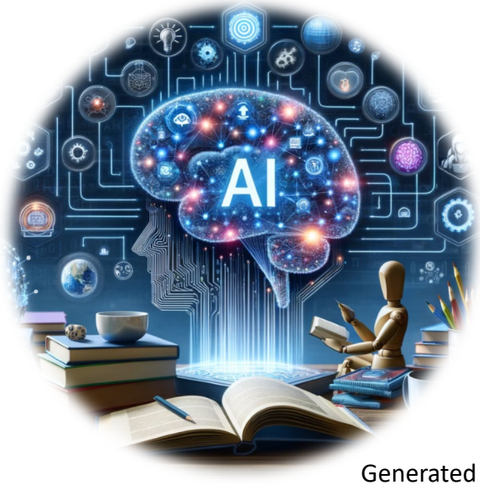
Anthropic Claude

Anthropic Claude was mentioned as a valuable AI tool by 24% of respondents.



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Google Bard (Gemini)

Google Bard (Gemini) was also cited as a beneficial AI tool by 24% of respondents.

Additional Insights on AI Tools

1

Content Creation and Writing

Respondents find generative AI tools beneficial for content creation, writing, and research tasks.

2

Efficiency and Time-Saving

Some tools are valued for their efficiency and time-saving capabilities in educational settings.

3

Visual Content and Presentations

Certain AI tools are acknowledged for contributing to visual content creation or interactive presentations.

4

Versatile Applications

The survey highlights the diversity of tools available and their versatile applications in teaching and course development.

Implications and Discussion

Best Practices

Additional research is needed to establish best practices for using AI in teaching and course development.

Training programs should be developed to educate faculty on the various AI tools.

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Student Perspectives

Understanding students' perceptions of AI is crucial for gaining insights into how they value and utilize these technologies in their learning.

Exploring students' experiences with AI tools can inform educators about the effectiveness, challenges, and potential improvements needed.

Ethical Considerations

Data Privacy

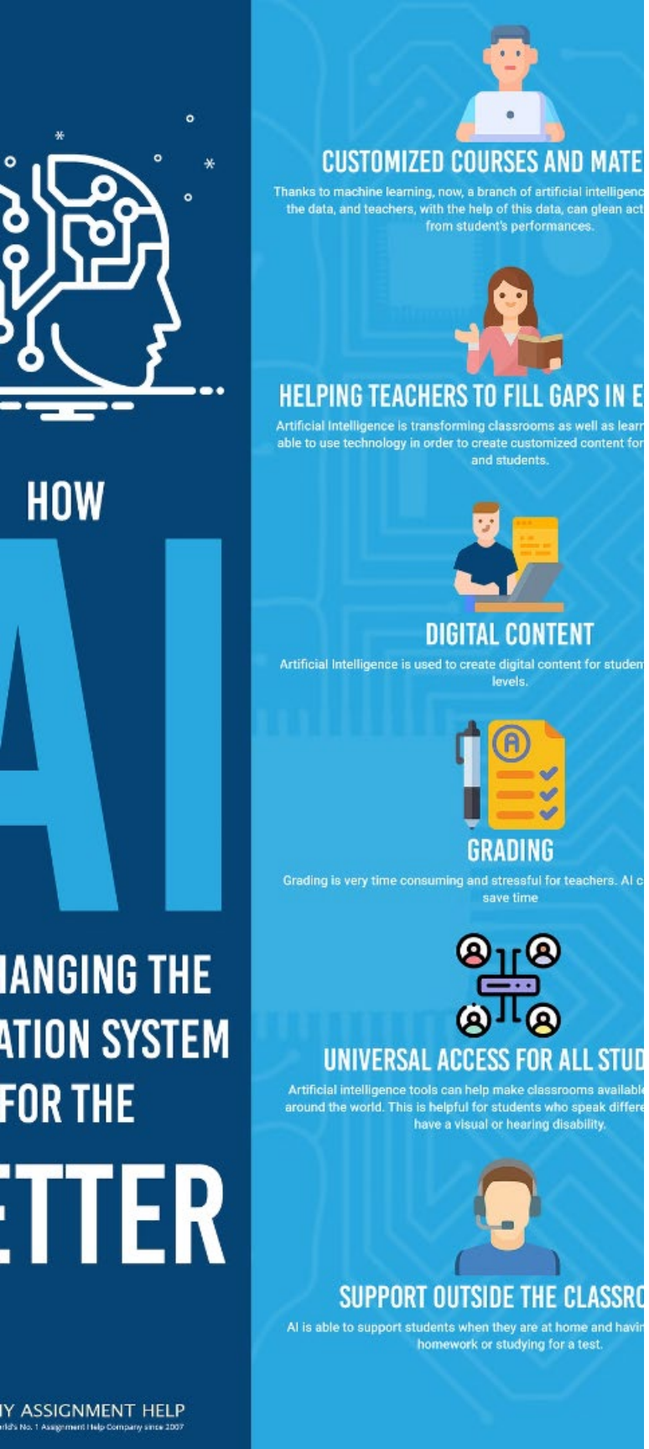
Ethical considerations, including data privacy, must be addressed as AI becomes more integrated into educational frameworks.

Educator Autonomy

Preserving the autonomy of educators and their ability to make pedagogical decisions is essential when incorporating AI tools.

Critical Pedagogy

Maintaining critical pedagogical discourse and ensuring AI does not diminish the importance of critical thinking and analysis is a key concern.



Conclusion: Positive Perception of AI in Higher Education

1

Curriculum Development

The study results reveal a generally positive stance on AI's role in education, with 80.95% strongly affirming its effectiveness in curriculum development.

2

Teaching Materials and Student Success

71.43% strongly agreed on AI's efficacy in creating impactful teaching materials and promoting student success.

3

Diverse Learning Needs

The combined 'strongly agree' and 'agree' responses across all categories underscore the favorable perception of AI's integration in higher education, including its ability to cater to diverse learning needs.

Qualitative Insights

Concerns

However, concerns were raised about accuracy, critical thinking, faculty training, and administrative guidance regarding AI integration.

Benefits

Qualitative feedback points to AI's benefits in course development, efficiency, and student support.

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Tool Adaptability

The variety of AI tools mentioned by participants reflects the technology's adaptability in enhancing educational practices.

Ongoing Research and Ethical Vigilance

1

Broadening Understanding

This ongoing research aims to broaden the understanding of AI's educational implications, focusing on ethical considerations such as data privacy, educator autonomy, and critical pedagogy.

2

Evolving Tech Landscape

The study is a precursor to more extensive research in the evolving tech landscape, emphasizing the need for ethical vigilance as AI becomes more entrenched in educational frameworks.

3

Responsible Integration

The preliminary insights contribute to a larger conversation on responsibly leveraging AI's potential in education while addressing its challenges.

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