Increasing equity and access with personalized AI learning support

Inside UAZ-Funded Scholarship

September 12, 2024

3:00pm – 4:00pm

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Land Acknowledgement

Increasing equity and access with personalized learning support

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Event Introduction





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Director, External Relations, School of Mathematical Sciences
Research Professor of Mathematics

AI Adaptive Learning in Higher Education

- Integration of machine learning technology and educational theory
- AI has the potential to personalize learning experiences based on individual student needs and preferences
- Real-time adjustments to content, pacing, sequencing, and interactive assistance
- Potential to address diverse learning styles and backgrounds

Image Source: Adobe Stock, GenAI by Summit Art Creations

AI takes many familiar forms

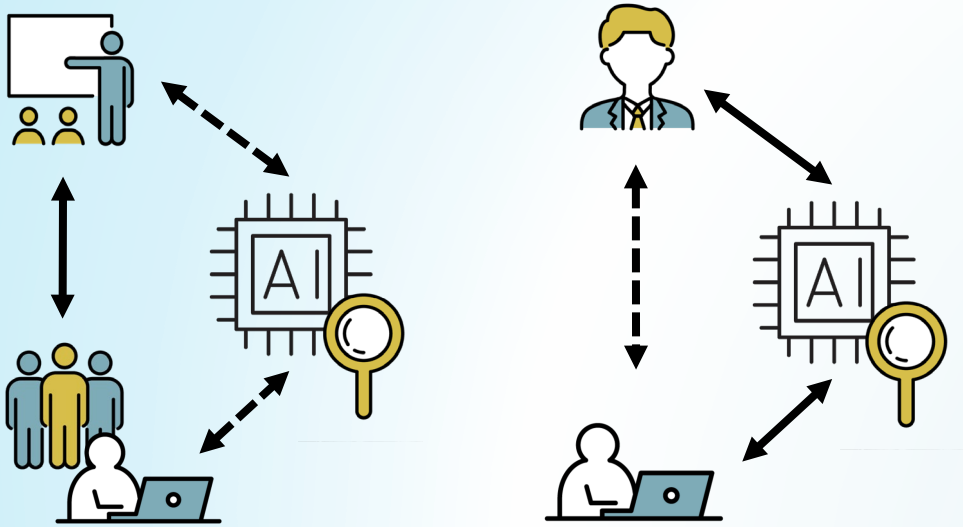
- Conversational AI: Siri, Alexa
- Generative AI: Chat GPT, Claude, DALL-E
- AI-powered language tutoring systems: Babbel
- AI personalized learning systems: ALEKS Adaptive Learning

Image Source: Adobe Stock, GenAI by Phichitpon

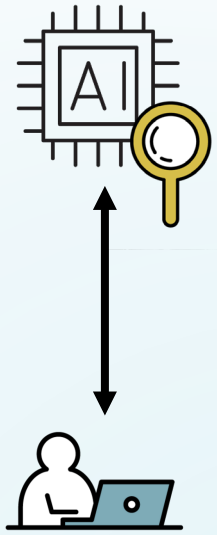
GenAI is an unexpected but predicted surprise—a Grey Swan event.

AI Teaching and Learning Models

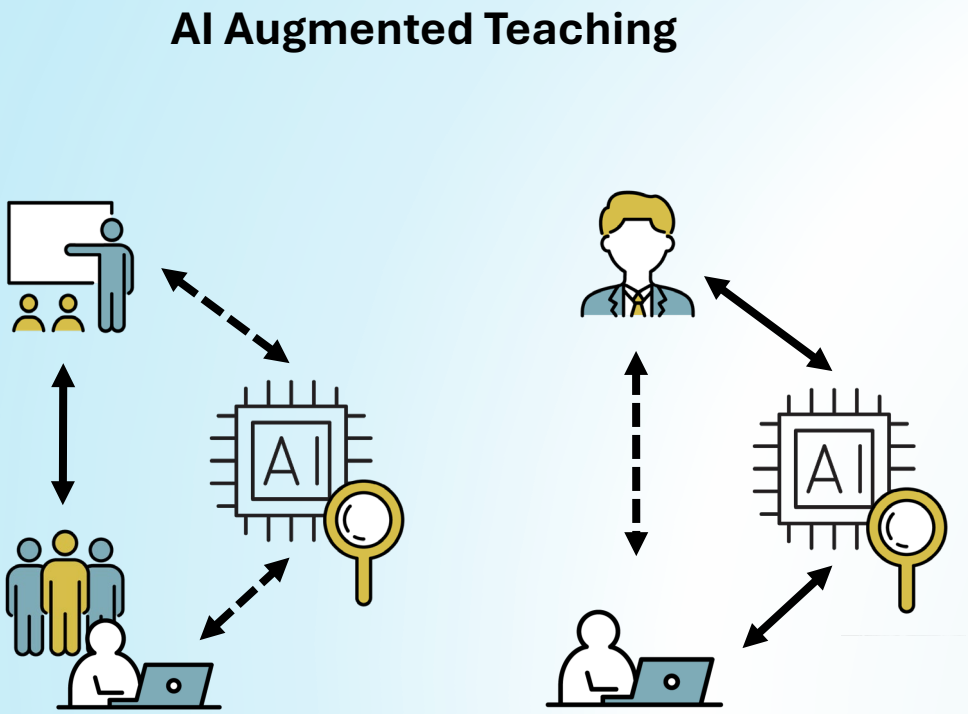
AI Augmented Teaching



AI Teaching



AI Integration

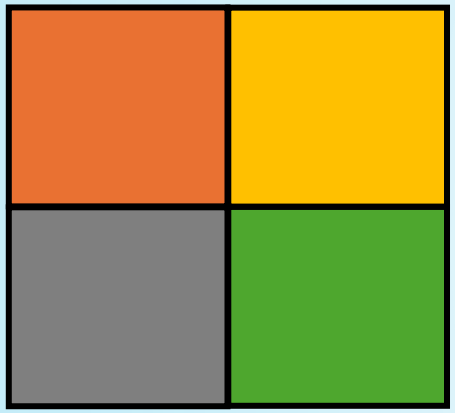


Two types of AI

- Generative AI: GPT 4.0 for course content
- AI personalized learning system: Cerego

PALS Research Question

PALS:
Personalized
Adaptive
Learning
System



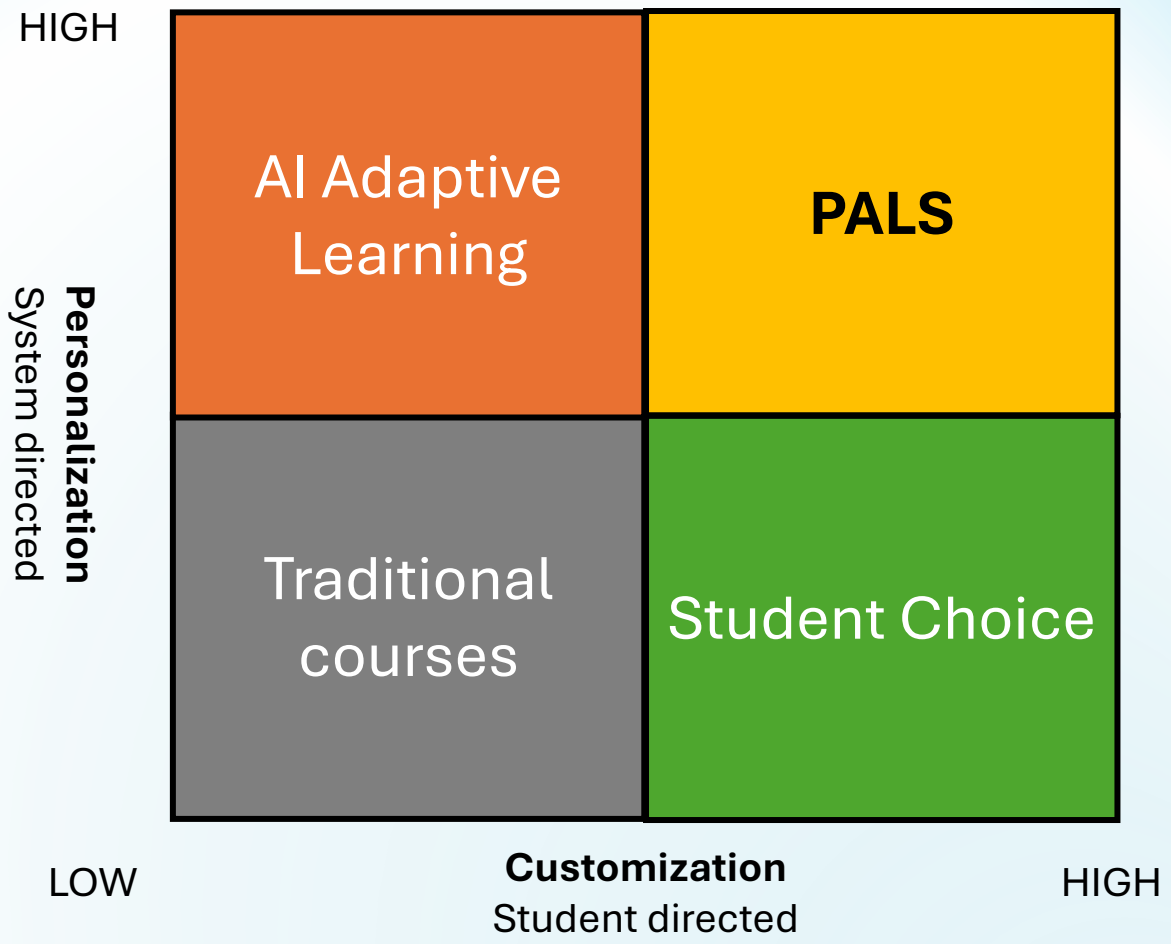
How can we integrate AI adaptive learning with in-person instruction to:

1. Foster individual student success
2. Expand access to education
3. Build more equitable and inclusive learning environment

The PALS Framework

AI adaptive learning creates a personalized experience based on student behavior and learning assessments.

Customization creates a sense of student ownership and control over their learning experience, as students are actively involved in shaping it.



The PALS Study

Large-scale, multi-disciplinary investigation

- 20 courses across diverse academic fields, offered 1 to 3 times
- 18 instructors
- Over 1,000 undergraduate students

Instructors integrated AI adaptive learning components in courses

- Within subjects A-B experimental design

2024-2025: Confirmation studies and some additional methods testing

Mixed methods approach

- Surveys, interviews, focus groups, learning analytics, course performance data, and educational records
- Student experience, satisfaction, and learning outcomes
- Faculty experience, support requirements, and workload

Theoretical Framework

Adaptive Learning Systems Theory (Peng et al., 2019)

- Focuses on personalized learning paths
- Emphasizes competency-based progression
- Utilizes learner profiles for customization

Social constructivism (Rumjaun & Narod, 2020)

- Emphasis on social interaction and collaborative learning

Universal Design for Learning (CAST, 2018)

- Multiple means of engagement, representation, and expression

Student-AI Collaborative Learning Theory (concept from PALS study)

- An extension of Collaborative Learning Theory that posits learners benefit from working together to create meaning, explore a domain, or improve skills. (Dillenbourg, 1999)
- Explores synergy between human cognition and AI capabilities
- Emphasizes co-construction of knowledge collaborating with AI
- Considers ethical implications of AI in education

Key Findings

Student Learning Outcomes

- Mixed and inconsistent results, + for 31% of students
- Varied by discipline, design approach, and student orientation

Student Engagement and Satisfaction

- Net positive effect on both measures for majority of students

Faculty Attitudes and Approaches

- Increased course prep workload
- Did not change instructional approaches

Challenges and Limitations

- Rapidly developing technology
- Current tech does not support some desired functionality (e.g., individual student learning paths)
- Integration of individualization with calendar-locked course schedules

Implications for Teaching Practice

Instructional Practice

- AI adaptive learning can be integrated within existing teaching approaches rather than replacing them.
- Focusing on key learning objectives can help manage the increased course preparation workload.
- Developing simple student paths with options for remediation and acceleration can be effective.
- Incorporating student choices can increase engagement and satisfaction.

Implementation Considerations

- Balancing AI personalization with human collaborative learning experiences is valuable for student development.
- Faculty training and support are crucial for effective AI integration.
- Aligning individualized learning paths with fixed course schedules is a challenge.
- Continuous evaluation and refinement of AI implementations are necessary to ensure they are meeting access and equity goals.

Access and Equity

- AI support can provide additional resources and guidance for struggling students, potentially reducing achievement gaps.
- Student-AI collaboration can create a “safe place” for student to ask for help on basic concepts and skills.
- Flexible learning options may improve accessibility for non-traditional and post-traditional students, but student directed options such as Blackboard Ally are effective and preferred.

It is essential to consider the ethical implications and potential biases in AI systems to ensure they promote rather than hinder equity.

Speaker & Panelists

Kathleen Kennedy
CUES Distinguished Fellow
Associate Professor of Practice, Retailing & Consumer Sciences
College of Agriculture, Life & Environmental Sciences

Elif Kavakci
Associate Professor of Practice,
Fashion Industry's Science & Technology
College of Agriculture, Life & Environmental Sciences

Samyukta (Sam) Krishnamurthy
Assistant Professor of Practice, Physics
College of Science

Linda Friend
Lecturer, Nutritional Sciences & Wellness
College of Agriculture, Life & Environmental Sciences

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Q&A

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Sources

Dillenbourg, P. (1999). What do you mean by collaborative learning? In P. Dillenbourg (Ed.), *Collaborative-learning: Cognitive and Computational Approaches* (pp. 1–19). Oxford: Elsevier.

CAST. (2018). Universal Design for Learning Guidelines version 2.2. http://udlguidelines.cast.org

Peng, H., Ma, S., & Spector, J. M. (2019). Personalized adaptive learning: An emerging pedagogical approach enabled by a smart learning environment. *Smart Learning Environments, 6*(1), 1-14.

Rumjaun, A., & Narod, F. (2020). Social Learning Theory—Albert Bandura. In *Science Education in Theory and Practice* (pp. 85-99). Springer, Cham.

Upcoming CUES Events

View CUES Events

October 14, 2-3PM

Featuring Jessica Retis, CUES Distinguished Fellow

School of Journalism | College of Social & Behavioral Sciences

November 12, 12-1PM

Featuring Bryan Carter, CUES Distinguished Fellow

Center for Digital Humanities; Africana Studies | College of Humanities

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CUES Distinguished Fellowships:

Spring 2025 | Dates to be announced soon

Read more & view office hours >>>

NOTE: *Look out for workshop series to support proposal preparation in early Spring!*

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