COLTER WEHMEIER

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EDUCATION

PhD Candidate, Informatics, University of Illinois Urbana Champaign, 2026 (anticipated)
PhD Candidate, Science and Technology in Cultural Heritage, The Cyprus Institute, 2026 (anticipated)
Two doctorates pursued concurrently under a joint UIUC-NCSA and Cyprus Institute agreement.

M. Architecture, University of Illinois at Urbana-Champaign, 2019
B.Sc, Architectural Studies, University of Illinois at Urbana-Champaign, 2016

RESEARCH POSITIONS

The Science and Technology in Archaeology and Culture Research Center,
The Cyprus Institute   2018 - Present
Graduate Research Assistant, Virtual Environments Laboratory (VELab)   *Aglantzia, CY*

· Research Lead: Dr. Georgios Artopoulos
· Developed interactive software for public engagement and education with cultural heritage and the arts across the EU.
· Operated Dariah codesign and cultural heritage workshops to survey populations, design architectural interventions, and publish statistical, spatial, and qualitative results .
· Leading development of immersive virtual environment reconstructions for preservation of modern architectural heritage, currently featured in major cultural exhibition at Bank of Cyprus Cultural Foundation.

National Center for Supercomputing Applications,
The University of Illinois at Urbana-Champaign   2016 - Present
Fiddler Innovation Fellow, Advanced Visualization Lab (AVL)   *Urbana, IL*

· Research Lead: Dr. Donna Cox (2016-2020), Kalina Borkiewicz (2020-2023), Matthew Turk (2023-Present)
· Developed software for accessing and storing digital cultural heritage assets in AR/VR.

National Center for Supercomputing Applications (NCSA),
The University of Illinois at Urbana-Champaign   2013 - 2016
SPIN Fellow (Students Pushing Innovation), Advanced Visualization Lab (AVL)   *Urbana, IL*

· Advisor: Dr. Donna Cox
· Developed VR interfaces and experiences for scientific data, architecture, and heritage.

RESEARCH FOCUS

HERITAGE THROUGH CREATIVE PARTICIPATION
Digital Architectural Humanities

· Developing creative and participatory approaches to heritage studies, where the creation of new artifacts and practices builds greater clarity, dialogue, and relevance to heritage.
· Focusing specifically on design and technology developments of the 20th century, implemented through serious games, interactive museum installations, and urban heritage co-design methodologies.

SCAFFOLDING INTERACTION
Design-Based Research

· Investigating fundamental utilities for immersive computing and interactive software to create enhanced learning environments, thinking tools (visualization, fluid tinkering), and spaces for dialogue in museums.
· Engaging design concepts such as 'divergent collaboration' to integrate meaningful play into computational environments.

COLLABORATIVE DIGITAL CULTURE
Experimental Collaborative Media

· Enabling greater degrees of co-design and participation in digital cultural projects through mass collaboration, play, and the authorship of shared digital artifacts.
· Developing methodological and technical frameworks that democratize the creation and interpretation of cultural heritage.

BIO

As a dual-PhD candidate at UIUC and the Cyprus Institute, my work bridges Informatics with 20th-century cultural heritage studies. I develop software to support public-inclusive spatial research through interactive, interpretive, and participatory interfaces.

Leveraging Building Information Modelling (BIM) and Virtual Environments (VEs), my research contributes a comprehensive methodology to the Architectural Digital Humanities, by transforming scholarship-backed virtual environments from the products of research to participatory research platforms in themselves; tools for collecting and integrating public-contributed insights, stories, and media into an evolutionary model.

A key theoretical underpinning of my research is Bernard Stiegler's concept of mnemotechnical systems, which advocates for a holistic view of memory infrastructure, merging social practices with technological frameworks to support collective memory.

This work is supported by the Fiddler Innovation Fellowship at the National Center for Supercomputing Applications (NCSA), which advances computational approaches for art, humanities research, and public engagement. By integrating high-performance computing with participatory design, my research fosters equitable access to cultural heritage and empowers communities to contribute to the preservation and interpretation of shared memory.

FELLOWSHIPS/GRANTS

Received:

- **Fiddler Innovation Graduate Student Fellowship**, 2017-2025
  Awarded to students addressing cultural/global challenges that incorporate art and technology

- **Conference Presentation Award: Culture and Computing (KUI)**, 2023
  Awarded to students students traveling to an academic conference to present research.

- **Student Led Initiative Grant**, Student Sustainability Committee (SSC),
  University of Illinois at Urbana-Champaign, 2019
  Wrote the awarded grant proposal for recycling 3D printed plastic/sawdust into new filament for student projects, and sourcing local recycled materials for digital fabrication projects

AWARDS AND HONORS

- **Chicago Studio Award (First)**, 2019
  Awarded to top project across department
  Project: Recovering Urban Memory in Baitasi District, Beijing

- **Archon Studio Prize (2nd)**, 2018
  Awarded to top project in Archon Prize Studio
  Project: 12 Miles, A Year and Staked Bench

- **CRITICAL MASS Student Choice Award**, 2018
  Awarded to top student-voted project across department
  Project: The Austere: Subsistence Farming and Micro-Housing in the Instaserf Era

- **Chicago Studio Award (HM)**, 2017
  Awarded to top project across department
  Project: Fractal City: A Vertical Art Museum for Fulton Market, Chicago
  Collaboration with Melika Hajishafieiha

TEACHING

Classes as Instructor of Record:

- ARTD 218 Interaction Design Foundation, School of Art + Design, Spring 2023

  - Studio course introducing graphic design students to web technologies and interactive design

  - Core topics: Web development fundamentals (HTML, CSS, JavaScript), responsive design, typography for web

  - Emphasized historical context: Evolution of typesetting, web publishing technologies, and design systems

  - Project-based curriculum covering: Design patterns, modular development, cross-platform compatibility

  - Technical focus on maintainable code practices, modern web standards, and animation principles

  - Students developed portfolio-ready projects integrating design theory with practical web development

Classes as Co-Instructor:

- DCH 421 Community Engagement and Heritage Education in a Digital World, Dr. Georgios Artopoulos, Spring 2022

Classes as Teaching Assistant:

- ARCH 577 Theories of Architecture, Dr. John Stallmeyer, Fall 2024

Invited Reviewer

- DTX 499 Human-Centered Design & Design Thinking - Multidisciplinary Innovation Studio, Prof. Beth Ladd, Fall 2023, Spring 2024

- LA 5XX Future Natures, Dr. David Lyle Hays, Spring 2023

- Experimental Computational Architecture, Artificial Intelligence Research Seminar, University of Stuttgart, Dr. Thomas Wortmann, Spring 2022

INVITED LECTURES

- "The Emergence of Parametricism and Computational Design in Architecture - 1960-2025"
  ARCH 577 Theories of Architecture, University of Illinois at Urbana-Champaign, Fall 2024

- "Human Centered Design Research Methods in Spatial Computing and HCI"
  DTX 499 Human-Centered Design & Design Thinking - Multidisciplinary Innovation Studio, Prof. Beth Ladd, Spring 2024

PUBLICATIONS

Peer-Reviewed Articles:

- Wehmeier, Colter, and Georgios Artopoulos. 2023. "MetaFraming: A Methodology for Democratizing Heritage Interpretation through Wiki Surveys." In KUI: Culture and Computer Science XX.

- Wehmeier, Colter, Georgios Artopoulos, Francesca Maria L. Russa, and Cettina Santagati. 2022. "Scan-To-Ar: from Reality-Capture to Participatory Design Supported by AR". In *Representation Challenges: New Frontiers of AR and AI Research for Cultural Heritage and Innovative Design*, edited by A. Giordano, M. Russo, and R. Spallone. FrancoAngeli. DOI: 10.3280/oa-845-c238.

- Artopoulos, Georgios, Panayiotis Charalambous, and Colter Wehmeier. 2019. "Immersive Computing and Crowd Simulation Techniques in Modelling Urban Commons: The Case of Nicosia-Cyprus." *International Journal of E-Planning Research* 8, no. 1: 35–49. DOI: 10.4018/IJEPR.2019010103.

Book Chapters:

- Wehmeier, Colter. 2025. "Are Surveys Necessary? Designing Virtual Environments for Participatory Research." In *Clever Design in Critical Times: Conceptualizing the Callidocene*, edited by Milena Radzikowska, Stan Ruecker, Guilherme Meyer, and Teresa Dobson. Bloomsbury Academic.

- Smaniotto Costa, Carlos, Juan A. García-Esparza, Georgios Artopoulos, Colter Wehmeier, and Mohammed Rafat-Saleh. 2024. "Heritage-Based Storytelling and Narratives. The Added Value of Engagement in Placemaking and Heritage Communication." BRILL: Placemaking in Practice 1.

Not Peer-Reviewed or Abstracts in Conference Proceedings:

- "Memory in Uncertainty, Web Preservation in the Polycrisis: A New Design Congress Report", New Design Congress, 2022, Editor

- "#The-New-Aesthetic: Objects in Mirror are Much Closer than They Appear.", New Models Codex Y2K20, 2021, New Models, Article Author

PRESENTATIONS

At Conferences:

- "Spatially-distributed narratives: Generative Ambiguity in Heritage Visualisation" presented at DARIAH Annual Event 2025: The Past, Goettingen, Germany, June 18-20, 2025, [Link to Materials]

- "The Interpretive Nature of Space: Generative Ambiguity in Heritage Visualization" presented at Spaces of Nature/Natures of Space Graduate Student Symposium, University of Illinois Urbana-Champaign, February 14, 2025

- "Virtual Time Capsules: Unlocking Living Memory Through Meaningful Play in Immersive Heritage Environments" presented at 3rd International Playful by Design Conference, University of Illinois at Urbana-Champaign, November 7-9, 2024

- "MetaFraming: A Methodology for Democratizing Heritage Interpretation through Wiki Surveys" presented at XX. International Culture and Computer Science Conference, 28-29 September 2023, Lisbon, Portugal, `https://kui.htw-berlin.de/kui-2023-final-program-and-abstracts/`

- "REAACH-ID Symposium 2021: AI/AR For Space Recognition, Valorization, Design, Monitoring, And Management", Sicily/Webinar, October 12-13, 2021, `https://reaachid.wixsite.com/2021`

- "Developing Wikar: A Mixed Reality Platform for Art and Humanities Researchers", DARIAH Open Working Group Meeting: Digital Practices For The Study Of Urban Heritage, 2021, `https://doi.org/10.5281/zenodo.5769870`

- "Developing Infrastructure for Collective Data Management, Enabling Social Computation Research in the Digital Humanities (Wikar + ClowderBridge)", Clowder All Paws, Urbana/Webinar, September 20, 2020

Academic Workshops:

- "A Day at the Nicosia Airport: Participatory Heritage Interpretation Through Virtual Reconstruction," Bank of Cyprus Cultural Foundation, Nicosia, Cyprus, November 30, 2024
    - Co-directed participatory research workshop with Dr. Georgios Artopoulos examining collective memory formation through digital heritage environments
    - Implemented mixed-methods data collection protocol combining semi-structured interviews, observational analysis, and post-experience evaluation instruments
    - Facilitated co-design charrettes exploring participant-driven interpretive strategies for contested heritage spaces
    - Applied theoretical frameworks from memory studies and spatial cognition to analyze user interaction with virtual reconstructions
    - Integrated findings with ongoing research on digital heritage presentation methodologies within "Cyprus Insula" exhibition context

- "Embracing Modern Heritage: Wiki-Surveys and Gamified Informatics for Participatory Research", Game Studies and Design Spring Showcase, University of Illinois at Urbana-Champaign, April 28, 2023

- "The Patio Walk: "Patio Walk: sharing Tangible and Intangible Heritage in Córdoba"", Dariah ERIC UDigiSH WG, 2022, Presenter, Coordinator

- "Use of ICT for community building actions towards the reactivation of urban heritagescapes in South European cities, Palermo, Italy", Dariah ERIC UDigiSH WG, 2021, Presenter, Coordinator

ORGANIZATIONS

New Design Congress   2021-present
Independent Research Group

· A research organisation that recognises all infrastructure as expressions of power, and sees interfaces and technologies as social, economic, political and ecological accelerants. https://newdesigncongress.org/en/
· Academic research-collaborator with a specialization in games culture, design, and technology.

New Models   2019-2021
New Media Theory/Criticism

· Participated in discussion panels about emerging technologies and attendant risks for social organization
· Wrote for and helped organize first publication (New Models Codex 2020)

The Haunted PS1   2020-present
Indie Game Collective, Founding Member

· As a founding member and technical/creative director for this DIY international/distributed game collective, my role focused on conceptualizing projects and designing systems for mass collaboration. I developed and implemented automated project management workflows, custom toolchains, and game-launcher software that enabled hundreds of artists and developers to co-construct cohesive projects without direct supervision. This work served as the technical and organizational backbone for multiple shipped game collections with millions of plays.

QUIPIT: Critical Architecture Student Group   2014-2019
Student Organization for Discussions, Workshops, Exhibitions

· Lead student discussions about issues in architecture, representation, and society
· Organized multiple exhibitions and public events in coordination with the architecture dept and local businesses
· Designed and built interior installations, furniture for popups, interactive technologies for dissemination (VR+AR)

ACADEMIC SERVICE & CONFERENCE ORGANIZATION

- **Co-Director and Visual Designer**, "Spaces of Nature/Natures of Space" Graduate Student Symposium, University of Illinois Urbana-Champaign, February 2025

  - Collaborated on conceptualizing the interdisciplinary framework spanning architecture, landscape, and cultural studies

  - Designed symposium website, promotional materials, and visual identity

  - Coordinated with organizing team of six graduate students across multiple departments

  - Supported organization of four thematic sessions with twelve papers and keynote lecture by Prof. D. Fairchild Ruggles

MENTORING AND RESEARCH SUPERVISION

Undergraduate Research Supervision   2018-2019
SPIN Fellowship Program, NCSA

· **Kajetan Haas** (Computer Science)

- Supervised development of high-performance graphics pipeline for mobile AR visualization

- Project outcomes:

    – Developed AR visualization system for Stephen Cartwright's data-driven sculptures

    – Created custom shader framework for real-time data visualization on mobile devices

    – Implemented optimized rendering techniques: texture-baking, GPU particle systems

    – Designed Python toolchain for converting scientific data to mobile-optimized 3D textures

- Exhibition: Art & Design Fall Faculty Showcase, UIUC

- Technical focus: Mobile GPU optimization, HLSL/GLSL, Unity3D, Python

- Career outcome: Technical Artist @ Bungie Studios

CREATIVE WORKS: EVENTS

- "Quantum Itineraries Live Visuals" @ Quantum Itineraries Week, ARTos House, Nicosia, CY: Unity-Based Live Data-Driven Visualization System for Quantum Computer Music Performances, Production Lead, November 2024

- "Genesis 2k24" @ BitBash Xtreme, iO Theater Chicago: VR Game Exhibition and Live Demo, August 31, 2024

- "Cyprus Insula: History-Memory-Reality" @ Bank of Cyprus Cultural Foundation: Interactive Virtual Environment Installation for Nicosia International Airport, July 2024 - June 2025

- "Mixed Reality" by Peter Kogler @ Otto Wagner Areal, Penzing: Wikar Mixed Reality Sculpture Public Installation, Production Lead, 2023

- OTHER MATTER @ Heft/Hüttenberg via Günther Domenig: DIMENSIONAL, Wikar Mixed Reality Sculpture Public Installation, Production Direction, University of Applied Arts in Vienna, 2022

- Eva Schlegel May Installation (+ DARIAH conference), Wikar Mixed Reality Sculpture Public Installation, Dornbirn, 2022

- Munich Academy of Fine Arts Sculpture Studio with Peter Kogler, Wikar Mixed Reality Sculpture Public Installation, Graz, Austria, 2022

- Calvary Club Energy Utilization Visualization, Wikar Mixed Reality Architecture + Scientific Visualization, Development, February 2022
  Allowed users to visualize the simulated per-month energy usage of each room in a 3D Revit file for a historic building. Created a fully dynamic 3D clipping tool to inspect the interior and a GUI slide to determine the month.
  Features: Dynamic User-Operated Section Cut Tool in Mobile, Section Cut Shader for arbitrary meshes using 3D Signed Distance Fields, Optimized CSV parsing, Mesh Generation, Dynamic Coloring (at runtime)
  [YouTube Video] [YouTube Video 2] [Project Link]

- Eli Joteva Magnetic Field, Mixed Reality in Gallery, Technical Production (Visualization, Programming), September 2021

- The Pavilion 2 with Eva Schlegel, Wikar Mixed Reality Installation, Lead Programmer, App Developer, September 2021
  [Eva Schlegel's Website]

- Mixed Reality Development for Erwin Wurm's "Millisecond Sculpture Series" using Wikar, "The Pavilion", Scuola Nazionale di Cinema, Palermo, Italy, July 15-December 30, 2021
[Event Details]

- Mixed Reality Development for Stephen Cartwright's "Timeline Atlas Project" (Wikar), Art + Design Faculty Exhibition, Krannert Art Museum, UIUC, October 31-December 7, 2019

- "GucciBytes: Architectural Fictions and Forgeries," exhibition and zine, UIUC, September 26-31, 2019

- "Recovering Urban Memory" exhibition for Dong Gong's Plym Studio Fellowship, UIUC, April 29, 2019

- "Digital Picnic / Bezeliness Intensifies" exhibition, UIUC, November 4, 2018 - January 20, 2019

- "Historic Nicosia. Climate Change Hot Spot: Future's Extremes" interactive installation, exhibited at the Cities exhibition of the Seoul Biennale of Architecture and Urbanism, September 1-November 5, 2017

DIGITAL WORKS AND SOFTWARE: CREATIVE IMPACT & MASS COLLABORATIVE APPROACHES

Haunted PS1 Collective (2020-Present)
As a founding member and key technical/creative director, I helped establish the Haunted PS1 (HPS1) collective as a pioneering model for cooperative, distributed game development. HPS1 provides a crucial network of mutual support for solo developers, offering a meaningful alternative to the alienation and exploitation common in the games industry. The collective has had a defining influence on the modern indie scene by popularizing low-poly aesthetics and reviving the '90s demo disk format as a powerful, low-overhead platform for elevating emerging creators. Through its highly-visible collaborative projects, HPS1 functions as a critical cultural on-ramp, blurring the boundaries between media production, consumption, and performance for a new generation of artists.

- **The Overlook Rehaunted** (PC) [Collaborative Media Reinterpretation], Project Director, 2025 (forthcoming)

  - Directing 20+ contributors in a critical reexamination of a canonical cinematic masterpiece through interactive media.

- **Demo Disk Series** [Video games], Lead Programmer/Launcher Developer (2020-2024)

  - **Flipside Frights** (2024) [Link] (150k+ plays)

  - **Spectral Mall** (2022) [Link] (140k+ plays)

  - **Demo Disk 2021** [Link] (150k+ plays)

  - Highly selective showcase (150+ applicants) featuring curated independent games.

  - Received millions of impressions through YouTube creator coverage and streaming platforms.

C.H.A.I.N. Experimental Collaborative Development Series (2020–2026)
A series of vanguard projects testing methodologies for mass-scale experimental game development. Scaled from 14 to over 120 distributed contributors by designing and implementing automated production networks and technical pipelines that ensured a cohesive experience for both developers and players.

- **CHAIN 3** (Title Pending) (PC) [Mass-Collaborative Videogame], *Executive Producer and Co-Director*, 2026 (forthcoming)

  - Directing a spatially-distributed collaborative development network with 120+ contributors, establishing new paradigms for decentralized creative production at an unprecedented scale.

  - Built a fully automated build and update pipeline our "developer build", quickly reflecting changes as the game-network expands and refines.

- **C.H.A.I.N.G.E.D.** (PC) [Video game], 2023, [Link] (20k+ plays, 40 developers)

- Managed the design of a unique branching narrative structure across a distributed team of 40 developers.

- Work selected for presentation at the prestigious **Game Developers Conference (GDC) Experimental Games Workshop 2024** with Adam Pype.

- **C.H.A.I.N.** (PC) [Video game], 2020, [Link] (16k+ plays, 14 developers)

  - The inaugural project that established the foundational "exquisite corpse" model of collaborative, sequential game design for the series. It built on the legacy of Terry Cavanagh's 'Experiment-12' (2013), introducing new 'rules' to structure communication/exchange between developers.

Madvent Calendar Series [Video games], Launcher Lead Developer (2020-2023)
An annual, month-long collaborative event for the Haunted PS1 collective, structured as a digital advent calendar. For each series, 25-31 developers were tasked with creating a small, themed game for a specific day in December. As Launcher Lead Developer, I designed and built the custom interactive launcher for each collection. This bespoke software served as the themed container for the event, programmatically unlocking one new game for players each day, creating a shared, time-based experience and a sense of daily discovery for the community.

- **Madvent 4: End of the Line** (2023) [Link] (25k+ plays)

- **Madvent 3: Necrosis** (2022) [Link] (22k+ plays)

- **2Madvent2Calendar** (2021) [Link] (20k+ plays)

- **Madvent 2020** [Link] (18k+ plays)

Participatory Virtual Environment Prototypes (2020-2023)
A series of iterative projects that form the technical and conceptual foundation for my dissertation research on participatory mechanisms in virtual environments. Each project, typically contributed to the annual Madvent Calendar, presented a shared scene where players could design and place their own artifacts and messages. Over time, these asynchronous contributions allowed hundreds of players to collectively 'co-construct' the environment. This work pioneered technical systems for community-based creation and became an essential, recurring feature for the Madvent series, serving as a powerful experiment in digital community building.

- **The People's Sky** (Web) [Video game], 2023, [Link] (30k+ plays)

- **The People's Tree 2** (Web) [Video game], 2021, [Link] (25k+ plays)

- **The People's Tree** (Web) [Video game], 2020, [Link] (28k+ plays)

- **Cordoba Court** (Web) [Video game/Survey Software], 2022, [Link]

Research Software (2019-2024)

- **Wikar** [Mobile Application and Platform], Lead Developer, 2019, [Link]
  A foundational project of my early doctoral research, Wikar was developed to address a critical need for an open-source, non-corporate augmented reality platform for artists, designers, and researchers. Leveraging the NCSA's Clowder data management system as a dynamic, university-hosted backend, the platform enables creatives to rapidly develop and exhibit digital content in the real world. Its core innovation was a novel QR code system that handled both content resolution and high-fidelity spatial placement for iOS and Android devices. Wikar solved significant practical challenges and was adopted by architects, artists, and researchers for use in co-design workshops, public exhibitions, and university studios. Although my dissertation later converged on touchscreen interfaces, the extensive experience gained from consulting on and deploying Wikar in museums, parks, and classrooms was formative. It profoundly shaped my understanding of interaction design, usability, curation, and the critical role of technology in mediating successful collaborations between diverse disciplines.

- **Nicosia International Airport VE** [Virtual Environment], 2024, [Link], [DOI]

- **Cordoba Patio Walk Interactive Survey Publication** [Web Application], Lead Developer, 2023, [Link]

- **Dariah Cloud Web Data Collection/Visualization Tool** [Web Application], Lead Developer 2022, [Link]

Experimental Works (2020-2024)

- **Genesis 2k24** (VR PC) [Video game], Exhibited at BitBash Xtreme Chicago, Fall 2024, [Link]

- **Rococo** (WebGL) [Video game], Lead Developer, June 2020, [Link] (16k+ plays)

- **Minotaur** (WebGL + PC) [Video game], Lead Developer, April 2020, [Link] (18k+ plays)

TECHNICAL EXPERTISE

Research Leadership:	Interdisciplinary team management across technical and creative domains; Project leadership for complex interactive installations and digital humanities initiatives; Designing and implementing scalable, automated workflows for large, distributed creative teams; Coordinating diverse stakeholders including academics, institutions, and creatives; Experience securing and managing research grants and institutional partnerships; Ensuring paths to data creation and interpretation for valid research outcomes
Research Methodologies:	Design-Based Research and participatory research approaches; Mixed-methods evaluation of interactive systems and spatial computing environments; Critical analysis of technological mediation in cultural contexts; Ethical data collection frameworks within human-centered research paradigms
Computational Skills:	Software development (C, C#, Python, PHP, Node, Java, R) with focus on interactive systems; High-performance computing optimization (OMP, MPI, CUDA, GPU compute shaders); Multi-modal embedded systems integration for sustained public interaction; Game development and real-time application optimization; Real-time automation pipelines and web dashboards for data collection, interpretation, and management
Design & Implementation:	Spatial computing and embodied interaction design (Unity 3D, Godot, VR/AR); Digital fabrication and electronics integration (CNC, 3D printing, prototyping); Visual systems development across digital and physical media (web, print, video); Parametric design and computational form-generation (Grasshopper, CAD, HLSL/GLSL)
Data & Analytics:	Mixed methods for understanding user behavior and experience, analytics specialized for interactive social learning environments; Developing methodologies for capturing and interpreting interaction data; Creating contextual analytical frameworks bridging qualitative and quantitative approaches; Implementing automated interpretation pipelines for complex user behavior analysis