

Lucile Favero Montero

Doctoral researcher in human-centered AI — argument mining, Socratic dialogue, critical thinking, and responsible AI in education

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Biography

Lucile Favero is a doctoral researcher in the **ELLIS PhD Program** at **ELLIS Alicante**, supervised by Dr. Nuria Oliver (ELLIS Alicante; IEEE and ACM Fellow), Prof. Tanja Käser (EPFL; head of the ML4ED laboratory; ELLIS Member), and Prof. Juan Antonio Pérez-Ortiz (Universidad de Alicante; director of the Transducens group). Her research asks how AI can **strengthen rather than replace human reasoning**. Her PhD develops **Socratic educational chatbots** that respond to students with **critical questions rather than answers**, fostering reflection, argumentative reasoning, and metacognition while limiting cognitive offloading. This research is embodied in **MAIKE**, an open-source Socratic tutoring system recently evaluated in a **classroom study** in which secondary-school students revised argumentative essays. More broadly, her work examines how AI affects **cognition, agency, emotion, and ethics**. In a position paper (ACM AI Leadership 2026), she and her co-authors propose a guiding principle for human-centered AI: **scaffold, do not substitute**. Lucile was trained at the intersection of mathematics, computational neuroscience, and natural language processing. She holds an MSc in Mathematics and an MSc in Interdisciplinary Neuroscience from the University of Geneva, both awarded with the highest grade. Her long-term goal is to design AI systems that **develop human capacities rather than automate them away**.

Selected highlights

- **Creator and lead developer of MAIKE** — an open-source Socratic chatbot app that fosters students' critical thinking and learner agency by responding to their essays with adaptive questions rather than answers. Concept first presented at the **CAIHu Bridge at AAAI 2024** and full system presented at the **Tools for Thought workshop CHI 2026**. Evaluated in a **classroom study with 65 secondary-school students** (June–July 2026) comparing MAIKE with a conventional chatbot.
- **1st place out of 13 international teams** — Critical Questions Generation Shared Task, 12th Workshop on Argument Mining at **ACL 2025** (Vienna). Lead author of the winning system, which employed a two-stage pipeline combining creativity, analysis and critical evaluation. [ACL Anthology](#) — [ELLIS Alicante press release](#)
- **Opening talk**, GenAIHEd workshop at **AIED 2025** (Palermo, 22 July 2025) — “Do AI tutors empower or enslave learners? Toward a critical use of AI in education.”
- **Proceedings paper, ACM AI Leadership Summit 2026** (Atlanta, 30 Aug – 2 Sep 2026) — proposes *scaffold, do not substitute* as a guiding principle for human-centered AI.
- **Best Poster Award**, Jornada del Doctorado en Informática 2024, Universidad de Alicante.
- **Co-organizer**, *Collaborative AI and Modeling of Humans* (CAIHu) Bridge at **AAAI 2025** (Philadelphia, 25 Feb 2025).
- **Three competitive EU mobility awards** from ELLIS-affiliated networks of excellence: **ELIAS** (Horizon Europe), **ELSA** (Horizon Europe “European Lighthouse on Secure and Safe AI”), and **ELISE** (H2020 ICT-48).
- **Media coverage of MAIKE** — TV and radio interviews (*TV Sur*, *TV Andalucía*, *Cadena SER*, *Radio Estudiantil*), among others.
- **Public engagement at scale**: panelist at the *Samsung Innovation Campus Summit: AI for a Better World* (Madrid, Sept 2025) and *Fundación Banco Sabadell — La Cultura del Talento* (Barcelona, Sept 2025); **more than 1100 high-school students reached** across two talks (Alicante, 2025–2026).

Education

- **2023 – 2027: Ph.D. in Human-Centered Artificial Intelligence**, ELLIS Alicante (pan-European ELLIS PhD Program)
Thesis: [Socratic Dialogues for Learning: Toward AI-Enabled Human Active Learning](#)
Supervisors: Dr. Nuria Oliver (ELLIS Alicante), Prof. Tanja Käser (EPFL), Prof. Juan Antonio Pérez-Ortiz (UA).
Focus: Responsible AI, NLP, argument mining, and educational technology.
- **2020 – 2023: M.Sc. in Interdisciplinary Neuroscience**, University of Geneva, Switzerland
Thesis: [Rational Design of Goal-Directed Behavioral Tasks in Mice](#)
Supervisors: Dr. Giulio Matteucci & Prof. Sami El-Boustani. *Grade: 6/6 (Highest Distinction).*
Focus: Computational neuroscience, decision-making, and behavioral modeling.
- **2020 – 2022: M.Sc. in Mathematics**, University of Geneva, Switzerland
Thesis: [A Machine Learning-Based Surrogate Model to Optimize the Performance of Large Air-to-Water Heat Pumps in Existing Buildings](#)
Supervisor: Prof. Sylvain Sardy. *Grade: 6/6 (Highest Distinction).*
Focus: Machine learning, optimization, and applied statistics.
- **2016 – 2020: B.Sc. in Mathematics**, University of Geneva, Switzerland
- **2015 – 2016: Preparatory Classes (CPGE) MPSI**, Lycée Claude Fauriel, Saint-Étienne, France
Intensive French post-secondary program in mathematics, physics, and engineering science.

Publications

Peer-reviewed publications

- Favero, L., Pérez-Ortiz, J. A., Käser, T., & Oliver, N. (2026). [From Substitution to Scaffolding: Breaking the Self-Reinforcing Harm Cycle of AI in Education \(and Beyond\)](#). In *Proceedings of the ACM AI Leadership Summit 2026*, Atlanta, USA. *To appear.* arXiv:2608.17451.
- Favero, L., Pérez-Ortiz, J. A., Käser, T., & Oliver, N. (2026). [MAIKE: Designing a Socratic Educational Chatbot to Foster Critical Thinking and Learner Agency](#). *Tools for Thought* workshop at **ACM CHI 2026**, Barcelona, Spain.
- Favero, L., Pérez-Ortiz, J. A., Käser, T., & Oliver, N. (2026). [Leveraging Small LLMs for Argument Mining in Education: Argument Component Identification, Classification, and Assessment](#). *Proceedings of the 25th International Workshop on Computational Models of Natural Argument (CMNA 2025)*, CEUR-WS Vol-4166, pp. 11–30.
- Favero, L., Frases, D., Pérez-Ortiz, J. A., Käser, T., & Oliver, N. (2025). [ELLIS Alicante at CQs-Gen 2025: Winning the critical thinking questions shared task — LLM-based question generation and selection](#). *Proceedings of the 12th Workshop on Argument Mining (ArgMining)*, ACL 2025, Vienna, Austria. DOI: 10.18653/v1/2025.argmining-1.31. ★ **Winner of the Critical Questions Generation Shared Task (ranked 1st of 13 international teams)**.
- Favero, L., Pérez-Ortiz, J. A., Käser, T., & Oliver, N. (2025). [Do AI tutors empower or enslave learners? Toward a critical use of AI in education](#). *Applications of Generative AI to Support Teaching and Learning in Higher Education (GenAIHed)*, workshop at **AIED 2025**, Palermo, Italy. **Selected as the workshop's opening talk.**
- Favero, L., Pérez-Ortiz, J. A., Käser, T., & Oliver, N. (2025). [Argument Mining in Education: Exploring the Potential of Open-source Small LLMs for Argument Classification and Assessment](#). *AI for Education — Tools, Opportunities, and Risks in the Generative AI Era (AI4ED)*, workshop at **AAAI 2025**, Philadelphia, USA.
- Favero, L., Pérez-Ortiz, J. A., Käser, T., & Oliver, N. (2024). [Enhancing Critical Thinking in Education by means of a Socratic Chatbot](#). In *Proceedings of the 1st International Workshop on AI in Education and Educational Research (AIEER 2024)*, Santiago de Compostela, 19–20 Oct. 2024, Springer Communications in Computer and Information Science (CCIS). DOI: 10.1007/978-3-031-93409-4_2. **Cited 170+ times (Google Scholar, Oct. 2026).**
- Favero, L., Pérez-Ortiz, J. A., Käser, T., & Oliver, N. (2024). [Towards Student-Centric AI-Supported Learning: Teaching Chatbots to Ask the Right Questions](#). *Collaborative AI and Modeling of Humans (CAIHu) Bridge*, **AAAI 2024**, Vancouver, Canada.

Preprints and under-review papers

- Favero, L., Pérez-Ortiz, J. A., Käser, T., & Oliver, N. (2026). [Thinking Is Not Writing: Designing AI Chatbots to Connect Reasoning and Revision](#). *Under review*. Classroom study with 65 secondary-school students comparing MAIKE with a conventional chatbot during argumentative-essay revision.
- Favero, L., Pérez-Ortiz, J. A., Käser, T., & Oliver, N. (2026). [Score the Construct, Not the Average: How Trait-Level Ordinal Essay Scoring Recovers Writers Who Need It Most](#). *Under review*.
- Favero, L., Pérez-Ortiz, J. A., Käser, T., & Oliver, N. (2026). [Beyond Holistic Scores: Automatic Trait-Based Quality Scoring of Argumentative Essays](#). arXiv:2602.04604 *preprint*. Evaluates a structured in-context-learning small-LLM pipeline against a supervised BigBird encoder with CORAL-style ordinal regression on 1,783 essays from the ASAP++ benchmark.
- Favero, L., Pérez-Ortiz, J. A., Käser, T., & Oliver, N. (2026). [AI in Education Beyond Learning Outcomes: Cognition, Agency, Emotion, and Ethics](#). arXiv:2602.04598 *preprint*. A position paper proposing an integrative four-dimensional framework for evaluating AI in education.
- Favero, L., Gaudeau, G., Pérez-Ortiz, J. A., Käser, T., & Oliver, N. (2026). [Argumentative Essay Assessment with LLMs: A Critical Scoping Review](#). *Research Square preprint* (rs-8632843). PRISMA 2020-conformant review of 46 studies (2022–2025) across six dimensions: datasets, traits, models, methods, evaluation, and analytics.

Research experience

- 03.2026 – 09.2026: **Visiting doctoral researcher, ML4ED Lab, EPFL**, Lausanne, Switzerland
[Six-month international research stay through the ELLIS PhD Program, hosted by co-supervisor Prof. Tanja Käser](#).
Keywords: *Educational AI, user study, learner modeling*.
- 11.2023 – 08.2027: **Doctoral researcher, ELLIS Alicante**
[Designing MAIKE, a Socratic educational chatbot that analyzes student essays through argument mining and engages the learner with adaptive critical questions to foster reasoning and agency](#).
Keywords: *critical thinking, argument mining, NLP, LLMs, educational AI, human-centered evaluation*.
Supervisors: Dr. Nuria Oliver, Prof. Tanja Käser, Prof. Juan Antonio Pérez-Ortiz.
- 02.2023 – 10.2023: **Research scholar, El-Boustani Lab**, Dept. Medicine, University of Geneva
[Integrating motivation, effort, and sensorimotor learning into a unified decision-making model](#).
Keywords: *Behavioral modeling, reinforcement learning, reward, motivation*.
- 10.2022: **Short research internship, E3 Lab**, Dept. Psychology, University of Geneva
[Modeling the effect of stress on reward-seeking behavior](#).
Keywords: *Reinforcement learning, reward, stress, human behavior*.
Supervisor: Prof. Eva Pool.
- 01.2022 – 08.2022: **Mathematics M.Sc. thesis**, Dept. Mathematics, University of Geneva
[A machine learning-based surrogate model to optimize the performance of large air-to-water heat pumps in existing buildings](#).
Keywords: *Surrogate modeling, extreme gradient boosting, energy system performance*.
Supervisor: Prof. Sylvain Sardy.
- 09.2021 – 01.2022: **Mathematics reading project**, Dept. Mathematics, University of Geneva
[Sparsity and regularization in machine learning](#).
Keywords: *Neural networks, exact support recovery, pruning, ℓ_1 regularization*.
Supervisor: Prof. Sylvain Sardy.
- 09.2020 – 02.2023: **Neuroscience research internship, El-Boustani Lab**, Dept. Medicine, University of Geneva
[Rational design of goal-directed behavioral tasks in mice](#).
Keywords: *Modeling, learning, behavioral interfaces, (sub)optimality*.
Supervisors: Dr. Giulio Matteucci, Prof. Sami El-Boustani.
- 07.2019 – 10.2019: **Neuroscience research internship, Jolivet Lab**, Dept. Physics, University of Geneva
[Ephaptic coupling at the Node of Ranvier: Spike-Diffuse-Spike simulation](#).
Keywords: *Hodgkin-Huxley spiking neuron model, simulation*.
Supervisor: Prof. Renaud Jolivet.

Honors, awards, and funding

Awards

- 04.2025 – **Ranked 1st of 13 international teams** in the Critical Questions Generation Shared Task (CQs-Gen), *12th Workshop on Argument Mining, ACL 2025*, Vienna, Austria.
- 05.2024 – **Best Poster Award**, *Jornada del Doctorado en Informática (JDI 2024)*, Universidad de Alicante, for “Enhancing Critical Thinking in Education with a Socratic Chatbot.”

Competitive travel & research funding

- **ELIAS mobility grant** — ELLIS Research Exchange 2026, EPFL, Switzerland. *ELIAS: “European Lighthouse of AI for Sustainability,” Horizon Europe network of excellence built on ELLIS.*
- **ELSA mobility grant** — ELLIS Doctoral Symposium 2024, Paris, France. *ELSA: “European Lighthouse on Secure and Safe AI,” Horizon Europe network of excellence (~€10M, 26+ institutions).*
- **ELISE mobility grant** — AAAI 2024 Bridge Program, Vancouver, Canada. *ELISE: H2020 ICT-48 “European Learning and Intelligent Systems Excellence” (70-partner ELLIS network).*

Leadership and service

Event organization

- 02.2025: **Co-organizer**, *Collaborative AI and Modeling of Humans (CAIHu) Bridge*, **AAAI 2025**, Philadelphia, USA.

Peer review

- *Continuing Education* — 2026
- *Cogent Education* — 2026
- *ACM International Conference on Human-Agent Interaction (HAI)* — 2026.
- *Educational Psychology* — 2026.
- *ACM Transactions on Intelligent Systems and Technology (TIST)* — 2025–2026.
- *Acta Psychologica* — 2025.
- *Collaborative AI and Modeling of Humans (AAAI Bridge program)* — 2025.
- *ACM Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT)* — 2024.

Teaching and mentoring

Student supervision

- **Marta Serrador** — M.Sc. thesis (2024–2025), Software Development for Mobile Devices, Universidad de Alicante. “Design and Implementation of an Interface for a Socratic Educational Chatbot.” [Code](#).
- **Nuria Riera** — B.Sc. thesis (2024–2025), then research intern (06.2025–07.2025), Multimedia Engineering, Universidad de Alicante.
- **Daniel Frases** — research intern (05.2025–06.2025), Advanced Technician in Cross-Platform Application Development, CFP Alfonso X El Sabio, Madrid. Co-author of the ACL 2025 shared-task-winning paper.

Teaching experience

- 2018 – 2024: Mathematics, statistics, and programming tutoring (university level).
- 2017 – 2024: Mathematics, physics, and French tutoring (secondary level).

Talks

- 25.06.2026: **Teaching AI to Ask: MAIKE, a Socratic Chatbot** — **invited talk**. *Social computing group seminar*, IDIAP, Martigny, Switzerland.
- 05.05.2026: **Classroom-study design for Socratic chatbots**. *ML4ED group seminar*, EPFL, Lausanne, Switzerland.
- 12.12.2025: **Leveraging Small LLMs for Argument Mining in Education**. *25th International Workshop on Computational Models of Natural Argument (CMNA 2025)*, online. [Workshop website](#)
- 02.09.2025: **An LLM-based educational chatbot to promote critical thinking**. *ELIAS Plenary 2025*, Alicante, Spain. [Press coverage](#)
- 22.07.2025: **Do AI tutors empower or enslave learners? Toward a critical use of AI in education** — **opening talk**. *GenAIHed workshop, AIED 2025*, Palermo, Italy. [Workshop website](#)
- 08.07.2025: **An LLM-based educational chatbot to promote critical thinking**. *ELLIS Alicante Scientific Advisory Board meeting*, online.
- 18.10.2024: **Enhancing critical thinking in education with a Socratic chatbot**. *AIEER 2024 workshop, ECAI 2024*, Santiago de Compostela, Spain.
- 01.03.2024: **Towards student-centric AI-supported learning: teaching chatbots to ask the right questions**. *Universidad de Alicante*, Spain (and online).
- 19.10.2023: **A theoretical framework for studying sensorimotor learning during goal-directed tasks in water-restricted mice**. *Structuring Knowledge for Flexible Behaviour*, FENS, Rungstedgaard, Denmark.

Scientific dissemination and media appearances

Active in science communication and responsible-AI advocacy.

- 07.10.2026: Talk, **“AI and education: what do we want students to learn? MAIKE, a Socratic chatbot to support critical thinking”**, *IV Alicante Futura Summit*, Parque Científico de Alicante, Spain. [Event page](#)
- 16.03.2026: **Outreach talk to more than 700 high-school students** — IV ELLIS Alicante event on AI for teenagers, Alicante, Spain. [ELLIS Alicante press release](#)
- 12.11.2025: Television interview on **intelligent tutoring systems**, *TV Andalucía*. [Video](#)
- 29.10.2025: Invited presentation of the **MAIKE project** at the *Galician Centre for Educational and Digital Innovation*, Alicante, Spain.
- 08.10.2025: Talk, **“Risks and benefits of AI in education”**, *“Youth, screens and relationships: connection/disconnection?”*, Proyecto Hombre, Murcia, Spain. [Event page](#)
- 17.09.2025: Panelist, **“Can AI make us more human?”**, *Samsung Innovation Campus Summit: AI for a Better World* (2nd edition), Auditorio El Beatriz, Madrid, Spain. [Samsung News](#)
- 17.09.2025: Television interview, **“Benefits of AI tutors in education”**, *TV Sur*, Madrid, Spain.
- 17.09.2025: Panelist, **“La Cultura del Talento — technical panel”**, *Fundación Banco Sabadell*, Barcelona, Spain. [La Vanguardia](#)
- 17.04.2025: Radio interview on the **ACL 2025 Critical Questions Generation Shared Task win**, *Cadena SER* (online segment).
- 21.02.2025: **Outreach talk to more than 400 high-school students** on careers in technology, Alicante, Spain.
- 19.02.2025: Talk, **“Teaching chatbots how to ask the right questions”**, *Anna Lindh Foundation Spanish Network (ReFAL XXIV) & Casa Mediterráneo*, ELLIS Alicante, Spain.
- 07–08.05.2024: Invited speaker, *Shaping the Future, Keeping us Human*, Madrid, Spain.
- 19.04.2024: Outreach talk to high-school students on **careers in technology**, Alicante, Spain.
- 28.03.2024: Radio interview, **“AI in the educational environment”**, *Radio Estudiantil* (Universidad de Valencia), online.
- 11.02.2024: Talk for the **International Day of Women and Girls in Science (11F)**, IES Mutxamel, Spain.

Technical skills

Certificates

- 08.2020: **Advanced Neurobiology I**, Prof. Yan Zhang & Prof. Yulong Li, Peking University.
- 08.2020: **Introduction to Genetics and Evolution**, Prof. Mohamed Noor, Duke University.
- 08.2020: **Introduction to Molecular and Cellular Biology**, Saylor Academy.
- 07.2019: **Neuronal Dynamics**, Prof. Wulfram Gerstner, EPFLx.

Computer science

- **Computational linguistics**: argument mining, large language models, natural language processing, formal logic.
- **Machine learning**: statistical machine learning, reinforcement learning.
- **Optimization**: convex, constrained and unconstrained optimization, linear and quadratic programming, duality, operations management.
- **Numerical methods and analysis**: integration, interpolation, approximation, differential equations and partial differential equations, linear equation systems.
- **Iterative methods**: stationary, non-stationary, and preconditioning methods.
- **Programming**: Python, MATLAB, R; basic knowledge of C#, Caml, scientific 3D applications.
- **Web & deployment**: FastAPI, Angular, Docker, Kubernetes (EPFL RCP cluster).
- **Toolkits & libraries**: PyTorch, Hugging Face Transformers, Unsloth, Ollama, LangChain, scikit-learn, TensorFlow, SpaCy, NLTK.

Advanced mathematics

- Quantum invariants of knots ■ Riemann surfaces ■ Elliptic curves and cryptography ■ Topology ■ Algebraic structures ■ Graph theory ■ Applications of mathematics in physics ■ History and philosophy of science

Neuroscience

- Computational neuroscience ■ Cognitive and affective neuroscience ■ Neurobiology ■ Clinical and experimental neuropsychology ■ Techniques for investigating brain function ■ Behavioral modeling ■ Bayesian decision-making

Education and cognitive science

- Critical thinking ■ Socratic questioning ■ Cognitivist approaches to emotion ■ Human-computer interaction ■ AI in education, incl. computational tools for mathematics education ■ Transversal principle in mathematics ■ Classroom and user-study design ■ Qualitative coding and inter-rater agreement

Tools and technologies

- Git ■ VSCode ■ $\LaTeX$ ■ Bash scripting ■ Jupyter notebooks ■ Google Colab ■ Zotero

Languages

- French (native) ■ Spanish (C2) ■ English (C1, *EF SET*)

Key links

- Personal website: lucilefавero.github.io
- Google Scholar: scholar.google.com/citations?user=1TxDNLsAAAAJ
- Semantic Scholar: semanticscholar.org/author/Lucile-Fавero/2320308855
- DBLP: dblp.org/pid/387/1203
- ACL Anthology: aclanthology.org/people/lucile-fавero
- ORCID: [0009-0005-2981-0124](https://orcid.org/0009-0005-2981-0124)
- LinkedIn: linkedin.com/in/lucilefавero
- GitHub: github.com/lucilefавero
- MAIKE project: ellisalicante.org/maike