Zifeng (Lauren) Liu

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EDUCATION

University of Florida Gainesville, FL, USA *Ph.D. in Curriculum and Instruction specializing in Educational Technology Sep. 2023 – present*
▪ Advisor: Dr. Wanli Xing
  ▪ Cumulative GPA: 3.95/4.0
  ▪ Research Assistant (Full tuition & stipends): 2023 ~
  ▪ Doctoral Dissertation Committee: Dr. Wanli Xing, Dr. Maya Israel, Dr. Anthony Botelho, and Dr. Corinne Manley

Beijing Normal University, Beijing, China *Master of Computer Software and Theories Sep. 2020 – May. 2023*
▪ Advisor: Dr. Su Cai
  ▪ Cumulative GPA: 3.70/4.0
  ▪ First Prize of Excellent graduate Student Scholarship (2020-2021, 2021-2022)
  ▪ Outstanding Freshman Scholarship (2020)
  ▪ Excellent Individual of Summer Volunteer Teaching Program of BNU (2022)
  ▪ Master's thesis: *Facial expression recognition and application based on contrastive learning and visual attention*

Beijing Technology and Business University, Beijing, China *Bachelor of Computer Science Sep. 2016 – May. 2020*
▪ Advisor: Dr. Zhongming Han and Dr. Yi Chen
  ▪ Cumulative GPA: 4.27/5.0 (Ranked number 1 among 58 students)
  ▪ Excellent Graduate of Beijing (2020)
  ▪ National Scholarship of China (2018-2019)
  ▪ Headmaster Scholarship of BTBU (2018-2019)
  ▪ Outstanding Student Scholarship of BTBU (2018,2019)
  ▪ Student LeaderShip Award of BTBU (2017-2018)
  ▪ National Scholarship for Encouragement of China (2016-2017, 2017-2018)

RESEARCH INTERESTS
  ▪ AI/Computer Science Education
  ▪ Educational Data Mining/Learning Analytics
  ▪ STEM-integrated Computing Education

CURRENT RESEARCH EXPERIENCE

AI Across the Curriculum for Virtual Schools *Aug. 2024 - present*
(Funded by Department of Education EIR #S411C230070, $3,999,322; PI: Dr. Jie Chao (Concord), Co-PI: Dr. Wanli Xing)
▪ Conducted Research about how to use GenAI support pedagogical multi-choice questions distractor and feedback generation
▪ Design the AI-integrated math curriculum in virtual learning environments for high school students.
▪ Create the learning objectives and activities aligning with the AI big ideas and math standards.
▪ Design the user interface for virtual learning environments and conduct user testing.

Using Flow-Based Music Programming to Engage Children in Computer Science
(Funded by NSF iTEST # 2241715, $1,227,507; PI: Dr. Wanli Xing) **FL,CA, USA** *Researcher Sep. 2023 – present*

- Led the flow-based music programming platform Mflow development.
- Led the design and development of instruments for teachers and students.
- Led the professional development interviews for 3 elementary school teachers.
- Contributed to the 2024 Spring classroom study to examine the efficacy of Mflow platform and the curriculum.

eSPAC3: A Culturally Relevant Approach to Spatial Computational Thinking Skills and Career Awareness through an Immersive Virtual Environment
(Funded by NSF iTEST, $227,619. PI: Dr. Wanli Xing) *Researcher* Sep. 2023 – *present*
- Led the design and development of survey instruments targeting peer mentors, parents, and students.
- Conducted analysis of pre- and post-survey data assessing Spatial Computational Thinking and self-efficacy.

ALTER-Math : AI-augmented Learning by Teaching to Enhance and Renovate Math Learning
(Funded by Learning Engineering Virtual Institute (LEVI), Schmidt Future Foundation, PI: Dr. Wanli Xing)
FL, USA *Researcher Oct. 2023 – present*
- Contributed to the classroom study to examine the efficacy of the ALTAR-Math in P.K.Yonge research school.
- Contributed to the log data analysis on how students interact with the AI teachable agent.

A Logic Programming Approach to Integrate Computing with Middle School Science Education
(Funded by NSF: #1901704, $421,755; PI: Dr. Yuanlin Zhang, Co-PI: Dr. Wanli Xing)
FL, USA *Researcher Apr. 2024 – Apr. 2025*
- Analyzing students learning log data using entropy analysis and connecting it with student performance.

Innovating Quantum-Inspired Learning for Undergraduates in Research and Engineering (INQUIRE)
(Funded by NSF IUSE program #2142552, $1,250,000, PI: Dr. Gloria Kim, Co-PI: Dr. Wanli Xing)
Researcher Nov. 2023 — Apr. 2025
- Led the efficacy research on Spin-Qubit Lab (a simulation-based tool) in the University of Florida.

A Student-centered Interactive Mathematical Learning and Creation Platform powered by AI
(Funded by Department of Education #91990023 C0022, $4,000,000, PI: Dr. Wanli Xing)
FL, CA, USA *Researcher Apr. 2024 – present*
- Contributed to the organization of a classroom study to examine the initial efficacy of the ART-Math platform.
- Contributed to usability interviews for about 20 elementary school teachers and five teachers across the US.

SELECTED PUBLICATIONS

JOURNAL PUBLICATIONS

- **Liu, Z.**, Xing, W., Jiao, X., & Li, C. (accepted). Implementing fair and explainable AI-generated responses for online learning discussion support. Manuscript submitted for publication to *Journal of Learning Analytics*.
- **Liu, Z.**, Xing, W., Jiang, Y., Li, C., Kim, T., & Li, H. (accepted). Leveraging contrastive learning to improve group and individual fairness in predictive analytics for online learning. Manuscript submitted for publication to *Journal of Computing in Higher Education*.
- **Liu, Z.**, Xing, W., Li, C., Zhang, F., Li, H., & Minces, V. (2025). Exploring Automated Assessment of Primary Students' Creativity in a Flow-Based Music Programming Environment. *Journal of Learning Analytics, 12*(2), 83-104. https://doi.org/10.18608/jla.2025.8835.
- **Liu, Z**., Xing, W., Jiao, X. et al. What are the differences between student and ChatGPT-generated pseudocode? Detecting AI-generated pseudocode in high school programming using explainable machine learning. *Education and Information Technologies* (2025). https://doi.org/10.1007/s10639-025-13385-z.
- Song, Y., Kim, J., **Liu, Z.**, Li, C., & Xing, W. (2025). Students' perceived roles, opportunities, and challenges of a generative AI-powered teachable agent: a case of middle school math class. *Journal of Research on Technology in Education*, 1–19. https://doi.org/10.1080/15391523.2024.2447727.
- Xing, W., Song, Y**.**, Li, C., **Liu, Z**., Zhu, W., Oh, H. (2025). Development of a generative AI-powered teachable agent

for middle school mathematics learning: a design-based research study. *British Journal of Educational Technology.* 1-20.

▪ Song, Y., Kim, J., Xing, W., **Liu, Z.**, Li, C., & Oh, H. (2025). Elementary school students' and teachers' perceptions toward creative mathematical writing with Generative AI. *Journal of Research on Technology in Education*, 1–23. https://doi.org/10.1080/15391523.2025.2455057.

▪ Xing, W., Fang, Z., Zhang, H., Kamiyama, T., **Liu, Z.**, & Kim, T. (2025). Making the 'mathematics register' accessible to students: an exploratory study of two teachers' discourse in an online lesson on polynomial expressions. Language and Education, 1–24. https://doi.org/10.1080/09500782.2025.2542861

▪ Li, H., Xing, W., Zhu, W., Zhang, S., & **Liu, Z.** (2025). Should educational AI models include gender attribute? Explaining the why based on environmental psychology course with gender imbalance. *Journal of Computing in Higher Education.*

▪ Zhu, W., Xing, W., Kim, E. M., Li, C., Wang, Y., Yang, Y., & **Liu, Z**. (2025). Integrating image-generative AI into conceptual design in computer-aided design education: Exploring student perceptions, prompt behaviors, and artifact creativity. *Educational Technology & Society, 28*(3), 166-183. https://doi.org/10.30191/ETS.202507_28(3).SP11.

▪ Cai, S., **Liu, Z**., Liu, C., & others. (2022). Effects of a BCI-based AR inquiring tool on primary students' science learning: A quasi-experimental field study. *Journal of Science Education and Technology, 31,* 767–782. https://doi.org/10.1007/s10956-022-09991-y.

▪ Liu, E., Cai, S., **Liu, Z.**, & Liu, C. (2023). WebART: Web-based augmented reality learning resources authoring tool and its user experience study among teachers. *IEEE Transactions on Learning Technologies, 16*(1), 53–65. https://doi.org/10.1109/TLT.2022.3214854.

UNDER REVIEW WORK

▪ **Liu, Z.**, Xing, W., Ngo, B., Jiao, X., Jiang, S., & Li, C. (under Review). *Engagement patterns of struggling students with AI teachable agents in mathematics learning* [Manuscript submitted for publication]. *Scientific Reports*.

▪ **Liu, Z.**, Cheon, S., Stanbury, A., Jiao, X., Xing, W., & Kang, H. (under Review). *Towards contextual-based AI: A scoping review of artificial intelligence in X reality for personalized learning* [Manuscript submitted for publication]. *Computers and Education: Artificial Intelligence*.

▪ **Liu, Z.**, Xing, W., Monteith, B., Pei, B., & Zhang, Y. (under Review). Engaging secondary students in data science learning through a mathematical logic approach: Insights from surveys and log data. Manuscript submitted for publication to *ACM Transactions on Computing Education*.

▪ Xing, W., **Liu, Z.,** Song, Y., & Kim, T**.** (under review). Why do students leave instructional videos: understanding students' in-video dropout behavior in a large online math learning platform? Manuscript submitted for publication to *Distance Education*.

▪ Jiao, X., **Liu, Z.,** Enhancing Collaboration in AR-based Inquiry: Effects of Structured Collaborative Scripts on Students' Performance and Group Dynamics. Manuscript submitted for publication to *Journal of Science Education and Technology*.

▪ Xing, W., Song, Y., **Liu, Z.,** Du, H., Zhu, W., & Li, C**. (**under review). Investigating Expert and Peer Tutoring Behaviors in a Large Online Discussion Forum Using Temporal Dynamic Analytics. Manuscript submitted for publication to *Journal of Learning Analytics*.

▪ Owoputi, R., Kwok, A., **Liu, Z.**, Zhu, W., Xing, W., & Ray, S. (under review). Immersive virtual environment for automotive security education. Manuscript submitted for publication to *IEEE Transactions on Education*.

PUBLISHED CONFERENCE PROCEEDINGS

▪ Kim, T., **Liu, Z.**, Xing, W., Li, H., & Oh, H. (2025, June). Emotional dynamics in asynchronous math discussions: Analyzing the impact of negative emotions on learning outcomes. *In Proceedings of the 2025 International Conference of the Learning Sciences (ICLS 2025).* International Society of the Learning Sciences (ISLS). June 10–13, Finland.

▪ Li, H., Xing, W., Zhu, W., Li, C., Lyu, B., **Liu, Z**., & Heffernan, N. (accepted). Leveraging multi-modality and collaborative filtering for supporting automatic scoring in mathematics education. Proceedings of the 26th

International Conference on Artificial Intelligence in Education.

- Li, H., Xing, W., Lyu, B., Zhu, W., **Liu, Z.**, & Li, H. (accepted). An automated aesthetic assessment framework of mathematical story images validated by click counts. In Proceedings of the 18th ACM Conference on Learning@ Scale.

- Jiao, X., Huang, H., **Liu, Z.**, Cai, S., & Fan, Z. (2025). Beyond the screen: Enhancing augmented reality collaborative inquiry with social scripts. Proceedings of the 25th IEEE International Conference on Advanced Learning Technologies (ICALT 2025), Changhua, Taiwan. IEEE. **[Best Full Paper Award]**

- **Liu, Z.**, Song, Y., Yang, Q., Xing, W., & Guo, J. (2025, June). Exploring the Impact of a Simulation-Based Learning Tool on Undergraduate Quantum Computing Education. In *2025 ASEE Annual Conference & Exposition*.

- **Liu, Z.**, Zhang, S., Xing, W., Minces, V., Israel, & Barron, A. (2025, June). A NSF ITEST Program: Integrating Music and Flow-Based Programming Builds Teachers' Confidence in Computer Science. In *2025 ASEE Annual Conference & Exposition*.

- **Liu, Z.**, Xing, W., Zhang, F., & Li, C. (2025, March). A visual programming approach to enhance spatial computational thinking skills in upper-elementary students [Poster presentation]. The 15th International Learning Analytics & Knowledge Conference, Dublin, Ireland.

- Oh, H., **Liu, Z.**, & Xing, W. (2025). Do actions speak louder than words? Unveiling linguistic patterns in online learning communities using cross recurrence quantification analysis. In *Proceedings of the 15th International Conference on Learning Analytics and Knowledge* (LAK2025) (pp. 1–7).

- Li, H., Xing, W., Li, C., Zhu, W., Lyu, B., Zhang, F., & **Liu, Z.** (2025, March). Who Should Be My Tutor? Analyzing the Interactive Effects of Automated Text Personality Styles Between Middle School Students and a Mathematics Chatbot. In *Proceedings of the 15th Learning Analytics and Knowledge Conference* (LAK2025) (pp. 1–7).

- **Liu, Z.**, Zhang, S., Israel, M., Smith, R., Xing, W., & Minces, V. (2025, Feb). Engaging K-12 students with flow-based music programming: An experience report on its impact on teaching and learning. *In Proceedings of the 56th ACM Technical Symposium on Computer Science Education V. 1 (SIGCSE TS 2025)*, February 26–March 1, 2025, Pittsburgh, PA, USA.

- **Liu, Z.**, Jiao, X., Xing, W., & Zhu, W. (2025, Feb). Detecting AI-generated pseudocode in high school online programming courses using an explainable approach. *In Proceedings of the 56th ACM Technical Symposium on Computer Science Education V. 1 (SIGCSE TS 2025)*, February 26–March 1, 2025, Pittsburgh, PA, USA.

- **Liu, Z.**, Monteith, B., Chao, J., Wiedemann, K., Fofang, J. B., Li, L., Ma, D., Mohamed, R., Mondol, A., Jo, Y., Fleetwood, A., Lipien, L., Zhang, Y., & Xing, W. (2025, February 17–19). Using entropy analysis to explore student engagement in an online high school data science course. Presented at *DSE-K12 Conference 2025*, Hyatt Regency San Antonio Riverwalk, San Antonio, TX, USA.

- **Liu, Z.**, Guo, R, Song, Y., Xing, W. (2024). WIP: understanding students' in-video dropout behavior in large online math learning platform. In Proceedings of 2024 IEEE Frontiers in Education, Oct 13–16, 2024, Washington, D.C., USA.

- **Liu, Z.**, Jiao, X., Li, C., & Xing, W. (2024, July). Fair Prediction of Students' Summative Performance Changes Using Online Learning Behavior Data. In *Proceedings of the 17th International Conference on Educational Data Mining* (pp. 686-691).

- **Liu, Z.**, Xing, W., & Li, C. (2024, July). Explainable analysis of AI-generated responses in online learning discussions. In Educational Data Mining 2024 Workshop: Leveraging Large Language Models for Next-Generation Educational Technologies. https://doi.org/10.13140/RG.2.2.24309.38881

- **Liu, Z.**, Guo, R., Jiao, X., Gao, X., Oh, H., & Xing, W. (2024, June). How AI Assisted K-12 Computer Science Education: A Systematic Review. In *2024 ASEE Annual Conference & Exposition*.

- Oh, H., Guo, R., Xing, W., **Liu, Z.**, Song, Y., & Li, C. (2024, June). The Seamless Integration of Machine Learning Education into High School Mathematics Classrooms. In *2024 ASEE Annual Conference & Exposition*.

- Jiao, X., **Liu, Z.**, Zhou, H., & Cai, S. (2022, July). The Effect of Role Assignment on Students' Collaborative Inquiry-based Learning in Augmented Reality Environment. In *2022 International Conference on Advanced Learning Technologies (ICALT)* (pp. 349-351). IEEE.

- Feng, Z., Gong, C., Jiao, X., **Liu, Z.**, & Cai, S. (2022, July). The Effects of AR Learning Environment to

Preschool Children's Numerical Cognition. In *2022 International Conference on Advanced Learning Technologies (ICALT)* (pp. 352-356). IEEE.
- **Liu, Z.**, Jiao, X., & Cai, S. (2021, April 4). *Effects of augmented reality on students' online physics learning*. Paper presented at the 2021 Annual Meeting of the American Educational Research Association (AERA), Virtual Conference. Retrieved August 25, 2022, from the AERA Online Paper Repository.
- Jiao, X., **Liu, Z.**, & Cai, S. (2020, November 23–27). *Impact of embedded cognitive scaffolding of augmented reality technology on elementary school students' science learning*. Paper presented at the 28th International Conference on Computers in Education (ICCE 2020), Virtual Conference. **[Best Paper Nominee]**

Patent
- Cai, S., **Liu, Z.**, Changhao Liu, & Haitao Zhou. (2021). *A non-invasive brain-computer interface-based attention feedback method* (Patent No. ZL 2021 1 1283053.5).
- Cai, S., **Liu, Z.**, & Zhang, Y.. (2023, submitted). *A grid-based self-attention facial expression recognition method using supervised contrastive learning*. (Patent pending).

PRESENTATIONS

- **Liu, Z**., Ngo, B., & Xing, W. (2025). Evaluating AI-generated distractors in programming education: A human-AI collaborative approach [Poster Presentation]. In Proceedings of the 2025 ACM Conference on International Computing Education Research (ICER 2025). ACM.
- **Liu, Z.,** Xing, W., Zhang, F., & Li, C**.** (2025, November). *Assessing creativity in music programming: Can AI automate the process?* Concurrent presentation at the AECT International Convention, Las Vegas, NV, United States.
- Xing, W., **Liu, Z.**, & Zhang, F. (2025, November). *Enhancing spatial computational thinking in upper-elementary students through visual programming* [Poster presentation]. AECT International Convention, Las Vegas, NV, United States.
- **Liu, Z**., Jiang, Y., Li, C., & Xing, W. (2025). Using supervised contrastive learning for improving individual fairness in AI online performance prediction. Presented at the 2025 American Educational Research Association (AERA) Annual Meeting, Denver, Colorado.
- **Liu, Z.**, Song, Y., & Xing, W. (2025). Identifying factors of in-video dropout in middle school online math learning using survival analysis. Presented at the 2025 American Educational Research Association (AERA) Annual Meeting, Denver, Colorado.
- Xing, W., **Liu, Z.**, & Song, Y. (2025). Teaching quantum computing to undergraduate students using a multimedia and simulation-based learning technology. Presented at the 2025 American Educational Research Association (AERA) Annual Meeting, Denver, Colorado.
- Xing, W., Song, Y., Li, C., **Liu, Z**. (2025) Flipping the Roles: Engaging Middle School Students in Learning-by-teaching with a Generative AI-powered Teachable Agent. Presented at 2025 American Educational Research Association (AERA). Denver, Colorado.

- Kim, T., Xing, W., **Liu, Z**., & Li, H. (2025). Investigating the Impact of Negative Emotions in High School Students' Asynchronous Online Math Discussions. Presented at the 2025 American Educational Research Association (AERA) Annual Meeting, Denver, Colorado.

- **Liu, Z.**, Xing, W. , & Zhu, W.(2023). How AI assisted k-12 computer science education? A systematic review. [Symposium]. University of Notre Dame, US.

- **Liu, Z.**, Xing, W. , & Zhu, W.(2023). Integrating Generative AI in Augmented Reality: A New Paradigm for Educational Resource Creation. [Symposium]. University of Notre Dame, US.
- Oh, H., Guo, R., Xing, W., Song, Y., Li, C., **Liu, Z**. (2024, October 19-23). Integrating Machine Learning into High School Mathematics [Paper presentation]. Association for Educational Communications & Technology International Convention 2024, Kansas City, MO, United States.

- Xing, W., **Liu, Z**., & Fang, Z. (2024,October 19-23). An exploratory study of mathematics teachers' discourse in an online lesson on polynomial expressions [Paper presentation]. Association for Educational Communications & Technology International Convention 2024, Kansas City, MO, United States.
- Xing, W., **Liu, Z.**, & Song, Y. (2024,October 19-23). Understanding in-video dropout behavior: Analyzing student engagement in online math education [Paper presentation]. Association for Educational Communications & Technology International Convention 2024, Kansas City, MO, United States.
- **Liu, Z.**, Song, Y., Xing, W., Guo, J., Feng, P., & Kim, G. (2024). Enhancing students' quantum computing learning through multimedia and simulation-based tools. Proposal submitted for presentation at the AECT International Convention, Kansas City, MO, October 19–23.
- **Liu, Z.**, Jiang, Y., Li, C., & Xing, W. (2024, October 19–23). Improve individual fairness in online learning performance prediction [Paper presentation]. Association for Educational Communications & Technology International Convention 2024, Kansas City, MO, United States.
- Fang, Z., Xing, W., & **Liu, Z**. (2024, December 4-7). Mathematics teachers' discourse in an online lesson on polynomial expressions. Presented at the Literacy Research Association's 74th Annual Conference, Westin Peachtree Plaza, Atlanta, GA, USA.
- **Liu, Z**., Xing, W., Ray, S., & Owoputi, R. (2024, December 5–6). Enhancing automotive cybersecurity education in higher education through an immersive virtual environment [Poster presentation]. Warren B. Nelms Annual IoT Conference 2024, Gainesville, FL, United States.
- Li, H., **Liu, Z**., & Xing, W. (2024, December 5–6). Leveraging secure IoT for intelligent multi-modal assessment in mathematics education [Poster presentation]. Warren B. Nelms Annual IoT Conference 2024, Gainesville, FL, United States.
- **Liu, Z.**, Xing, W., Zhang, F., & Li, C. (2025, March). A visual programming approach to enhance spatial computational thinking skills in upper-elementary students [Poster presentation]. The 15th International Learning Analytics & Knowledge Conference, Dublin, Ireland.

Doctoral Symposium

- *An Explainable Model for AI-Generated Pseudocode Detection in Online High School Programming Courses*, IEEE Frontiers in Education (FIE) 2024, Washington, D.C.

- *Automatic Distractor and Feedback Generation in Online AI Education: A Design-Based Research Study*, ACM International Computing Education Research (ICER) 2025, Virginia

PROFESSIONAL WORK EXPERIENCE

University of Florida, USA

Graduate Research Assistant *Aug. 2023– present*
- Working on the design and development of an educational website called Mflow, using Flow-Based Music Programming to engage children in computer science.
- Conducting research on how AI assists K–12 computer science education.
- Leading research sub-projects on AI fairness and LLMs for online learning

Department of Education, Beijing Normal University

Research Assistant, VR/AR in Education Laboratory Beijing, Sep. 2021 – July 2023
- Designed and developed AR applications for K–12 education, implementing object recognition and plane detection using C#.
- Developed and maintained data validation and storage servers using Java.
- Studied the impact of the AR learning environment on student learning and teacher instruction.

Computer Network Information Center, Chinese Academy of Sciences

Research Assistant, Advanced Interactive Laboratory Beijing, Oct. 2019 – May. 2020
- Led the visualization research of multi-person and multi-dimensional data interactive sharing based on AR.

▪ Developed Augmented Reality software for satellite science using C#, successfully registered it under Software Copyright (Registration No. 2020R11L426768).

SERVICE/LEADERSHIP

Reviewer
Academic journals
   ▪ Reviewer of the Computers & Education (C&E) (2024)
   ▪ Reviewer of the Education and Information Technologies (EIT) (2024, 2025)
   ▪ Sub-reviewer of special issue on the Equity of Artificial Intelligence in Higher Education, Journal of Computing in Higher Education (2024)
   ▪ BMC Psychology (2025)
Conferences
   ▪ The 15th International Learning Analytics & Knowledge Conference (LAK Poster Session) (2025)
   ▪ International Society for the Learning Sciences (ISLS) (2025)
   ▪ Special Interest Group for Computer Science Education (SIGCSE TS) (2025, 2026)
   ▪ International Conference on Educational Data Mining (EDM) (2024)
   ▪ Association for Educational Communications and Technology (AECT) (2024, 2025)
   ▪ Association Society for Engineering Education (ASEE) (2024, 2025)
   ▪ IEEE Frontiers in Education (IEEE FIE) (2024, 2025)
   ▪ IEEE Global Engineering Education Conference (IEEE EDUCON) (2025)
   ▪ American Educational Research Association (AERA) (2024, 2025)
Volunteer
   ▪ Special Interest Group for Computer Science Education (SIGCSE TS) (2024)

LANGUAGES AND SKILLS

   ▪ Language: Mandarin (Native) English (Fluent)
   ▪ Certifications: Machine Learning, Deep Learning (Coursera Certificate)
   ▪ Programming: Python, C#, HTML, Javascript, R