

# Conrad Borchers

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## Education

### Carnegie Mellon University

HUMAN-COMPUTER INTERACTION, PhD

HUMAN-COMPUTER INTERACTION, MS

### University of Oxford

SOCIAL DATA SCIENCE, MSc

### University of Tübingen

PSYCHOLOGY, BSc

Pittsburgh, PA

08/2022 - present

08/2022 - 08/2024

Oxford, United Kingdom

10/2021 - 08/2022

Tübingen, Germany

10/2018 - 07/2021

## Professional Experience

08/2022 -	<b>Graduate Research Assistant</b> , Human-Computer Interaction Institute, Carnegie Mellon University
02/2020 - 10/2024	<b>Research Affiliate</b> , Lab of Christian Fischer, University of Tübingen
11/2021 - 07/2022	<b>Student Researcher and Team Lead</b> , Oxford Artificial Intelligence Society
11/2021 - 07/2022	<b>Graduate Research Assistant</b> , Saïd Business School, University of Oxford
05/2021 - 09/2021	<b>Research Intern</b> , CAHL Lab (Zach Pardos), University of California, Berkeley
08/2020 - 01/2021	<b>Undergraduate Research Assistant</b> , Tübingen School of Education
02/2019 - 07/2020	<b>Undergraduate Research Assistant</b> , Leibniz Knowledge Media Research Center (IWM)

## Publications

*Italicized* author names indicate mentored students. An asterisk (\*) indicates equal contribution.

### JOURNAL ARTICLES

- J8 – Pritchard, C., **Borchers, C.**, Rosenberg, J. M., Fox, A. K., & Stegenga, S. M. (2024). The datafication of student information on X (Twitter). *Computers and Education Open*, 7, 100197. <https://doi.org/10.1016/j.caeo.2024.100197>
- J7 – **Borchers, C.\***, Rosenberg, J.\*, & Swartzentruber, R. M.\* (2023). Facebook Post Data: A Primer for Educational Research. *Educational Technology Research and Development*. <https://doi.org/10.1007/s11423-023-10269-2>
- J6 – **Borchers, C.\***, Eder, T. F.\*, Richter, J., Keutel, C., Huettig, F., & Scheiter, K. (2023). A Time Slice Analysis of Dentistry Students' Visual Search Strategies and Pupil Dilation during Diagnosing Radiographs. *PloS one*. <https://doi.org/10.1371/journal.pone.0283376>
- J5 – Pardos, Z. A., **Borchers, C.**, & Yu, R. (2023). Credit hours is not enough: Explaining undergraduate perceptions of course workload using LMS records. *The Internet and Higher Education*, 56, 100882. <https://doi.org/10.1016/j.iheduc.2022.100882>
- J4 – Rosenberg, J., **Borchers, C.**, Stegenga, S., Burchfield, M., Anderson, D., & Fischer, C. (2022). How educational institutions reveal students' personally identifiable information on Facebook. *Learning, Media and Technology*. Advanced Online Publication. <https://doi.org/10.1080/17439884.2022.2140672>
- J3 – Rosenberg, J., **Borchers, C.**, Burchfield, M., Anderson, D., Stegenga, S., & Fischer, C. (2022). Posts About Students on Facebook: A Data Ethics Perspective. *Educational Researcher*. Advanced Online Publication. <https://doi.org/10.3102/0013189X221120538>
- J2 – Rosenberg, J., Burchfield, M., **Borchers, C.**, Gibbons, B., Anderson, D., & Fischer, C. (2021). Social media and students' privacy: What schools and districts should know. *Phi Delta Kappan*, 103(2), 49-53. <https://doi.org/10.1177/00317217211051145>
- J1 – Rosenberg, J., **Borchers, C.**, Dyer, E., Anderson, D. & Fischer, C. (2021). Understanding Public Sentiment About Educational Reforms: The Next Generation Science Standards on Twitter. *AERA Open*, 7(1), 1-17. <https://doi.org/10.1177/23328584211024261>

## CONFERENCE PROCEEDINGS [PEER-REVIEWED]

- C20 – Zhang, J.\*, **Borchers, C.\***, & Barany, A. (2024). Studying the Interplay of Self-Regulated Learning Cycles and Scaffolding Through Ordered Network Analysis Across Three Tutoring Systems. *Proceedings of the International Conference on Quantitative Ethnography (ICQE)*, Philadelphia, PA, USA.
- C19 – Yang, K. B.\*, **Borchers, C.\***, Falhs, A.-C., Echeverria, V., Karumbaiah, S., Rummel, N., & Aleven, V. (2024). Leveraging Multimodal Classroom Data for Teacher Reflection: Teachers' Preferences, Practices, and Privacy Considerations. *Proceedings of the 19th European Conference on Technology Enhanced Learning (EC-TEL)*, Krems, Austria.
- C18 – Baucks, F.\*, Schmucker, R.\*, **Borchers, C.**, Pardos, Z. A., & Wiskott, L. (2024). Gaining Insights into Group-Level Course Difficulty via Differential Course Functioning. *Proceedings of the Tenth (2024) ACM Conference on Learning@Scale (L@S)*. Atlanta, GA, USA. <https://doi.org/10.1145/3657604.3662028>
- C17 – **Borchers, C.**, Xu, Y., & Pardos, Z. A. (2024). Are You an Early Dropper or Late Shopper? Mining Enrollment Transaction Data to Study Procrastination in Higher Education. *Proceedings of the 17th International Conference on Educational Data Mining (EDM)*. Atlanta, GA, USA.
- C16 – Zhang, J., **Borchers, C.**, Aleven, V., & Baker, R. S. (2024). Using Large Language Models to Detect Self-Regulated Learning in Think-Aloud Protocols. *Proceedings of the 17th International Conference on Educational Data Mining (EDM)*. Atlanta, GA, USA.
- C15 – **Borchers, C.**, Yang, K., Lin, J., Rummel, N., Koedinger, K. R., & Aleven, V. (2024). Combining Dialog Acts and Skill Modeling: What Chat Interactions Enhance Learning Rates During AI-Supported Peer Tutoring? *Proceedings of the 17th International Conference on Educational Data Mining (EDM)*. Atlanta, GA, USA.
- C14 – **Borchers, C.**, Liu, X., Lee, H. H., & Zhang, J. (2024). Ethical AIED and AIED Ethics: Toward Synergy Between AIED Research and Ethical Frameworks. *Proceedings of 25th International Conference on Artificial Intelligence in Education (AIED) – BlueSky Track*. Recife, Brazil.
- C13 – Zhang, L., Lin, J., **Borchers, C.**, Sabatini, J., Hollander, J., Cao, M., & Hu, X. (2024). Predicting Learning Performance with Large Language Models: A Study in Adult Literacy. *Proceedings of the 26th International Conference On Human-Computer Interaction (HCI)*. Washington, DC, USA
- C12 – Peng, C., **Borchers, C.**, & Aleven, V. (2024). Designing Homework Support Tools for Middle School Mathematics Using Intelligent Tutoring Systems. *Proceedings of the 2024 Annual Meeting of the International Society of the Learning Sciences (ISLS)*. Buffalo, NY, USA.
- C11 – Nguyen, H. T., **Borchers, C.**, Xia, M., & Aleven, V. (2024). Designing Tools for Caregiver Involvement in Intelligent Tutoring Systems for Middle School Mathematics. *Proceedings of the 2024 Annual Meeting of the International Society of the Learning Sciences (ISLS)*. Buffalo, NY, USA.
- C10 – **Borchers, C.**, Wang, Y., Karumbaiah, S., Ashiq, M., Shaffer, D. W., & Aleven, V. (2024). Revealing Networks: Understanding Effective Teacher Practices in AI-Supported Classrooms using Transmodal Ordered Network Analysis. *Proceedings of the 14th International Learning Analytics and Knowledge Conference (LAK)*. Kyoto, Japan. ACM. <https://doi.org/10.1145/3636555.3636892>
- C9 – **Borchers, C.**, Zhang, J., Baker, R. S., & Aleven, V. (2024). Using Think-Aloud Data to Understand Relations between Self-Regulation Cycle Characteristics and Student Performance in Intelligent Tutoring Systems. *Proceedings of the 14th International Learning Analytics and Knowledge Conference (LAK)*. Kyoto, Japan. ACM. <https://doi.org/10.1145/3636555.3636911>
- C8 – **Borchers, C.**, Carvalho, P. F., Xia, M., Liu, P., Koedinger, K. R., & Aleven, V. (2023). What Makes Problem-Solving Practice Effective? Comparing Paper and AI Tutoring. *Proceedings of the 18th European Conference on Technology Enhanced Learning (EC-TEL)*. Aveiro, Portugal.
- C7 – Karumbaiah, S., **Borchers, C.**, Shou, T., Falhs, A.-C., Liu, C., Nagashima, T., Rummel, N., & Aleven, V. (2023). A Spatiotemporal Analysis of Teacher Practices in Supporting Student Learning and Engagement in an AI-enabled Classroom. *Proceedings of the 24th International Conference on Artificial Intelligence in Education (AIED)*. Tokyo, Japan.
- C6 – Shou, T., **Borchers, C.**, Karumbaiah, S., & Aleven, V. (2023). Optimizing Parameters for Accurate Position Data Mining in Diverse Classrooms Layouts. *Proceedings of the 16th International Conference on Educational Data Mining (EDM)*. Bengaluru, India.
- C5 – **Borchers, C.**, Klein, L., Johnson, H., & Fischer, C. (2023). Timing Matters: Inferring Educational Twitter Community Switching from Membership Characteristics. *Proceedings of the 16th International Conference on Educational Data Mining (EDM)*. Bengaluru, India.

- C4 – Karumbaiah, S.\*, **Borchers, C.\***, Falhs, A.-C.\*, Holstein, K., Rummel, N., & Aleven, V. (2023). Teacher Noticing and Student Learning in Human-AI Partnered Classrooms: A Multimodal Analysis. *Proceedings of the 2023 Annual Meeting of the International Society of the Learning Sciences (ISLS)*. Montréal, Canada.
- C3 – **Borchers, C.** & Pardos, Z. A. (2023). Insights into undergraduate pathways using course load analytics. *Proceedings of the 13th International Learning Analytics and Knowledge Conference (LAK)*. Arlington, TX, USA. ACM. <https://doi.org/10.1145/3576050.3576081>
- C2 – **Borchers, C.**, Rosenberg, J., Gibbons, B., Burchfield, M., & Fischer, C. (2021). To Scale or Not to Scale: Comparing Popular Sentiment Analysis Dictionaries on Educational Twitter Data. *Proceedings of the 14th International Conference on Educational Data Mining (EDM)*. Paris, France.
- C1 – Burchfield, M., Rosenberg, J., **Borchers, C.**, Thomas, T., Gibbons, B., & Fischer, C. (2021). Are Violations of Student Privacy “Quick and Easy”? Investigating the Privacy of Students’ Images and Names in the Context of K-12 Educational Institution’s Posts on Facebook. *Proceedings of the 14th International Conference on Educational Data Mining (EDM)*. Paris, France.

## WORKSHOP PUBLICATIONS [PEER-REVIEWED]

- W4 – Aleven, V., **Borchers, C.**, Huang, Y., Nagashima, T., McLaren, B., Carvalho, P., Popescu, O., Sewall, J., & Koedinger, K. (2024). An Integrated Platform for Studying Learning with Intelligent Tutoring Systems: CTAT+TutorShop. *Proceedings of the Fifth Annual Workshop on Learning@Scale 2024: A/B Testing and Platform-Enabled Learning Research*.
- W3 – Zhang, L., Lin, J., **Borchers, C.**, Cao, M., & Hu, X. (2024). 3DG: A Framework for Using Generative AI for Handling Sparse Learner Performance Data From Intelligent Tutoring Systems. *Proceedings of the First Workshop on Generative AI for Learning Analytics (GenAI-LA) at LAK24*.
- W2 – Han, Z. F., Lin, J., Gurung, A., Thomas, D. R., Chen, E., **Borchers, C.**, Gupta, S., & Koedinger, K. R. (2024). Improving Assessment of Tutoring Practices using Retrieval-Augmented Generation. *Proceedings of the AAAI2024 Workshop on AI for Education - Bridging Innovation and Responsibility*.
- W1 – **Borchers, C.\***, Gala, D. S.\*, Gilbert, B.\*, Oravkin, E., Bounsi, W., Asano, Y. M., & Kirk, H. R. (2022). Looking for a Handsome Carpenter! Debiasing GPT-3 Job Advertisements. *Proceedings of the 4th Workshop on Gender Bias in Natural Language Processing (NAACL)*.

## CONFERENCE DEMO PUBLICATIONS [PEER-REVIEWED]

- D1 – Rao, J., **Borchers, C.**, & Lin, J. (2024). Coursera-REC: Explainable MOOCs Course Recommendation using RAG-facilitated LLMs. *25th International Conference on Artificial Intelligence in Education (AIED)*.

## STUDENT-LED CONFERENCES, WHITE PAPERS, AND BLOG POSTS

- M3 – **Borchers, C.** (2020). Die Replikationskrise in der Psychologie - Reflexionen und Implikationen für die Erziehungswissenschaft. [The Replication Crisis in Psychology - Reflections and Implications for Pedagogy]. *Dynamiken des Pädagogischen Perspektiven auf Studium, Theorie und Praxis*. Budrich.
- M2 – **Borchers, C.**, Rosenberg, J., & Fischer, C. (2020). An Examination of the #NGSSchat Storify Database. <https://doi.org/10.31219/osf.io/4tafx>
- M1 – **Borchers, C.**, Ferdinand, J., & Fischer, C. (2020). Inquiry-based Learning: Forschendes Lernen im Unterricht. [Inquiry-based learning in classroom instruction]. <https://lead.schule/blog/forschendes-lernen-im-unterricht/>

## Presentations & Invited Talks

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### CONFERENCE PRESENTATIONS

- P8 – Rosenberg, J. M., Pritchard, C., **Borchers, C.**, Burchfield, M., Fischer, C., Fox, A. K., & Stegenga, S. (2024, March). Data ethics in the open: Navigating student information risks in educational social media. Presentation at the Data Science & Social Research, 4th International Conference. <https://dssr2024.unina.it/index.html>
- P7 – Gold, G., **Borchers, C.**, & Carvalho P. F. (2024, March). Students’ Academic Performance and Goal Orientation Relate to Initial Knowledge but Not Learning Rate. Poster presented at the 14th International Learning Analytics and Knowledge Conference (LAK), Kyoto, Japan.

- P6 – Fischer, C., Morina, F., **Borchers, C.**, & Klein, L. (2023, August). Online Communities of Practice on Twitter: A Case Study of the German Educational Twittersphere. Paper presented at the 20th Biennial EARLI Conference, Thessaloniki, Greece.
- P5 – **Borchers, C.**, & Braesemann, F.. Correlation networks predict success of digital technologies (2022, November). Paper presented at the the 11th International Conference on Complex Networks and their Applications, Palermo, Italy.
- P4 – Fischer, C., Morina, F., **Borchers, C.**, Klein, L., & Eich, M. (2022, April). Informal Professional Development in Online Communities of Practice at Scale: Mapping Nationwide Educational Twitterspheres. Paper presented at the 2022 Annual Meeting of the American Educational Research Association, San Diego, CA.
- P3 – **Borchers, C.**, Eder, T., & Scheiter, K. (2021, September). How Effective is Reflective search? A Time Slice Analysis of Dentistry Students' Visual Search Strategies and Pupil Dilation during Diagnosing Radiographs. Paper presented at the 2nd Workshop on Mental Effort, Virtual Conference.
- P2 – Rosenberg, J., **Borchers, C.**, Gibbons, B., Dyer, E., Anderson, D., & Fischer, C. (2021, April). Don't worry, be happy? A sentiment analysis of the #NGSSchat Twitter community. Paper presented at the 2021 Annual Meeting of the American Educational Research Association, Virtual Conference.
- P1 – Fischer, C., Morina, F., **Borchers, C.**, & Klein, L. (2021, March). Using Big Data to Support Educational Change: Twitter as a Platform for Informal Professional Development. Paper presented at the 2021 Annual Meeting of the Leibniz Education Research Network, Hannover, Germany.

## INVITED TALKS AND LECTURES

- T7 – **Borchers, C.** (2024, November). LLMs in Educational Research: Recent Trends and Three Future Directions. Interdisciplinary Education Seminar at the University of Tennessee, Knoxville.
- T6 – **Borchers, C.** (2024, September). Lecture Guest on Publications [C17] and [C15]. CS 568 (AI in Adaptive Ed Tech) at Worcester Polytechnic Institute hosted by Neil Heffernan.
- T5 – **Borchers, C.** (2024, September). To Improve Education with LLMs, Do More Than Just LLMs. Learning Analytics (M.S.Ed. Online), University of Pennsylvania GSE
- T4 – **Borchers, C.** (2024, May). Envisioning LLMs as Tools for Educational Research and Practice Rather than Instructional Replacements. Invited Talk at the ALTTAI Seminar at the University of Memphis.
- T3 – **Borchers, C.** (2024, April). Tools for Socio-Emotional Learning. Guest Lecture in Tools for Online Learning Lecture hosted by Steven Moore, Carnegie Mellon University.
- T2 – **Borchers, C.** (2022, October). Debiasing GPT-3 Job Ads. The Data Skeptic Podcast hosted by Kyle Polich.
- T1 – **Borchers, C.** (2022, September). Leveraging data science to improve educational processes: From K-12 student privacy on social media to higher education student workload. Invited talk at the Department of Theory & Practice in Teacher Education, University of Tennessee, Knoxville.

## Awards, Fellowships, & Grants

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### CONFERENCE PAPER AND THESIS AWARDS

- 2024 **Best Student Paper Award [C20]**, International Conference on Quantitative Ethnography (ICQE)
- 2024 **Best Interactive Event Nominee [D1]**, 25h International Conference on Artificial Intelligence in Education
- 2024 **Best Student Paper Award [C15]**, 17th International Conference on Educational Data Mining
- 2024 **Best Short Paper Award [C17]**, 17th International Conference on Educational Data Mining
- 2024 **Best Paper Award (AIS) [C13]**, 26th Intl. Conference On Human-Computer Interaction (HCI)
- 2023 **Best Full Paper Honorable Mention [C3]**, 13th International Learning Analytics and Knowledge Conference
- 2022 **OII Thesis Prize for Best MSc Dissertation**, Oxford Internet Institute
- 2021 **Best Poster Award [C2]**, 14th International Conference on Educational Data Mining

## RESEARCH AND CONFERENCE FUNDING

- 2024 **GSA Conference Funding (LAK '24)** - \$750, Carnegie Mellon University
- 2024 **Full Conference Travel Support (AIED '24)** - \$2,000, Learnest
- 2023 **EDM2023 Travel Scholarship** - \$1,250, International Educational Data Mining Conference
- 2023 **Prof. Ramkumar Memorial Foundation Scholarship** - \$100, International Educational Data Mining Conference
- 2023 **GSA Conference Funding (LAK '23)** - \$750, Carnegie Mellon University
- 2023 **GuSH Graduate Research Grant (Scaffolding Effects on Problem-Solving in Intelligent Tutoring Systems) [C9, C16, C20]** - \$750, Carnegie Mellon University

## SELECTIVE FELLOWSHIPS, SCHOLARSHIPS, AND SUMMER SCHOOLS

- 2024 **Ethical AI in Education Fellow**, Learnest
- 2022 **LearnLab Summer School Participant (ITS Track)**, Carnegie Mellon University
- 2022 **Merck Innovation Cup '22 Participant**, Merck KGaA (Merck Group)
- 2021 **Learning Engineering Fellow - 2nd Place in Tools Competition (\$15,000)**, EPIC@Berkeley - UC Berkeley GSE & Schmidt Futures
- 2019-2020 **Research Fellow**, European Federation of Psychology Students Associations (EFPSA)
- 2018 **BSc and MSc Scholarship**, German Academic Scholarship Foundation (Studienstiftung)

## Teaching Experience

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### TEACHING ASSISTANT

- Su 2024 **CTAT Track Instructor**, LearnLab Summer School, Carnegie Mellon University
- Fall 2023 **User-Centered Research and Evaluation**, School of Computer Science, Carnegie Mellon University
- Spring 2023 **Tools for Online Learning**, School of Computer Science, Carnegie Mellon University
- Spring 2021 **Cognitive Modeling**, Department of Computer Science, University of Tübingen, Germany

### GUEST LECTURES

- Spring 2021 **Tools for Online Learning**, Guest Lecture on Socio-Emotional Learning, School of Computer Science, Carnegie Mellon University

### WORKSHOPS

- Fall 2024 **Multimodal Machine Learning: An Introductory Workshop**, Hosted by Joshua Rosenberg at the University of Tennessee, Knoxville; GitHub: <https://tinyurl.com/utk-mmml>
- Fall 2022 **Sentence Embeddings for Twitter Research**, Introduction to Data Science Methods in Education, University of Tennessee, Knoxville; GitHub: <https://tinyurl.com/sembutk>

## Mentoring

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- All 2024 **Katherine Zhao**, SURA+Lab Intern, School of Computer Science, Carnegie Mellon University
- Fall 2024 **Kennion Gubler**, Independent Study, Carnegie Mellon University
- Fall 2024 **Siyu (Dorian) Pan**, Lab Intern, Carnegie Mellon University

Fall 2024 **Tianze (Steven) Shou**, Independent Study, Carnegie Mellon University  
 Su 2024 **Hrugved Anantrao Pawar**, Summer Lab Intern, Carnegie Mellon University  
 Su 2024 **Kloe Chen**, Summer Lab Intern, Carnegie Mellon University  
 Su 2024 **Doris Gao**, Summer Lab Intern, Carnegie Mellon University  
 Su 2024 **Zoey Yan**, NSF REU, Carnegie Mellon University  
 SpSu 2024 **Devika Venikopalan**, SURF, School of Computer Science, Carnegie Mellon University  
 Fall 2023 **Snigdha Tiwari**, Research Assistant, Carnegie Mellon University  
 Fall 2023 **Dhruvisha Mondhe**, METALS Independent Study, Carnegie Mellon University  
 Su 2023 **Kennion Gubler**, NSF REU, Carnegie Mellon University  
 Su 2023 **Ha Tien Nguyen**, NSF REU, Carnegie Mellon University  
 Su 2023 **Cindy Peng**, NSF REU, Carnegie Mellon University  
 Spring 2023 **Jialin Ye**, MHCI Independent Study, Carnegie Mellon University  
 Spring 2023 **Avani Guduri**, Undergraduate Independent Study, Carnegie Mellon University  
 Fall 2022 **Tianze (Steven) Shou**, NSF REU Extension, Carnegie Mellon University

## Service to the Academic Community

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### PEER REVIEW

2024 **Springer Scientific Reports**, Ad-hoc Reviewer  
 2024 **British Journal of Educational Technology**, Ad-hoc Reviewer  
 2024 **Frontiers in Education**, Ad-hoc Reviewer  
 2024 **Journal of Learning Analytics**, Ad-hoc Reviewer  
 2024 **Journal of Infrastructure, Policy and Development**, Ad-hoc Reviewer  
 2024 **Teaching and Teacher Education**, Ad-hoc Reviewer  
 2024 **American Journal of Education**, Ad-hoc Reviewer  
 2024 **RecSys**, Conference Proceedings  
 2024 **L@S**, Conference Proceedings  
 2024 **CSCW**, Conference Proceedings  
 2024 **EDM**, Conference Proceedings  
 2024 **AIED**, Conference Proceedings  
 2024-2025 **CHI**, Conference Proceedings  
 2024-2025 **LAK**, Conference Proceedings  
 2023-2024 **ISLS**, Conference Proceedings  
 2022-2024 **AERA**, Annual Meeting Proceedings  
 2023 **NeurIPS**, Workshop Track

### COMMITTEE WORK

2023-2024 **Graduate Student Assembly Representative**, Carnegie Mellon University  
 2023-2024 **NSF REU Summer Intern Admissions Committee**, Carnegie Mellon University

### VOLUNTEERING

2023-2024 **EDM**, Student Volunteer  
 2023-2024 **ISLS**, Student Volunteer