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Teachers' Motivations to Learn about ML and AI

Background

As ML and AI become ubiquitous in our lives, it is essential to educate people about its basic concepts. Some suggest introducing it in the school curriculum, which raises issues such as pedagogy and teacher professional development. Although limited, current ML and AI education research has started to explore designing curricula and resources but has been focused on teachers' motivations and challenges. Investigating teachers' motivations can give insights into their adoption of new curricula, teaching practices, and students' motivations to learn. This study addresses this new research area by developing and trialling a teacher survey on motivations to learn about ML and AI.

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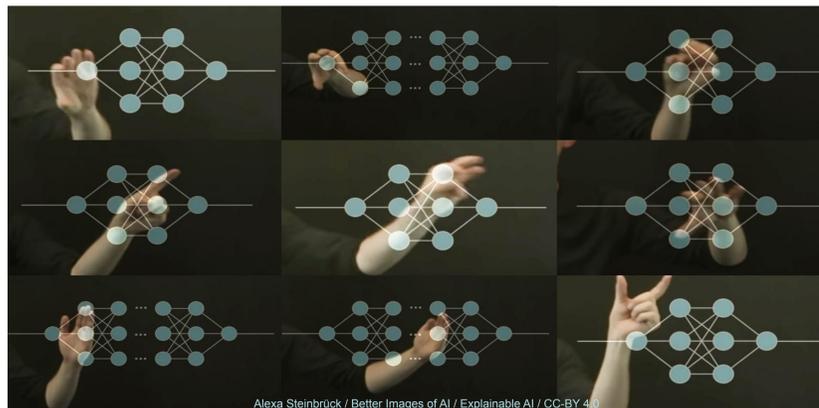
Methods

Research question: What are teachers' motivations to learn about ML and AI?

Teachers (n=28) who enrolled in the online Raspberry Pi Foundation AI course were given a survey (https://tinyurl.com/AITBelQ) prior to the course. The questionnaire consisted of adapted questions from:

- The Motivation to Teach Computer Science (MTCS) scale: Questions about motivations

- The Teacher Beliefs about Coding and Computational Thinking (TBaCCT) scale: Questions about value beliefs

- Open ended questions: Questions about motivations

Results and Discussion

The MTCS scale, based on self-determination theory, is divided into the four motivation sub-constructs of External Pressure, External Benefit, Student Benefit, and Personal Enjoyment on a continuum from external to increasingly internal motivation. The results indicate that our teachers were more motivated by intrinsic motivators, e.g., personal enjoyment, than external motivators, e.g., external pressures, to learn about AI and ML..
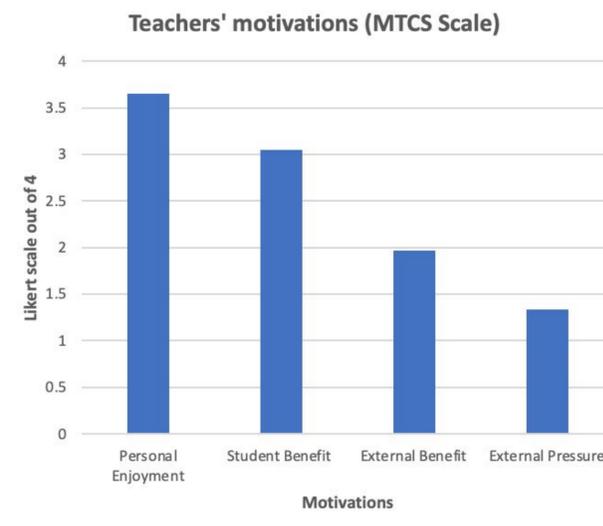
The TBaCCT scale is divided into six Value Beliefs sub-constructs of Importance (importance to teach AI and ML), Utility (benefits of AI and ML to students), Interest (learning ML and AI is interesting to students), Intelligence, nature and expectancy. The TBaCCT results confirmed the MTCS findings that student benefit was a strong motivator for teachers.
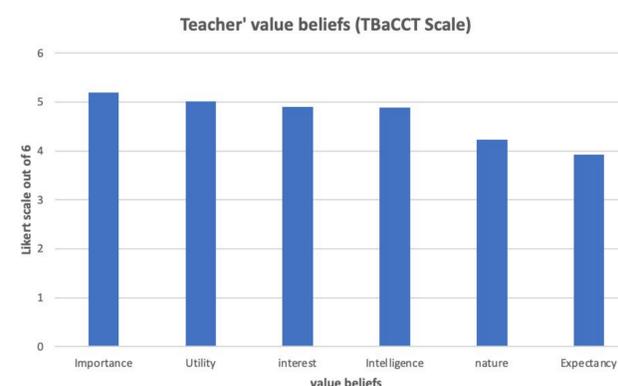
Teachers were asked open-ended questions as well to understand their motivations further. The answers supported the MTCS and TBaCCT findings in that most teachers were motivated to learn ML and AI because it is an important 21st-century literacy, which is part of our daily lives. The second highest motivation was that ML and AI will benefit their students.

Motivations to teach ML and AI Themes	Number of teachers
ML and AI is an important 21st-century literacy because it's part of our daily lives	15
It could help benefit those I teach	11
societal benefit	5
I think ML and AI will be interesting	3
ML and AI Improve learning and thinking process	1

"I would like to teach the younger generation how we will live in the future with ML and AI technologies"

Conclusions and Next Steps

This study used a survey incorporating the MTCS, TBaCCT, and open-ended questions to explore teachers' motivations in learning ML and AI. We found that our participants were more intrinsically than extrinsically motivated and most motivated by personal enjoyment, importance and potential student benefits. The main limitation of this study is its small sample size, which we will address as we review and validate the survey and expand its use. In the next steps, we will investigate the concepts and appropriateness of teaching ML and AI in the classroom. We will also investigate how teachers' motivations impact students' learning of ML and AI because we believe this research may be important for predicting and influencing the successful K-12 introduction.

References

[1] Gagné, M., & Deci, E. L. (2005). Self-determination theory and work motivation. Journal of Organizational Behavior, 26(4), 331-362. https://doi.org/10.1002/job.322

[2] Lindner, A., Romeike, R., Jasute, E., & Pozdniakov, S. (2019). Teachers' perspectives on artificial intelligence. In 12th International conference on informatics in schools,"Situation, evaluation and perspectives", ISSEP.

[3] Marques, L. S., Gresse von Wangenheim, C., & Hauck, J. C. (2020). Teaching machine learning in school: A systematic mapping of the state of the art. Informatics in Education, 19(2), 283-321. https://doi.org/10.15388/infedu.2020.14

[4] Martin, N. D., Baker, S. N., Haynes, M., & Warner, J. R. (2021, March). Development and Validation of the Motivation to Teach Computer Science Scale. In Proceedings of the 52nd ACM Technical Symposium on Computer Science Education, 1312. https://doi.org/10.1145/3408877.3439622

[5] Rich, P. J., Larsen, R. A., & Mason, S. L. (2021). Measuring teacher beliefs about coding and computational thinking. Journal of Research on Technology in Education, 53(3), 296-316.

[6] Tedre, M., Toivonen, T., Kaihila, J., Vartiainen, H., Valtonen, T., Jormanainen, I., & Pears, A. (2021). Teaching Machine Learning in K-12 Computing Education: Potential and Pitfalls. arXiv preprint arXiv:2106.11034. https://doi.org/10.48550/arXiv.2106.11034

[7] Waite, J. (2022). Teachers' motivations to learn AI survey questions. Retrieved February 16, 2022, from https://tinyurl.com/AITBelQ