K-12 Computing Teachers' Topics for Inquiry

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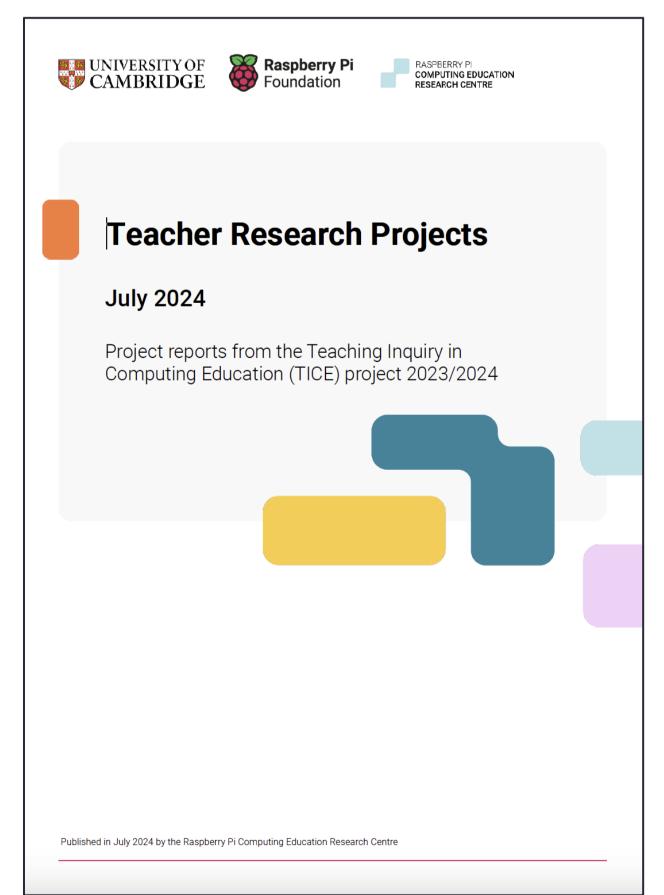
Why teacher inquiry?

Teacher inquiry, also referred to as action research or practitioner research, provides a significant way of generating both local and public knowledge about teaching [3]. It involves teachers working with their students and reflecting on their own work [2], empowering teachers to investigate changes in their own practice and the impact on their learners. This contrasts with the often didactic objectives of formal professional development sessions and recognises teachers' roles in decision making [1].

While teacher inquiry has been known for decades to be an effective way of improving practice, teachers often do not have the time or confidence to undertake their own research. The Teacher Inquiry in Computing Education (TICE) project has been developed for teachers and researchers to work together on projects that teachers choose to investigate. This poster describes the research questions that computing teachers chose to investigate when participating in a teacher inquiry project for computing.

Teacher presents the results of their project on types of feedback preferred by students at the recent Computing At School (CAS Conference) (source: authors)

Booklet describing teachers' projects, written by the participants themselves. Download at http://computingeducationresearch.org

References

[1] Mary D. Burbank and Don Kauchak. 2003. An alternative model for professional development: Investigations into effective collaboration. Teaching and teacher education 19, 5 (2003), 499–514.
[2] Stephen Kemmis, Robin McTaggart, and Rhonda Nixon. 2014. The action research planner: Doing critical participatory action research. Springer.
[3] Susan Lytle and Marilyn Cochran-Smith. 1992. Teacher research as a way of knowing. Harvard educational review 62, 4 (1992), 447–475.
[4] The Royal Society. 2018. Harnessing Educational Research. https://royalsociety.org/-/media/policy/projects/rs-ba-educational-research/educational-research-report.pdf Policy Report.

The TICE project

The TICE project was launched in October 2023 via the Computing At School (CAS) and Raspberry Pi Computing Education Research Centre (RPCERC) networks. Teachers were invited to express an interest to participate and invited to an introductory webinar. Participants signing up were a mixture of both primary and secondary classroom computing teachers.

Teachers were given a free choice of topic, the aim being for them to look at an issue that either interested or concerned them in their own school context. They were assigned to a volunteer helper who had experience of conducting research who would assist them during the year. Webinars and drop-in sessions were available for teachers to support teachers through the stages of choosing a research question, data collection, data analysis and writing up. At the end of the project, teachers were invited to write up their findings which were published in a booklet and distributed to their schools and at the CAS conference Teachers were then able to present their projects to other teachers at the CAS Conference in July 2024. One of the key mechanisms of the project is to provide support by matching academics to teachers to work collaboratively on a project together.

Teachers' choice of topics

22 teachers registered for the project and chose research questions that were relevant to their school context. Of these, three were classified as investigations (finding something out) and 19 as interventions (trying something out). Questions were also classified with respect to computing topic, area of concern, and method proposed. Teachers chose topics focused on a range of age groups, from 5-7 year olds up to 16-18 year olds, with the most common being 11-14 year olds (41%, n=9). In terms of the research questions chosen, more teachers (82%, n=18) were interested in cognitive outcomes, with the most prevalent area of concern being a lack of understanding (50%, n=11), for example students struggling with programming.

Four teachers (18%) were concerned about a lack of interest and how an intervention could address that. The topics under consideration were programming (36%, n=8) and computing topics generally (32%, n=7), with computational thinking, digital media, AI/data science and computer systems also represented in the proposed topics. The interventions proposed included changing pedagogy (36%, n=8), using AI (18%, n=4) and putting in a cross-curricular intervention (18%, n=4).

Topics for Inquiry

Common areas of concern	%	Computing topic	%
Lack of understanding	50%	Programming	36%
Lack of interest	18%	General computing	32%
Need for transferable skills	14%	AI/ data science	14%
Need for effective assessment	14%	Computational thinking	9%
Need for personalised curriculum	5%	Computer systems	5%
		Digital media	5%
Intervention proposed	**%**	**Age of pupils**	**%**
Change pedagogy	36%	5-7	5%
Use of AI	18%	7-11	23%
Cross-curricular intervention	18%	11-14	41%
No intervention	14%	14-16	23%
Use of tool	9%	16-18	9%
Change curriculum	5%		
Outcome type			
Affective	18%	Cognitive	82%

Summary and conclusions – and a new TICE project!

Results show that teachers are focused on cognitive outcomes, are concerned with students' lack of understanding, and are mostly focused on either programming or 'general computing topics'. While some teachers planned to change their pedagogy, others introduced cross-curricular opportunities to increase interest and understanding.

Teachers' choice of questions can support researchers in developing a research agenda for K-12 computing education; the so-called 'supply and demand' problem in educational research means that researchers often are more concerned about addressing a gap in the literature rather than researching something that is important to schools and teachers [4]. Continuing to collect information about what teachers choose to research in future TICE projects could help us to understand where research is most needed in practice.

The TICE project will be running in 2024/2025. Sign up by 13th September 2024: https://bit.ly/tice3_signup

Acknowledgements

Find out more about this project at:
http://computingeducationresearch.org