Supporting K-12 CS Education in Odisha through Code Club Partnerships

Divya Joseph
divya.joseph@raspberrypi.org
Raspberry Pi Foundation
Cambridge, UK

Fiona Coventry
fiona.coventry@raspberrypi.org
Raspberry Pi Foundation
Cambridge, UK

Robert Whyte
bobby.whyte@raspberrypi.org
Raspberry Pi Foundation
Cambridge, UK

ABSTRACT

As computer science is more widely introduced across India, significant challenges remain in increasing access for young people. Through a partnership with the state government of Odisha, we report the experience of supporting government high-school teachers to improve their confidence in teaching CS. Following a teacher training program, we found teachers' reported increased understanding of coding concepts and confidence when teaching about coding. Our findings demonstrated the potential for collaborating with non-specialist teachers to deliver computing content; however, it also highlights the need to tailor the approach to the context.

1 BACKGROUND

With the growth of the IT sector in India, interest in studying CS has grown among high school students [2]. Since 2016, 300,000 students have taken part in unplugged computing activities across 11 states through the CSpathshala program [5]. The National Education Policy of India 2020 has also reaffirmed efforts to promote programming and digital literacy in formal curricula [3].

However, like many countries that have begun to introduce CS in schools, India has struggled to train qualified professionals or non-specialist teachers to teach CS [1]. Likewise, significant challenges remain in sub-optimal infrastructure and the delegation of CS courses as "optional" in many curricula [4]. In Odisha, government initiatives aim to improve the infrastructure and quality of education in government schools. To support these goals, we aimed to provide resources and training to teachers across the state to promote more positive CS outcomes for young people in India.

2 ESTABLISHING CODE CLUBS IN ODISHA

The Raspberry Pi Foundation recently partnered with Mo School Abhiyan, a government initiative in Odisha, to establish code clubs in state government schools. The program aimed to train 1075 high school teachers to start running code clubs during 2022. By April 2023, 950 clubs had registered, and 443 teachers had confirmed they had run code club sessions, with an estimated reach of at least 32,000 young people. Two cohorts of teachers took part in training, including on the basics of Scratch, to prepare them to run code clubs. Most were not computing specialists, but teachers of other STEM subjects. We trained teachers via a combination of online courses and in-person training. Ongoing support was provided via online engagement sessions (or 'Coding pe Charcha') where teachers asked questions and took part in code-alongs. It was important to tailor the program to local infrastructure, such as IT equipment and internet connectivity, and tailor teacher support via WhatsApp groups localised to multiple timezones.

We used pre/post surveys and teacher feedback to evaluate the training program. Using multiple Wilcoxon signed-rank tests, we found statistically significant increases in teachers' self-reported knowledge of coding concepts across both cohorts. For example, teachers reported increased knowledge of the sequencing construct in programming across both cohorts ($z = 6.49, p<.001$ and $z = 6.82, p<.001$ respectively) and most (89%) reported feeling confident to teach coding after the training.

3 DISCUSSION

The findings of our partnership work demonstrate the potential of working with non-specialist teachers to deliver computing; however, they also highlight the challenges of adapting to accommodate teachers' limited capacity to participate in the program and suit the local context (e.g. the availability of IT infrastructure). We aim to continue working with state governments and agencies to build on this experience. This includes exploring opportunities to develop a localized CS curriculum for government schools to adopt in Odisha.

REFERENCES

[1] Peter Hubwieser, Michail N. Giannakos, Marc Berges, Torsten Brinda, Ira Diethelm, Johannes Magenheim, Yogendra Pal, Jana Jackova, and Egle Jasute. 2015. A Global Snapshot of Computer Science Education in K-12 Schools. In *Proceedings of the 2015 ITiCSE on Working Group Reports* (Vilnius, Lithuania) *(ITiCSE-WGR '15)*. Association for Computing Machinery, New York, NY, USA, 65–83. https://doi.org/10.1145/2858796.2858799

[2] INTO. 2022. India's digital transformation fueling interest in computer science for students seeking to study abroad: INTO survey. https://www.intoglobal.com/media/press-releases/2022/india-s-digital-transformation-fueling-interest-in-computer-science-for-students-seeking-to-study-abroad-into-survey/

[3] Ministry of Human Resource Development. 2020. National Education Policy 2020. https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf

[4] Raghu Raman, Smrithi Venkatasubramanian, Krishnashree Achuthan, and Prema Nedungadi. 2015. Computer Science (CS) Education in Indian Schools: Situation Analysis Using Darmstadt Model. *ACM Trans. Comput. Educ.* 15, 2, Article 7 (2015), 36 pages. https://doi.org/10.1145/2716325

[5] Vipul Shah. 2019. CSpathshala: Bringing Computational Thinking to Schools. *Commun. ACM* 62, 11 (2019), 54–55. https://doi.org/10.1145/3343445

CompEd 2023, December 5–9, 2023, Hyderabad, India
© 2023 Copyright held by the owner/author(s).
This is the author's version of the work. It is posted here for your personal use. Not for redistribution. The definitive Version of Record was published in *Proceedings of the ACM Conference on Global Computing Education Vol 2 (CompEd 2023), December 5–9, 2023, Hyderabad, India*, https://doi.org/10.1145/3617650.3624944.