

Teacher Preparation for Introducing CT for Children with Visual Impairments

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Background

Vision Empower implements the CSPathshala CT curriculum (Project VICT) using the Ludic Design for Accessibility, a play based approach at special schools for students with visual impairment. The VE Team works very closely with the teachers as they are ones who further conduct the CT session with the children. To support teachers, a continuous interaction and engagement, through various means such as Training sessions, one on one interaction and online support is provided. Based on regular interaction with the teachers and VE coordinators observations, the paper describes VE's experiences of some of the methodologies, challenges and suggestions in teacher preparation for introducing CT for children with visual impairment.

STEM Education for children with visual impairments

Traditionally, the opportunities of studying science and math were denied to children with visual impairment, the curriculum itself adopted a visual approach. Due to lack of inclusive and accessible resources, learning environments, including labs, very few children take up science and math in higher grades. In the context of special schools, most of the teachers have not studied science and math and are often not able to work towards the higher goals of math education as they themselves have not experienced it. They need support both in terms of content knowledge as well as pedagogies to help children with visual impairments in mathematics.


On the other hand, access to STEM education is linked to social mobility and economic success and being denied a career in STEM often results in inequitable opportunities for children with disabilities. In particular, computational thinking is now being recognized

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across the world as an important skill for all the students, and this is not merely restricted to computer scientists (Jeannette M. Wing, 2006). In today's society, understanding how algorithm driven processes work is important and needs to be considered in school education (R. Ramanujam, 2022).

VE has designed and is implementing a program for supporting teachers in special schools with accessible resources for teaching science and mathematics as well as an accessible curriculum for teaching CT. This paper describes our teacher preparation efforts in the context of CT.

VICT Program

The objective of the VICT program is to introduce CT to children with visual impairment. Based on the CS Pathshala CT curriculum, NCERT Math Curriculum as well as a pilot at a field level, VE Team came up with various games to cover the CT curriculum by following the LDA approach ([Ludic Design for Accessibility](#)) where play is considered as an integral part of the game. ( Online CT for children.pdf)

Teacher Preparation

Teachers play a very critical role in the CT Program as they are the ones who further play these games with the children. In our game based pedagogy, the teacher is encouraged to actively participate and play the game, including designing new rules and variations in the games. To facilitate this teachers needed a lot of handholding and support, both in terms of the material usage and pedagogies. This paper describes some of the methodologies and challenges in teacher preparation.

Teacher Training Workshops - Pragya

The first Teacher Training Program was conducted in 2017 on STEM pedagogy and special needs of students with visual impairment. The curriculum for these training sessions includes - science and math teacher instruction kits, CT games, orientation to learning management systems, etc.

The VICT Program is introduced to the teacher during the Teacher training workshop. Games from each of the categories are played, followed by sharing of the Key learning

Areas. The objective behind the process of playing games is to make the teachers experience the element of fun, joy along with some learning through play.

In 2020 when the pandemic began, most of the Pragya Training sessions were conducted online with the teachers, it began by conducting pilot group teacher training sessions to understand how online training should be conducted, given their constraints on availability, accessibility and knowledge of the usage of digital platforms. This provided us with the much needed research and experience of how online teacher training could be taught effectively online.

Once the schools reopened, we were able to make these as hybrid training sessions, where some of the VE team members are physically meeting the teachers and some conducted remotely.

Digital Literacy Training

We noticed that many teachers needed support for digital technologies and accordingly developed Digital literacy audio tutorials for the teachers with visual impairment to understand how to use different apps on their phone. VE first trained the visually impaired teachers on the online meeting platforms. Once the teachers were familiar with the platforms, online training was conducted.

VICT - Teacher Support

In the case of the VICT Program, the VE coordinator visits the schools, conducts a play session of 40 minutes along with the teacher (offline session). Whereas in other places, first an online preparatory session of 30 minutes is conducted by the VE coordinator with the teacher to share about the game, how it is played, and its KLAs. After that the teacher plays the same game, offline, with the children, and the VE coordinator joins online (hybrid session).

The VE School coordinators are in continuous touch with the school teachers to understand their needs, challenges and share more about the games and processes. Sometimes, a few teachers do share their experiences of playing games with the children and its impact, which further helps in improvising the play plans.

Observations during Teacher Interactions

A questionnaire was circulated through a google form, among the VE Coordinators who are involved in conducting CT sessions for VICT Program, to share their experiences of interacting with the teachers and what the training and support requirements are. The following points emerged from their responses:

- Teachers are mostly interested and asking questions around the materials and very few are involved in asking about the game levels.
- Teachers' responses and degree of involvement during offline and hybrid mode varies. For example, in some schools teachers are actively involved during the game session, they do alter the games as per children's response. However, in some schools teachers follow exactly what is shared with them. Sometimes, from the teacher's side it becomes more of an instruction based session.
- Teachers are often not fully aware of the possibilities of CT from the game.

Changes in VE's approach

Need to improve teachers' understanding of CT

Based on the interaction, there is a need to deepen teachers' understanding of CT, by first orienting them about CT and CT curriculum, discussing the processes, play plans and KLAs, in detail, so that the teachers internalize the idea of CT and play based pedagogy. A regular engagement with the teachers has to be continued to bring teachers understanding of the game as play and a sense of empowerment in taking the games to children. Teachers feel more empowered and are able to take ownership of the learning experiences. This will also create a better understanding about the game and at the same time teacher's flexibility in modifying the game as per the children's response. Furthermore, looking at games more as play ba and less instructions based.

Integration with mathematics teaching

All the games are being mapped with the NCERT Math curriculum, grade wise and the next step is to integrate all the games into subject related curriculum where teachers can play these games in their subject related classes. For example; a teacher playing a game of odd

and even in their math classroom after introducing the concept of odd and even to the students.

Creating an orientation to inclusion and accessibility

- To create an inclusive environment and extend our accessible CT games into the mainstream curriculum, VE has been working with B.Ed. program student as enrichment, where a training workshop is conducted to bring awareness about accessibility, to share our approach of making CT curriculum accessible and playing games following the LDA approach.
- Another approach that we want to take forward is setting up of an inclusive education resource center VE in collaboration with the Odisha Government has set up an experience center at IIC Jatani, Odisha, a space to showcase all the accessible materials, devices and to conduct experiential events for teachers and children. Similarly, setting up such kind of resource centers at different other regions to showcase accessible STEM materials, frequent interactions between teachers and educators, sharing of experiences, to discuss and understand the use of materials and at the same time taking their inputs to make it better.

Creating a platform for continuous teacher preparation


- Through LMS
- And a COP
- Through encouraging teachers to share their experiences - Our approach will be focusing on helping teachers to reflect on their own practices such as reflection on the game played and what they learned. This would also include writing observations and papers on the games they have played.

Conclusion

As the process of creating CT games is evolving, VE continues to engage with the teachers by providing stronger orientation as to what CT is and introducing CT as an idea embedded in mathematics education. For strengthening teachers' habits, we will be continuously engaging with the teachers through a Community of practice approach. There is also a need to engage the whole community together, to bring awareness and a positive attitude towards children with visual impairment. To create a space, where the whole community

can be involved and engaged through conversations, sharing and learning of ideas to build an ecosystem which can be accessed by everyone, whenever required.

References:

1. <https://visionempowertrust.org/computational-thinking-games/>
2. <https://visionempowertrust.org/ct-games/play-plan/?q=last-man-standing>
3. <https://visionempowertrust.org/ct-games/>
4.  *Online CT for children.pdf*
5. *NCF, 2005.*
6. *Wing, J. M. (2006). Computational thinking. Communications of the ACM.*
7. *VE Team experiences with the schools and Teachers*