

Design-Based Research for Technology Enabled Language Learning: From Theory to Practice

Jennifer Thomas & Nishevita Jayendran

Abstract

English Language Teaching in India presents multiple challenges, such as a dearth of authentic materials, competent language teachers with a sound knowledge of pedagogical principles and diverse content to support English language learning. As we witness a rise in digital content for building language competence in students, it is necessary to identify research methodologies that can inform the design processes to create and access authentic resources for Communicative English. We argue for the suitability of Design Based Research (DBR) as an appropriate research methodology for designing technology-enabled language learning (TELL) materials for under-resourced contexts. Thereafter we discuss three design principles that emerged as critical features in developing TELL materials for Indian government schools.

Keywords: Design Based Research, Technology Enabled Language Learning, Communicative English, authentic materials, digital content equitable access

Teaching English in India: Demand and Challenges

The last few decades have seen the demand for instruction in English in Indian schools increasing manifold. Recent trends in the global economy have favoured English as the language of choice and a symbol of class, privilege and aspirations for most Indians. Though English is spoken only by a small percentage of the Indian population, it is, as the associate official language of the nation, the language of the ruling elite, with many activities at a national level transacted in English (Graddol, 2010). The simultaneous increase in the demand for English language instruction

coupled with the tendency to use English as a medium of instruction from a young age have widened the divide between those who can access quality education from those who cannot. As a result, most Indian adolescents enter higher education and /or economic job markets on an unequal footing with little or no proficiency in communicative English.

Meaningful English language education has three prerequisites: a proficient, skilled and knowledgeable teacher, contextualized learning materials in multimodal forms and an enabling learning environment (Meghanathan, 2011; NCF, 2006). However, materials development in India has been commercialized based on two misconceptions: a) language learning is a close-ended process that, upon completion of prescribed courses, will lead automatically to proficiency in the target language; and b) short-term courses are sufficient to equip students, youth and adults with the necessary vocabulary to communicate effectively. This has, unfortunately, created an academic context for language learning that focuses on grammar, sentence construction and lists of phrases and idioms, which frequently compromise on reading for meaning and speaking with fluency (Alexander, 2000; Menon et al., 2017). It is against this background that the Connected Learning Initiative (CLiX) was conceptualized to enable ICT-based learning in Indian government schools in Communicative English, Maths and Science. Communicative English from CLiX (hereafter, CEC¹) is a Technology Enabled Language Learning (TELL) module that aims to strengthen listening and speaking skills among high school students through a task-based approach.

I. The Case for Design Based Research in Second Language Learning

Krashen (1985) argued that language learning is most effective when the target language is present in the environment, the language inputs are comprehensible and sufficiently scaffolded with feedback in multimodal forms, and the learning environment is stress-free. He also indicated that constant internal monitoring of language production by the learners can sometimes stop them from progressing in their language acquisition skills. Krashen's hypotheses underscore the process-based nature of language learning, as opposed to the product-oriented approach. Many studies establish the importance of the socio-cultural contexts of learners (Brown, 2000; Kumaravadivelu, 2006; Harmer, 2007), the affordances of learning spaces and the availability of rich and varied teaching learning materials (TLM) for language acquisition. Cognition and language

learning must therefore be approached as a complex social phenomenon, situated and understood within the context of the learning environment and the multiple variables at play therein (Barab, 2006).

In the context of CLIX, we realized that an experimental design would not allow for the creation of TELL material that would be responsive to students' needs and their learning environment. Designing a TELL intervention to support language learning for Indian schools emerged as a complex issue, requiring designers to apply their knowledge about principles of second language acquisition within contexts of implementation with many constraints. Design Based Research (DBR) allows researchers to systematically change the environment through multiple iterations and study the learning process in naturalistic contexts, to develop new theories, artefacts and practices that can be generalised to similar contexts. It allows researchers to identify and examine multiple variables to provide systemic understanding of the learning challenge (DBR Collective, 2003; Barab, 2006). Further, DBR spotlights emergent features of the setting such as student interactions and behaviour, teacher facilitation and actions and other issues which might otherwise go unnoticed. DBR thus emerged as a viable research methodology to adopt for this present study.

The present research study was organized following Bannan-Ritland's Integrative Learning Design Framework (ILDF) model (2003) which divided the coordination of activities into four phases of Informed Exploration, Enactment, Evaluation of Local Impact and Evaluation of Broad Impact. These stages were completed over four years, between April 2015 and March 2019, and did not always progress in a linear fashion. A particular phase of one stage would overlap and intersect with a different phase of the next stage.

An examination of ICT labs in the Informed Exploration (2015) phase revealed wide disparities across schools in Telangana, Chhattisgarh, Mizoram and Rajasthan. Understanding local contexts systematically was crucial a) to create a responsive curriculum and technology platform, and teacher support systems that could be deployed at scale and b) to develop a better theoretical understanding of designing TELL materials for under-resourced contexts. Field visits in the early phase of the study delineated the term 'under-resourced' across the following three axes:

1. Teaching Learning Materials (TLM)—The textbook was the

only TLM in most classrooms and teachers promoted practice in reading and writing skills through de-contextualized tasks. Due to teachers' low proficiency in English, unavailability of story books and audio-visual materials, students were not immersed in a language rich environment and had few opportunities to use English—a critical requirement for language learning (Krashen, 1985; Kumaravadivelu, 2006).

2. **Teacher Profile**—Teacher proficiency and competence, which is critical for effective language learning (Cazden, 1988; Harmer, 2007) varied across the four states. The teacher-to-student ratio was inconsistent, and in many cases, low. In some schools, teachers taught multigrade classrooms making it difficult to have a dedicated teacher assigned to the ICT lab. Majority of the teachers did not have digital skills or training and had never used ICT to teach a school subject in interactive ways. This also indicated that teachers would be unavailable to provide feedback on TELL tasks and would not be able to troubleshoot and offer technical support.
3. **Technology Availability**—Most schools had ICT labs but the student-to-device ratio was very low (1:2 in most cases). Most labs were shut or in a state of disuse. Other limitations included frequent power failures, computers with minimal configurations and no ancillaries like cameras or headsets. The lack of stable internet in schools across the four states prevented use of AI for feedback and interactions, as is often required in many TELL programmes.

In the next section, we describe how the learning environment was systematically changed through design iterations of TELL materials and studied using DBR. We present vignettes from classroom observations and research notes to discuss three design principles that emerged as crucial for developing TELL materials in under-resourced contexts.

II. Design Principles for TELL Materials

Technology as Enabler for Language Production

The CEC lab departs from a typical TELL lab that works with a 1:1 ratio of students and devices and provides automated feedback in a clinical environment. In the CEC lab, working with (a) partner/s reinforces

language learning as a social process where most learning happens through discussions. Such cooperative peer learning along with the affordances of technology and teacher facilitation helps improve their skills by providing students opportunities to use language in multiple ways.

November 2016: Two girls watch *Grandma's Glasses* in Story Time. The teacher reminds them to switch on the subtitles. They switch it on and continue. In Let's Talk, they choose option 1 which asks for a description of Grandma's glasses. They listen to the model conversation. G1 records her response and plays it back. G2 records, plays back and listens. They look happy and clap.

Minimal technology available in classrooms was innovatively used to create a multimodal experience for learners that allowed them to not only receive inputs in English but also produce written and spoken content. The subtitles, word clouds and model conversations enabled students to listen to and acquire language structures which they otherwise may not have noticed. Students gradually moved from repeating or imitating conversations to creating original ones using Let's Talk, the recording tool and as seen below in the Open Story Tool (OST) as well.

November 2016: Two girls are discussing and typing a suitable caption for a picture. They type, 'While both of them were standing near the school gate, they saw a lady with a pink dress who seems to be a teacher.' G2 reads aloud the sentence twice. She changes the stress/intonation on some words the second time she says the sentence. She then puts on her headset, clicks the record button and records.

January 2017: Three boys are on an OST activity that requires them to match the image to a pre-given caption. They however, begin changing the captions based on the story they just heard. B1 reads "The barber is setting a boy's hair." B2 tells them to change it to 'Barber said, I cannot cut.' They type. B3 again asks B2 what to type. He says, "Cut long hair today". They read it aloud. They select the second slide. They continue adding to existing caption, i.e. The wife is cooking in the kitchen. "His wife cannot cut the hair." B1 whispers to B2, suggesting a change.

OST allows students to collaboratively build a story by mixing pictures, captions and voice clips. The freedom to play with language using technology encouraged students to express themselves meaningfully. It also led them to focus on linguistic aspects beyond syntax, as peers directed each other to also pay attention to spelling, pronunciation,

intonation, vocabulary and imagination.

June 2018: A girl and boy successfully log into the CLIX platform and navigate to lesson 9. B1 holds the mouse and carefully moves to Warm Up. Next, they listen to Story Time on full screen mode with subtitles. Sometimes they minimize the screen and write down sentences in their books. They move on to CLIX Time to check their listening comprehension but there is an 8080 error and the computer hangs. B1 resolves it quickly.

In all these episodes, we see students controlling technology independently, receiving language inputs in an integrated way as they listen to dialogues while reading subtitles on a video and practising to speak in English before recording. They exercised autonomy in switching on computers, in managing the controls (pause, play, re-play, record) and in deciding which options to attempt. This was in stark contrast to the traditional classroom where they had little or no autonomy. Design decisions were deliberately made at the materials development stage, e.g. introducing a choice between prompts for production tasks, to guide learners to become autonomous (Bhonsale et al., 2018). Other technical features like the facility to save or discard recordings, or re-record themselves were built in to create a safe learning environment and to underscore the value of using language to learn language.

Peer Collaboration as a Learning Resource

In under-resourced contexts, peers emerged as valuable resources for language production, correction and other forms of learning. This reduced stress and increased motivation as students became collaborators, rather than competitors, in learning English.

June 2018: Two boys (B1, B2) and a girl (G1) are recording a conversation. B2 tells B1 to read out, "He was afraid of the dark". B2 then says that G1 would read out the question and both the boys would read out the answers. They record successfully. They repeat the process thrice and save the file. They listen to their recording and smile. They rehearse the next conversation. B2 takes G1's headset down and tells her to clearly pronounce the word "star" as she pronounced it as "eh-star". B1 and B2 correct her.

Here, we see students working together at a terminal, sharing the device, splitting the task between them and creating opportunities for each other to speak. They create their own dialogues and practice multiple times without fear of making mistakes. Collaboration led to

error recognition (pronunciation) followed by feedback to peers, leading to error correction.

June 2018: A student pair has finished watching the story and is now stuck on a sentence completion task. They ask the pair beside them for help, who in turn advise them to replay the story video and to follow the story transcript carefully for clues,

Two students have spent thirty minutes and are at the end of CEC lesson five. The boy announces that he is tired and asks the girl to stop. The girl insists on completing the lesson. Encouragingly in the mother tongue she says, "We must be the first to go to lesson six."

Student collaboration is seen not only in pairs but also between pairs, where one pair gently guides the other *towards* the answers without telling them the answer. This in turn created more opportunities for learning. In the second case we see how, within a pair, one motivates the other to stay on task. Discussion in the mother tongue thrived in these classrooms and was an important scaffold that learners used to ultimately speak or write in English. Codes developed to analyse classroom observations show peer collaboration was useful for technical troubleshooting, linguistic support (spelling & grammar, pronunciation, intonation) and affective support as manifested in student initiative, autonomy and task completion.

June 2018: A pair types, "There is no such things difficult for me and my partner. We overcome our difficulty with my partner"

Students' reflection in the journaling activity *Think and Write*, demonstrates that they recognized peer support as a resource that helped them navigate through the course and complete tasks with confidence. However, it must be noted that teachers played a crucial role in creating a safe space that promoted peer collaboration.

Teacher Facilitation

In the initial enactment stages, the CEC modules were visualized as student-led that could be run in an after-school model with no support from the teacher. However, this failed and we realized that the teacher is central to enabling and sustaining learning in the ICT lab. The enactment phase taught us that in a TELL environment, the teacher plays a significant role in supporting students to understand and execute the task, pairing students according to their learning levels, encouraging them to stay on

the task, and lending technical and content support when needed.

In the episodes described above, the teachers monitored students' work, reminded them of the technology affordances (subtitles) and guided them to collaborate. Teachers' individualized feedback (affective and linguistic) in real time played an encouraging role in helping students stay on task and complete it. In CEC, the most effective teachers were those who believed that children learn from mistakes and need safe spaces to discuss, practise and try again. As one teacher remarked,

"I have been telling them that it is all right to make mistakes. They can learn from their mistakes and ask their friends. They can ask me."

CLlx, Personal Communication, June 2018

Some Concluding Reflections

In the light of increasing number of ICT-based language materials in the market, many of which do not consciously factor learning contexts, pedagogical content knowledge or thoughtful use of technology, the DBR approach ensured relevant and effective ways of designing materials by focusing on learners' needs and contexts. As materials developers and researchers, DBR allowed us to understand learning contexts better, enabling an equitable design in marginalised spaces. Creating spaces for collaborative learning and use of English, requiring teacher facilitation in language and content inputs and feedback, and deploying the advantages of ICT and multimedia as a tool, rather than an end in itself, were instrumental in achieving communicative competence. While the iterative process of design was resource and cost-intensive, insights into learning processes that emerged during enactment cycles were indispensable in identifying design principles that reinforced best practices in language learning.

Endnotes

1. Details about Communicative English modules from CLlx can be found at www.clixoer.tiss.edu

References

Alexander, R.J. (2000). *Culture & pedagogy: International comparisons in primary education*. Blackwell.

- Bannan-Ritland, B. (2003). The role of design in research: The integrative learning design framework. *Educational Researcher*, 32 (1), 21–24.
- Barab, S. (2006). Design based research: A methodological toolkit for the learning scientist. In K. Sawyer (Ed.), *The Cambridge handbook of the learning sciences* (pp. 153-167). Cambridge University press.
- Bhonsale, S., et al. (2018). Creating meaning focused materials for a TELL Course: An example from India. In M. Bouckaert, et al. (Eds.), *Meaning-focused materials for language learning* (pp. 205-224). Cambridge Scholars Publishing.
- Brown, D.H. (2000). *Principles of language learning and teaching* (4th ed.). Pearson Education.
- Cazden, C.B. (1988). *Classroom discourse: The language of teaching and learning*. Heinemann.
- Design-Based Research Collective. (2003). Design-based research: An emerging paradigm for educational inquiry. *Educational Researcher*, 32 (1), 5–8.
- Graddol, D. (2010). *English next India: The future of English in India*. British Council.
- Harmer, J. (2007). *The practice of English language teaching*, (4th ed.). Pearson.
- Krashen, S.D. (1985). *The input hypothesis: Issues and implications*. Longman.
- Kumaravadivelu, B. (2006). *Understanding language teaching: From method to postmethod*. Lawrence Erlbaum Associates.
- Meganathan, R. (2011). Language policy in education and the role of English in India: From library language to language of empowerment. In H. Coleman (Ed.), *Dreams and realities: Developing countries and the English language* (pp. 57-86). British Council.
- Menon, S., et al. (2017). *Literacy research in Indian languages (LiRiL): Report of a three-year longitudinal study on early reading and writing in Marathi and Kannada*. Azim Premji University and Tata Trusts.
- National Council of Educational Research and Training (NCERT). (2006). *National Focus Group Position Paper on Teaching of English*. NCERT.

Jennifer Thomas and Nishevita Jayendran are Assistant Professors at the Centre for Education, Innovation and Action Research at Tata Institute of Social Sciences, Mumbai and teach courses on pedagogy of language.

jennifer.thomas@tiss.edu

nishevita.jayendran@tiss.edu