Data Analysis Exercise #1: Traditional Methods of Analysis

EDCI 61600
Learning, Design, and Technology
Wonjin Yu

Overview

My advisor and I conducted semi-structured interviews for the research, 'Investigating barriers to implementing Artificial Intelligence (AI) education in elementary schools in South Korea', at the end of last year. This February, I transcribed and translated the interview transcripts, analyzed them separately with Dr. Huang using traditional methods of analysis; thematic analysis, and compared each analysis to create themes. In this document, I would like to introduce the codes and themes we agreed on so far.

Codes

Since we had a theoretical framework, we analyzed the overall transcripts based on Ertmer's framework for barriers to the technology-integration. In her framework, the first-order barriers encompass extrinsic obstacles such as limited resources (Ertmer, 1999, p. 50). The second-order barriers are "more personal and more deeply ingrained" (Ertmer, 1999, p. 51) such as beliefs about teaching. We tried to use Ertmer's framework as a holistic lens enabling us to see how first- and second-order barriers interact and unfold as South Korean teachers embrace this change. Applying thematic analysis, my advisor and I individually analyzed each transcript based on Ertmer's framework. Then, they reconvened to compare their analyses, conferred, and came to an agreement on discrepant coding as follows (see Table 1):

Table 1. Examples for coding

Code	Criteria	Note examples
First-order barriers	Pre-knowledge	The lack of understanding about AI
	Opportunity	The needs for the additional re-training
	Curriculum	The needs of in-depth level on AI education for in-service teachers
	Tools / Infrastructure	The need for new comprehensive tools
	Guideline	The lack of guideline
	Teaching hours	The limited teaching hours, only 17 hours per year to only 5th and 6th graders
	Rationale	The rack of the rationale for lower graders
Second-order barriers	Burden	Psychological burden – Too busy
	Easy-going attitude	Psychological burden – Easy-going attitude
New findings	Societal concern	Societal concern – It would be difficult to learn, who will teach it?
	Top-down approach	Led by the government
	Want to do more	Stuck in just simple skills

Themes

Considering the codes my advisor and I created, we additionally discussed the elements that did not fit in the first- and second-order barrier framework and created a new dimension to categorize those barriers. The preliminary analysis revealed three themes as follows:

Theme 1: Training, training, and more training to resolve first-order barriers

Every participant repeatedly mentioned training was essential to prepare teachers to integrate the new curriculum. “It will be possible to reach the academic standards only if teachers have a better understanding of AI,” said one. However, “only 10% of the K-12 teachers have taken the AI training” due to a lack of access to the training programs. This presents a barrier to entry.

Another teacher echoed the need for training - “Some teachers took the initiative to learn AI, but most teachers have not had the opportunity.” Even though this teacher was concerned about the lack of training, he felt positively about the effectiveness of the training - “It can be difficult to learn something new for the first time, but once they [K-12 teachers] have AI training or something like that, they would feel it is not as difficult as they thought.” He concluded, "after taking the training, they will believe that they are more competent in teaching AI than before.”

Theme 2: Strong teachers’ buy-in resulting in fewer second-order barriers

All participants were optimistic about AI education integration and indicated most of their colleagues were also positive about it. One stated, “it seems that everyone agrees AI education is needed. . . . even senior teachers agreed AI education is a necessity.”

However, one participant identified potential psychological barriers for teachers stating “some teachers might find it challenging to learn a new thing and are not confident teaching AI; some teachers might not want to learn a new thing.” Even though all teachers indicated there might be some second-order barriers, they also referenced an earlier “software education” integration implemented in 2019 with reflections that diminished some of the negativity associated with those second-order barriers, pointing to a bright future for AI education integration. One shared: “There were similar barriers when implementing software education. Some thought it would be difficult . . . After a few years, teachers became more confident teaching it. . . . Although psychological barriers exist, it would be better than before [software education].”

Theme 3: Third-order barriers? A desire to go deeper and further with AI education

Without prompting, all participants referenced gaps in the AI materials. One noted “it seems that the focus was only on the technical aspects of AI such as using the correct commands, rather than the broader and more meaningful aspect.” He emphasized that “AI education should encourage students to think about what they want to do with AI, which can result in a more positive impact on themselves and this society, which should be the most fundamental.”

Another concurred “the goal of AI education is to enhance problem-solving skills,” and found the curriculum overly focused on the “simple experience” of technical aspects (e.g., using block-based coding to move robots). He concluded “we need to integrate AI into the whole educational system rather than treating it as a standalone educational unit,” adding “I intentionally include problem-based solving activities rather than simple coding activities in AI classes.”

Conclusion

In this thematic analysis, we analyzed the data with three themes. This result is not a completed analysis, but a tentative finding. Furthermore, we figured out the possibilities of the various relationships between the first-order barriers, second-order barriers, and new dimensions. Therefore, we decided to recruit more teachers this semester for further interviews who can be representatives of various voices in the context of South Korea.

Reference

Ertmer, P. A. (1999). Addressing first-and second-order barriers to change: Strategies for technology integration. *Educational Technology Research and Development*, *47*(4), 47-61.