Valuing Mathematics: Translation Challenges

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In the following we elaborate on our experiences of the linguistic and cultural adaptation of a questionnaire exploring what students value as important when learning mathematics. The adaptive process required us to adapt both language and the mathematical activities and content chosen for the questionnaire.

Research background

Values that guide students' valuing of what is important when learning mathematics are difficult to measure and even more difficult to compare. Still, this is the aim of the Third Wave project. The WiFi-study, "What I Find Important (in maths learning)", part of the Third Wave Project (Seah & Wong, 2012), is a large-scale investigation across 19 countries to be distributed to 11 and 15 year old students. It consists of 89 questions focusing mathematical and classroom activities. The translation of the questionnaire allowed us to reflect on cultural challenges when focusing what students value as important (Andersson & Österling, 2012).

Three examples of challenges

To use the WiFi-questionnaire in a Swedish context required a translation and a cultural adaptation, keeping the metric equivalence between languages. We will here demonstrate three of the challenges we met during this process. Translating a questionnaire with questions about mathematical activities does not imply only linguistic aspects; the activities also need to be evaluated out of what mathematical content and activities Swedish students are familiar with. Interviews and pilot tests helped us improving the translation and adaptation.

First, the research guidelines suggested a Back Translation from the Swedish target questionnaire to English that then was compared to the source questionnaire as a way of validating language validity. However we could conclude that a successful back translation was not enough to ensure that same concepts were measured. Respondents did not understand all the questions. Therefore, a back translation did not help us with the meaningfulness of item content to each culture, or the metric equivalence. Instead we used a methodology (Survey Research Centre, 2010) that helped us investigate linguistic problems, cultural adaptation, adaptation to the intended group and generic problems in the source version (Harkness, Pennell, & Schoua-Glusberg,

2004). Second, it turned out that Swedish students were not familiar with some of the mathematical contents used in the questionnaire, for example proofs and formulae. We needed to pose questions that students could understand out of a Swedish cultural context. But the cultural adaptation cannot be drawn too far without affecting the instrument validity across languages. The decision we took was to keep the questions rather similar to the English source question, and instead give examples to improve students understanding. Third, there were mathematical activities that responding students were not familiar with, for example mathematical debates. In introducing an agent and describe the activity by verbs, we improved the understanding of how these activities were enacted.

Discussion of possible outcomes from the study

The WiFi-study allows us to research what students value on an international arena. When adapting the questionnaire we needed to suggest meaningful activities from the respondents' perspective. Migrating pedagogical ideas and teaching methods, as well as migrating teachers and students, requires a cultural adaption. Aligning teaching to students' valuing imply involving students in the planning and evaluation of teaching. Andersson (2011) explored how students' engagement in learning mathematics changed when tasks were set in a real context, answering a genuine question. Other activities, like learning proofs, are connected to specific mathematical skills, and teachers need to foster students to step in to the mathematical community. A well-adapted WiFi-questionnaire can help us understand, on a cultural level, what activities and content students value in mathematics.

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