

Designing a method for identifying gendered views of mathematics

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Introduction

While the idea that mathematics is meaningful for everyone to learn is shared, social perceptions of gender aptitude in mathematics, such as “girls are not good at mathematics,” have permeated people’s consciousness, and have been identified as a problem that prevents female students from learning mathematics (Spencer, et al., 1999). This is referred to as *gendered views of mathematics* in this study.

In Japan, there are gender differences in STEM university enrolment rates, in completion rates of advanced mathematics courses, and in beliefs about mathematics in high school (OECD, 2015). Meanwhile, gendered views of mathematics have been reported (Ikkatai, et al., 2021). Nevertheless, there are few studies focusing on the relationship between gendered views of mathematics and students’ mathematics learning within the social and cultural context of Japan.

The purpose of this paper is to design a survey method to answer the following questions:

1. What views can be said to be gendered views of mathematics, combined with the “masculinity/femininity” of the students in the context of Japan?
2. What survey methods and question items could be designed?

Definition and research framework

This research endorses psychological and physical gender diversity and views the sex/gender concept as a socially constructed notion. Individuals are not only passively dichotomized entities, but also act as agents who choose their own masculinity/femininity and behave repeatedly (Damarin & Erchick, 2010). Under the above concept of gender, “gendered” and “gendering” are words using gender as a verb, and mean attributing or being attributed a property of a certain object to either the masculine or feminine depending on social/cultural contexts. So, a gendered view of mathematics in this paper is the social/cultural perception of mathematics attributed to either masculinity or femininity.

It can be pointed out that, as in other Western countries, a gendered view of mathematics is shared in Japan, implying that mathematics is male dominated. On the other hand, there are some Japanese contexts that differ from Western countries, such as the gendered division of labour in the family and society, gender differences in career choice and subject selection associated with dichotomous career guidance and the examination system, and the gender ratio of mathematicians and mathematics teachers at different school levels. While taking the Japanese context into account, survey items will be designed with the intention of making comparisons with previous studies.

It has been widely shared that children have stereotypes that mathematics is a male domain through quantitative research (Ikkatai, et al., 2021). On the other hand, qualitative research has found meaning in individual and communal practices through his/her/their words (Damarin & Erchick, 2010). Given

the need for a deeper understanding of the meaning of the view of mathematics, this study will employ qualitative research in the collection, interpretation, and explanation of the data.

Design of survey methods

The purpose of this survey is to identify the characteristics of Japanese students' gendered views of mathematics. The survey will be targeted at undergraduate/graduate students.

In this poster, four survey methods are employed. The reason for this is that it is difficult to understand the meaning of gendered views of mathematics using only a single survey method. The first is an open-ended questionnaire (2 items), the second is portrayal of a person (2 items), the third is a semi-structured interview (5 items), and the fourth is a single-response questionnaire (33 items). The fifth item of the interview and the single-response questionnaire establishes a clear association with gender in the context of Japan.

The survey procedure is intended to be conducted where the degree of freedom of description increases: free description, drawing a person, interview, and single response. There are two reasons: First, the content recalled with a high degree of freedom is the subject's interest, and second, when interviewed about more specific content, it can be recursively stated based on the previous descriptions and can be pursued in more depth. The fifth item of interview and the single response questionnaire have an explicit association with gender and are placed last so as not to affect the other three surveys.

The analysis will refer to the views of Japanese sociologists and data on gender differences in relevant areas, as well as focusing on students' dominant views of mathematics and individual contradictions and resistance. The results of this analysis will provide an implication of factors contributing to the gender gap in STEM within the Japanese educational system in comparison with other countries and will also provide a unique view in the context of Japan.

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