

INFLUENCES OF A LIBERAL-ART COURSE ABOUT EAST-ASIAN MATHEMATICAL CULTURE ON UNIVERSITY STUDENTS' MATHEMATICS BELIEFS

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This paper examines the impacts of a liberal-art course about East-Asian mathematical cultures on university students' mathematics beliefs. The course, taught in a comprehensive university in Taiwan, explored pre-modern East-Asian mathematics, focusing on traditional Korean culture and mathematics, which have deep links to its Chinese counterparts. This course covered key theories, methods, and problems of pre-modern East-Asian mathematics, highlighting unique reasoning patterns and possible applications in fields such as astronomy and civil engineering. In addition to Chinese treatises, this course exposed students to some Korean scientific artefacts, such as the *Cheomseongdae* ('star-gazing tower'), counting rods, and mathematical texts containing problems related to government functions in pre-modern East Asia. We used a survey research method, with quantitative and qualitative tools. The quantitative tool was a twenty-seven-item Likert-scale questionnaire on mathematics beliefs, which was designed to examine students' beliefs in the dimensions of the 'nature' and 'values' of mathematics; the qualitative tool was students' after-class reflexions. The two tools were analysed with descriptive and inferential statistics, and content analysis, respectively. A total of forty-six students from six different colleges (Science, Engineering, Nuclear Science, Humanities and Social Sciences, Electrical Engineering and Computer Sciences, and Education) of that university took the course, wrote several reflexions, and finished both the pre-test and post-test of the questionnaire. Quantitative results show that, generally speaking, for the dimension of the nature of mathematics, students had a more diversified understanding of the justification of mathematical knowledge; for the dimension of the values of mathematics, students tended to agree more on the links between mathematics and traditional cultures, humanities, and real-world applications. Individual students' changes between the pre-test and post-test have also been compared, and it could be seen that most students were inclined to more diversified and culturally-oriented beliefs about mathematics. Qualitative data were used to triangulate our findings from the quantitative data. In general,

research results show that the liberal-arts course about East-Asian mathematical cultures has a similar impact with earlier studies on university students' mathematics beliefs in terms of the nature of mathematics, in which students, though highly approve of the role of logic in mathematics, also confuse the context of discovery with that of justification in mathematics; results also show that after taking this kind of course students' beliefs in terms of the values of mathematics have a stronger tendency that mathematics can be linked to real-world applications, traditional cultures, and humanities and social sciences.