STUDENTS' UPTAKE OF PHYSICS: A STUDY OF SOUTH AUSTRALIAN AND FILIPINO PHYSICS STUDENTS

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Abstract

The present study brought together and examined different factors that affect students' attitudes towards physics thus influencing their uptake of physics in the South Australian and Filipino contexts.

The theoretical framework was designed to examine the possible relationships among student-level and school-level factors. Student-level factors include gender, attitudes towards physics, general self-esteem, motivation to learn physics, and attitudes towards computers. School-level factors include school level, school curriculum, and classroom climate which include teachers. The theoretical base was drawn from numerous research findings on how these factors affect students' attitudes towards, and thus uptake of, physics. From these findings, constructs were integrated into the theoretical framework in an attempt to answer the research questions advanced in this study.

The study employed quantitative and qualitative methods. The quantitative data were collected using the Students' Uptake of Physics Study Questionnaire (SUPSQ). Several existing scales specifically designed to measure attitudes towards physics, self-esteem, motivation to learn physics, parents' aspiration for their child's education, attitudes towards computers, and classroom climate were adapted for use in the SUPSQ. Each of these scales was validated using structural equation modeling and Rasch analysis which provide inputs from a grounded psychometric perspective. In addition, a number of open-ended questions were also included to gain some insights on students' perceptions and beliefs about studying physics. The SUPSQ instrument for students was administered to a total of 306 combined senior high school and first year university physics students in the metropolitan Adelaide area in South Australia, and to 403 combined senior high school and first year university physic students in Quezon City, Philippines. Single-level and multilevel analysis techniques were used to analyse the survey data.

A questionnaire containing only open-ended questions designed for teachers was used to gain insights into their perceptions of physics and the teaching approaches they employ in the physics classroom. A semi-structured interview for physics teachers was

conducted as a follow up to their responses to the questionnaire items. The qualitative questionnaire responses and the interview data provided rich insights that complemented the quantitative analyses results. There were 13 South Australian and 19 Filipino physics teachers who participated in the study.

The validation of the scales was carried out using mainly LISREL 8.80 and ConQuest 2.0 for the structural equation modeling and Rasch analysis, respectively. Validation results indicate measurement variance between the two sample groups. Therefore, no comparison was made, and analysis results for each sample group are reported separately. LISREL 8.80 and HLM 6.08 computer software were used to carry out single-level path analysis and hierarchical linear modeling, respectively.

The single-level path analysis at student level for the South Australian sample revealed that school level, gender, the affective domain of attitudes towards computers, the investigation aspect of preferred physics classroom climate, the differentiation aspect of the actual physics classroom climate, motivation to learn physics through performance goals, self-efficacy, and science-learning value all play significant roles in shaping students' attitudes towards physics, influencing their decision to study physics. With the Filipino sample, school level, school type (government/private), the affective and cognitive domains of attitudes towards computers, independence in the actual physics classroom climate, investigation in the preferred physics classroom climate, and motivation to learn physics through learning environment stimulation and science-learning value were found to affect students' attitudes. The multilevel analysis technique using hierarchical linear modeling (HLM) revealed how, with the South Australian sample, school-level factors (school level/curriculum and classroom climate) interacted with a student-level factor (motivation) to influence attitudes. Only school level showed positive effect, and classroom climate and motivation negative effects. The negative effects shown by these factors suggest that they do not necessarily cause positive attitudes towards physics.

Similarly, with the Filipino sample, HLM revealed how school type, school level/curriculum, classroom climate (interacting with motivation), and attitudes towards computers to influence students' attitudes. Classroom climate and motivation also showed negative effects. However, with the Filipino sample, these results could be

misleading due to the fact that there is no physics uptake in the Philippines because physics is a compulsory subject in secondary schooling. Physics uptake happens at the university level.

Common to both the South Australian and the Filipino samples are the following factors that appear to influence attitudes: school level/curriculum and classroom climate at the school-level, and motivation to learn physics at the student-level.

In general, the study contributes to the literature of how individual-level and school-level factors influence students' uptake of physics. The results of the study have important implications on the design of physics curriculum to make it more relevant to students' needs, and, in the case of physics education in the Philippines, whether physics should be kept compulsory or not. In addition, the results have important implications on physics teachers' professional development programs that could help minimise students' generally negative image of physics, and consequently improve the uptake of physics.

Declaration

This work does not contain any material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution, and, to the best of my knowledge and belief, contains no material that is previously published or written by another person, except where due reference has been made in the text.

I give consent to this copy of my thesis, when deposited in the University Library, being available for loan and photocopying.

Signed: _____

Date: _____

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