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CONTENT PEDAGOGY PROGRAMME

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EXAMINING SEVENTH-GRADE STUDENTS' VIEWS OF THE NATURE OF SCIENCE AND EPISTEMOLOGICAL BELIEFS IN SCIENCE

Summary of PhD dissertation

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A major focus of international science education research is the study of NOS views (see Lederman, 2007) and epistemological beliefs in science (Kampa et al., 2016) and these contents are increasingly reflected in curriculum documents (Elby et al. 2016; Peffer & Ramezani, 2019). However, in Hungary, NOS views have not yet been investigated, and the research presented in this thesis provides the first information on Hungarian students' views about the nature of science. Information on epistemological beliefs in science is already available in Hungary, thanks to a few pilot studies (see Nagy et al., 2021; Z. Orosz & Korom, 2020), but the development of students' epistemology in science has not been investigated in such a large sample.

In our research, we aim not only to examine the two research areas separately and then conduct correlation studies between the two variables (e.g., Cho et al., 2011; Deng et al., 2011; Ozgelen, 2012), but also to integrate the research and methodological specificities that characterize the study of NOS views and epistemological beliefs. The logical structure of the thesis attempts to follow the steps of scientific research. Among the preparatory studies, we presented an adaptation of the SINOS questionnaire (Chen et al., 2013), which was used to assess NOS beliefs in a large sample survey, and then tested the Conley questionnaire (Conley et al., 2004) and the person-centered approach used in the research on epistemological beliefs on a sample of sixth-graders. We organized our research into three areas: (1) examining the internal structure of the questionnaires, (2) exploring the development of and individual differences in students' NOS views and epistemological beliefs, and (3) investigating the structural relations between NOS views and epistemological beliefs, as well as the relationships between the independent variables included in the study.

For our empirical research, we formulated 11 hypotheses in advance, considering the literature. The data were collected in the spring of the school year 2021/2022. A total of 1,480 students participated in the study, with a mean age of 13.41 (SD = 0.70) years. Among the participants, 672 were boys (45.41%) and 808 were girls (54.59%). In analysing the data, we aimed to demonstrate our methodological diversity. In addition to descriptive statistical analyses, difference and correlation analyses, we employed confirmatory factor analysis, latent profile analysis, cross-tabulation analysis, and structural equation modelling. Our results were as follows: (1) The latent structure and reliability of the SINOS and Conley questionnaires were adequate. (2) There was no correlation between the naïve and sophisticated statement subscales in the questionnaires and no correlation between the naïve subscale and the sophisticated subscale. The sophisticated subscale correlates with sophistication regardless of the content concept. (3) Students are more confident in agreeing with the statements of the sophisticated subscales. (4) Five student profiles were identified for NOS views, and four learner profiles were identified for epistemological beliefs in science. (5) There was a medium-strength relationship between the development of NOS beliefs and the development of epistemological beliefs at the profile level. (6) Advanced NOS beliefs were strong predictors of sophisticated epistemological beliefs in science. (7) Classroom inquiry, classroom NOS content, and school performance were weak predictors of the development of NOS beliefs. The results of our study confirmed 10 of our 11 hypotheses. Our findings align well with previous international research, and based on this, we consider the research to be fruitful.

The results of our large-scale survey may also provide relevant information for the international research community. It demonstrates the potential of applying person-centered approaches to the study of NOS views to create developmental portfolios, and presents a new empirical link between NOS views and epistemological beliefs in science. A further research task could involve exploring how to integrate NOS content into classroom research activities

effectively, taking into account domestic curricular regulations, infrastructural conditions, and the number of science teachers. This integration aims to promote and raise awareness of the development of students' epistemological beliefs. Achieving this requires designing development programs and evaluating their impact, for which measurement tools are already available as a result of our research

Keywords: science education, NOS views, epistemological beliefs in science, quantitative questionnaires, profile analysis, elementary school

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