Habilitation Thesis

FACTORS WHICH CONTRIBUTE TO THE DEVELOPMENT OF SCIENCE TEACHER'S EXPERTISE

Summary of the Habilitation Thesis

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The habilitation thesis titled "Factors which contribute to the development of Science teacher's expertise" is structured in four chapters and three annexes. The first chapter presents the author's academic, scientific, and professional career evolution. The main focus of this chapter is on the process of getting the PhD in Pedagogy with a thesis in the field of the methodology. At the beginning of my university career my interests were in the Didactics of Physics, in relation with the initial and continuing training of Physics teachers. Along with my career development my interests in the domain of Educational Sciences have diversified in the following directions: Didactics of Sciences, Intercultural Education, Media Education, Classroom Management, Project Management, The training and Professional Development of Teachers, Students' Creativity, ICT, New educational technologies etc.

The publishing activity of the 27 years of university career covers over 200 publications, after obtaining the PhD, including: 12 volumes which I have coordinated, 11 volumes as only/ main author, 18 volumes as co-author, 24 chapters and studies published in various volumes – all in publishing houses recognized by CNCSIS, 5 contributions in collective volumes published abroad, 5 articles published in WoS journals, from which 4 have impact factor (3 articles in The Science of Education), 20 articles published in journals included in at least two recognized databases, 4 articles in prestigious international journals, 13 articles at WOS conferences, both national and international, 12 articles published in international conferences publications. The number of quotations in WoS and SCOPUS articles is 24.

I coordinated two national research projects and an international one (I was the coordinator of the Romanian team). The most of my publications are the results of group or students' research.

The articles presented in the second chapter are related to Pedagogical Content Knowledge (PCK). PCK is a concept introduced in 1986 by Shulman and his research team from Stanford University, developed in order to identify the knowledge system that is useful to a teacher for transforming a theoretical content into comprehensible knowledge for students. The PCK factors that are the target of my research are: a) knowledge of how students learn; b) teaching-learning-assessment strategies in science; c)

school curriculum. These factors have an essential role because they highlight: a) theoretically: the relationship between Shulman's model of PCK and the didactic transposition theory; b) applicability: the complexity and specificity of the knowledge required for teachers to transform a scientific content into "teachable" knowledge; integrating PCK into the curriculum of training programs; the usefulness of PCK in optimizing school curricula, lessons and university courses; c) in the research plan: the relationship between the two dimensions of PCK on the content delivery: PCK that is specific/unique to a teacher and to a context and PCK that is appropriate to various teachers and contexts; the study of the dynamic and evolutionary character of PCK. (Park & Suh, 2015)

The third chapter approaches another concept introduced by Shulman (1986), namely the Knowledge base of teaching. My research grouped around this theme focuses on the structure of the knowledge base of science teaching, and on the factors that can contribute to the development of this base: metacognition, the opinion and beliefs of teachers about teaching and learning science, and initial and in-service teacher training. Among the contributions of the underlying research to the knowledge base needed for teaching, we mention: the development of a thematic inventory that can be used to structure the content of the papers in the field of pedagogy/didactics of sciences of the Romanian specialists; identifying a system of metacognitive knowledge, abilities and strategies that pupils, students, and teachers can use in learning and teaching science; highlighting the causes of changes in teachers' opinions and believes; identifying directions for improving teacher training. Among the research themes identified by the author of the present paper, we mention those themes applied to learning and teaching science: the effectiveness of the metacognitive strategies used in the study of some concepts and scientific themes, the relationship between metacognition and teaching/learning science through investigation; the development of a learning framework that promotes deep learning at the university level.

Each of the two chapters mentioned above identifies, based on the results of our research, educational implications and future research themes. The last chapter synthesizes these themes and proposes directions for the development of future research in the domain of Educational Sciences. These research themes are structured in the following directions: didactics of Sciences, the nature of science (NoS), specific strategies for learning and teaching science; metacognition in science teaching and learning; teacher training and development; the PCK and knowledge base needed for teaching science.

The three annexes present an explanation of the author's research concerns, the list of the 101 references used for identifying the structure of the knowledge base needed for teaching science and some of the documentary sources studied in order to identify future research directions related to the concerns mentioned in this paper.