Research in Biological Education

A selection of papers presented at the IXth Conference of European Researchers in Didactics of Biology (ERIDOB), 17th - 21st September 2012, Henry-Ford-Bau, Freie Universität Berlin, Germany



Editors Dirk Krüger and Margareta Ekborg

Layout and Cover Fenna Penning

First published in 2014

ISBN 978-3-9815778-3-9

Academic Committee

Dr Margareta Ekborg (Secretary)

Malmö University, Sweden

Dr Dirk Krüger

Freie Universität Berlin, Germany

Dr Dirk Jan Boerwinkel

Uetrecht University, The Netherlands

Dr Marida Ergazaki

University of Patras, Greece

Dr Maria José Gil Quílez

University of Zaragoza, Spain

Dr Grégoire Molinatti

Universite Montpellier II, France

Dr Michael Reiss

University of London, United Kingdom

Dr Tali Tal

Israel Institute of Technology, Haifa, Israel

Local Organization Team

Dr Dirk Krüger Fenna Penning

Anja Czeskleba

Christine Eßmann-Stern

Johannes Koska

Juliane Grünkorn

Martine Forêt

Dr Moritz Krell

Susanne Meyfarth

Sponsors

SPONSORED BY THE





TABLE OF CONTENTS

	FFACE Krüger and Margareta Ekborg	. 9
SEC	CTION 1: STUDENT CONCEPTIONS, TEACHER CONCEPTIONS AND TEACHER KNOWLEDGE	11
1	THE ROLE OF CONCEPTIONS, METAPHORS, AND ANALOGIES IN STUDENTS' UNDERSTANDING OF SEEING	
	Sarah Dannemann and Dirk Krüger	13
2	THE INTERPRETATION OF STUDENTS' LAMARCKIAN EXPLANATIONS Kerst Boersma and Caspar Geraedts	29
3	EFFECTS OF EXPERIMENTS FOR STUDENTS' UNDERSTANDING OF PLANT NUTRITION	,
	Tanja Braun and Marcus Schrenk	43
4	CHANCE AND DETERMINISM IN EVOLUTION: TEACHERS' CONCEPTIONS IN 21 COUNTRIES	
	Pierre Clément	55
5	CHARACTERIZING THE TACIT RELATIONSHIPS BETWEEN BIOLOGY TEACHERS' CONTENT KNOWLEDGE (CK) AND OTHER PROFESSIONAL KNOWLEDGE COMPONENTS	
	Ronit Rozenszajn and Anat Yarden	73
SEC	CTION 2: BIOLOGY EDUCATION IN INFORMAL SETTINGS	87
6	BEGINNING BIOLOGY- INTEREST AND INQUIRY IN THE EARLY YEARS	
	Annette Scheersoi and Sue Dale Tunnicliffe	89

SEC	TION 3: MODELS AND MODELING	101
7	STUDENTS' VERSUS SCIENTISTS' CONCEPTIONS OF MODELS AND MODELLING	
	Ulrike Trier, Dirk Krüger, and Annette Upmeier zu Belzen	103
8	HOW YEAR 7 TO YEAR 10 STUDENTS CATEGORISE MODELS: MOVING TOWARDS A STUDENT-BASED TYPOLOGY OF BIOLOGICAL MODELS	
	Moritz Krell, Annette Upmeier zu Belzen, and Dirk Krüger	117
SEC	TION 4: TEACHING: TEACHING STRATEGIES, TEACHING SOCIO- SCIENTIFIC ISSUES AND CURRICULUM DEVELOPMENT	133
9	DEVELOPING THE ABILITY TO CRITIQUE IN THE COURSE OF INQUIRY-ORIENTED PROGRAMS IN BIOLOGY	
	Tom Bielik and Anat Yarden	135
10	COMPARATIVE ANALYSIS OF THE ACTIVITY OF TWO TEACHERS IN TERMS OF PUPIL'S ACCULTURATION TO SCIENCE	
	Patricia Schneeberger, Yann Lhoste, and Brigitte Peterfalvi	149
11	CONTENT CHOICES WITHIN A CONCEPT-CONTEXT APPROACH IN PRIMARY SCIENCE EDUCATION	
	Annelotte Lammers, Ronald Keijzer and Marja van Graft	163
12	ARGUMENTS, VALUES & BELIEFS OF PRE-SERVICE TEACHERS DISCUSSING SOCIO-SCIENTIFIC ISSUES	
	Marina Castells, Aikaterini Konstantinidou, and Josep M. Cerveró	177
13	THE APPLICATION OF CONCEPT MAPS IN TEACHING INVERTEBRATE ZOOLOGY	
	Jelena D. Stanisavljević and Ljubiša Ž. Stanisavljević	197
14	HIGH-SCHOOL TEACHERS' APPROPRIATION OF AN INNOVATIVE CURRICULUM IN BIOINFORMATICS	
	Yossy Machluf, Hadas Gelbart, and Anat Yarden	213

PREFACE

This volume contains 14 selected papers from the 9th Conference of European Researchers in Didactics of Biology (ERIDOB). ERIDOB's well established conferences attract about 200 biology education researchers from Europe as well as from counties far beyond its borders. For 16 years now, researchers in didactics of biology have come together at the biennial conference to exchange research questions, designs, instruments, results, interpretations, and conclusions. The intention of ERIDOB is to provide an opportunity for researchers with diverse experiences to discuss biology education research.

In order to widen the field of themes for discussion and submission of interesting papers from researchers of biology didactics, the academic committee at the last ERIDOB conference in Braga, Portugal, 2008 decided not to select a theme for the 2012 conference. The 2012 conference was organized by and held at Freie Universität Berlin, in Berlin, Germany. From initially over 170 contributions, 56 papers were presented as oral presentations and 58 as poster presentations at the 9th conference. All presentations were arranged in 12 strands: Environmental education; health education; biology education in informal settings; scientific thinking; argumentation; models and modeling; teaching strategies; teaching socio-scientific issues; teaching genetics; pedagogical content knowledge; student conceptions; interest and motivation; and two symposia: supporting students' interactions with socio-scientific issues; teaching evolution: cognitive and affective factors.

All papers presented at the conference and published have been double reviewed by a minimum of one member of the academic committee and by one experienced participant of ERIDOB and reviewer of biology educational journals. Out of twenty excellent papers chosen for publication in the proceedings of the ERIDOB conference six were included in a special issue of the Journal of Biological Education (Vol. 47, Issue 3, 2013). The choice of papers was based on the intention to illustrate both the high quality and diversity of current European research in biological education. The 14 papers presented in this volume address topics in the areas of student conceptions, teacher conceptions and teacher knowledge (section 1), biology education in informal settings (section 2), models and modeling (section 3), and teaching strategies, teaching socio-scientific issues and curriculum development (section 4).

The next ERIDOB conference takes place at the University of Haifa, Israel, in 2014. The family atmosphere of an ERIDOB conference offers possibilities of recognising and exploring European research cultures with the intention of building a strong and internationally coherent research culture. Newcomers are warmly welcomed.

Dirk Krüger

Margareta Ekborg

d. linger hayant Elibert