Table of Contents
Editors ......................................................................................................................... 4
LOCAL ORGANISING COMMITTEE (LOC) .................................................................. 5
LIST OF REVIEWERS ................................................................................................. 6
Message from the Conference Chair ........................................................................ 8
Review Process ........................................................................................................... 9
Acknowledgements .................................................................................................... 10
Plenary speakers ......................................................................................................... 11
Maitree Inprasitha ....................................................................................................... 11
Carmel McNaught ....................................................................................................... 12
Irene Govender .......................................................................................................... 13
Josef de Beer ............................................................................................................. 14
CHEMISTRY EDUCATION ....................................................................................... 19
STUDENTS’ AND TEACHERS’ ALTERNATIVE CONCEPTIONS ABOUT ELECTROCHEMISTRY
Sipho Nhlanhla Dlamini & CE Ochonogor ................................................................. 20
CHEMISTRY 2.0: BUILDING AND DISSEMINATING CHEMISTRY THROUGH STUDENTS-GENERATED WEB 2.0 CONTENT
Carla Morais, Luciano Moreira, João C. Paiva, Juliana Monteiro, Hugo Vieira, Diogo Santos 27
ICT EDUCATION .................................................................................................... 34
CORRELATING PERFORMANCE AND DIGITAL LEARNING HABITS IN A HIGHER-EDUCATION INSTITUTION
Duan van der Westhuizen and Leoné Michaels ........................................................... 35
USING SELF-PACED ONLINE TUTORIALS TO BRIDGE THE DIGITAL DIVIDE AMONG FIRST-YEAR STUDENTS
Duan van der Westhuizen ............................................................................................ 41
CONCEPTUALISING A GERMAN MATHEMATICS EDUCATION TEACHER PROFESSIONAL DEVELOPMENT COURSE BASED ON A SOUTH AFRICAN SUCCESS MODEL
Melanie Platz, Marlien Herselman & Adele Botha ..................................................... 47
WORK-INTEGRATED LEARNING: THE CASE OF SECOND-YEAR IT STUDENTS
Lynette Drevin ........................................................................................................... 55
DIMENSIONAL EVALUATION OF A RURAL MOBILE LEARNING TEACHER PROFESSIONAL DEVELOPMENT CURRICULUM
Adele Botha, Marlien Herselman, Sarietjie Musgrave, Glynis Jaeschke ..................... 62
INVESTIGATING THE ACCEPTANCE OF DIGITAL TECHNOLOGIES IN AN EXCEL COURSE
Trudie Benadé, Janet Liebenberg .............................................................................. 71
THE EFFECTS OF COURSE DESIGN CHARACTERISTICS, SELF-REGULATED LEARNING AND KNOWLEDGE SHARING IN FACILITATING THE DEVELOPMENT OF INNOVATIVE BEHAVIOUR AMONG TECHNOLOGY STUDENTS AT UNIVERSITIES
James K. Ngugi & Leila Goosen ................................................................................ 80
MAKING MORE EFFECTIVE USE OF APPS: DESIGNING MEANINGFUL PROFESSIONAL LEARNING NETWORKS
Geoffrey Lautenbach¹ & David M. Kennedy² ....................................................................................... 87

USING MOBILE TECHNOLOGIES FOR SELF-REGULATION IN HIGH SCHOOL LEARNERS’ STRESS MANAGEMENT
Geoffrey Lautenbach¹ & Nardia Randell² ................................................................................................. 94

A VISUALIZATION ARTEFACT TO SUPPORT LEARNING IN DATABASES
Imelda Smit¹ & Romeo Botes² .................................................................................................................. 100

LIFE SCIENCE EDUCATION ................................................................................................................... 108

THE INFLUENCE OF ASSESSMENT ON TEACHERS’ TEACHING STYLE IN LIFE SCIENCES: A CASE OF TWO SCHOOLS IN ONE PROVINCE OF SOUTH AFRICA
Kgomotsego B. Samuel¹ & Washington T. Dudu² ...................................................................................... 109

PRE-SERVICE TEACHERS’ ANALYSIS OF THE MEANINGFULNESS AND RELEVANCE OF THE LIFE SCIENCES CURRICULUM TO SOUTH AFRICAN LEARNERS
Lydia Mavuru .............................................................................................................................................. 116

EFFECTIVE UNDERGRADUATE PRACTICES AND INTERVENTIONS PREPARING STUDENTS FOR HONOURS STUDIES IN BIOLOGICAL SCIENCES
Janice Williamson¹, Etstrna Pretorius² and Melanie Jacobs³ .................................................................... 123

CURRICULUM IDEOLOGIES AND SOCIO-SCIENTIFIC ISSUES IN LIFE SCIENCES
Lindelani Mnguni ......................................................................................................................................... 132

THE INDIGENOUS KNOWLEDGE DEBATE IN LIFE SCIENCES: WHAT ABOUT INDIAN INDIGENOUS KNOWLEDGE?
Camantha Reddy¹, Josef de Beer² & Neal Petersen³ .................................................................................. 141

A LEAP TOO FAR: AN EVALUATION OF LIFE SCIENCES TEACHERS’ LEARNING DURING A THREE DAY SHORT LEARNING PROGRAMME IN INDIGENOUS KNOWLEDGE
Lounell White¹ & Josef de Beer² ................................................................................................................ 148

THE JOURNEY STARTS WITH A SINGLE “SIP”: THE USE OF THE JAPANESE LESSON STUDY AND SENSORY TEA WHEELS IN THE TEACHING OF INDIGENOUS KNOWLEDGE IN THE LIFE SCIENCES CLASSROOM
Brits JS¹, De Beer JJJ² & Kgopong RM² ...................................................................................................... 157

THE ELEPHANT IN THE ROOM: THE WORK-INTEGRATED LEARNING OF STUDENT TEACHERS, AND THE INFLUENCE OF TEACHER EDUCATOR SCHOLARSHIP ON THEIR PROFESSIONAL DEVELOPMENT
Josef de Beer ............................................................................................................................................... 165

MATHEMATICS EDUCATION .................................................................................................................. 175

SUPERVISION PRACTICES AS QUALITY ASSURANCE FOR MATHEMATICS PRE-SERVICE TEACHERS IN ZIMBABWE
Makamure Chipo¹ & Loyiso Jita² ............................................................................................................... 176

EXPLORING GRADE 12 LEARNERS’ APPROACHES FOR SOLVING TRIGONOMETRIC EQUATIONS
Paul Mutodi ..................................................................................................................................................... 183

TOWARDS CONTEXTS WITH MATHEMATICAL MODELLING TASKS
Hanti Kotze .................................................................................................................................................. 192
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investigating the Attitudinal Differences of Students in Service and Mainstream Courses Towards Statistics</td>
<td>199</td>
</tr>
<tr>
<td>Vaughan van Appel &amp; Rina Durandt</td>
<td></td>
</tr>
<tr>
<td>Technology and Its Relationships with Distance and Online Learning Constructs in Undergraduate Mathematics in Nigeria</td>
<td>206</td>
</tr>
<tr>
<td>Comfort O. Reju &amp; Loyiso C. Jita</td>
<td></td>
</tr>
<tr>
<td>Student Teachers’ Authentic Introduction to Mathematical Modelling: A Design-Based Approach</td>
<td>220</td>
</tr>
<tr>
<td>Rina Durandt, Gerrie Jacobs &amp; Geoffrey Lautenbach</td>
<td></td>
</tr>
<tr>
<td>Exploring Grade 9 Learners’ Knowledge of Properties of Quadrilaterals</td>
<td>226</td>
</tr>
<tr>
<td>Benard Chigonga, Gladys Kahle &amp; Kabelo Chuene</td>
<td></td>
</tr>
<tr>
<td>Cognitive Load or Cognitive Engagement: Which Limits Learning in the Mathematics Classroom?</td>
<td>233</td>
</tr>
<tr>
<td>Joanne David &amp; Ronel Paulsen</td>
<td></td>
</tr>
<tr>
<td>Developing Local Instructional Theories and Local Theories: Preconceptions of Lesson Study</td>
<td>242</td>
</tr>
<tr>
<td>Jagals, D. &amp; Van der Walt, M.S.</td>
<td></td>
</tr>
<tr>
<td>The Impact of Using GeoGebra to Teach Circle Geometry on Grade 11 Students’ Achievement</td>
<td>250</td>
</tr>
<tr>
<td>Ugorji I. Ogbonnaya, Chimuka Alfred</td>
<td></td>
</tr>
<tr>
<td>Metacognitive Transference: What Portfolios Tell Us About Contextualized Mathematics</td>
<td>260</td>
</tr>
<tr>
<td>Marthie van der Walt, Divan Jagals &amp; Erika Potgieter</td>
<td></td>
</tr>
<tr>
<td>Physics Education</td>
<td>269</td>
</tr>
<tr>
<td>Probing Students’ Understanding and Scientific Thinking of Equations of Motion in Kinematics</td>
<td>270</td>
</tr>
<tr>
<td>Leelakrishna Reddy</td>
<td></td>
</tr>
<tr>
<td>Gender Differences in Attitude to Laboratory Experiences of Laboratory Teaching of Physical Science at a South African University</td>
<td>279</td>
</tr>
<tr>
<td>Leelakrishna Reddy</td>
<td></td>
</tr>
<tr>
<td>Science Education</td>
<td>288</td>
</tr>
<tr>
<td>Do Imbalances of the Past Count Anymore? Teaching Practices of Two Physical Sciences Teachers in Two South African High Schools</td>
<td>289</td>
</tr>
<tr>
<td>Washington T. Dudu &amp; Kgomotsego B. Samuel</td>
<td></td>
</tr>
<tr>
<td>Role of Context in Shaping the Pedagogical Orientations of Teachers Towards Science Teaching</td>
<td>296</td>
</tr>
<tr>
<td>Lydia Mavuru &amp; Umesh Ramnarain</td>
<td></td>
</tr>
<tr>
<td>In Search of a Working Strategy: The Aha... Moment of Life and Physical Sciences Teachers of Two Best Performing High Schools in the North West Province of South Africa</td>
<td>304</td>
</tr>
<tr>
<td>Kgomotsego B. Samuel &amp; Washington T. Dudu</td>
<td></td>
</tr>
</tbody>
</table>
SCIENCE CONCEPTS FOR THE INTEGRATION OF THE GRADE 1 LIFE SKILLS CURRICULUM
Charnay Sargent¹ & Francois Naude² ................................................................. 312

SCIENCE TEACHING ORIENTATIONS FOR CAPS PHYSICAL SCIENCES PRACTICAL WORK: A CASE STUDY
Maria Tsakeni ........................................................................................................ 323

THE EARTH IS FLAT! EXPLORING THE MENTAL MODELS OF THE SOLAR SYSTEM IN THE FOUNDATION PHASE
K. Nthimbane¹, S. Ramsaroop² & F. Naude³ ................................................................. 331

SEEKING ECOLOGICAL CONNECTIONS IN THE FOUNDATION PHASE: PLANTS ARE THINGS BUT ANIMALS ARE ANIMALS
Francois Naude ....................................................................................................... 339

THE EFFECT OF PROFESSIONAL DEVELOPMENT ON SCIENCE TEACHERS’ CLASSROOM PRACTICE
Maria Catherine Kekana¹ & Estelle Gaigher² ................................................................. 345

FACTORS INFLUENCING THE LEARNERS’ PERFORMANCE AT SCIENCE FAIRS
Sure Mupezeni¹ & Jeanne Kriek² ............................................................................... 352

TECHNOLOGY AND ENGINEERING ........................................................................ 361

EFFECTS OF SCAFFOLDING AND COLLABORATIVE INSTRUCTIONAL APPROACHES ON SCIENCE AND TECHNICAL SCHOOL STUDENTS’ ACHIEVEMENT IN BASIC ELECTRONICS IN NORTH-CENTRAL NIGERIA
Atsumbe Bernard Numgwo¹, Raymond Emmanuel², Samuel Ayanda Owodunni³ and Maxwell Emmanuel Uduafemhe⁴ ................................................................................... 362