Chemistry Education Research and Practice

rsc.li/cerp

A fully refereed electronic journal for teachers, researchers and other practitioners in chemistry education

IN THIS ISSUE

ISSN 1756-1108 CODEN CERPCE 18(1) 1-278 (2017)

EDITORIAL

Always a matter of interpretation: inferring student knowledge and understanding from research data

Keith S. Taber

PERSPECTIVE

13

The potential of the non-formal educational sector for supporting chemistry learning and sustainability education for all students – a joint perspective from two cases in Finland and Germany

Fiona Affeldt, Sakari Tolppanen, Maija Aksela and Ingo Eilks*

PAPERS

26

Prepare, Do, Review: a model used to reduce the negative feelings towards laboratory classes in an introductory chemistry undergraduate unit

Dino Spagnoli,* Lawrence Wong, Shannan Maisey and Tristan D. Clemons*

45

Probing the question order effect while developing a chemistry concept inventory

Molly A. Undersander, Travis J. Lund,* Laurie S. Langdon* and Marilyne Stains*

55

Improving critical thinking *via* authenticity: the CASPiE research experience in a military academy chemistry course

A. M. Chase,* H. A. Clancy, R. P. Lachance, B. M. Mathison, M. M. Chiu and G. C. Weaver

PAPERS

64

Language of mechanisms: exam analysis reveals students' strengths, strategies, and errors when using the electron-pushing formalism (curved arrows) in new reactions

Alison B. Flynn* and Ryan B. Featherstone

78

The effects of problem-based learning (PBL) on the academic achievement of students studying 'Electrochemistry'

Tuğçe Günter* and Sibel Kılınç Alpat

99

High school students' engagement in planning investigations: findings from a longitudinal study in Spain

B. Crujeiras-Pérez* and M. P. Jiménez-Aleixandre

113

Reform in a general chemistry laboratory: how do students experience change in the instructional approach?

I. Chopra, J. O'Connor, R. Pancho, M. Chrzanowski and S. Sandi-Urena*

127

Research on evaluation of Chinese students' competence in written scientific argumentation in the context of chemistry

Yang Deng* and Houxiong Wang*

PAPERS

151

Investigating high-school chemical kinetics: the Greek chemistry textbook and students' difficulties

Theodoros Gegios,* Katerina Salta* and Spyros Koinis

169

Capturing students' abstraction while solving organic reaction mechanism problems across a semester

M. L. Weinrich and H. Sevian*

191

Development and evaluation of a chemistry-specific version of the academic motivation scale (AMS-Chemistry)

Yujuan Liu, Brent Ferrell, Jack Barbera* and Jennifer E. Lewis*

214

The case of middle and high school chemistry teachers implementing technology: using the concerns-based adoption model to assess change processes

Shwartz Gabby, Shirly Avargil, Orit Herscovitz and Yehudit Judy Dori*

233

An examination of student outcomes in studio chemistry

Alan L. Kiste,* Gregory E. Scott, Jesse Bukenberger, Miles Markmann and Jennifer Moore

PAPERS

250

Exploring the complexity of teaching: the interaction between teacher self-regulation and pedagogical content knowledge

Esen Uzuntiryaki-Kondakci,* Betül Demirdöğen, Fatma Nur Akın, Aysegul Tarkin and Sevgi Aydın-Günbatar

271

Impact of instructional decisions on the effectiveness of cooperative learning in chemistry through meta-analysis

Andrew Apugliese and Scott E. Lewis*