Tren Penelitian Pendidikan Kimia
Trends of Chemistry Education Research

Dr.paed Nurma Yunita Indriyanti, M.Si.,M.Sc

Senin, 28 Agustus 2017

Penelitian Pendidikan Kimia

- According to Kornhauser (1979),

The scientific basis of the new [chemistry] discipline is this: the methods of chemical education are derived from the structure, logic and methods of chemistry itself. No other discipline can replace chemical science as the basis of the methodology of chemical education.

- ‘‘scholarship focused on understanding and improving chemistry learning’’ (Herron and Nurrenbern, 1999)

Chemistry education research trends: 2004–2013
(Teo, Chem. Educ. Res. Pract., 2014, 15, 470)

- two chemistry education
- and four science education research journals, namely, Chemistry
- Education Research and Practice (CERP), Journal of Chemical
- Education (JCE), Journal of Research in Science Teaching (JRST),
- Science Education (SE), International Journal of Science Education
- (IJSE) and Research in Science Education (RSE).

Journal	Number of papers	Percentage (%)
Chemistry Education Research and Practice	206	31.7
Journal of Chemical Education	240	36.9
International Journal of Science Education (*IJSE*)	91 (including one from *IJSE* (*B*))	14
Journal of Research in Science Teaching (*JRST*)	45	6.9
Research in Science Education (*RSE*)	46	7.1
Science Education (*SE*)	22	3.4
Total	650	100

Research topics

Learning—students' and teachers' conception & conceptual change
Learning—classroom contexts & learner characteristics
Teaching
Goals and policy, curriculum, evaluation, and assessment
Educational technology
Teacher education
History, philosophy, and nature of chemistry
Cultural, social and gender issues
Informal learning

Learning: Teachers' and students' conception and conceptual change

- learners' alternative conceptions or misconception studies in specific chemistry topics
- approaches used to solve chemistry questions
- difficulties in learning specific topics;
- Instruments used to diagnose, address, or change conceptions; and
- learning progression of students in specific chemistry topics.

learners' alternative conceptions or misconception studies in specific chemistry topics

- Ozmen H., (2008), Determination of students' alternative conceptions about chemical equilibrium: a review of research and the case of Turkey, Chem. Educ. Res. Pract., 9, 225–233.
- Cakmakci G., (2010), Identifying alternative conceptions of chemical kinetics among secondary school and undergraduate students in Turkey, J. Chem. Educ., 87(4), 449–455.
- Adadan E., Trundle K. C. and Irving K. E., (2010), Exploring Grade 11 students' conceptual pathways of the particulate nature of matter in the context of multirepresentational instruction, J. Res. Sci. Teach., 47(8), 1004–1035.

Determination of students' alternative conceptions about chemical equilibrium: a review of research and the case of Turkey

(Note: The full text of this document is currently only available in the PDF Version)

Haluk Özmen

Abstract

This study aims to determine prospective science student teachers' alternative conceptions of the chemical equilibrium concept. A 13-item pencil and paper, two-tier multiple choice diagnostic instrument, the Test to Identify Students' Alternative Conceptions (TISAC), was developed and administered to 90 second-semester science student teachers enrolled in CHEM 102 Chemistry II course in spring 2006, after they received fourteen 50-minute regular course instruction concerning the equilibrium. The content validity of the test was established by the panel consisting of lecturers. The Spearman-Brown reliability for the test was 0.71. Analysis of the results collected with the TISAC show that students did not acquire a satisfactory understanding of the chemical equilibrium concept. For the first tier of the test items, the range of correct answer was 48.8% to 78.8%. When both tiers were combined, the correct response was reduced to a range of 22.2% to 48.8%. In this study, seventeen alternative conceptions were also identified through analysis of the TISAC. These conceptions were grouped under the headings of the application of Le Chatelier's principle, reliability of the equilibrium constant, heterogeneous equilibrium, and the effect of a catalyst.

Exploring Grade 11 students' conceptual pathways of the particulate nature of matter in the context of multirepresentational instruction

Emine Adadan ✉, Kathy Cabe Trundle, Karen E. Irving

First published: 3 February 2010 Full publication history

DOI: 10.1002/tea.20366 View/save citation

Cited by (CrossRef): 0 articles Check for updates Citation tools ▼

View issue TOC
Volume 47, Issue 8
October 2010
Pages 1004–1035

Abstract

This study investigated the conceptual pathways of 19 Grade 11 introductory chemistry students (age 16–17) as they participated in a multirepresentational instruction on the particulate nature of matter (PNM). This study was grounded in contemporary conceptual change theory, in particular, research on students' conceptual pathways that focuses on the interaction between students' existing conceptions and instruction, which might give rise to observing multiple paths. This mixed method study combined a quantitative research design with qualitative data collection and analysis methods. Data were collected through open-ended questionnaires, interviews, and document analysis to portray the patterns of students' conceptual pathways of the PNM from pre to postinstruction to 3 months after the instruction. An interpretive analysis of the qualitative data revealed six different conceptual pathways varying between radical progress and no additional progress (stable) after the multirepresentational instruction and between stable (no change) and full decay over a 3-month period following the instruction. The identified patterns of conceptual pathways provide information about the manner in which conceptual change occurred, as well as suggest potential implications for instructional practices. © 2010 Wiley Periodicals, Inc. J Res Sci Teach 47: 1004–1035, 2010

Instruments used to diagnose, address, or change conceptions; and

- Stains M., Escriu-Sune M., de Santizo M. L. M. A. and Sevian H., (2011), Assessing secondary and college students' implicit assumptions about the particulate nature of matter: development and validation of the structure and motion of matter survey, J. Chem. Educ., 88, 1359–1365.
- Kaya O. N., (2008), A student-centred approach: assessing the changes in prospective science teachers' conceptual understanding by concept mapping in a general chemistry laboratory, Res. Sci. Educ., 38, 91–110.

The purpose of this study was to explore the feasibility and validity of Prospective Science Teachers' (PSTs) concept maps as authentic assessment tools in a student-centred approach to describe the changes in the conceptual understanding of the PSTs in general chemistry laboratory investigations. After the PSTs ($n = 47$) decided on important issues, such as who would assess their concept maps and what scoring strategy and criteria would be used, they practiced assessing their own and peers' concept maps during the first five laboratory investigations. They subsequently constructed and assessed pre- and post-laboratory concept maps in a student-centred approach consisting of self, peer, and instructor assessments for the five remaining laboratory investigations. The results of the study showed using pre- and post-laboratory concept maps as authentic assessment tools in a student-centred approach was valid and reliable for describing the conceptual understanding of the PSTs in a university general chemistry laboratory course. The results of individual interviews indicated most PSTs had positive views of their assessment practices in the laboratory course. This study also provides pedagogical implications for the training of science teachers.

Teaching

- The various pedagogies used in teaching. Other areas that were researched on included teacher thinking, pedagogical content knowledge, knowledge representation, and teaching materials.

- Lewis S. E. and Lewis J. E., (2005), Departing from lectures: an evaluation of a peer-led guided inquiry alternative, J. Chem. Educ., 82(1), 135–139.
- Barbosa R., JoaLfili Z. and Watts M., (2004), Cooperating in constructing knowledge: case studies from chemistry and citizenship, Int. J. Sci. Educ., 26(8), 935–949.

This paper looks at three case studies within the teaching and learning of chemistry. Each case considers the effectiveness of group learning activities in terms of the ways in which they enhance cooperative learning. Group tasks are generally undertaken in order to encourage learners to develop their understanding of particular issues, lthough one key disadvantage is that much of the process of the group work is lost as soon as the group disbands. The cases explored here aim to: (i) investigate the development of cooperative attitudes among students, looking for significant learning of scientific concepts, (ii) encourage the development of ethical attitudes, to motivate, and then (iii) empower the participants so that they can build upon the communal knowledge that is generated. In this way learners enhance their levels of partnership and cooperation with other members leading to a fuller and broader understanding of the collaboration required within the values of citizenship education. Using science to educate for citizenship is a growing concern across many countries of the world, in this case illustrated by work in Brazil and the UK.

- A number of pedagogies were examined, including peer-led team learning (e.g. Lewis and Lewis, 2005; Hockings et al., 2008), peer mentoring (e.g. Amaral and Vala, 2009; Essex, 2011), cooperative learning (e.g. Barbosa et al., 2004; Sandi-Urena et al., 2011), jigsaw classrooms (e.g. Doymus, 2007; Tarhan and Sesen, 2012), demonstrations (e.g. Ashkenazi and Weaver, 2007; Price and Brooks, 2012), Science Writing Heuristic (e.g. Hand and Choi, 2010; Kingir et al., 2012), inquiry-based (e.g. Yang and Li, 2009; Sampson and Walker, 2012), hands-on learning (e.g. Oliver-Hoyo et al., 2004; Bruck et al., 2010), problem-based learning (e.g. Senocak et al., 2007; Tosun and Taskesenligil, 2013), context-based learning (e.g. Vaino et al., 2012), and others.

Learning—classroom contexts and learner characteristics.

- The attitudes and beliefs of participants,
- Cognitive variables in participants,
- Learning approaches,
- Factors affecting learners' chemistry performance, classroom interaction
- Classroom environment.

Bauer C. F., (2008), Attitude towards chemistry: a semantic differential instrument for assessing curriculum impacts, J. Chem. Educ., 85(10), 1440–1445.

Attitude toward Chemistry: A Semantic Differential Instrument for Assessing Curriculum Impacts

Christopher F. Bauer
Department of Chemistry, University of New Hampshire, Durham, NH 03824

J. Chem. Educ., 2008, *85* (10), p 1440
DOI: 10.1021/ed085p1440
Publication Date (Web): October 1, 2008

Abstract

The development of a 20-item semantic differential assessment instrument for measuring student attitudes toward the subject of chemistry is described (Attitude toward the Subject of Chemistry Inventory—ASCI). Instrument subscales and survey items pertain to interest and utility, anxiety, intellectual accessibility, emotional satisfaction, and fear. Detailed information on validity is provided by means of exploratory factor analysis, comparisons between different populations of students (general chemistry, peer leaders, chemistry majors), and comparisons with course performance. Reliability is established by estimation of internal consistency of subscales and retesting correlation. The instrument is useful for assessing student attitude for any curriculum setting for longitudinal change or intercomparison of groups. Specific application in an inquiry-based, nonmajors chemistry course is described.

Research method

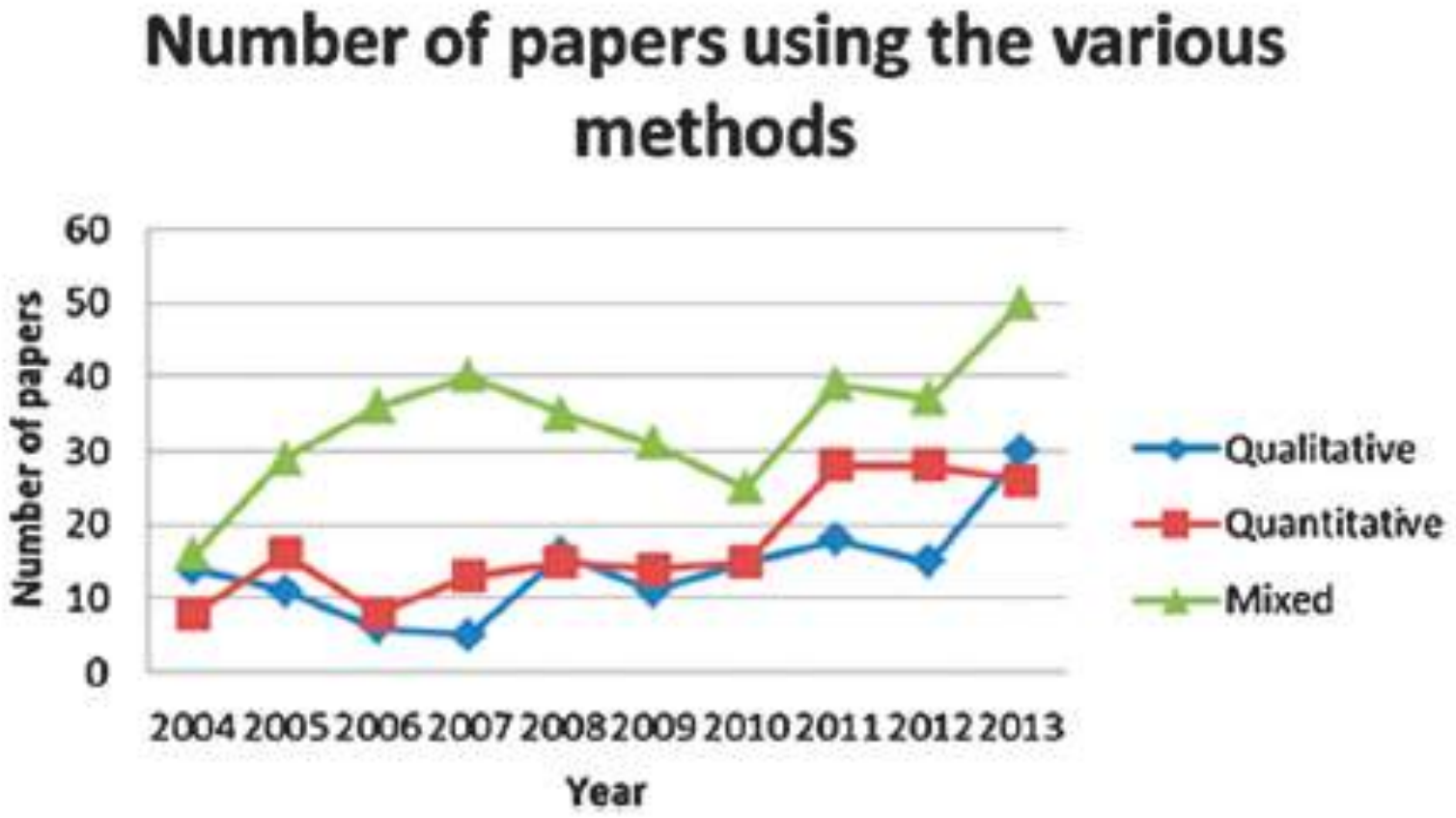

Fig. 6 The number of qualitative, quantitative and mixed methods studies

- More quantitative data found than qualitative ones.
- Qualitative: observation, interview (represented qualitatively)
- Quantitative: survey using Likert scale, test
- Mixed method: a mixture of qualitative and quantitative instruments (e.g., questionnaires with Likert-scale items and open-ended response) and methods were adopted

Participants

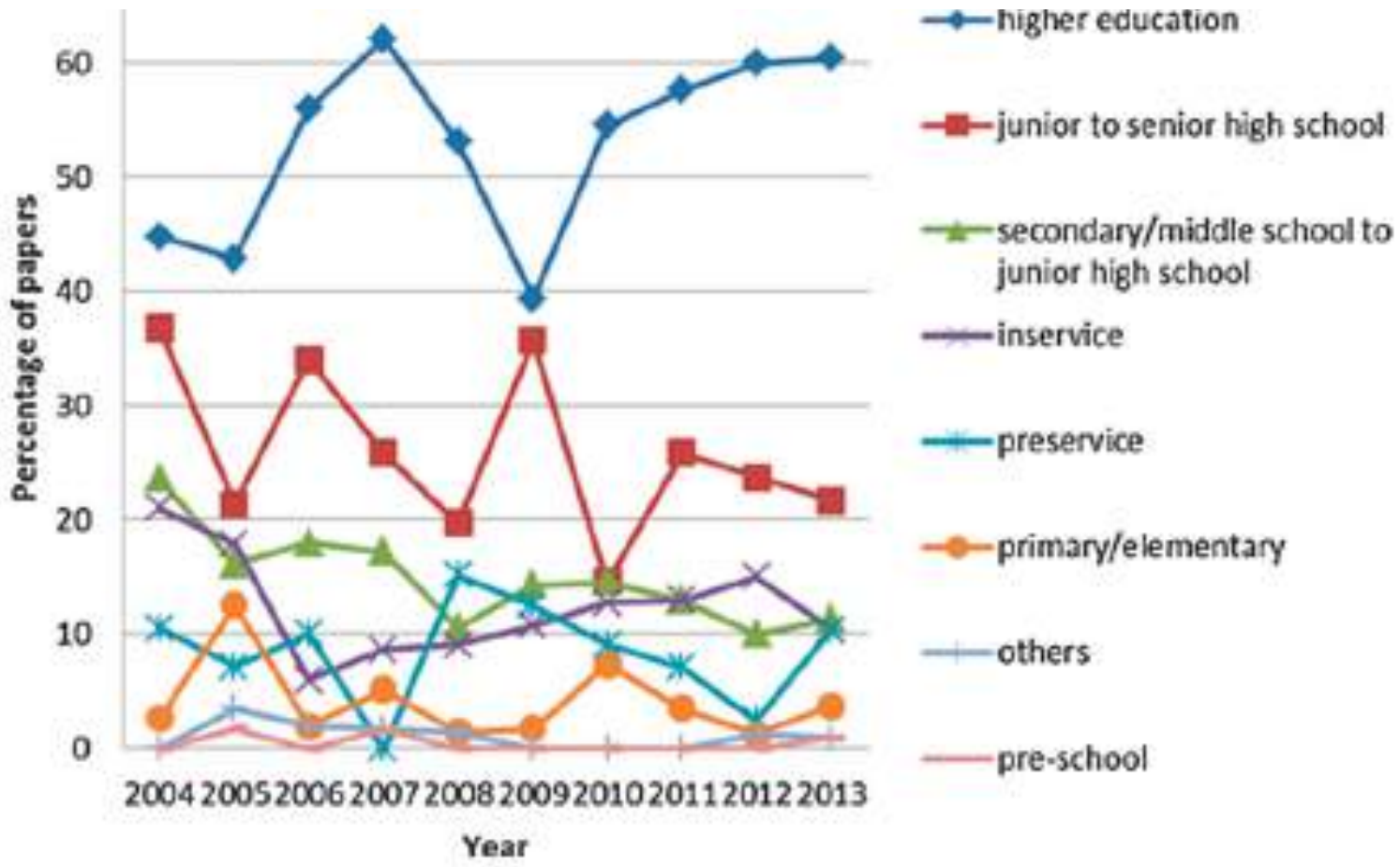

Table 11 Top 11 most published authors of empirical chemistry education research papers from 2004–2013

Score	Papers	Name	Institute, location	Area of interest	Notes
7.800	15	Vicente A. Talanquer	University of Arizona, USA	• Students' explanation and reasoning	Editorial board member: IJSE & CERP
6.000	6	Derek Cheung	The Chinese University of Hong Kong, Hong Kong	• Chemistry education • Curriculum development • School-based assessment • Assessment of affective learning outcomes	
5.900	10	Michael Sanger	Middle Tennessee State University, USA	• Identifying student misconceptions in chemistry • Designing and evaluating instructional methods to confront student misconceptions • Using computer-based visualization strategies (computer animations, electron density plots) to improve students' conceptual knowledge of chemistry at the molecular level	
5.592	11	Keith S. Taber	University of Cambridge, UK	• Learners' ideas, misconceptions, alternative conceptions and alternative frameworks • Conceptual understanding, conceptual integration and conceptual change and development • Constructivism in science education • Learner thinking and metacognition • Explanations in science • Teaching about the nature of science • Challenging high attainers	Editor: CERP Editorial board member: IJSE

5.376	13	Melanie Cooper	Michigan State University, USA	• Curricula development and assessment • The effect of interventions and educational environments on problem solving and metacognition • Investigation of representational competence • BeSocratic: a free-form interactive system	Editorial board member: JRST Advisory Panel: CERP
5.180	14	Marcy H. Towns	Purdue University, USA	• Small-group learning, • Computer supported collaborative learning	Associate Editor: JCE
4.623	9	Scott E. Lewis	University of South Florida, USA	• Peer-led team learning	
4.503	14	David Treagust	Curtin University, Perth, Australia	• Students' conceptions and conceptual change • Multiple representations • Students' and teachers' understanding • Two-tier diagnostic instruments	Editor: IJSE Editorial advisory board member: CERP Editorial board member: RSE
4.260	13	Stacey Lowery Bretz	Miami University, USA	• Development of assessment measures to diagnose chemistry misconceptions and to stimulate metacognition and reflection in both the teaching and learning of chemistry. • Application of cognitive science theories to the teaching and learning of chemistry. • Experiments, taxonomies and rubrics for inquiry learning in the chemistry laboratory. • Children's learning of chemistry. • Project evaluation, with an emphasis on qualitative measures.	

4.175	9	Nathaniel Grove	University of North Carolina Wilmington, USA	• Factors influencing meaningful/rote learning in chemistry • Students' epistemological development in chemistry. • The development of representational competence in chemistry. • The role of metacognition in developing representation competence. • The use of technology in the chemistry classroom.
4.078	13	Jennifer E. Lewis	University of South Florida, USA	• Diagnostic, assessment inventory • Student attitude, attitude change

Pengajuan judul skripsi

- Program Percepatan AEE (dari Skripsi) untuk angkatan 2014
- 14 Agustus 2017 : Sosialisasi ke Dosen
- 29 Agustus 2017 : Sosialisasi ke mahasiswa angkatan 2014
- 8 September 2017 : Deadline Judul
- 15 September 2017 : Deadline verifikasi Judul
- 16 Sept – 15 Okt'17 : Penyusunan Proposal Skripsi
- 16 Okt – 3 Nov'17 : Jadwal Seminar Proposal
- Februari 2018 : Seminar Hasil
- Mei-Juli 2018 : Ujian Skripsi

- http://kimia.fkip.uns.ac.id