



SIG 9
Phenomenography
and Variation Theory

1/2020 Newsletter

Dear SIG9 members and friends,

Welcome to the Fourth issue of our Newsletter!

Wishing you the best for 2020! We hope you are in the midst of planning your submission to the SIG9 conference, 17-19 August in Göteborg.

Even though Göteborg at the moment is dark and rainy, we expect that it will show itself at its the best in August with warm evenings and a vibrant community life. Together with inspiring conversations and the latest in the phenomenography and variation theory community, it may be the experience of a lifetime! We are working hard towards this goal, preparing ourselves for the review process of the high quality proposals we expect. Anyway, deadline is approaching (February 17th), don't miss it!

Please remember also to renew your membership in SIG9 along with your EARLI membership, which also will give you a discount on the conference fee. The SIG is an important platform for the phenomenography and variation theory community, and the more members we are, the stronger we stand in the EARLI organisation.

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A short reflection on the 2019 EARLI Conference

It has now been about five months since many of us met in Aachen. Although I have been to a couple of Earli conferences before, this was my first conference as a SIG9 member. Looking back at the conference, with the paper sessions, the invited symposium, where I had the pleasure to participate with a paper, the SIG meeting and the SIG dinner, three things stand out: the competence represented, the interesting

discussions and the warm welcoming. What really struck me during the conference was the great competence that is represented in SIG9. It is a pleasure to be part of a community with so many competent and experienced fellow colleagues. In addition, both during the different sessions and between – during dinners and other social events – I also had many interesting discussions. There were discussions about theory, method, potential future projects, interesting problems to dig into and much more. I very much appreciated those discussions. Last but not least, as a new member of SIG9 I felt very welcomed and I really appreciated the warm and generous fellowship in the group. Thank you for welcoming us newcomers with open arms! I believe that the three components mentioned above, the competence, the interesting discussions and the warmth, are central in forming a thriving and creative research community. My experience after this year's Earli conference is that SIG9 surely has all three parts. I therefore already look forward to the 2020 SIG9 conference in Gothenburg to continue all interesting discussions with competent colleagues from around the world. And not the least I look forward to the fellowship and hopefully new members to welcome with the same warmth as I was welcomed.

Ann-Sofie Jägerskog, Stockholm University.

SIG9 GOTHENBURG CONFERENCE

We do hope that you are considering putting in a proposal at this year's conference in Gothenburg. We would particularly like to encourage you to offer an Extended Paper session. These are longer sessions which we hope will provide really good opportunities for discussion. To be considered for an Extended Paper session, we ask that proposers give an idea of how they will promote discussion. One way to do this is to provide a list of discussion questions and give some idea about how discussions will be managed. **We look forward to receiving your proposals before the deadline of 17th February 2020.**

[More information](#)

PhD COURSE PHENOMENOGRAPHIC HORIZONS

Thank all of you in helping to spread the word about the upcoming PhD course Phenomenographic horizons given by University of Gothenburg. 16 students have been enrolled, and course is starting in April. We hope you will meet most of the students at the SIG9 conference. We plan to give the course bi-annually, so you might want to take note of the next opportunity planned for 2022. If you have any queries you can contact the course leaders Angelika Kullberg and Åke Ingerman.

PUBLICISE YOUR WORK

To keep you in touch with some of the key developments in the field, we like to highlight recently published PhD theses in each SIG9 newsletter. Now we are looking to extend this to include other new publications (at the end of this newsletter). If you have something that you have just published and would like to share with like-minded people in the SIG, then please do drop one of us a line. It might be a good way to get your work noticed and you never know what opportunities for collaboration might result.

RECENT DOCTORAL THESIS

Norsadiah Raduan, Universiti Brunei Darussalam

A Design for Teaching and Learning Chemical Equilibrium Based on the Variation Theory of Learning

An understanding of the concept of chemical equilibrium (CE) is fundamental for learning more advanced chemistry topics. Numerous studies have shown that CE remains a troublesome concept for students to comprehend and for chemistry teachers to teach. In the first part of this study a phenomenographic research approach was adopted to identify the qualitatively different ways in which a sample of Bruneian pre-university level students understand CE. The analysis of interviews with students from four sixth-form centres revealed categories of description of qualitatively different ways of understanding CE. This analysis supported the identification of the critical aspects of the most advanced and comprehensive way of understanding CE and what students needed to learn to achieve that understanding. In the second part of the study a digital CE simulation was designed, framed by the variation theory of learning, incorporating the critical aspects. The CE simulation was implemented to achieve the intended object of learning chemical equilibrium. Research lessons were conducted to explore what is possible for students to learn -afforded by engagement with the CE simulation- through experiencing patterns of variance and invariance shaped by the researcher and in cooperation with the students through interaction in an ICT Laboratory. The lessons were videotaped and analysed in terms of the enacted and lived objects of learning constituted by students' exposure to the CE simulation. The findings of this study have some important implications for the teaching of chemical equilibrium and other chemical concepts. The results of this study are anticipated to be useful in informing teachers, authors of chemistry textbooks and software developers, and in promoting the preparation of instructional sequences in chemistry that

address students' conceptions using variation theory as the theoretical design tool

Anna-Lena Ekdahl, Jönköping Universtiy, Sweden

Teaching for the learning of additive part-whole relations: The power of variation and connections

<http://hj.diva-portal.org/smash/record.jsf?pid=diva2%3A1372663&dswid=-9094>

In this thesis, results from four empirical studies and a re-analysis are synthesized with what can constitute a structural approach to teaching and learning additive part-whole relations among learners aged four to eight years. In line with a structural approach to additive relations, the relations of parts and whole are in focus from the outset and are seen as the basis for addition and subtraction (Davydov 1982; Neuman, 1987). This approach was introduced by the researches in two intervention studies across different contexts. The researches collaborated with teachers in planning part-whole activities, teachers teaching them in their own settings, and then reflecting on them together with the research team. The empirical material consists of video-recorded lessons (Grade 3), small-group teaching (preschool) and individual video-recorded task-based learner interviews (with preschoolers). The teaching episodes and interviews were analyzed on a micro-level, using analytical tools and concepts from variation theory (Marton, 2015). To deepen the knowledge, a re-analysis was also conducted with the purpose of identifying qualitative differences in teachers' enactments of mathematical ideas and principles associated with a structural approach to additive relations.

Looking at the articles and the re-analysis, the results suggest that, for learning, it matters which representations are offered to the children. Some representations seem to facilitate the discernment of the parts and whole, and their relations. The results suggest that it matters which examples are offered. A systematic sequence of examples has the potential to bring to the fore relations between different part-whole examples, which offer the children opportunity to learn mathematical principles such as commutativity. Furthermore, the results indicate that what is made possible to learn about additive part-whole relations is associated with what aspects are opened up as dimensions of variation (Marton, 2015). Foremost, though, the results reveal the importance of making connections to highlight number relations and key features associated with the structural approach to additive relations. The results suggest that how variation is offered, and whether and how the teacher explicitly (verbally and gesturally) draws attention to relations, ideas and aspects, is crucial for the learning of additive part-whole relations. Moreover, through the separate articles and the re-analysis, the outcomes indicate that the structural approach to additive part-whole relations and conjectures from

variation theory are possible to implement in different contexts and for different ages of children.

Patrik Johansson, Stockholm University

Learning history through historical source materials : Teaching and learning historical source interpretation in primary and secondary school

<http://su.diva-portal.org/smash/record.jsf?pid=diva2%3A1346457&dswid=8294>

This doctoral thesis is concerned with how students learn historical source interpretation and the design of facilitating teaching practices. Source interpretation is at the core of historians' professional practice and, while being a key aspect of historical learning, it is sometimes misunderstood or misrepresented in history teaching. To better understand these issues two educational design research field studies were conducted in middle and upper secondary schools to explore how students learn historical source interpretation. The historical content in upper secondary school concerned the process of democratisation in Sweden, while the middle school content was the Viking Age. Source materials in upper secondary school included various text sources, while archaeological artefacts were used in middle school.

The research object was historical source interpretation, or the ability to understand the meaning of sources in relation to the historical questions and contexts formulated and dealt with in history teaching. Source interpretation is one element of the ability to reason historically. It is a theoretical construct that has a heuristic function along with the development of historical consciousness. Four research questions are addressed: i) What do middle and upper secondary school students know when they have developed the ability to reason historically when engaged in source interpretation, ii) What are critical aspects of learning to reason historically when engaged in source interpretation, iii) What are similarities and differences between middle and upper secondary school students' learning of historical reasoning in source interpretation, and iv) How can history teaching facilitate the learning of historical reasoning through source interpretation?

An interventionist and theory-informed research methodology, in the form of learning study, was used to develop teaching practices while generating empirical data. A compilation of four peer-reviewed articles simultaneously contribute knowledge to the practice of history teaching and to the theory of history didactics. Two articles address the first two questions of the qualitative meaning of learning source interpretation using phenomenography and variation theory to analyse students' perceptions and to identify the critical aspects of discernment that students must learn. From the perspective of variation theory, it is argued that learning source interpretation can be regarded

as obtaining differentiated ways of seeing, as previous experiences are supplemented with more complex perceptions.

The third question is addressed by comparing students' developing of source interpretation skills in middle and upper secondary school. One finding of the comparison is that younger students' learning reflects an increasing understanding of what history is, whereas older students learn to use the disciplinary tools and methods of history. Two articles address the final question regarding the role of teaching by combining content-based conversation analysis with variation theory to analyse students' learning processes when working with source interpretation tasks. It is argued that students' preunderstandings can be regarded and used as resources in teaching and learning. Finally, seven design principles are suggested to guide teachers in organising their teaching practice. These include motivating historical research through source work and activating historical consciousness through sources.

KEY DATES IN 2020

17 February	Submission of abstracts to SIG9 conference
17 April	Notification of acceptance
13-17 July	JURE 2020 conference, Porto, Portugal
17-19 August	SIG 9 conference in Göteborg, Sweden

RECENT PUBLICATIONS OF EARLI SIG9 MEMBERS AND FRIENDS

- Durden, G. (2020). Qualitative differences in beginner teachers' knowledge of pupils' understandings: evidence from Learning Study and implications for teacher education. *Journal of Education for Teaching*. Advance online publication. [doi:10.1080/02607476.2019.1708630](https://doi.org/10.1080/02607476.2019.1708630)
- Durden, G. (2019). Beginner Teachers' conceptions of a successful lesson in English Secondary schools: structure and implications. *Teaching and Teacher Education*, 77, 10-18.
- Kettunen, J. & Makela, J.P. (2019). Practitioners' conceptions of ethical practice in social networking in career services. *International Journal for Educational and Vocational Guidance*, 19, 345-362. [doi:10.1007/s10775-018-9383-4](https://doi.org/10.1007/s10775-018-9383-4)
- Kullberg, A., & Björklund, C. (2019). Preschoolers' different ways of structuring part-part-whole relations with finger patterns when solving an arithmetic task. *ZDM Mathematics Education*. Online first. [doi:10.1007/s11858-019-01119-8](https://doi.org/10.1007/s11858-019-01119-8)

- Kullberg, A., Björklund, C., Brkovic, I., & Runesson Kempe, U. (2019). Effects of learning addition and subtraction by making the first ten numbers and their relations visible with finger patterns. *Educational Studies in Mathematics*. Online first. [doi:10.1007/s10649-019-09927-1](https://doi.org/10.1007/s10649-019-09927-1)
- Larsson, K. (2019) Using Essay Responses as a Basis for Teaching Critical Thinking – a Variation Theory Approach, *Scandinavian Journal of Educational Research*, [doi:10.1080/00313831.2019.1650824](https://doi.org/10.1080/00313831.2019.1650824)



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