

SIG9

Phenomenography and Variation Theory

*Biennial Conference 2022
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Book of Abstracts



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Conference Theme

The theme for the conference is *Phenomenography and variation theory in practice – addressing educational challenges in a changing world*. The world is rapidly changing and issues such as war, climate change, spread of misinformation, refugee crisis, racial injustice and the pandemic become increasingly interwoven with debates about the nature and purpose of education. Such a changing world presents new educational challenges.

The SIG 9 conference therefore offers the opportunity to explore how phenomenography and variation theory can address such educational challenges in conceptual as well as methodological terms.



Keynote Speakers

Keynote 1: Ulla Runesson

The impact of phenomenography and variation theory on addressing educational challenges? Looking back – and forward



One of the most important challenges in education is to help learners to handle novel situations in powerful ways (Marton, 2015). Contributing with knowledge that can help educators encountering these challenges is the ultimate aim for the phenomenographic research approach and its theoretical extension, variation theory (PHVT).

- What are the features and strengths of PHVT to giving such contributions?
- What has been the impacts of PHVT research on practice?
- What are the challenges in the future?

In my keynote I will look back on four decades of PHVT research and give personal reflections on these issues.

Keynote 2: Jennifer Case

Four decades on: How are Phenomenography and Variation Theory shaping up in the globalized 21st century?



The world has changed tremendously since the word *Phenomenography* first appeared in the scholarly literature in the early 1980s, and the emergence of Variation Theory in the late 1990s. With the end of the Cold War, geopolitics saw a massive shift in terms of the locations of political and economic power, and globalization of trade and the development of the web saw a revolution in connectivity. Education also changed dramatically over this period; higher education most notably saw unprecedented increases in the number of young people enrolled in post-secondary education in nearly every part of the world.

This keynote surveys how the use of Phenomenography and Variation Theory has developed over these decades in response to these dramatic changes in education and society. Four decades on we live in a time characterized by rapidly evolving crises in the geopolitical area, coupled with the urgency of the climate crisis, renewed urgency in relation to race and equity in many countries, and we are also only just emerging from a global health pandemic.

The keynote asks pertinent questions about the potential contributions of Phenomenography and Variation Theory in relation to pressing educational research questions of the moment. Specifically, it considers contemporary pressing issues of the climate crisis, a global health pandemic, and an urgency about issues of racial equity – to ask the question of how this field of research is bringing forward important insights that are relevant, and how it might potentially strengthen this contribution.

Parallel sessions I

Room A:

The Mechanical Paul Trap in the Upper Secondary Physics Classroom: A Design-based Approach to Developing Laboratory Exercises

Author: Sebastian Kilde Löfgren, Jonathan Weidow, Jonas Enger

Department of Physics, University of Gothenburg, Department of Physics, Chalmers University of Technology

Keywords: Design-based research; variation theory; secondary physics education; physics laboratory

There are plenty of opportunities to make modern physics accessible using simulations and 3D printers in the modern digital world. This paper explores these opportunities by designing and evaluating a teaching module where a simulation and a 3D-printed physical model of a particle trap, the Paul trap, are implemented in Swedish upper secondary physics education. Using a design-based approach to develop a laboratory lesson, quantitative pre and post-tests and qualitative field notes guided the changes between the prestudy and the two main parts of the study. We did a thematic analysis on field notes and student interviews to investigate student learning further and discern emerging patterns. The emerging patterns and iterations of the lab design are further tested against theoretical assumptions using variation theory to identify critical aspects when teaching the concept of Paul traps using the developed artifacts.

Research on Design and Creation in Architecture and Engineering

Author: Shannon M. Chance, Mike Mimirinis, and Inês Direito

CREATE, Technological University Dublin, Centre for Engineering Education, UCL, University of West London

Keywords: Design, conceptions, phenomenography.

The overall work seeks to provide new understandings of how students interpret the act of creation: spanning multiple professions; identifying the various concepts that architecture and civil engineering students hold about the generation of new designs; and describing how these conceptualizations compare within and between fields. We are using phenomenographic research methodologies to identify qualitatively different ways engineering and architecture students conceptualize design creation. Understanding how students interpret creating will help the research team provide recommendations for improving design-related pedagogy. Providing a solid analysis of prior research related to our question will help situate the work and help readers understand the context and rationale for our study.

Room B:

A phenomenographic investigation into how engineering students experience learning to think critically

Author: Liezle Boshoff, Zachary Simpson, Brandon Collier-Reed

Problem solving is seen as the heart of engineering practice, and critical thinking is regarded as a key component of problem solving. Engineering lecturers' failure to express the meaning of critical thinking and their complaints about students' inability to think critically are troubling. This study explores the phenomenon of learning to think critically through the experience of eleven undergraduate engineering students at the Cape Peninsula University of Technology in South Africa. To ensure a shared experience of critical thinking amongst the students, a model eliciting activity (MEA) was developed. The six processes in the solving of MEAs served as motivation for using an MEA as framework for analyzing engineering students' conceptions of learning to think critically. Analysis suggests that students experience learning to think critically in five qualitatively different ways: by (1) Translating – translating words into equations or coding, (2) Sifting – narrowing down, (3) Relating and synthesizing – relating and synthesizing concepts, (4) Critiquing – criticizing and advising on plans to solve a problem (5) Innovating – discovering what it means to become a critical thinker. The outcome space facilitates improved understanding and communication about the qualitatively different ways in which engineering students experience learning to think critically.

Leveraging the Critical Incident Technique in Phenomenographic Research

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Keywords: methodology, critical incident technique, conceptual change

Phenomenography and variation theory are used by researchers to understand how students and instructors conceptualize different phenomena in higher education, such as learning and teaching, the research profession, and academic or educational development. The purpose of interviews in phenomenography is to reveal the understanding of the phenomenon from the perspective of the participant; the phenomenon cannot exist separately from the person experiencing it. Through analysis, researchers identify the nuances in the meaning and structure of these aspects as described by the participants. This process helps researchers articulate the variation between conceptions and aids in refining the categories to form an outcome space. We propose that the critical incident technique (CIT) from the psychology research tradition can serve as a methodology to enhance the quality of phenomenographic research. CIT focuses on understanding the characteristics of memorable moments and experiences that are impactful to individuals. We suggest that use of CIT with phenomenography serve multiple important purposes by: (a) aiding researchers in identifying the structural aspects of conceptions and factors that contribute to conceptual change, (b) offering a way to ensure theoretical saturation of data, and (c) addressing potential validity concerns associated with phenomenography.

Parallel sessions II

Room A:

Unpacking Pre-service Teachers' Novice Experiences of Lesson Planning with Variation Theory

Author: Miechie, Yuen Sze Michelle Tan, Douglas Adler

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Keywords: Pre-service teacher, science education, learning study, lesson planning, initial teacher education

Variation theory is recognized as a powerful pedagogical tool to guide pre-service teachers (PSTs) in developing effective teaching instruction. However, applying variation theory can be a challenging task for PSTs due to their partial understandings of the theory. In this regard, teacher educators could benefit from more studies that elucidate how PSTs could be better supported in their application of the theory to teaching practice. Our study thus examines how PSTs employed variation theory in planning lessons of difficult school science topics such as genetics. Variation theory was introduced to PSTs (n=27) in a science teacher education course, where they engaged in collaborative lesson development consisting of the identification of objects of learning, critical aspects and patterns of variation. Self-selected PSTs participated in post-lesson interviews (n=5), which were transcribed verbatim and triangulated with the researchers' fieldnotes, video-recording of the lesson planning session, and resources provided to the PSTs. Borrowing phenomenography, we constructed categories of description capturing four different ways the PSTs employed variation theory (not hierarchically ordered), namely, to determine whole-part relationships between objects of learning and critical aspects, identify student learning difficulties, develop effective patterns of variation, and develop lesson sequence. Our findings further strengthen the repertoire of lesson planning strategies PSTs employ in science teaching.

The use of variation theory in teacher conversations in a Subject Didactic Group in physical education

Author: Marlene Sjöberg & Angelika Kullberg

University of Gothenburg, Sweden

Keywords: teachers' conversation, variation theory, teachers' professional development, subject didactic group

Teachers' collegial discussions about teaching and student learning is advocated to be of importance for the development of teacher professional knowledge. Seven teachers in physical education participated in a Subject Didactic Group using variation theory as a tool for discussing teaching and student learning regarding complex movements and warm-up. The study aims to describe and discuss how variation theory, and particularly the concept of critical aspects, was used and contributed to meaning-making of teaching and student learning in physical education. The data consists of six hours of conversations from meetings during one year. A phenomenographic approach was used to identify qualitative different ways in how the teachers used and in turn seemed to experience critical aspects as a means in their discussions of teaching and learning over time. The qualitative differences identified show how the concept

of critical aspects after some time of struggle became a tool for the teachers to focus on student learning on a more detailed level.

Room B:

Lesson studies and teacher students' didactic reasoning during teaching practice

Author: Kyriaki Doulas, Gunilla Gunnarsson
Linnaeus University, Sweden

Keywords: Lesson study, teacher students, didactic reasoning, contextual analysis

The purpose of the present study is to explore qualitative different ways of didactic reasoning that teacher students develop collectively conducting Lesson studies during their teaching practice. The participants are two student groups (primary and leisure teacher students) of 40 respectively 25 students each, attending the course Didactics and curriculum theory. A "lesson study" is one of the assignments of the course. The students worked in pairs to plan and successively conduct a lesson with a group of pupils according to the Lesson Study cycle (Murata 2011). The empirical material consists of the recordings of student discussions about their teaching and was analysed using contextual analysis (Svensson 1997; Svensson & Doulas, 2013). The following types of didactic reasoning developed during teacher students' lesson study were identified: *Process-oriented demonstrative didactics* where students were attentive to and developed the planned steps of the lesson by advancement of the process, such as a clearer introduction, repetition and use of artefacts. *Pupil-oriented dialogic didactics* where students were attentive to pupils' learning as a dialogic interaction, and focused on developing a dialogic learning environment. *Subject-oriented transformative didactics* where students were attentive to learning requirements of each pupil, and transformed the subject content to correspond to specific pupils and situations.

A phenomenographic analysis of teacher conceptions and practice of growth mindset pedagogy in British primary schools

Author: Will Zoppellini
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Keywords: Growth Mindset, Growth Mindset Pedagogy, Teacher Education, Phenomenography

Growth mindset has been extensively researched in education with specific focus improving children's academic achievement. Research indicates that students who hold a growth mindset over a fixed mindset have higher levels of academic success and resilience. The implementation of educational interventions that include growth mindset in classrooms has divided opinion amongst teachers and scholars. Due to the varied uses and research applications of mindset, teachers have developed differing conceptions of what growth mindset is and how it is developed through their teaching practice. Utilising a phenomenographic approach this study explored the qualitatively different ways that British primary school teachers conceive of growth mindset and its related practices within education. 17 teachers were interviewed from a variety of schools. Findings suggest that there are four varying conceptions for understanding growth mindset. Differences are presented in how growth mindset develops human qualities, teacher's implicit beliefs about the malleability of children's intelligence and how pedagogic practices are used to foster children's mindsets. Some conceptions are closely linked to

academic research in the field, other conceptions highlight misunderstandings and alternative ways of understanding the concept within education. These have several implications for teaching practice and significantly affect how the concept is developed in children.

Parallel sessions III

Room A:

The development of a teaching program for number and early arithmetic skills based on insights from multiple intervention studies with variation theory

Author: Angelika Kullberg, Camilla Björklund, Ulla Runesson Kempe, Anna-Lena Ekdahl, Jessica Elofsson

University of Gothenburg and Jönköping University, Sweden

Keywords: Variation theory, Teaching program, Early arithmetic, Intervention

In this paper, we show the development towards a teaching program designed as an intervention for six-year-old pupils' learning about numbers and addition and subtraction. The paper aims to illustrate how insights from two previous intervention studies based on a structural approach to early arithmetic skills, FASETT – about 5-year-olds' learning of number and number relations up to ten, and EXTENT – about 7-year-olds' learning of addition and subtraction up to 20, was used as an outset to design the teaching program. A goal with the teaching programs was that the pupils would learn to structure numbers up to 12 in part-whole relations, and by that develop a sustainable basis for arithmetic skills. We will show how the critical aspects identified in the previous studies, and the patterns of variation used to enact the critical aspects in tasks and activities were used as points of departure to develop the teaching program.

Visualising the complex and the changing: Identifying critical aspects of social science models

Author: Ann-Sofie Jägerskog, Malin Tväråna, Mattias Björklund, Max Strandberg, Sara Carlberg, Robert Kenndal, Therese Juthberg, Per Sahlström, Marie Losciale, Patrik Gottfridsson, Bodil Kåks

Stockholm university, Uppsala university

The aim of this presentation is to discuss how phenomenography and variation theory can increase our understanding of how models used in social studies teaching can help students grasp the complexity and changeability in societal issues. The aim is also to discuss the possible transferability of critical aspects between different kinds models. Models are often used in social studies teaching to help students grasp complexity and changeability. However, students often find models difficult to understand and there is a risk that seemingly fixed models do not offer an understanding of the changeability in societal issues. The project presented investigates students' conceptions of four different models that are commonly used in social science teaching (two flowcharts and two plot diagrams) and what aspects need to be discerned in order for students to reason in a qualified way about the content illustrated. Results from a phenomenographic analysis of 46 group discussions (with students from both compulsory and

upper secondary school) show that the critical aspects identified in part can be understood as model and content specific, but in part as model generic. This raises questions concerning the transferability of critical aspects between different kinds of models and if aspects that reoccur in relation to different models, such as aspects of changeability and complexity, could be understood as especially characteristic for social studies models.

Room B:

On BOUNCE! Practice-based feedback – A study of Theatre, Teaching and Dance Situations

Author: Pernilla Ahlstrand, Ninnie Andersson

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Keywords: Variation theory, dance, theatre, feedback

A recently funded research project will be introduced and discussed. The title 'Practice based feedback' refers to formative assessment that takes place during feedback in teaching situations. Previous research has shown that feedback in the school subjects dance and theater takes place partly orally in the form of words or sounds, and partly physically in the form of physical corrections (Ahlstrand, 2015; Andersson, 2016). Parts of the content is handled unarticulated i.e., via sound and/or body or expressed as metaphors (Andersson, 2016; Englund & Sandström, 2015; Notér Hooshidar, 2014).

The purpose of the project is to develop knowledge about knowing that is expressed in a physical form. The questions raised aim to make visible which aspects of knowing are paid attention to in the feedback situation and to implement learning situations to help develop teaching practice. The analyses will show how the teacher adapts to different student's particular needs in feedback opportunities. As part of the design the teacher can create whole class teaching of those situations, on bounce. Here variation theory will be used as a teaching theory. Teachers and students at upper secondary school level in Gothenburg and Stockholm are participating in this practice-based project.

Illuminating shadow as a light phenomenon in preschool reading activities

Author: Anna Backman

University of Gothenburg, Sweden

Keywords: children's perspectives, children's literature, picturebook, preschool, shadow

The purpose of this study is to shed light on children's discernment of aspects from an unplanned learning object in conversations based on reading picturebooks in preschool. The research question is: What is made possible for children to discern of shadow as a light phenomenon when it spontaneously arises as a learning object in reading activities? This is studied based on what five-year-olds in words and actions express discernment of when it comes to the light phenomenon of shadow. The variation theory analysis (Marton, 2015) shows *visibility* as a dimension of variation, which makes it possible for the children to discern shadow as a light phenomenon. The analysis also highlights other aspects of shadow as a light phenomenon, *length* and *location* of

shadows, depicted and introduced but without variation. When length and location do not vary, they do not become discernible to the children, despite the fact that explanations for them are sought by the teacher and the children in the reading activities. This result provides a basis for discussing children's possible discernments that could be opened with systematic variation in spontaneous and planned exploratory reading activities.

Parallel sessions IV

Room A:

Career experts' conceptions of innovation in career development

Author: Jaana Kettunen

Finnish Institute for Educational Research, University of Jyväskylä, Finland

Keywords: Career development · Innovation · Phenomenography

This presentation reports the findings from a phenomenographic investigation into career experts' conceptions of innovation in career development. The results show that conceptions of innovation in career development varied from (1) initiating service, (2) developing demographic-based programmes, (3) professionalising the sector to (4) exploiting cross-sectoral synergies. The findings give us a more profound understanding of critical aspects that may have an important role in improving innovation in career development.

A Phenomenographic investigation into students' conceptions of independent digital learning

Author: Sanela Lazarevski

Leeds Beckett University

Keywords: digital learning, digital learning environment, computing, affordances

Digital learning is now a vital learning model in adult higher education. Although digital technology is a growing trend in higher education, more research is necessary to understand the perceived role of digital technology in student independent digital learning. In addition, adult learners face more challenges related to digital learning, given that the affordances of digital technology and digital materials is not yet fully apparent (Berthelsen and Tannert, 2020). This research explored the qualitative variation of students' experience of independent digital learning of undergraduate computing courses. A sample of 21 voluntary participants from four different courses at the School of Computing Science at Leeds Beckett University, from all undergraduate levels, participated in this research. Semi-structured interviews were used to collect data on the experience of students conducting newly completed assessments with research assignments on the type of computing modules.

The analysis found that there are four different ways for students to experiment with digital learning: (A) Interacting – students experience digital learning as equivalent to interacting with digital technology, (B) Negotiating – digital learning is experienced as a negotiated learning that is dependent upon digital technology, (C) Internalising – digital learning is internalised by students as personalised directed learning, and (D) Self-Determination – digital learning is seen as a the path of personal development.

Structural and referential aspects were presented by mapping the variations that constitute a framework, within which one aspect is the perceived role of digital technology for independent digital learning and how students go about digital learning, may be understood. As result of this research provides a more comprehensive understanding, compared to the current understanding on the ways students experience digital learning during their independents learning, when studying on their own using digital learning environments.

A phenomenographic analysis of the variation of HE academic's experience of designing MOOCs

Author: Xiaoxia Wang, Julie-Ann Sime

Department of Educational Research, Lancaster University, Department of Learning and Teaching Enhancement, Edinburgh Napier University

Keywords: Phenomenography, HE academic experience, designing MOOCs, perception

Research literatures show that there is very limited research in HE (higher education) academics' experience of designing courses especially in online context. MOOCs (massive open online courses) emerged as a new online teaching form has attracted a lot of interests from HE providers and researchers, but there is hardly any published research about HE academics' experience of designing MOOCs. This paper aims to fill this research gap through a phenomenographic study of the UK (United Kingdom) HE academics' experience of designing MOOCs to gain understanding of the possible variations of their understanding of and approaches to designing MOOCs. In this research project, twenty-two UK HE academics from six universities who have experience of designing MOOCs were interviewed. The phenomenographic data analysis revealed five categories of HE academics' perceptions of designing MOOCs. This paper presents the revealed outcome space from the data analysis and discusses each category of description and the internal structure between the categories. The research results could inform course designers and MOOC development stakeholders as well as provide insight to researchers in this research area.

Room B:

Symposium: From learning study towards intervention studies as a means of comparing ways of handling the object of learning in different forms of teaching.

Åke Ingerman, Ulf Ryberg, Jenny Svanteson Wester, Ahoo Shokraiefard
University of Gothenburg, Sweden

This symposium concerns results that aims to move beyond learning study as a format for developing teaching and learning for a specific object of learning. The ambition is to move towards small-scale classroom studies, that retains the sharp focus on the object of learning. Studies that on the one hand frames lesson designs that have been developed through learning study as more stable interventions that may be distinctly compared, and on the other hand may

allow consideration and comparison of different forms of teaching, given similar ways of handling the same lesson content in terms of critical aspects.

The three contributions intertwine previous threads of research: the research approach learning study; small-group discussions as teaching form; small-scale intervention studies in classroom contexts. The first contribution focuses on learning study and the potential of small-group discussions as a form of teaching, while the second contribution focuses small-scale classroom study as a step towards scaling up a learning study across different classrooms and schools. The third contribution draws on an ongoing project where two similar, but distinct, lesson designs are compared – one which is structured in the traditional form of whole class teaching (with elements of individual work), while the other has several integrated elements of small-group discussions. The number of participating students is relatively large and the students' knowledge with respect to the object of learning is investigated before and after teaching using a validated test instruments with appropriate focus.

Paper 1: Teaching mathematics with small-group discussions integrated in whole-class discussions

Author: Jenny Svanteson Wester

Keywords: Learning study, Variation theory, Learning opportunities, Small-group discussions, Mathematics

The aim of this study is to explore the relationship between teaching and student learning opportunities in mathematics when small-group and whole-class discussions are used during the lessons. The study draws on data from a learning study, with four cycles, about enlarging and reducing two-dimensional geometric figures. The empirical material in the study consists of ten video recorded lessons and pre- and post-tests. In total, three teachers and five classes were involved. Variation theory is used as a theoretical framework to analyze how the object of learning was handled during the lessons. The result shows that the students' learning, with respect to what was intended to be learnt, increased significantly in cycle four. A distinct difference between cycle three and four was that small-group discussions in cycle four were systematically integrated in whole-class discussions and used as a mean to explore the object of learning, rather than, as in cycle three, as a mean for students to express their understanding about the object of learning. In cycle four students' ways of experience the object of learning come to the fore in small-group discussions and were used in the subsequent whole-class discussions in a way that critical aspects were further explored and made possible to discern for all students in more explicit way.

Paper 2: Investigating validity and generalizability of small-scale intervention studies: on teaching and learning the derivative

Author: Ulf Ryberg

Keywords: derivative, intervention, learning study, generalizability

This presentation reports the result from two interrelated studies having the goal to design (Study 1) and test (Study 2) a two-lesson teaching unit. The studies were conducted in the Swedish upper secondary school and concerned the mathematical concept of derivative. In Study 1, which used learning study as research approach, three different lesson designs were implemented. The students' progression, examined through pre- and posttests, suggested that one of these designs was more beneficial for the students' learning of the derivative. However, the analysis was primarily based on qualitative interpretation. Aiming towards testing the stability of the results, two of the lesson designs were implemented once again, this time using a research design with more controlled experimental conditions. In Study 2, 83 students, with similar background to the students in the learning study, were randomized to conditions in a double treatment design. In comparison with Study 1, the test procedure was comprehensive. Furthermore, with the aim of obtaining quantitative data, the tests consisted almost exclusively of multiple-choice questions. Subsequent statistical analyses showed that the results of the studies were compatible. The design that Study 1 suggested as most beneficial generated significantly higher post-test scores also in Study 2.

Paper 3: Learning study-developed designs for negative numbers and matter in two forms of teaching - A systematic comparison of whole-class teaching and small-group discussions

Author: Åke Ingerman, Ulf Ryberg, Jenny Svanteson Wester, Aho Shokraiefard

In this presentation, we report some initial and tentative results from an ongoing project. Small-group discussions are a common form in teaching mathematics and science. Motives to use small-group discussions are often related to students' interaction when solving problems, and learning to collaborate, while the intentions of affecting students' learning about an object of learning are more unclear. With two specific objects of learning and lesson designs developed through learning study as a starting point, this project compares 1) teaching in the form of whole class (with elements of individual work) and 2) teaching in which small-group discussions focusing central aspects of the object of learning are integrated with whole-class teaching. Previous learning studies indicate that teaching design according to 1) achieves good results for students' learning with respect to the object of learning. This project tests the hypothesis whether a development in line with 2) can provide even better conditions for learning. Two studies focusing the areas of matter and negative numbers are implemented in Grades 6 and 7. In a pilot study, conducted in the spring 2022, test instruments are developed and the two lesson designs are refined, especially the small-group discussions in 2). In a main study, scheduled for the fall 2022, the effects of the two designs are compared through an alternative treatment design wherein 250 students are randomized to conditions.

Parallel sessions V

Room A:

A Phenomenographic Exploration of Nurse Practitioner Capability

Author: Martha M. Whitfield, Mike Mimirinis, Danielle Macdonald, Tracy Klein, Rosemary Wilson

Queen's University, Kingston, Canada, University of West London, UK, Washington State University, Vancouver, USA

Keywords: Capability, phenomenography, nurse practitioners, advanced practice nursing, treatment of opioid use disorder

Capability is understood as a combination of knowledge, skills, experience, and competencies applied in familiar and novel situations and can be used as an inclusive description of the key attributes of the application of expertise in nurse practitioner practice. We will use a phenomenographic approach to explore how nurse practitioners develop, experience, and understand capability in the context of an exemplar of providing treatment for opioid use disorder in primary care settings. Semi-structured interviews will be conducted with a purposive sample of 20 nurse practitioners divided between Canada and the United States. We will present preliminary findings from the study including our learning from the recruitment and interview process, and initial data analysis. Our study is the first phenomenographic exploration of the ways in which nurse practitioners in North America understand and experience the development and definition of capability in practice.

What is afforded and what is required?

Author: Hanna Knutson, Angelika Kullberg
University of Gothenburg

The current study considers the geometric topic 'similarity', and is a part of a larger project, in which, learning opportunities in textbooks for upper secondary vocational education, are investigated. Textbooks have proved to play a significant role in mathematics classrooms. It is therefore, of certain importance to examine learning opportunities in mathematics textbooks. Geometry is selected for the analysis because of its multiple roles, as an important theoretical domain, as an area of various practical use, and as a tool for perceiving other areas of mathematics. The study aims to exemplify and discuss learning opportunities, on the topic of similarity, afforded in three mathematics textbooks for vocational education. Patterns of variation, such as contrast, generalisation and fusion are explored in order to determine which aspects that are made possible to discern. Gu's et.al. (2004) theorization of teaching mathematics through variation, also informed the analysis. Tentative findings reveal major differences, both regarding the aspects that are required, when solving tasks, and to what extent these aspects are afforded through variation. Only one of the analysed textbooks, made it possible for students to experience essential aspects of the similarity concept, in the beginning of the section, and then use the discerned aspects in subsequent tasks.

Room B:

Deconstructing students' different ways to experience the writing of a bachelor's thesis

Author: Ani Henttonen, Kristina Ahlberg, Max Scheja, Margareta Westerbotn, Björn Fossum
Sophiahemmet Högskola, Sweden

Keywords: Academic writing, Bachelor's thesis, Nursing education

Writing a bachelor's thesis, (BT) in nursing education is stipulated as part of the qualifications leading to a nursing degree. While it is highly valued as a proof in mastering studies at the basic level of higher education, the exercise itself is debated, and more voices need to be heard. This study aimed at catching different ways to experience the writing among nursing students having come half-way in the writing of their BTs. Fifteen nursing students were interviewed, and the transcribed interviews were subjected to a phenomenographic analysis revealing four categories of different ways to experience the writing of a BT:

Four categories of qualitatively different ways to experience-the writing of a BT at the half way stage constitute following outcome space of variation:

A. Structure B. Comparison C. Shift D. Relation

The findings pointed towards a constitution of an academic context for the writing task. Furthermore, the result indicated a tension between merely performing the BT as a task and creating personal and shared meaning by the writing. It is therefore proposed that students would benefit from a space for formulating their learning and meaning making processes which could function as a meta cognitive device, parallel to their concrete writing endeavour.

Qualitative differences in Chinese graduates' conceptions of education

Author: Guy Durden
UCL-IOE, London, UK

This study adds to the evidence base on Chinese learners by identifying qualitative differences between Chinese graduates' conceptions of education. Results offer a framework for thinking about the development of graduate students' understanding of an important aspect of their routine experience. Conceptions were found to be composed of up to four independently variable components. The nature of the relationship between conceptions of education and of learning is exemplified in the similarities and differences noted with previously established conceptions of learning. The study offers a point of comparison for future studies of non-Chinese students' conceptions and therefore a way of identifying the 'Chineseness' of those conceptions.

Parallel sessions VI

Room A:

TEACHING “THE SAME” LESSON ABOUT SUBTRACTION TO FIRST GRADERS

Author: Maria Nord

University of Gothenburg, Sweden

Keywords: Variation theory, teaching, arithmetics

Teachers’ sharing of instructional knowledge products like lesson plans has been proposed to be powerful for students’ learning. The implementation of teaching has been advocated to be an integral part of the research, since students’ learning is affected by how teaching is enacted. This paper focuses on the teaching of a lesson planned by a group of teachers and researchers working collaboratively in a larger intervention project concerning addition and subtraction in grade 1. The aim is to identify afforded learning possibilities. This can shed light on issues in need to be addressed when teachers implement instructional products. Variation theory (Marton, 2015) was used to analyse which possibilities to learn the teaching afforded. The teaching of a model lesson and the video recordings of teaching of three lessons replicating the model lesson, are the data used in this study. The result shows differences in afforded aspects of subtraction bridging through 10 in the enacted lessons. The affordances entail qualitatively different possibilities to learn subtraction for the students. Implications for teaching interventions is that most likely more time need to be spent on theoretical issues to deepen the theory used by the teachers into a lived theory.

How do students with Autism Spectrum Disorders experience groupwork in a Higher Education context?

Author: Sophia Hutchinson

University of London

Keywords: ASDs, Groupwork, Higher education pedagogy, lived experiences, Equality.

Higher education institutions continue to be challenged by the growing number of students with Autism Spectrum Disorders (ASDs) choosing to attend university, and the need to provide a fair and reasonably adjusted learning experience that does not impair the non-traditional university student. Higher Education students with ASDs experience a higher than average discontinuation rate compared with their peers. Literature indicates students with ASDs have inherent social and communicative barriers, and will therefore experience problems in groupwork scenarios. Whilst many allude to this, little has been researched into the lived experiences of higher education students in groupwork contexts. Employing a phenomenographic methodology, students from a medium-sized UK higher education institution took part in a semi-structured interview designed to draw on a second order perspective. The purpose was to capture the variation of conceptions of groupwork in the higher education context, but also the variations in experiences. The findings indicate the need for more research into this area but also engage the voice of a marginalised group so scarcely employed in qualitative research of this kind.

Room B:

Variation in Black British students' conceptions of academic support

Author: Mike Mimirinis, Elina Wright

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Keywords: Black students, race equity, higher education, academic support, phenomenography.

Inequalities in the educational achievement of ethnically and racially minoritized students in higher education appear in a wide range of national contexts and are often attributed to structural inequalities (Richardson, 2018). In the UK, a large number of minoritised students enter higher education with lower qualifications, and, even when factors such as age and entry qualifications are controlled for, the attainment gap still exists, pointing to the role of students' experience of the curriculum or teaching and learning processes (Smith, 2017; Richardson, 2015). In this study, we shift our focus from "gaps" to a relational understanding of academic achievement with a particular focus on the role of support in the process of minoritized students navigating the higher education landscape. In particular, we explore whether the support provided by academic institutions and processes is the type, level and quality of the support expected by Black students in higher education. The study adopted a phenomenographic approach (Marton & Booth, 1997) so that variation *within* the group can be identified. Drawing on semi-structured interviews with 20 undergraduate students from various disciplines are presented and implications for the development

Identity, Power, and Legitimacy: Higher Education Instructor Conceptions of Diversity in the United States

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Keywords: conceptions, diversity, higher education

Higher education institutions around the globe have increasingly made the commitment to diversity, and instructors play an integral role in creating inclusive learning environments. Guided by sociocultural and sociopolitical perspectives on learning, this study asks: How do higher education instructors in the United States conceptualize diversity, and how do these conceptions inform curriculum and instruction? Using phenomenography and variation theory, we examined the qualitatively different ways in which instructors at minority-serving institutions in the United States conceptualize student diversity in the classroom. Data were collected through semi-structured interviews with 39 instructors, and transcripts were analyzed by four researchers with different intersections of identities and positionalities to ensure validity and reliability. Results are organized into an outcome space with specific aspects that describe the phenomenon of diversity attended to by instructors and variations within each aspect that distinguish the different conceptions. The data reveal three distinct conceptions of diversity defined by variations in five aspects: student features, ability belief, faculty role, learning environment, and legitimized membership. Overall, the results indicate that while instructors acknowledge different student features and have varying understanding for what diversity means and why it is important, some conceptions of diversity do not necessarily suggest an inclusive culture.



Collaborative sessions

One of the great things with meeting at a conference is the possibility to have deepening discussions with colleagues in the field, allowing time for new ideas to grow and find new collaborations. On Thursday afternoon during the conference, we will have a session called “Collaborative space”. The idea with this session is to provide an opportunity for just this – deepening discussions concerning both ongoing and future research projects as well as methodological issues. This can facilitate larger group discussions or allow time for small groups to collaborate.

During the Collaborative space session there will be a couple of parallel sessions with different themes. The themes can focus on methodological issues to be discussed as well as on a more specific content area.

