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Vukolov, A.

Free and open source software applications for education of TMM discipline in Bauman university

(2017) Mechanisms and Machine Science, 43, pp. 253-260.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988476243&partnerID=40&md5=54109781341c72a4e4aad39d4b248b70)

[84988476243&partnerID=40&md5=54109781341c72a4e4aad39d4b248b70](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988476243&partnerID=40&md5=54109781341c72a4e4aad39d4b248b70)

DOI: 10.1007/978-3-319-44156-6_26

AFFILIATIONS: Bauman Moscow State Technical University, Moscow, Russian Federation

ABSTRACT: According to modern tendencies, open source software conquest all areas of calculations. This paper shows only small aspect of its usage in Bauman University: tuition of "TMM" discipline. Now students are free to choose software for their tasks. Most software products that computers in Bauman are equipped with are proprietary. Rightsmanagement problems are worsening tuition process and stimulating to use free solutions instead. Several solutions, their (dis)advantages in comparison with proprietary products are explained in this paper with paying attention to specific tasks of TMM. © Springer International Publishing Switzerland 2017.

AUTHOR KEYWORDS: Bauman university; CAD; CAS · LibreCAD; Engineering; Free license; Free software; Lazarus; Mathematics; Maxima; Open source; TMM· education

DOCUMENT TYPE: Conference Paper

SOURCE: Scopus

Lehavi, Y.a b, Bagno, E.a , Eylon, B.-S.a , Mualem, R.a , Pospiech, G.c , Böhm, U.d , Krey, O.e , Karam, R.f

Classroom evidence of teachers' PCK of the interplay of physics and mathematics

(2017) Springer Proceedings in Physics, 190, pp. 95-104.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84989315298&partnerID=40&md5=cf6de3a1849a72delbd61a6237975f9f)

[84989315298&partnerID=40&md5=cf6de3a1849a72delbd61a6237975f9f](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84989315298&partnerID=40&md5=cf6de3a1849a72delbd61a6237975f9f)

DOI: 10.1007/978-3-319-44887-9_8

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Gymnasium Coswig, Dresden, Germany;

Martin Luther University Halle-Wittenberg, Halle, Germany;

University of Copenhagen, Copenhagen, Denmark

ABSTRACT: The interrelations between Physics and Mathematics caught the attention of the physics education research community. Focusing mainly on students and teachers competency, the research in physics education (PER) found that learners, at different ages and levels, lack the ability to construct the mathematical models of physical processes or to describe the physical meaning of mathematical constructs. Mathematical knowledge was also found to reflect on the quality of explanations of physical phenomena. (Clement et al. 1981; Cohen et al. 1983; Rozier and Viennot in International Journal of Science Education 13:159-170, 1991; Rebmann and Viennot 1994; Bagno et al. in Physics Education 43(1):75-82, 2007; Redish and Smith in Journal of Engineering Education 97(3):295-307, 2008; Baumert et al. 2010; Zuccarini and Michelini 2014). The approach that underlines our study adopts the view that the context of physics teaching invites investigating the interplay between physics and mathematics. This "Phys-Math" interplay is regarded as a complex two ways track by which the knowledge and understanding of physics is constructed by learners. Our multi-national group examines this subject from various perspectives: history and philosophy of science as well as its instruction in different levels from high school to university (Eylon et al. 2010; Pospiech and Matthias 2011; Lehavi et al. 2013; Pospiech et al. 2014, 2015). The present study follows our previous research in which we addressed, through interviews, the "Phys-Math" PCK of expert high school physics teachers from Israel and Germany (Lehavi et al. 2013, 2015; Pospiech et al. 2015). Here we report on a study which follows this research by analysing data collected from classes. The data was collected by videotaping physics lessons at middle school level. The videotapes were analysed, looking specifically for incidents in which Phys-Math interplay is evident. © Springer International Publishing Switzerland 2017.

DOCUMENT TYPE: Conference Paper

SOURCE: Scopus

Carneiro, V.a , Gomes, Â.a , Rangel, B.b

Proposal for a universal measurement system for school chairs and desks for children from 6 to 10 years old

(2017) Applied Ergonomics, 58, pp. 372-385.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0->

84982804419&partnerID=40&md5=cdda0341ddc39f9af1839efc3f70c9b0

DOI: 10.1016/j.apergo.2016.06.020

AFFILIATIONS: Faculdade de Engenharia da Universidade do Porto, Rua Doutor Roberto Frias s/n, Porto, Portugal;

DESIGNSTUDIO, Faculdade de Engenharia da Universidade do Porto, Rua Doutor Roberto Frias s/n, Porto, Portugal

ABSTRACT: In a primary education classroom of any country, children of the same age have very different statures, reaching variations of 200 mm (Gonçalves, 2012). However, the school furniture provided is not suitable or adaptable to these differences. Designing school furniture able to respond to these variations is, therefore, a challenge for ergonomics and design in a global market. It is clearly not viable for industries to adapt productions for each country. When competitiveness and limitation of resources are essential for the viability of any product it becomes essential to find a universal system adapted to the requisites of any country. Taking as prescription measure the popliteal height obtained from the data of different countries, a universal measurement system for the school chair and desk set is proposed, combining the ellipse methodology used by Molenbroek et al. (2003) and the (mis)match equations mentioned by Castellucci et al. (2014b). From the results obtained, it can be concluded that only 5 sizes are needed to implement this new measurement system of evolutionary school furniture for the primary education classroom. © 2016 Elsevier Ltd

AUTHOR KEYWORDS: Children; School furniture; Universal measurement system

DOCUMENT TYPE: Article

SOURCE: Scopus

Greca, I.M.a , de Ataíde, A.R.P.b

The influence of epistemic views about the relationship between physics and mathematics in understanding physics concepts and problem solving

(2017) Springer Proceedings in Physics, 190, pp. 55-64.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0->

84989327831&partnerID=40&md5=11ab89fc6c4628c673ca75d9d25408ea

DOI: 10.1007/978-3-319-44887-9_5

AFFILIATIONS: Department of Specific Didactics, Faculty of Education, University of Burgos, c/Villadiego s/n, Burgos, Spain;

Department of Physics, Federal University of Paraiba, Campina Grande, Brazil

ABSTRACT: From all the difficulties students have while trying to understand physics, the ones with mathematics are of the more remarkable, at least for physics teachers. Although the problem is explicit, its solution becomes complex due to the lack of clarity about the characteristics of the relationship between maths and physics. If for the teacher these relationships are unclear, it is probable that their students will not realize their character and assume a naive attitude, believing that knowing the equation and how to resolve it will result in success in solving physics problems, forgetting the conceptual part. We investigated how these relationships were perceived by two consecutive groups of undergraduate students in a physics degree that educate high school physics teachers and how this way of understanding is reflected in their conceptual learning and their attitudes when they are asked to resolve problems of thermodynamics. We will discuss how their perceptions would influence their teaching in middle school. © Springer International Publishing Switzerland 2017.

DOCUMENT TYPE: Conference Paper

SOURCE: Scopus

Bringula, R.P., Alvarez, J.N., Evangelista, M.A., So, R.B.

Learner-interface interactions with mobile-Assisted learning in mathematics: Effects on and relationship with mathematics performance

(2017) International Journal of Mobile and Blended Learning, 9 (1), pp. 34-48.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0->

84989220469&partnerID=40&md5=115de081a4db057a90ed0d7f5f16997d

DOI: 10.4018/IJMBL.2017010103

AFFILIATIONS: University of the East, Manila, Philippines

ABSTRACT: This study attempted to determine the effects on mathematics performance of learner-interface interaction with mobile-Assisted learning in mathematics. It also determined the relationship between these interactions and students' mathematics performance. It revealed that students solved more complex problems as they went through the intervention period, and that they solved more than 50% of the problems correctly. Participants had little prior knowledge of linear equations. However, after the intervention period, students achieved a normalized class learning gain of 41%, which was higher than the 30% minimum. Testing of difference between means confirmed that the difference between posttest and pretest scores was significant. Most of the skill sets were correlated with time used in solving linear equations. Moreover, identifying equivalent mathematical expressions required all three forms of learner-interaction, for students to become familiar with this skill. Recommendations future studies are presented.

AUTHOR KEYWORDS: Engagement; Equation Sensei; Learning Gain; Mobile Learning; Prior Knowledge; Self-Regulated Learning

DOCUMENT TYPE: Article

SOURCE: Scopus

International Conference Group on Physics Teaching, GIREP EPEC 2015

(2017) Springer Proceedings in Physics, 190, pp. 1-229.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84989329047&partnerID=40&md5=dd94f1b943dbcb041e82d51309bdece7)

[84989329047&partnerID=40&md5=dd94f1b943dbcb041e82d51309bdece7](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84989329047&partnerID=40&md5=dd94f1b943dbcb041e82d51309bdece7)

ABSTRACT: The proceedings contain 18 papers. The special focus in this conference is on Towards Shaping Key Competences, Educational Research, Classroom Ideas and Teaching-Learning Practice. The topics include: Role of key competences in physics teaching and learning; competence and understanding-a personal perspective; analysing the competency of mathematical modelling in physics; introduction of current scientific results to education: experiences from the case of liquid crystals; eyetracking in research on physics education; preliminary data analysis of SSQ-HOPE questionnaire; representational issues in teaching ideas about matter; dynamic visualizations of multi-body physics problems and scientific reasoning ability; hydrogels in the classroom; electronic properties of graphene and a learning path for undergraduate students.

DOCUMENT TYPE: Conference Review

SOURCE: Scopus

Shiwakoti, N.a , Tay, R.b , Stasinopoulos, P.a , Woolley, P.J.a

Likely behaviours of passengers under emergency evacuation in train station

(2017) Safety Science, 91, pp. 40-48.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84979210400&partnerID=40&md5=7364e6e7810f71eba4a2a7de3d9bf0b5)

[84979210400&partnerID=40&md5=7364e6e7810f71eba4a2a7de3d9bf0b5](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84979210400&partnerID=40&md5=7364e6e7810f71eba4a2a7de3d9bf0b5)

DOI: 10.1016/j.ssci.2016.07.017

AFFILIATIONS: School of Aerospace, Mechanical and Manufacturing Engineering, RMIT University, Carlton, Victoria, Australia;

School of Business, IT & Logistics, RMIT University, Melbourne, Victoria, Australia

ABSTRACT: This paper explores the likely behaviours of train passengers in an emergency evacuation and examines four crucial theoretical issues on the passengers' evacuation, including reactive vs. proactive behaviours, cooperative vs. competitive behaviours, symmetry breaking, and route/exit choice. A survey of 1134 train passengers shows that respondents are not homogeneous in their likely behaviours. Overall, they are more likely to be reactive (e.g., wait for instruction from station staff) than proactive (e.g., move to exit) in an emergency situation. We also find that people are more likely to be cooperative (e.g., helping other people) than competitive (e.g., push other passengers). Although passengers are likely to show herding or symmetry breaking behaviour (e.g., following other passengers) than symmetric behaviour (e.g., choose least crowded exit), the degree of symmetry breaking behaviour is not as high as assumed in previous mathematical models. They are also unlikely to use escalators, lifts and train tunnels in their exit/route choice during an emergency escape. In terms of demographic differences in behaviours, results from the ordered logit models demonstrate that there are significant differences in the evacuation behaviours between males and females but not among the different age groups. Besides providing valuable information for developing mathematical models intended to simulate passengers' evacuation in a train station, our

findings can assist managers of emergency response in developing appropriate strategies and training, and in designing solutions and education campaigns for effective evacuation. © 2016 Elsevier Ltd

AUTHOR KEYWORDS: Crowd dynamics; Gender differences; Pedestrians; Route choice; Safety; Underground train station

DOCUMENT TYPE: Article

SOURCE: Scopus

Gresham, K.C.a , Palma, C.b , Polsgrove, D.E.c , Chun, F.K.c , Della-Rose, D.J.c , Tippetts, R.D.c

Education and outreach using the falcon telescope network

(2016) Acta Astronautica, 129, pp. 130-134.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84987974286&partnerID=40&md5=eaff1ebc1fa10dff0127bab34b1e8c7d)

[84987974286&partnerID=40&md5=eaff1ebc1fa10dff0127bab34b1e8c7d](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84987974286&partnerID=40&md5=eaff1ebc1fa10dff0127bab34b1e8c7d)

DOI: 10.1016/j.actaastro.2016.09.006

AFFILIATIONS: Universities Space Research Association, United States Air Force

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ABSTRACT: The Falcon Telescope Network (FTN) is a global network of small aperture telescopes developed by the Center for Space Situational Awareness Research in the Department of Physics at the United States Air Force Academy (USAFA). Consisting of commercially available equipment, the FTN is a collaborative effort between USAFA and other educational institutions ranging from two- and four-year colleges to major research universities. USAFA provides the equipment (e.g. telescope, mount, camera, filter wheel, dome, weather station, computers and storage devices) while the educational partners provide the building and infrastructure to support an observatory. The user base includes USAFA along with K-12 and higher education faculty and students. The diversity of the users implies a wide variety of observing interests, and thus the FTN collects images on diverse objects, including satellites, galactic and extragalactic objects, and objects popular for education and public outreach. The raw imagery, all in the public domain, will be accessible to FTN partners and will be archived at USAFA. Currently, there are five Falcon telescopes installed, two in Colorado and one each in Pennsylvania, Chile, and Australia. These five telescopes are in various stages of operational capability but all are remotely operable via a remote desktop application. The FTN team has conducted STEM First Light Projects for three of the U.S. observatories, soliciting proposals from middle and high school students and teachers that suggest and then become what is observed as official STEM first-light objects. Students and teachers learn how to write and submit a proposal as well as how telescopes operate and take data, while university-level students at the U.S. Air Force Academy and The Pennsylvania State University learn how to evaluate proposals and provide feedback to the middle and high school students and teachers. In this paper, we present the current status of the FTN, details of and lessons learned from the STEM First Light Project, and feedback from middle and high school students and teachers. © 2016 IAA.

DOCUMENT TYPE: Article

SOURCE: Scopus

Barrett, T.J., Hegarty, M.

Effects of interface and spatial ability on manipulation of virtual models in a STEM domain

(2016) Computers in Human Behavior, 65, pp. 220-231.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84984629793&partnerID=40&md5=f8303ae83bdfef88dddf7cb54b606e)

[84984629793&partnerID=40&md5=f8303ae83bdfef88dddf7cb54b606e](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84984629793&partnerID=40&md5=f8303ae83bdfef88dddf7cb54b606e)

DOI: 10.1016/j.chb.2016.06.026

AFFILIATIONS: Department of Psychological and Brain Sciences, University of California, Santa Barbara, United States

ABSTRACT: Virtual models are increasingly employed in STEM education to foster learning about spatial phenomena. However, the roles of the computer interface and students' cognitive abilities in moderating learning and performance with virtual models are not yet well understood. In two experiments students solved spatial organic chemistry problems using a virtual model system. Two aspects of the virtual model interface were manipulated: display dimensionality (stereoscopic vs. monoscopic displays) and the

location of the hand-held device used to manipulate the virtual molecules (co-located with the visual display vs. displaced). The experimental task required participants to interpret the spatial structure of organic molecules and to manipulate the models to align them with orientations and configurations depicted by diagrams in Experiment 1 and three-dimensional models in Experiment 2. Co-locating the interaction device with the virtual image led to better performance in both experiments and stereoscopic viewing led to better performance in Experiment 2. The effect of co-location on performance was moderated by spatial ability in Experiment 1, and the effect of providing stereo viewing was moderated by spatial ability in Experiment 2. The results are in line with the ability-as-compensator hypothesis: participants with lower ability uniquely benefited from the treatment, while those with higher ability were not affected by stereo or co-location. The findings suggest that increased fidelity in a virtual model system may be one way of alleviating difficulties of low-spatial participants in learning spatially demanding content in STEM domains. © 2016 Elsevier Ltd
AUTHOR KEYWORDS: Chemistry education; Interface design; Molecular models; Spatial ability; Stereo; Virtual environments
DOCUMENT TYPE: Article
SOURCE: Scopus

Sitorus, J.a b , Masrayatia c
Students' creative thinking process stages: Implementation of realistic mathematics education
(2016) Thinking Skills and Creativity, 22, pp. 111-120.
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988662546&partnerID=40&md5=b4e411d5d2c434c23c4863b53db1dad6>

DOI: 10.1016/j.tsc.2016.09.007

AFFILIATIONS: State University of MedanNorth Sumatra Province, Indonesia;
Research & Development Department of North Sumatra Province, Indonesia;
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ABSTRACT: The study aims at finding the students' cognitive knowledge in each creative thinking process stage by implementing Realistic Mathematics Education (RME) based on the perspective theory. This type of research is qualitative with grounded theory approach, which is conducted in several steps, namely research initiation; data collection; data analysis; synthesis and research generation; and theory validation. The result shows that the creative thinking process by implementing RME occur within 5 stages: orientation, preparation, incubation, illumination, and verification. Students' cognitive knowledge at orientation stage are reading and understanding the contextual problem and searching information from contextual problems. At the preparation stage, the students do activities such as collecting data and information; representing/manipulating contextual problems into mathematics objects; and formulating model/strategies. At the incubation stage, the students obtain cognitive knowledge by rereading and understanding preparation stage process; recalling prior knowledge and learning experiences; imagining the connection of each mathematic objects, and bringing out rudimentary mathematics ideas. At the illumination stage, students analyze part of mathematic ideas and synthesize them; finding the main mathematics ideas; connecting mathematics ideas with others, and solving the contextual problems. At verification stage, students verify mathematics solutions; revise invalid mathematics idea, and find innovative mathematics solutions. © 2016 Elsevier Ltd
AUTHOR KEYWORDS: Illumination; Incubation; Orientation; Preparation; Verification
DOCUMENT TYPE: Article
SOURCE: Scopus

Pilegard, C.a , Fiorella, L.b
Helping students help themselves: Generative learning strategies improve middle school students' self-regulation in a cognitive tutor
(2016) Computers in Human Behavior, 65, pp. 121-126.
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84989252448&partnerID=40&md5=94ee0ee077266ffbef54c4a9216213e>

DOI: 10.1016/j.chb.2016.08.020

AFFILIATIONS: University of California, Riverside, United States;
University of Georgia, United States

ABSTRACT: The current study investigated whether prompting students to engage in generative learning strategies improves students' subsequent judgments of learning and

self-regulation. Seventy-eight middle school students in a pre-algebra class completed worksheets in between problem-solving sessions in a computer-based cognitive tutor. Some students were prompted to engage in a generative learning strategy (i.e., writing a summary or writing an explanation for a peer) followed by a judgment of learning (generative group), whereas other students were only asked to make a judgment of learning (control group). Results indicated non-significant levels of judgment accuracy in both groups; however, students in the generative group showed better-calibrated help-seeking behaviors when solving subsequent problems in the tutor. These results suggest that self-regulation can improve in the absence of accurate learning judgments, and that generative learning strategies can facilitate such an improvement. This may be especially true for younger students, who generally demonstrate lower metacognitive awareness. © 2016 Elsevier Ltd

AUTHOR KEYWORDS: Learning judgments; Learning strategies; Metacognition; Self-regulation

DOCUMENT TYPE: Article

SOURCE: Scopus

Lomibao, L.S.

Enhancing mathematics teachers' quality through Lesson Study

(2016) SpringerPlus, 5 (1), art. no. 1590, .

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84987899163&partnerID=40&md5=87932a88babf60e7d6b615b9e718e4b4)

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DOI: 10.1186/s40064-016-3215-0

AFFILIATIONS: Department of Mathematics Education, College of Policy Studies, Education and Management, Mindanao University of Science and Technology, Claro M. Recto Avenue, Lapan, Cagayan de Oro City, Misamis Oriental, Philippines

ABSTRACT: The efficiency and effectivity of the learning experience is dependent on the teacher quality, thus, enhancing teacher's quality is vital in improving the students learning outcome. Since, the usual top-down one-shot cascading model practice for teachers' professional development in Philippines has been observed to have much information dilution, and the Southeast Asian Ministers of Education Organization demanded the need to develop mathematics teachers' quality standards through the Southeast Asia Regional Standards for Mathematics Teachers (SEARS-MT), thus, an intensive, ongoing professional development model should be provided to teachers. This study was undertaken to determine the impact of Lesson Study on Bulua National High School mathematics teachers' quality level in terms of SEARS-MT dimensions. A mixed method of quantitative-qualitative research design was employed. Results of the analysis revealed that Lesson Study effectively enhanced mathematics teachers' quality and promoted teachers professional development. Teachers positively perceived Lesson Study to be beneficial for them to become a better mathematics teacher. © 2016, The Author(s).

AUTHOR KEYWORDS: Lesson Study; Mathematics teachers' quality; Teachers' professional development

DOCUMENT TYPE: Article

SOURCE: Scopus

English, D.a , Umbach, P.D.b

Graduate school choice: An examination of individual and institutional effects

(2016) Review of Higher Education, 39 (2), pp. 173-211.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84949571191&partnerID=40&md5=469272b6b7d1382e3a861c82bcbcd4ea)

[84949571191&partnerID=40&md5=469272b6b7d1382e3a861c82bcbcd4ea](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84949571191&partnerID=40&md5=469272b6b7d1382e3a861c82bcbcd4ea)

AFFILIATIONS: University of North Carolina School of the Arts, University of North Carolina School of the Arts, 1533 S. Main St, Winston-Salem, NC, United States; Department of Educational Leadership, Policy and Human Development, North Carolina State University, United States

ABSTRACT: Using the 2000/01 Baccalaureate & Beyond Longitudinal Study (B&B:00/01), this paper employs multilevel modeling to test a conceptual model of graduate school choice that draws significantly from human capital theory while incorporating the salient concepts of cultural and social capital. The model posits that the graduate school choice process is comprised of three nested phases. First, an individual develops an aspiration for graduate-level education; next, the student submits applications to graduate schools, and thirdly, the student enrolls in a graduate program. Dependent students who obtained high undergraduate grade point averages majored in the humanities, social or behavioral sciences, mathematics, or life and physical sciences, and attended a master's or doctoral

institution were most likely to aspire to, apply for, and enroll in graduate school. This study also found that, when controlling for all other variables in the models, Hispanic students are more likely to aspire to and apply for graduate school, and African-American students are more likely to aspire to, apply for, and enroll in graduate school than white students. A key variable of interest, undergraduate indebtedness, does not affect graduate school choice when accounting for all other variables in the model. © 2015 Association for the Study of Higher Education. All Rights Reserved.

DOCUMENT TYPE: Article

SOURCE: Scopus

Wang, C., Yuan, Y., Huang, L.

Base communication model of IP covert timing channels

(2016) *Frontiers of Computer Science*, 10 (6), pp. 1130-1141.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84978656516&partnerID=40&md5=84b961c60550fd849a4784b5d7aa8ca3)

[84978656516&partnerID=40&md5=84b961c60550fd849a4784b5d7aa8ca3](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84978656516&partnerID=40&md5=84b961c60550fd849a4784b5d7aa8ca3)

DOI: 10.1007/s11704-016-5089-2

AFFILIATIONS: School of Computer Science and Communication Engineering, Jiangsu University, Zhenjiang, China

ABSTRACT: IP covert timing channel (IPCTC) is an unconventional communication channel which attaches time information to the packets of an overt channel as messages carriers, e.g., using different inter-packet delays to transmit messages in a packet-switched network. Although the IPCTCs have many different communication methods, based on the concept of time, we categorized the base communication model of the IPCTCs into three types and then utilized the signal processing theory to build their mathematical models. As a result, the basic characteristics of the IPCTCs' base model were formally derived. Hence, the characteristics of any IPCTC can be derived from the base models that consist of the IPCTC. Furthermore, a set of approaches was devised to implement the base model of the IPCTCs in a TCP/IP network. Experimental results show the correctness of the proposed base model of the IPCTCs in this paper. © 2016, Higher Education Press and Springer-Verlag Berlin Heidelberg.

AUTHOR KEYWORDS: bandwidth; base communication model; error rate; network timing channel; stealthiness

DOCUMENT TYPE: Article

SOURCE: Scopus

Johnson, S.a , Strauss, V.b , Gilmore, C.c , Jaekel, J.d e f , Marlow, N.g , Wolke, D.f

Learning disabilities among extremely preterm children without neurosensory impairment:

Comorbidity, neuropsychological profiles and scholastic outcomes

(2016) *Early Human Development*, 103, pp. 69-75.

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[84981203377&partnerID=40&md5=f3c73c939da2a5ee06e44fa6dc8dec49](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84981203377&partnerID=40&md5=f3c73c939da2a5ee06e44fa6dc8dec49)

DOI: 10.1016/j.earlhumdev.2016.07.009

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Institute for Women's Health, University College London, 74 Huntley Street, WC1E 6AU, London, United Kingdom

ABSTRACT: Background Children born extremely preterm are at high risk for intellectual disability, learning disabilities, executive dysfunction and special educational needs, but little is understood about the comorbidity of intellectual and learning disabilities in this population. Aims This study explored comorbidity in intellectual disability (ID) and learning disabilities (LD) in children born extremely preterm (EP; < 26+ 0 weeks'

gestation). Subjects and study design A UK national cohort of 161 EP children and 153 term-born controls without neurosensory impairments was assessed at 11 years of age (the EPICure Study). Outcome measures IQ, mathematics and reading attainment, executive function, visuospatial processing and sensorimotor skills were assessed using standardised tests, and curriculum-based attainment and special educational needs (SEN) using teacher reports. Results Overall, 75 (47%) EP children and 7 (4.6%) controls had ID or LD (RR 10.12; 95% CI 4.81, 21.27). Comorbidity in ID/LD was more common among EP children than controls (24% vs. 0%). EP children with comorbid ID/LD had significantly poorer neuropsychological abilities and curriculum-based attainment than EP children with an isolated disability or no disabilities. LD were associated with a 3 times increased risk for SEN. However, EP children with ID alone had poorer neuropsychological abilities and curriculum-based attainment than children with no disabilities, yet there was no increase in SEN provision among this group. Conclusions EP children are at high risk for comorbid intellectual and learning disabilities. Education professionals should be aware of the complex nature of EP children's difficulties and the need for multi-domain assessments to guide intervention. © 2016 Elsevier Ireland Ltd

AUTHOR KEYWORDS: Academic attainment; Extremely preterm; Learning disabilities; Mathematics; Reading; Special educational needs

DOCUMENT TYPE: Article

SOURCE: Scopus

Sadollahi, A.a , Mokhlesin, M.a , Maddah, M.b , Kasbi, F.a , Salmani, M.a , Ghorbani, R.c
Comparison of working memory in normal and dyslexia children in semnan primary schools
(2016) Koomesh, 17 (2), pp. 433-438.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84951181830&partnerID=40&md5=e7ed54716f48bd11241e7bda0350a8da)

[84951181830&partnerID=40&md5=e7ed54716f48bd11241e7bda0350a8da](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84951181830&partnerID=40&md5=e7ed54716f48bd11241e7bda0350a8da)

AFFILIATIONS: Neuromuscular Rehabilitation Research Center, Semnan University of Medical Sciences, Semnan, Iran;

Dep of speech and language pathology, Semnan University of Medical science, semnan, Iran;
Research Center of Phsyiology and Research Center for Social Determinants of Health,
Department of Community Medicine, Semnan University of Medical Sciences, Semnan, Iran

ABSTRACT: Working memory is the capacity to store and control information for a short period of time. This memory is closely related to reading and other academic skills such as spelling, comprehension and mathematics. This study aimed to compare working memory in normal versus dyslexic children. Materials and methods: This was a descriptive-analytic study. Dyslexic group included 30 children randomly selected from the Learning Disability Center of Semnan Department of Education. The control group consisted of 60 primary school students without any academic failure and intellectual problems. Phonological working memories such as; Word Recall, Digits Recall and Non-word Repetition were used for assessments. Results: The experimental and control groups were not different in two factors of age ($P=0.880$) and sex ($P=0.552$). Control group scores in word recall, digits recall (forward), and non-word repetition tasks were highly dominated ($P < 0.001$) over dyslexic children. Conclusion: The findings showed that children with dyslexia have lower performance in subtests of phonological working memory. This study indicates the need to raise the awareness of teachers and speech and language therapists to plan designing and implementing educational and interventional programs based on activities related to the working memory for children with dyslexia and other learning disabilities. © 2015, Singapore Medical Association. All rights reserved.

AUTHOR KEYWORDS: Child; Dyslexia; Working Memory

DOCUMENT TYPE: Article

SOURCE: Scopus

Asamoah-Boaheng, M.a , Sam, E.K.b

Morphological characterization of breeds of sheep: a discriminant analysis approach
(2016) SpringerPlus, 5 (1), art. no. 69, pp. 1-12.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84955463276&partnerID=40&md5=b2e01617aafead5c2c32f18b45afebc2)

[84955463276&partnerID=40&md5=b2e01617aafead5c2c32f18b45afebc2](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84955463276&partnerID=40&md5=b2e01617aafead5c2c32f18b45afebc2)

DOI: 10.1186/s40064-016-1669-8

AFFILIATIONS: Institute of Research, Innovation and Development (IRID), Kumasi Polytechnic, Box 854, Kumasi, Ghana;

Department of Mathematics, Kwame Nkrumah University of Science and Technology, P.M.B., KNUST, Kumasi, Ghana

ABSTRACT: In this study the characterisation and separation/discrimination of three sheep breeds (crosses, West African Dwarfs (WAD) and West African Long Legged (WALL)] based on their physical traits (morphological characterisation) was investigated extensively with the application of discriminant analysis. The study's main objective was specifically based on developing a variable selection criterion that can discriminate best among the three sheep breeds and as well as obtain a reliable mathematical function/equation (discriminant functions) for provision of maximum separation among the three known sheep breeds. Data from College of Education, Mampong animal farms on various breeds of sheep (hybrid/crossed breed, Sahell/WALL and Djallonke/WAD) was used. Factor Analysis was employed as a variable selection criterion for selecting six sheep traits that can discriminate best among the sheep breeds. Canonical discriminant function was derived for the eight variable data set and was compared with the derived quadratic discriminant functions (QDFs) using the six extracted sheep traits. The six variable QDF distance classifier provided maximum separation after cross validation than the 8-variable canonical discriminant functions. The derived mathematical functions (QDFs) were able to provide maximum separation among the three known sheep breeds with a correct classification rate of 0.86. © 2016, Asamoah-Boaheng and Sam.

AUTHOR KEYWORDS: Discriminant analysis; Morphological characterisation; Quadratic discriminant functions; Sheep breeds

DOCUMENT TYPE: Article

SOURCE: Scopus

Rodríguez-Jiménez, J.M., Cordero, P., Enciso, M., Mora, A.

Data mining algorithms to compute mixed concepts with negative attributes: an application to breast cancer data analysis

(2016) *Mathematical Methods in the Applied Sciences*, 39 (16), pp. 4829-4845. Cited 2 times.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84954285390&partnerID=40&md5=fb155973dcd55e13950ec8d875be18e5)

[84954285390&partnerID=40&md5=fb155973dcd55e13950ec8d875be18e5](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84954285390&partnerID=40&md5=fb155973dcd55e13950ec8d875be18e5)

DOI: 10.1002/mma.3814

AFFILIATIONS: Universidad de Málaga, Andalucía Tech, Boulevard Louis Pasteur SN, Málaga, Spain

ABSTRACT: In the design of mathematical methods for a medical problem, one of the kernel issues is the identification of symptoms and measures that could help in the diagnosis. Discovering connections among them constitute a big challenge because it allows to reduce the number of parameters to be considered in the mathematical model. In this work, we focus on formal concept analysis as a very promising technique to address this problem. In previous works, we have studied the use of formal concept analysis to manage attribute implications. In this work, we propose to extend the knowledge that we can extract from every context using positive and negative information, which constitutes an open problem. Based on the main classical algorithms, we propose new methods to generate the lattice concept with positive and negative information to be used as a kind of map of attribute connections. We also compare them in an experiment built with datasets from the UCI repository for machine learning. We finally apply the mining techniques to extract the knowledge contained in a real data set containing information about patients suffering breast cancer. The result obtained have been contrasted with medical scientists to illustrate the benefits of our proposal. Copyright © 2016 John Wiley & Sons, Ltd. Copyright © 2016 John Wiley & Sons, Ltd.

AUTHOR KEYWORDS: formal concept analysis; knowledge discovery; medical issues; negative attributes

DOCUMENT TYPE: Conference Paper

SOURCE: Scopus

Hainey, T., Connolly, T.M., Boyle, E.A., Wilson, A., Razak, A.

A systematic literature review of games-based learning empirical evidence in primary education

(2016) *Computers and Education*, 102, pp. 202-223.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84987971233&partnerID=40&md5=3c33456de511a08ceb423f9560ef3991)

[84987971233&partnerID=40&md5=3c33456de511a08ceb423f9560ef3991](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84987971233&partnerID=40&md5=3c33456de511a08ceb423f9560ef3991)

DOI: 10.1016/j.compedu.2016.09.001

AFFILIATIONS: University of the West of Scotland, United Kingdom

ABSTRACT: Games-based Learning (GBL) has developed a reputation with educationalists it is perceived as a potentially engaging form of supplementary learning that could enhance

the educational process and has been used at all levels of education including primary, secondary and tertiary education. Despite this recognition and utilisation there is still a lack of empirical evidence supporting GBL as an approach. This paper presents the findings of a systematic literature review performed from 2000 to 2013 specifically looking at quality empirical studies associated with the application of GBL in Primary Education (PE) categorising studies into: behavioural change, affective and motivational outcomes, perceptual and cognitive skills and knowledge acquisition and content understanding. This paper presents a synthesis of these high quality studies associated with GBL. The studies showed that GBL have been used to teach a variety of subjects to children and young people in PE with mathematics, science, language and social studies being the most popular. However, the analysis shows that more Randomised Controlled Trial (RCT) studies should be performed comparing GBL to traditional teaching approaches to ascertain if GBL is a useful, viable teaching approach at PE level; there is a distinct lack of longitudinal studies and further longitudinal studies are required; further studies are required looking at whether there are pedagogical benefits of using 2D or 3D games at PE level to assess if 3D immersive games are indeed necessary; further studies are also required to perform comparisons between single and collaborative play and to identify the pedagogical benefits. © 2016 Elsevier Ltd

AUTHOR KEYWORDS: Empirical evidence; Games-based learning; Serious games; Systematic literature review

DOCUMENT TYPE: Article

SOURCE: Scopus

Vandercruysse, S.a b , Ter Vrugte, J.c , De Jong, T.c , Wouters, P.d , Van Oostendorp, H.d , Verschaffel, L.a , Moeyaert, M.e , Elen, J.a

The effectiveness of a math game: The impact of integrating conceptual clarification as support

(2016) Computers in Human Behavior, 64, pp. 21-33.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84975746883&partnerID=40&md5=05208ed182a0eab5f1720e456adb6e9a)

[84975746883&partnerID=40&md5=05208ed182a0eab5f1720e456adb6e9a](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84975746883&partnerID=40&md5=05208ed182a0eab5f1720e456adb6e9a)

DOI: 10.1016/j.chb.2016.06.004

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Faculty of Psychology and Educational Sciences, Ku Leuven Kulak, Mailbox 7654, Etienne Sabbelaan 53, Kortrijk, Belgium;

Department of Instructional Technology, Faculty of Behavioral Sciences, University of Twente, Enschede, Netherlands;

Department of Information and Computing Sciences, Utrecht University, Utrecht, Netherlands;

Department of Educational Psychology and Methodology, State University of New York, 1400, Washington Avenue, Albany, NY, United States

ABSTRACT: This study investigates the impact of integrating conceptual clarifications as support in an educational math game, and explores the impact of adding this (internal vs. external) support on students' game and mathematical performance, intrinsic motivation, and game perception. Three conditions are established: a condition in which internal support is offered, a condition in which (identical) external support is offered, and a control condition in which no support is added to the game. One hundred twenty-two vocational secondary education students participated in this study. The results of this study indicate that students benefit from playing with an educational game in order to enhance their proportional reasoning skills. Adding conceptual clarifications as instructional support in an intrinsically integrated game is not recommended. If the support is given to the students anyhow, it is advised to offer it externally because internally integrating this support leads to a decrease in performance and motivation. Hence, not only support as such, but also the way it is integrated in the game-based learning process, might be decisive for its effectivity. Obviously, further research is warranted in order to replicate these findings also for other types of support, other game-based learning environments and other target groups. © 2016 Elsevier Ltd. All rights reserved.

AUTHOR KEYWORDS: Conceptual clarification; Educational game; Instructional support; Vocational education

DOCUMENT TYPE: Article

SOURCE: Scopus

Jakubowski, M.a , Patrinos, H.A.b , Porta, E.E.c , Wiśniewski, J.d

The effects of delaying tracking in secondary school: evidence from the 1999 education reform in Poland

(2016) Education Economics, 24 (6), pp. 557-572.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84959213362&partnerID=40&md5=19e2a422b13a68871c8cb107bda49e8c)

[84959213362&partnerID=40&md5=19e2a422b13a68871c8cb107bda49e8c](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84959213362&partnerID=40&md5=19e2a422b13a68871c8cb107bda49e8c)

DOI: 10.1080/09645292.2016.1149548

AFFILIATIONS: Faculty of Economic Sciences, Warsaw University, Warsaw, Poland;

Education, World Bank, Washington, DC, United States;

Analitica LLC, Miami, FL, United States;

Ministry of National Education, Warsaw, Poland

ABSTRACT: Delaying tracking, extending students' exposure to a general academic education and increasing their time on task on basic competences (reading, mathematics) could improve academic outcomes. To test the hypothesis that delayed vocational streaming improves academic outcomes, this paper analyzes Poland's significant improvements in international achievement tests and the restructuring of the system which expanded general schooling. Estimates using propensity-score matching and difference-in-differences estimates show that delaying vocational education and increasing time on task have a positive and significant impact on student performance on the order of a standard deviation. © 2016 International Bank for Reconstruction and Development/The World Bank.

Published by Taylor & Francis.

AUTHOR KEYWORDS: student performance; time on task; Tracking

DOCUMENT TYPE: Article

SOURCE: Scopus

Savelsbergh, E.R.a , Prins, G.T.a , Rietbergen, C.b , Fechner, S.a c , Vaessen, B.E.a d , Draijer, J.M.a , Bakker, A.a

Effects of innovative science and mathematics teaching on student attitudes and achievement: A meta-analytic study

(2016) Educational Research Review, 19, pp. 158-172.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84984832889&partnerID=40&md5=abfc5323f97caf33abe784b72858f764)

[84984832889&partnerID=40&md5=abfc5323f97caf33abe784b72858f764](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84984832889&partnerID=40&md5=abfc5323f97caf33abe784b72858f764)

DOI: 10.1016/j.edurev.2016.07.003

AFFILIATIONS: Freudenthal Institute, Utrecht University, Netherlands;

Faculty of Social and Behavioral Science, Utrecht University, Netherlands;

University of Paderborn, Germany;

Eindhoven University of Technology, Netherlands

ABSTRACT: Many teaching approaches have been tried to improve student attitudes and achievement in science and mathematics education. Achievement effects have been synthesized, but a systematic overview of attitude effects is missing. This study provides a meta analytic review based on 56 publications (1988-2014), reporting 65 independent experiments that investigated the effects of teaching approaches on student attitudes in primary or secondary science or mathematics education. Five types of teaching approaches were distinguished: inquiry-based, context-based, computer-based, collaborative learning strategies, and extra-curricular activities. Since many different attitude outcomes were distinguished and attitudes were assessed at different levels of granularity, we did separate analyses for specific and more global outcomes. Outcomes were not significantly different for different educational approaches. When taking all interventions together, significant effects were found for General Attitude ($n = 60$; $d = 0.35$), General Interest ($n = 20$; $d = 0.22$), and Career Interest in Science ($n = 4$; $d = 0.40$). The effects were significantly weaker for studies with older students. Analysis of achievement outcomes yielded a significant and large overall effect ($n = 40$; $d = 0.78$), again with no significant differences between teaching approaches. Although the positive effects might be partly due to novelty, the current findings do counter skepticism about the learning outcomes of interest-oriented teaching approaches. © 2016 The Authors

AUTHOR KEYWORDS: Attitude; Interest; Mathematics education; Meta-analysis; Motivation; Science education; Teaching approach

DOCUMENT TYPE: Article

SOURCE: Scopus

Azigwe, J.B.a , Kyriakides, L.b , Panayiotou, A.b , Creemers, B.P.M.c

The impact of effective teaching characteristics in promoting student achievement in Ghana

(2016) International Journal of Educational Development, 51, pp. 51-61.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-44982281289&partnerID=40&md5=4b71715478677fcf6d652a9540b22254)

[44982281289&partnerID=40&md5=4b71715478677fcf6d652a9540b22254](https://www.scopus.com/inward/record.uri?eid=2-s2.0-44982281289&partnerID=40&md5=4b71715478677fcf6d652a9540b22254)

DOI: 10.1016/j.ijedudev.2016.07.004

AFFILIATIONS: Department of Marketing, Bolgatanga Polytechnic, Ghana;

Department of Education, University of Cyprus, P. O. Box 20537, Nicosia, Cyprus;

Faculty of Behavioural and Social Sciences, Department of Pedagogy & Educational Science, Groningen, Netherlands

ABSTRACT: This paper investigates the extent to which teacher behaviour in classroom affects student achievement gains in mathematics in Ghana. A representative sample of primary schools from three districts of the Upper East Region of Ghana was selected (n = 73) using stage sampling procedure, and written tests in mathematics were administered to all grade six students at the beginning and end of school year 2013-2014. Two observation instruments and a student questionnaire were used in collecting data on quality of teaching. Multilevel analyses revealed that teacher factors are associated with student learning outcomes. Implications for promoting quality in education are drawn. © 2016 Elsevier Ltd

AUTHOR KEYWORDS: Academic achievement; Educational research; Elementary education; Multilevel modeling; Teacher effectiveness; Teaching methods

DOCUMENT TYPE: Article

SOURCE: Scopus

Kafyulilo, A.a , Fisser, P.b , Voogt, J.c

Factors affecting teachers' continuation of technology use in teaching

(2016) Education and Information Technologies, 21 (6), pp. 1535-1554.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84929120585&partnerID=40&md5=9642708e029b12f8f10924925cd7f71d)

[84929120585&partnerID=40&md5=9642708e029b12f8f10924925cd7f71d](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84929120585&partnerID=40&md5=9642708e029b12f8f10924925cd7f71d)

DOI: 10.1007/s10639-015-9398-0

AFFILIATIONS: Department of Curriculum and Teaching, Dar Es Salaam University College of Education, P O Box 2329, Dar-es-Salaam, Tanzania;

National Institute for Curriculum Development, PO Box 2041, Enschede, Netherlands;

Department of Child Development and Education, University of Amsterdam, Windesheim University, PO Box 15776, Amsterdam, Netherlands

ABSTRACT: This study was conducted to investigate the continuation of technology use in science and mathematics teaching of the teachers who attended a professional development program between 2010 and 2012. Continuation of technology use was hypothesized to be affected by the professional development program and by personal, institutional, and technological factors. Twelve teachers and three school leaders participated in the study. Data was collected through interviews. Findings showed that the continuation of technology use differed for the teachers involved in the professional development program. While all teachers reported to have gained knowledge and skills through the professional development program and were positive about technology use in education, only some teachers continued the use of technology. The data revealed that despite the challenges that all teachers in the sample encountered when using technology in their teaching (such as large classrooms, problems with electricity supply, lack of time and lack of technology tools), the encouragement of school management was a critical factor in teachers' continuation of technology use. Implications of the findings are discussed. © 2015, The Author(s).

AUTHOR KEYWORDS: Enabling and hindering factors; Interview; Secondary education; Tanzania; Technology use

DOCUMENT TYPE: Article

SOURCE: Scopus

Gilbert, M.C.

Relating aspects of motivation to facets of mathematical competence varying in cognitive demand

(2016) Journal of Educational Research, 109 (6), pp. 647-657.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84976416482&partnerID=40&md5=51592307bb487438fb4b120309c773aa)

[84976416482&partnerID=40&md5=51592307bb487438fb4b120309c773aa](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84976416482&partnerID=40&md5=51592307bb487438fb4b120309c773aa)

DOI: 10.1080/00220671.2015.1020912

AFFILIATIONS: Stanford Center for Opportunity Policy in Education, Stanford University, Stanford, CA, United States

ABSTRACT: The author investigated the relationship between aspects of student motivation and performance on mathematical tasks varying in cognitive demand relevant to meeting the expectations of the Common Core State Standards for Mathematics (CCSS-M). A sample of 479 primarily Latino middle school students completed established survey measures of motivation and a constructed response assessment of two facets of mathematical competence. The assessment measured students' progress toward performing a procedure and demonstrating understanding by providing a written critique of a peer's work, a more cognitively demanding facet. As predicted, higher interest and efficacy in mathematics, lower performance-avoidance goals, and fewer experiences of negative emotions related to performance levels for both facets, while utility and mastery-approach goals (i.e., focusing on understanding mathematics) related only to the more cognitively demanding facet. Implications of these findings for preparing students to be successful mathematical learners, especially in the many states implementing the CCSS-M, are discussed. © 2016 Taylor & Francis.

AUTHOR KEYWORDS: Common Core State Standards; mathematics education; motivation

DOCUMENT TYPE: Article

SOURCE: Scopus

DeJarnette, A.F.

Students' discourse when working in pairs with Etoys in an eighth-grade mathematics class (2016) *Language and Education*, 30 (6), pp. 485-499.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0->

84958522997&partnerID=40&md5=54889616b1d78ba885f185905275ae94

DOI: 10.1080/09500782.2016.1141934

AFFILIATIONS: School of Education, 511H Teachers College, University of Cincinnati, Cincinnati, OH, United States

ABSTRACT: I examined students' discourse while working in pairs at the computer in an eighth-grade mathematics class to understand how students kept track of the people and things they discussed. I found that students most often referenced themselves and objects within the environment, through references to shared knowledge and the representations on the computer screen. Through these references, students communicated themselves as agents doing mathematical work situated through the use of the programming environment. This study contributes to articulating the complexity of students' mathematical discourse when they work with peers, using technology, for doing mathematics. © 2016 Informa UK Limited, trading as Taylor & Francis Group.

AUTHOR KEYWORDS: collaboration; discourse; Mathematics education; systemic functional linguistics; technology

DOCUMENT TYPE: Article

SOURCE: Scopus

Bengo, P.

Secondary mathematics coaching: The components of effective mathematics coaching and implications

(2016) *Teaching and Teacher Education*, 60, pp. 88-96.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0->

84982234150&partnerID=40&md5=3d0536524290843a40f4c1c8c90c5b6f

DOI: 10.1016/j.tate.2016.07.027

AFFILIATIONS: Department of Curriculum, Teaching and Learning, Ontario Institute for Studies in Education, University of Toronto (OISE/UT), 252 Bloor Street West, Toronto, Ontario, Canada

ABSTRACT: Mathematics coaching, which can be defined broadly as job-embedded learning for mathematics teachers with someone who can help, is being used in Canada to improve teaching practice and increase student achievement. Mathematics coaching research is quite new with little written on the components of effective coaching. The paper attempts to contribute to this research. Employing observations, interviews, archival data, and surveys, the study finds that time, trust, the coaches' backgrounds, and their courage in trying new initiatives may be elements of effective coaching. Effective coaching also required resources and was differentiated. Mathematics coaching improved teacher practices. © 2016 Elsevier Ltd

AUTHOR KEYWORDS: Coaching (performance); Mathematics education; Professional development

DOCUMENT TYPE: Article

SOURCE: Scopus

Martin-Gonzalez, A., Chi-Poot, A., Uc-Cetina, V.

Usability evaluation of an augmented reality system for teaching Euclidean vectors
(2016) *Innovations in Education and Teaching International*, 53 (6), pp. 627-636.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0->

84946866439&partnerID=40&md5=23f8c261828d59246a479d11e4e9237c

DOI: 10.1080/14703297.2015.1108856

AFFILIATIONS: Facultad de Matemáticas, Universidad Autónoma de Yucatán, Merida, Mexico

ABSTRACT: Augmented reality (AR) is one of the emerging technologies that has demonstrated to be an efficient technological tool to enhance learning techniques. In this paper, we describe the development and evaluation of an AR system for teaching Euclidean vectors in physics and mathematics. The goal of this pedagogical tool is to facilitate user's understanding of physical concepts, such as magnitude, direction and orientation, together with basic vector-related operations like addition, subtraction and cross product. The result of the system usability scale showed our system's usability and learnability. The system merges a real-world scenario with virtual elements controlled with a practical body-interactive interface. © 2015 Informa UK Limited, trading as Taylor & Francis Group.

AUTHOR KEYWORDS: augmented reality; Educational technology; interactive learning environments; mathematics education; system usability scale

DOCUMENT TYPE: Article

SOURCE: Scopus

Meroni, E.C.a , Abbiati, G.b

How do students react to longer instruction time? Evidence from Italy†

(2016) *Education Economics*, 24 (6), pp. 592-611.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0->

84954567286&partnerID=40&md5=9c14ac011d69d21779b219ffa942d710

DOI: 10.1080/09645292.2015.1122742

AFFILIATIONS: European Commission, Joint Research Centre, Via Fermi, Ispra, Italy;

FBK - IRVAPP, Via Dalla Piccola, Trento, Italy

ABSTRACT: This paper investigates the effects on achievement, study behaviours and attitudes of an intervention providing extra instruction time in language and in mathematics in lower secondary schools in Southern Italy. We use a difference-in-differences strategy and compare two contiguous cohorts of students enrolled in the same class for two consecutive years. We find that an average increase of 25% in instruction time leads to an increase in 0.12 sd in mathematics test score for both females and males, while no effect is found on Italian language test scores. Cross-disciplinary effects seem to suggest that extra-classes in mathematics are beneficial for girls also for language scores. The pattern of results found on attitudes and self-reported study behaviours suggests that girls use the extra instruction time as a complement to regular home study, while boys may use it as a substitute. © 2016 European Union. Published by Taylor & Francis.

AUTHOR KEYWORDS: Education policy; gender differences; instruction time; policy evaluation

DOCUMENT TYPE: Article

SOURCE: Scopus

Johansen, V.a b , Somby, H.M.c

Does the "Pupil Enterprise Programme" Influence Grades Among Pupils With Special Needs?

(2016) *Scandinavian Journal of Educational Research*, 60 (6), pp. 736-745.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0->

84946615705&partnerID=40&md5=2ac4da5d7811a7d6aeec92c6470dc09

DOI: 10.1080/00313831.2015.1085894

AFFILIATIONS: Group for welfare research, Eastern Norway Research Institute, Lillehammer, Norway;

Norwegian Centre for Child Research, Norwegian University of Science and Technology, Trondheim, Norway;

Department of Pedagogics, Lillehammer University College, Lillehammer, Norway

ABSTRACT: This paper asks whether the Pupil Enterprise Programme (PEP) is a suitable working method for improving academic performance among pupils with special needs.

Overall, 20% of pupils participate in PEP at some point during lower secondary school.

Results from multilevel regression modelling indicate that pupils with special needs who have participated in PEP attain better grades in Written Norwegian and Mathematics than those pupils with special needs who did not participate in PEP. The difference between PEP participants and non-participants in Written English was insignificant. The positive results for Norwegian and Mathematics seem to be related to the organisation and content of PEP. The data are from a study of 1,880 pupils in the 10th Grade. © 2015 The Author(s). Published by Taylor & Francis.

AUTHOR KEYWORDS: grades; lower secondary school; Pupil Enterprise Programme; Special education

DOCUMENT TYPE: Article

SOURCE: Scopus

Martinie, S.L.a , Kim, J.-H.a b , Abernathy, D.a

"Better to be a pessimist": A narrative inquiry into mathematics teachers' experience of the transition to the Common Core

(2016) Journal of Educational Research, 109 (6), pp. 658-665.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84976433553&partnerID=40&md5=823f355b01285c84bd0ba63e188958dd)

[84976433553&partnerID=40&md5=823f355b01285c84bd0ba63e188958dd](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84976433553&partnerID=40&md5=823f355b01285c84bd0ba63e188958dd)

DOI: 10.1080/00220671.2015.1020913

AFFILIATIONS: Curriculum and Instruction, Kansas State University, Manhattan, KS, United States;

Texas Tech University, United States

ABSTRACT: The Common Core State Standards (CCSS) are a focus of state education policy today influencing curriculum implementation and assessment in public schools. The purpose of this narrative inquiry is to understand how high school mathematics teachers experience the transition period. Based on interviews with mathematics teachers in a high school in the Midwest, we aim at bringing teachers' voices to the forefront. Through teachers' stories, we find that: a) Teachers live in the different zones of enactment; and b) Teachers' ecological view of agency should be used as a link to a transition to the CCSS for creating a genuine dialogue. This article is significant in two ways. First, it informs the administrators and policy makers of how there will be inconsistencies across states, districts, schools and classrooms in the implementation and assessment, and second, it helps to explain the need for new professional development approaches. © 2016 Taylor & Francis.

AUTHOR KEYWORDS: Common Core Standards for Mathematics; narrative analysis; teacher agency; zone of enactment

DOCUMENT TYPE: Article

SOURCE: Scopus

Averill, R.a , Drake, M.a , Anderson, D.a , Anthony, G.b

The use of questions within in-the-moment coaching in initial mathematics teacher education: enhancing participation, reflection, and co-construction in rehearsals of practice

(2016) Asia-Pacific Journal of Teacher Education, 44 (5), pp. 486-503. Cited 1 time.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84964066354&partnerID=40&md5=2c2f54dd7ae1ee09d2f7d686161fea01)

[84964066354&partnerID=40&md5=2c2f54dd7ae1ee09d2f7d686161fea01](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84964066354&partnerID=40&md5=2c2f54dd7ae1ee09d2f7d686161fea01)

DOI: 10.1080/1359866X.2016.1169503

AFFILIATIONS: School of Education, Victoria University of Wellington (Te Whare Wānanga o Te Ūpoko o te Ika a Māui), Te Whare Wānanga o Te Ūpoko o te Ika a Māui, Wellington, New Zealand;

Institute of Education, Massey University, Te Kunenga ki Pūrehuroa, Palmerston North, New Zealand

ABSTRACT: Managing mathematical discussion is known to be challenging for novice teachers. Coaching within student teacher rehearsals of teaching has been shown to develop mathematics teaching practice, but can be time consuming. To examine how coaching using questions could assist novice teachers to promote mathematical thinking and discussions within time-constrained programmes, videos of rehearsals, reflective debriefs, and student teacher surveys were collected across a range of courses over 4 years. Findings included that student teacher roles in rehearsals were enhanced through coaching with questions and co-construction was enabled. Coaching questions exposed effective practice, particularly in relation to orchestrating mathematical discussion, enabling student teachers to reflect, discuss, make decisions, and immediately trial teaching strategies. Questions appeared to lengthen rehearsals but improved their

effectiveness through enhancing participation and enabling co-construction of meaning. Findings indicate that questions used in coaching of rehearsals inform and empower novice teachers, essential factors within initial teacher education for equitable and ambitious mathematics teaching. © 2016 Australian Teacher Education Association.

AUTHOR KEYWORDS: coaching; equity; instructional practices; Mathematics teacher education

DOCUMENT TYPE: Article

SOURCE: Scopus

Little, J., Anderson, J.

What factors support or inhibit secondary mathematics pre-service teachers' implementation of problem-solving tasks during professional experience?

(2016) Asia-Pacific Journal of Teacher Education, 44 (5), pp. 504-521.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84948187312&partnerID=40&md5=62931ed4c6d5ade30f9f3b789bf2e28e)

[84948187312&partnerID=40&md5=62931ed4c6d5ade30f9f3b789bf2e28e](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84948187312&partnerID=40&md5=62931ed4c6d5ade30f9f3b789bf2e28e)

DOI: 10.1080/1359866X.2015.1115822

AFFILIATIONS: Faculty of Education and Social Work, The University of Sydney, Sydney, Australia

ABSTRACT: There is an acknowledged gap between the theory presented in university preparation programmes and the reality of classroom practice that has resulted in many secondary mathematics pre-service teachers failing to implement university-endorsed teaching strategies. Using responses to a questionnaire and interviews, this qualitative study examined the factors that support or inhibit secondary mathematics pre-service teachers' implementation of problem-solving tasks during professional experience. The results showed that even though the majority of pre-service teachers reported having beliefs compatible with using problem-solving tasks, the secondary students' ability, preparation time, and the cooperating teacher were key factors that inhibited pre-service teachers' implementation of problem-solving tasks. It is recommended that pre-service teachers regularly visit classrooms to observe the evolving implementation of problem-solving approaches. Furthermore, cooperating teachers should be required to attend professional development before the professional experience so they understand the goals of the university preparation programme and have the requisite skills and knowledge to support the implementation of problem-solving tasks in learning mathematics. © 2015 Australian Teacher Education Association.

AUTHOR KEYWORDS: Beliefs; cooperating teacher; pre-service; problem solving; professional experience; secondary mathematics; theory-practice

DOCUMENT TYPE: Article

SOURCE: Scopus

Armour, D., Warren, E., Miller, J.

Working together: strategies that support cross-cultural engagement of Indigenous teacher assistants working in Indigenous contexts

(2016) Asia-Pacific Journal of Teacher Education, 44 (5), pp. 421-435.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84952773237&partnerID=40&md5=a22f8e7b791726a4cb649d0a466a34ee)

[84952773237&partnerID=40&md5=a22f8e7b791726a4cb649d0a466a34ee](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84952773237&partnerID=40&md5=a22f8e7b791726a4cb649d0a466a34ee)

DOI: 10.1080/1359866X.2015.1127324

AFFILIATIONS: Faculty of Education and Arts, Australian Catholic University, Brisbane, Australia

ABSTRACT: Indigenous teacher assistants (ITAs) are often employed in schools to assist in addressing educational issues relating to Indigenous students. While, this practice has occurred for over 40 years in most Australian states, little has been written about their contribution in assisting Indigenous students to learn. This paper explores the influence of a large longitudinal research project (Representations Oral Language and Engagement in Mathematics) with respect to the role of ITAs in supporting Indigenous students' to learn mathematics. Data are collected from the perspectives of ITAs, teachers and school principals. In particular, the research proposes that including ITAs in high stakes professional learning, not only changes their confidence and contribution in the classrooms but also allows them and their students to begin to "walk" between the two knowledge worlds, Indigenous knowledge and Western knowledge. © 2015 Australian Teacher Education Association.

AUTHOR KEYWORDS: effective partnerships; Indigenous students; Indigenous teaching assistants; mathematics; two-way learning

DOCUMENT TYPE: Article

SOURCE: Scopus

Palmér, H.

Professional primary school teacher identity development: a pursuit in line with an unexpressed image

(2016) *Teacher Development*, 20 (5), pp. 682-700.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0->

84978655787&partnerID=40&md5=e2747772e51fa6381efefddelfced1af

DOI: 10.1080/13664530.2016.1202311

AFFILIATIONS: Mathematics Education, Linnaeus University, Vejdes Plats 7, Växjö, Sweden

ABSTRACT: The results presented in this article are taken from a case study of novice primary school mathematics teachers' professional identity development from the perspective of the teachers themselves. The empirical material was collected through self-recordings, observations and interviews. The results show how the professional identity development of these novice teachers becomes a pursuit in line with their image of a primary school teacher. To develop a sense of themselves as primary school teachers they need to establish their own criteria - individual (including graduation and personal knowledge) and social (the ability to work in one school, have colleagues and have a class of their own for which they do the planning and teaching). These criteria are shown to be both a precondition for and a part of professional identity development. The novice teachers' image of what it means to be a primary school teacher directs their actions and becomes the goal of their professional identity development. Because of its high impact, student and novice teachers' image of primary school teachers ought to be made visible in both teacher education and teacher induction. © 2016 *Teacher Development*.

AUTHOR KEYWORDS: novice teachers; primary school teacher; professional identity development

DOCUMENT TYPE: Article

SOURCE: Scopus

Yiğit Koyunkaya, M.

Mathematics education graduate students' understanding of trigonometric ratios

(2016) *International Journal of Mathematical Education in Science and Technology*, 47 (7), pp. 1028-1047.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0->

84961203295&partnerID=40&md5=d794f5ac050677020a4bbb1e46213270

DOI: 10.1080/0020739X.2016.1155774

AFFILIATIONS: Department of Secondary Science and Mathematics Education, Buca Education Faculty, Dokuz Eylül University, Cahit Arf Building, #327, Buca, İzmir, Turkey

ABSTRACT: This study describes mathematics education graduate students' understanding of relationships between sine and cosine of two base angles in a right triangle. To explore students' understanding of these relationships, an elaboration of Skemp's views of instrumental and relational understanding using Tall and Vinner's concept image and concept definition was developed. Nine students volunteered to complete three paper and pencil tasks designed to elicit evidence of understanding and three students among these nine students volunteered for semi-structured interviews. As a result of fine-grained analysis of the students' responses to the tasks, the evidence of concept image and concept definition as well as instrumental and relational understanding of trigonometric ratios was found. The unit circle and a right triangle were identified as students' concept images, and the mnemonic was determined as their concept definition for trigonometry, specifically for trigonometric ratios. It is also suggested that students had instrumental understanding of trigonometric ratios while they were less flexible to act on trigonometric ratio tasks and had limited relational understanding. Additionally, the results indicate that graduate students' understanding of the concept of angle mediated their understanding of trigonometry, specifically trigonometric ratios. © 2016 Taylor & Francis.

AUTHOR KEYWORDS: concept image and concept definition; instrumental and relational understanding angles; trigonometric ratios; Trigonometry

DOCUMENT TYPE: Article

SOURCE: Scopus

Dündar, S.a , Temel, H.b , Gündüz, N.a

Development of a mathematical ability test: a validity and reliability study

(2016) International Journal of Mathematical Education in Science and Technology, 47 (7), pp. 1061-1075.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84965028252&partnerID=40&md5=851e9d3d6584cc4a2bc8db442bf27130>

DOI: 10.1080/0020739X.2016.1153734

AFFILIATIONS: Department of Primary Mathematics Education, Abant Izzet Baysal University, Bolu, Turkey;

Department of Primary Mathematics Education, Çanakkale Onsekiz Mart University, Çanakkale, Turkey

ABSTRACT: The identification of talented students accurately at an early age and the adaptation of the education provided to the students depending on their abilities are of great importance for the future of the countries. In this regard, this study aims to develop a mathematical ability test for the identification of the mathematical abilities of students and the determination of the relationships between the structure of abilities and these structures. Furthermore, this study adopts test development processes. A structure consisting of the factors of quantitative ability, causal ability, inductive/deductive reasoning ability, qualitative ability and spatial ability has been obtained following this study. The fit indices of the finalized version of the mathematical ability test of 24 items indicate the suitability of the test. © 2016 Informa UK Limited, trading as Taylor & Francis Group.

AUTHOR KEYWORDS: Mathematical ability; mathematics education; secondary school students

DOCUMENT TYPE: Article

SOURCE: Scopus

Fisher, M.H.a , Royster, D.b

Mathematics teachers' support and retention: using Maslow's hierarchy to understand teachers' needs

(2016) International Journal of Mathematical Education in Science and Technology, 47 (7), pp. 993-1008.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84961627592&partnerID=40&md5=29312180caa96affeb4509f34b198206>

DOI: 10.1080/0020739X.2016.1162333

AFFILIATIONS: Department of STEM Education, University of Kentucky, Lexington, KY, United States;

Department of Mathematics, University of Kentucky, Lexington, KY, United States

ABSTRACT: As part of a larger study, four mathematics teachers from diverse backgrounds and teaching situations report their ideas on teacher stress, mathematics teacher retention, and their feelings about the needs of mathematics teachers, as well as other information crucial to retaining quality teachers. The responses from the participants were used to develop a hierarchy of teachers' needs that resembles Maslow's hierarchy, which can be used to better support teachers in various stages of their careers. The interviews revealed both non content-specific and content-specific needs within the hierarchy. The responses show that teachers found different schools foster different stress levels and that as teachers they used a number of resources for reducing stress. Other mathematics-specific ideas are also discussed such as the amount of content and pedagogy courses required for certification. © 2016 Informa UK Limited, trading as Taylor & Francis Group.

AUTHOR KEYWORDS: Maslow's hierarchy; mathematics education; qualitative research;

Teacher retention

DOCUMENT TYPE: Article

SOURCE: Scopus

Kontorovich, I.

Response to Mahmood and Mahmood (2015)

(2016) International Journal of Mathematical Education in Science and Technology, 47 (7), p. 1135.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84969776546&partnerID=40&md5=523a729c2820f43679e3aa0e0c1d101d>

DOI: 10.1080/0020739X.2016.1185543

AFFILIATIONS: Department of Mathematics, The University of Auckland, Auckland, New Zealand

ABSTRACT: In the article published in the International Journal of Mathematics Education in Science and Technology in 2015, Mahmood and Mahmood suggested an explanation for defining $0!$ as 1. In this response, I argue that their reasoning is flawed. © 2016 Informa UK Limited, trading as Taylor & Francis Group.

AUTHOR KEYWORDS: Concept definitions; factorial; Sandwich theorem

DOCUMENT TYPE: Letter

SOURCE: Scopus

Swanson, L.H., Coddington, L.R.

Creating partnerships between teachers & undergraduates interested in secondary math & science education

(2016) Teaching and Teacher Education, 59, pp. 285-294.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84978997868&partnerID=40&md5=75f0856668ea62606f24e7d0672ceb7e)

[84978997868&partnerID=40&md5=75f0856668ea62606f24e7d0672ceb7e](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84978997868&partnerID=40&md5=75f0856668ea62606f24e7d0672ceb7e)

DOI: 10.1016/j.tate.2016.06.008

AFFILIATIONS: Whittier College, Whittier, CA, United States

ABSTRACT: During a yearlong program experience, high school teachers and college undergraduates formed three content area partnerships in which they co-planned and implemented lessons aligned to newly adopted math and science content standards.

Participants' within-program experiences and the mentorship that occurred in their developing content area partnerships were explored. Findings suggested that both the high school teachers and undergraduates engaged in mentoring relationships that prompted two-way reflection and colearning. The content area partnerships formed were sustained yet flexible, represented accountability through shared goals, exhibited mutual and equitable sharing, and were transformative as evidenced by practice and identity. © 2016 Elsevier Ltd

AUTHOR KEYWORDS: Communities of practice; Mathematics education; Mentoring; Science education

DOCUMENT TYPE: Article

SOURCE: Scopus

Headley, M.G., Swoboda, C.M., Foote, L.

What's missing in longitudinal studies conducted in the U.S. with implications for mathematics education?

(2016) International Journal of Research and Method in Education, 39 (4), pp. 383-400.

Cited 1 time.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84966697338&partnerID=40&md5=3dceb79a0d464dc9458787b276bf5b68)

[84966697338&partnerID=40&md5=3dceb79a0d464dc9458787b276bf5b68](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84966697338&partnerID=40&md5=3dceb79a0d464dc9458787b276bf5b68)

DOI: 10.1080/1743727X.2016.1184245

AFFILIATIONS: College of Education, Criminal Justice, and Human Services, Educational Studies, University of Cincinnati, Cincinnati, OH, United States

ABSTRACT: 'What works' policies are the latest incarnation of best practices in educational research. Instituted by various organisations internationally, they define what kind of research counts as 'evidence' for reform-oriented decision-making. While some countries rely on systematic analyses and meta-analyses, the U.S. favours primary quantitative longitudinal research designs as evidence. Critics claim that institutionalising methods will distort educational research. This commentary discusses these two concerns about the research designs favoured in the American 'what works' milieu: missing research and missing data. To explore whether those concerns are warranted, we focus on mathematics education, a national priority in the U.S. After establishing enduring questions in mathematics education, we provide primers on quantitative longitudinal research designs and the analysis of missing data due to attrition. Then, we address these questions about the state of research: As a research community, are we missing research with implications for mathematics education? Are we missing data with implications for the inferences that can be made? This review of research questions and analyses in recent studies suggests missing data poses a greater threat than missing research. Finally, we make recommendations for minimising the risk of missing evidence that will be of interest to international educational researchers in any discipline. © 2016 Informa UK Limited, trading as Taylor & Francis Group.

AUTHOR KEYWORDS: Longitudinal design; mathematics education; missing data; research policy

DOCUMENT TYPE: Article

SOURCE: Scopus

Sørensen, L.B.a , Damsgaard, C.T.a , Petersen, R.A.a , Dalskov, S.-M.a , Hjorth, M.F.a ,
Dyssegaard, C.B.b , Egelund, N.b , Tetens, I.c , Astrup, A.a , Lauritzen, L.a ,
Michaelsen, K.F.a

Differences in the effects of school meals on children's cognitive performance according
to gender, household education and baseline reading skills

(2016) European Journal of Clinical Nutrition, 70 (10), pp. 1155-1161.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0->

84974851799&partnerID=40&md5=b545a680027ae988c0a0ca7aa179b74e

DOI: 10.1038/ejcn.2016.99

AFFILIATIONS: Department of Nutrition, Exercise and Sports, Faculty of Science,
University of Copenhagen, Rolighedsvej 26, Frederiksberg C, Denmark;

Department of Education, Faculty of Arts, Aarhus University, Copenhagen, Denmark;

Division of Nutrition, National Food Institute, Technical University of Denmark, Søborg,
Denmark

ABSTRACT: Background/Objectives:We previously found that the OPUS School Meal Study
improved reading and increased errors related to inattention and impulsivity. This study
explored whether the cognitive effects differed according to gender, household education
and reading proficiency at baseline.Subjects/Methods:This is a cluster-randomised cross-
over trial comparing Nordic school meals with packed lunch from home (control) for 3
months each among 834 children aged 8 to 11 years. At baseline and at the end of each
dietary period, we assessed children's performance in reading, mathematics and the d2-
test of attention. Interactions were evaluated using mixed models. Analyses included 739
children.Results:At baseline, boys and children from households without academic
education were poorer readers and had a higher d2-error%. Effects on dietary intake were
similar in subgroups. However, the effect of the intervention on test outcomes was
stronger in boys, in children from households with academic education and in children
with normal/good baseline reading proficiency. Overall, this resulted in increased
socioeconomic inequality in reading performance and reduced inequality in impulsivity.
Contrary to this, the gender difference decreased in reading and increased in
impulsivity. Finally, the gap between poor and normal/good readers was increased in
reading and decreased for d2-error%.Conclusions:The effects of healthy school meals on
reading, impulsivity and inattention were modified by gender, household education and
baseline reading proficiency. The differential effects might be related to environmental
aspects of the intervention and deserves to be investigated further in future school meal
trials.

DOCUMENT TYPE: Article

SOURCE: Scopus

Wijsman, L.A.a , Warrens, M.J.b , Saab, N.c , van Driel, J.H.c , Westenberg, P.M.a

Declining trends in student performance in lower secondary education

(2016) European Journal of Psychology of Education, 31 (4), pp. 595-612.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0->

84950297954&partnerID=40&md5=e4026a54b2c07d4a5f7e5badc07f6f69

DOI: 10.1007/s10212-015-0277-2

AFFILIATIONS: Institute of Psychology, Unit Developmental and Educational Psychology,
Leiden University, Leiden, Netherlands;

GION, University of Groningen, Groningen, Netherlands;

ICLON, Leiden University, Leiden, Netherlands

ABSTRACT: Student performance is related to motivation to learn. As motivation generally
declines during lower secondary education, one might expect performance to decline as
well during this period. Though, until now, it has been unclear whether this pattern
exists. In the present study, we examined student performance during the early years of
secondary education from a developmental perspective. Participants were 1544 Dutch
secondary school students across three grades (grades 7 to 9). To investigate student
performance trends, we analysed report card grades by using hierarchical linear modelling
with two levels (level 1, time point; level 2, student). Potential moderators to be
examined were (1) gender, (2) school type and (3) initial level. A linear decline in
report card grades from grade 7 to 9 was found for boys and girls, in all school types,
and regardless of initial level. Two variables moderated the steepness of the decline:
school type and initial level. Gender and school type had a main effect on performance
level. The same pattern was observed for the subset of 'core subjects'—Dutch, English and

mathematics. Motivational and cognitive factors that may explain the performance decline are discussed. © 2015, The Author(s).

AUTHOR KEYWORDS: Adolescence; Motivation development; Report card grades; Secondary education; Student performance trends

DOCUMENT TYPE: Article

SOURCE: Scopus

De Moura, A.P.a , De Moura, A.A.F.b

Use of virtual industry and laboratory machines to teach electric circuit theory (2016) International Journal of Electrical Engineering Education, 53 (4), pp. 371-383.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84989921548&partnerID=40&md5=8fb1c4d6a78fe6a7ef66e711d1cbc22c>

DOI: 10.1177/0020720916631564

AFFILIATIONS: Federal University of Ceara, Campus Do Pici, PO Box 6001, Fortaleza Ceara, Brazil;

Federal Rural University of Semi-Arid, Department of Environmental Science and Technology, Av Francisco Mota, 572, Bairro Costa-e-Silva - Mossoró-RN, Brazil

ABSTRACT: At the beginning of Fall 2012, the new modules of the Electrical Engineering Department at the Federal University of Ceara, Technology Center, Brazil, significantly modified the instructional philosophy of the TH0 176 Electric Circuit II module. The theory course was enhanced by the introduction of more engineering designs into the curriculum, adopting the virtual industry, and laboratory machine as a methodology to teach alternating electric circuit. This paper discusses the use of this new methodology in detailed form. An example is discussed, along with mathematical models, which describes electric circuit behavior, and it helps each team of students to have a specific homework. The approach presented in this paper can be adapted to any other course in engineering/science that involves mathematical calculations. So far, the course evaluations suggest that the students are more motivated and excited about electrical engineering as a career. © The Author(s) 2016.

AUTHOR KEYWORDS: Circuit analysis; educational technology; engineering education

DOCUMENT TYPE: Review

SOURCE: Scopus

Gasteiger, H.a , Benz, C.b

Professional Competence of Early Childhood Educators in Mathematics Education—A Theory Based Competence Model [Mathematikdidaktische Kompetenz von Fachkräften im Elementarbereich – ein theoriebasiertes Kompetenzmodell]

(2016) Journal fur Mathematik-Didaktik, 37 (2), pp. 263-287.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988428953&partnerID=40&md5=d17efe2653a6cb5678e995441efc7086>

DOI: 10.1007/s13138-015-0083-z

AFFILIATIONS: Ludwig-Maximilians-Universität München, Theresienstr. 39, München, Germany; Pädagogische Hochschule Karlsruhe, Bismarckstr. 10, Karlsruhe, Germany

ABSTRACT: Early childhood mathematics education became a more significant part of mathematics education over the past years. To guarantee coherent mathematical learning in pre-school settings, pre- and inservice education of early childhood educators in mathematics education is getting more and more important. Therefore, a sound examination and an intensive discussion of professional competence of early childhood educators are necessary. So far there are several theoretical and empirical findings considering teacher competence—in mathematics education as well as from an interdisciplinary perspective. But research of childhood educators' domain-specific competencies is a quite young field of research. In order to investigate this field it can be drawn on results of research of teacher competence and of pre-school education as well as on initial empirical findings of different facets of competence of early childhood educators. Based on these results and on a theoretical analysis of the requirements of early childhood educators concerning early mathematics education, this article suggests a theory-based domain-specific model of early childhood educators' competencies for mathematics education. This model aims to inspire a discussion about necessary competencies of early childhood educators—especially in comparison to competencies of teachers, which are seen as important for their profession—and can serve to develop instruments for the investigation of these professional competencies. In further studies this model has to be analysed empirically. © 2015, GDM.

AUTHOR KEYWORDS: Competence model; Early mathematics education; Pre-school education; Professional competence
DOCUMENT TYPE: Article
SOURCE: Scopus

Delgadillo, E.M.a , Vivier, L.b c
Erratum to: Mathematical working space and paradigms as an analysis tool for the teaching and learning of analysis (ZDM Mathematics Education, 10.1007/s11858-016-0777-9) (2016) ZDM - Mathematics Education, 48 (6), p. 755.
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988358494&partnerID=40&md5=eea0a5d9b896beb14dc63c545f008d15>

DOI: 10.1007/s11858-016-0793-9
AFFILIATIONS: IMA, Pontificia Universidad Católica de Valparaíso, Valparaíso, Chile; LDAR, Université Paris Diderot, Paris, France; IMAG, Université de Montpellier, Montpellier, France
ABSTRACT: The authors very much regret that errors have slipped into their contribution to the special issue on "Mathematical working spaces in schooling". The original article was corrected. © 2016, FIZ Karlsruhe.
DOCUMENT TYPE: Erratum
SOURCE: Scopus

Gabrieli, J.D.E.
The promise of educational neuroscience: Comment on Bowers (2016) (2016) Psychological Review, 123 (5), pp. 613-619. Cited 1 time.
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988637642&partnerID=40&md5=21ace9c4779f11d22c0d3ae9d64d5ae2>

DOI: 10.1037/rev0000034
AFFILIATIONS: Department of Brain and Cognitive Sciences and McGovern Institute for Brain Research, Massachusetts Institute of Technology, 43 Vassar Street (46-4033), Cambridge, MA, United States
ABSTRACT: Bowers (2016) argues that there are practical and principled problems with how educational neuroscience may contribute to education, including lack of direct influences on teaching in the classroom. Some of the arguments made are convincing, including the critique of unsubstantiated claims about the impact of educational neuroscience and the reminder that the primary outcomes of education are behavioral, such as skill in reading or mathematics. Bowers' analysis falls short in 3 major respects. First, educational neuroscience is a basic science that has made unique contributions to basic education research; it is not part of applied classroom instruction. Second, educational neuroscience contributes to ideas about education practices and policies beyond classroom curriculum that are important for helping vulnerable students. Third, educational neuroscience studies using neuroimaging have not only revealed for the first time the brain basis of neurodevelopmental differences that have profound influences on educational outcomes, but have also identified individual brain differences that predict which students learn more or learn less from various curricula. In several cases, the brain measures significantly improved or vastly outperformed conventional behavioral measures in predicting what works for individual children. These findings indicate that educational neuroscience, at a minimum, has provided novel insights into the possibilities of individualized education for students, rather than the current practice of learning through failure that a curriculum did not support a student. In the best approach to improving education, educational neuroscience ought to contribute to basic research addressing the needs of students and teachers. © 2016 American Psychological Association.
AUTHOR KEYWORDS: Brain and education; Education; Educational neuroscience; Instruction; Mind; Neuroscience
DOCUMENT TYPE: Note
SOURCE: Scopus

An, S.A., Tillman, D.A., Zhang, M., Robertson, W., Tinajero, J.
Hispanic Preservice Teachers' Peer Evaluations of Interdisciplinary Curriculum Development: A Self-Referenced Comparison Between Monolingual Generalists and Bilingual Generalists (2016) Journal of Hispanic Higher Education, 15 (4), pp. 291-309.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84984824075&partnerID=40&md5=2cdfdf73dcf5c02c42ac93c1f82c844>

DOI: 10.1177/1538192715612912

AFFILIATIONS: The University of Texas at El Paso, United States

ABSTRACT: This study investigated preservice teachers from two teacher education programs, elementary generalists and bilingual generalists (who will teach all subjects in both English and Spanish), about their instructional design abilities via examination of their ability to integrate interdisciplinary-themed activities into mathematics lessons. The findings illustrate the value provided by differentiating teacher preparation for preservice bilingual teachers—especially for challenging STEM-related (science, technology, engineering, and mathematics) subjects such as mathematics—based on their distinctive pedagogical, cognitive, and linguistic requirements. © 2015, © The Author(s) 2015.

AUTHOR KEYWORDS: bilingual education; instructional design; peer evaluation; teacher education

DOCUMENT TYPE: Article

SOURCE: Scopus

Meletiou-Mavrotheris, M.a , Prodromou, T.b

Pre-Service Teacher Training on Game-Enhanced Mathematics Teaching and Learning (2016) Technology, Knowledge and Learning, 21 (3), pp. 379-399.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84957566957&partnerID=40&md5=a5c5051f6f807651db4090da94954177>

DOI: 10.1007/s10758-016-9275-y

AFFILIATIONS: Department of Education Sciences, School of Arts and Education Sciences, European University Cyprus, 6 Diogenous St., Engomi, Nicosia, Cyprus; Department of Mathematics Education, School of Education, University of New England, Armidale, NSW, Australia

ABSTRACT: The paper reports the main insights from a study aimed at equipping a group of pre-service teachers with the knowledge, skills, and practical experience required to effectively integrate educational games within the mathematics curriculum. An instructional intervention based on the Technological Pedagogical and Content Knowledge framework was implemented in an undergraduate mathematics methods course attended by thirteen (n = 13) prospective primary teachers. Participants experimented with different ways in which educational games could help students internalize key mathematical concepts across the primary curriculum, and were familiarized with the design principles for constructivist gaming environments. Upon completion of a unit on game-enhanced learning, they worked in small groups to develop and deliver, during their teaching placements, instructional episodes integrating the use of serious games. Findings indicate a positive impact on pre-service teachers' perceptions regarding game-based learning, and on their competence in selecting, evaluating, and productively utilizing digital games as an instructional tool. © 2016, Springer Science+Business Media Dordrecht.

AUTHOR KEYWORDS: Educational games; Game-based learning; Game-enhanced learning; Pre-service teacher training; Serious games; Teacher professional development

DOCUMENT TYPE: Article

SOURCE: Scopus

Tíjaro-Rojas, R.a b , Arce-Trigatti, A.c , Cupp, J.d , Pascal, J.a , Arce, P.E.a

A Systematic and Integrative Sequence Approach (SISA) for mastery learning: Anchoring Bloom's Revised Taxonomy to student learning

(2016) Education for Chemical Engineers, 17, pp. 31-43. Cited 1 time.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84984684788&partnerID=40&md5=3c5460c2e28f53296bddb243327f0bff>

DOI: 10.1016/j.ece.2016.06.001

AFFILIATIONS: Chemical Engineering, Tennessee Technological University, Cookeville, TN, United States;

Environmental Engineering, Universidad Arturo Prat, Iquique, Chile;

College of Education, Health, and Human Science, University of Tennessee, Knoxville, TN, United States;

Counseling and Psychology, Tennessee Technological University, Cookeville, TN, United States

ABSTRACT: In this contribution, a methodical and student-based learning sequence entitled Systematic and Integrative Sequence Approach (SISA) is introduced. Primarily utilized within STEM disciplines, SISA is inspired by instructivist and constructivist approaches to learning and ultimately seeks to help students reach mastery learning levels regarding complex concepts within these fields. By organizing and anchoring lesson plans concerning these concepts to the cognitive objectives outlined by Bloom's Revised Taxonomy (Krathwohl, 2002), SISA facilitates students' preparedness to contribute to the creation of technological developments and innovation in STEM fields. Offering an example of its application, this paper outlines how SISA has been integrated into the instruction of hydrodynamic velocity profiles in viscous flows. In addition, this effort highlights exploratory data collected from students taught by the SISA approach. Analysis of this study and implications for future work are also discussed. © 2016

AUTHOR KEYWORDS: Creativity in classroom; Innovation-driven learning; Integration of courses in engineering curricula; Integrative constructionism-instruction-based approaches; Revised Bloom Taxonomy; Team-based learning

DOCUMENT TYPE: Article

SOURCE: Scopus

Chodkiewicz, A.R.a , Boyle, C.b

Promoting positive learning in Australian students aged 10- to 12-years-old using attribution retraining and cognitive behavioral therapy: A pilot study

(2016) School Psychology International, 37 (5), pp. 519-535.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84989235039&partnerID=40&md5=87e6a7a18139aafac1ae498bed95452)

[84989235039&partnerID=40&md5=87e6a7a18139aafac1ae498bed95452](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84989235039&partnerID=40&md5=87e6a7a18139aafac1ae498bed95452)

DOI: 10.1177/0143034316667114

AFFILIATIONS: University of New England, Australia;
The University of Exeter, United Kingdom

ABSTRACT: This study piloted an intervention using attribution retraining and cognitive behavioral therapy techniques to promote positive learning experiences and outcomes for students. This research is an important step to revitalise the dwindling field of attribution retraining research by assessing whether these techniques effectively improve student learning in modern classrooms. Participants were 50 students from grades five and six (age 10- to 12-years-old). Findings revealed that students in the intervention group showed significantly greater average reading levels compared to their control group peers at two months following the intervention. Whilst no other areas measured (mathematics, spelling, and self-concept) reached the level of significance, a number of interesting patterns were observed regarding student selection, intervention focus, and the trajectory of treatment effects. These findings encourage future researchers to expand the range of students targeted by school-based interventions, supports the use of attribution techniques, and highlights that without follow-up data, lagged treatment effects may go undetected. This is one of only a handful of studies to combine attribution retraining with cognitive behavioral therapy, and the results of this pilot study support the need for further research in this area. © 2016, © The Author(s) 2016.

AUTHOR KEYWORDS: attribution retraining; attributions; cognitive behaviour therapy; educational psychology; inclusive education; positive psychology; school improvement; school psychology; special education

DOCUMENT TYPE: Article

SOURCE: Scopus

Roller, S.A.

What they notice in video: a study of prospective secondary mathematics teachers learning to teach

(2016) Journal of Mathematics Teacher Education, 19 (5), pp. 477-498.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988020160&partnerID=40&md5=f87222ae6dce236a71eb9d1f832d7352)

[84988020160&partnerID=40&md5=f87222ae6dce236a71eb9d1f832d7352](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988020160&partnerID=40&md5=f87222ae6dce236a71eb9d1f832d7352)

DOI: 10.1007/s10857-015-9307-x

AFFILIATIONS: Department of Teacher Education, Michigan State University, 620 Farm Lane, 313 Erickson Hall, East Lansing, MI, United States

ABSTRACT: Most teacher preparation programs have embraced the use of video as an effective methodology for developing teachers' noticing skills. This study focused on learning about what secondary mathematics prospective teachers (PSTs) were able to notice when viewing video of their own co-teaching, particularly in a microteaching setting that consisted of peers. PSTs documented their observations on an observation tool while re-

watching their video and then identified and ranked their top three observations. The ranked noticing statements were analyzed based on a grounded theory approach. Overall, PSTs' ranked observations were more likely to attend to students and had a strong focus on mathematics and student learning. Ranked observations equally demonstrated both broad and specific understanding of video moments and often made suggestions that something they noticed could be improved in the implementation stage, versus improvements in planning or changes in themselves. Results support PSTs' use of video for developing noticing skills in teacher education programs. © 2015, Springer Science+Business Media Dordrecht.

AUTHOR KEYWORDS: Preservice teachers; Secondary mathematics education; Teacher noticing; Teacher preparation; Video use

DOCUMENT TYPE: Article

SOURCE: Scopus

Tucker, S.I.a b , Moyer-Packenham, P.S.b , Westenskow, A.b , Jordan, K.E.b
The Complexity of the Affordance-Ability Relationship When Second-Grade Children Interact with Mathematics Virtual Manipulative Apps

(2016) *Technology, Knowledge and Learning*, 21 (3), pp. 341-360.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84957679481&partnerID=40&md5=d7294a63ec894ac4f4882d85b220f110)

[84957679481&partnerID=40&md5=d7294a63ec894ac4f4882d85b220f110](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84957679481&partnerID=40&md5=d7294a63ec894ac4f4882d85b220f110)

DOI: 10.1007/s10758-016-9276-x

AFFILIATIONS: VCU School of Education, Virginia Commonwealth University, 1015 W. Main St., Richmond, VA, United States;

The Virtual Manipulatives Research Group, Utah State University, 2605 Old Main Hill, Logan, UT, United States

ABSTRACT: The purpose of this study was to explore relationships between app affordances and user abilities in second graders' interactions with mathematics virtual manipulative touchscreen tablet apps. The research questions focused on varying manifestations of affordance-ability relationships during children's interactions with mathematics virtual manipulative touchscreen tablet apps. Researchers qualitatively analyzed video recordings and ethograms from clinical interviews of 33 second-grade children. Each 45-min clinical interview involved one child interacting with two sequences of mathematics virtual manipulative touchscreen tablet apps: one sequence focusing on place value concepts and the other sequence focusing on skip counting concepts. Results provided evidence of Moyer-Packenham and Westenskow's (*Int J Virtual Pers Learn Environ* 4(3):35-50, 2013) five affordance categories of virtual manipulatives. Approach to and degree of affordance access varied depending on a child's corresponding ability, and some children modified their affordance access as their ability changed. Results also indicated that outcomes of accessing an affordance also related to a child's ability. Context also influenced affordance access. These results imply that affordance-ability relationships are multifaceted. Overall, these results imply that is important to consider affordance-ability relationships in relation to mathematics education technology. © 2016, Springer Science+Business Media Dordrecht.

AUTHOR KEYWORDS: Affordances; Mathematics; Mobile devices; Virtual manipulatives

DOCUMENT TYPE: Article

SOURCE: Scopus

George Mwangi, C.A.a , Fries-Britt, S.b , Peralta, A.M.b , Daoud, N.b
Examining Intra-racial Dynamics and Engagement Between Native-Born and Foreign-Born Black Collegians in STEM

(2016) *Journal of Black Studies*, 47 (7), pp. 773-794.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84986538889&partnerID=40&md5=23a82573eca087a641e09d20f7b094e9)

[84986538889&partnerID=40&md5=23a82573eca087a641e09d20f7b094e9](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84986538889&partnerID=40&md5=23a82573eca087a641e09d20f7b094e9)

DOI: 10.1177/0021934716658860

AFFILIATIONS: University of Massachusetts Amherst, United States;

University of Maryland, College Park, United States

ABSTRACT: For decades, higher education research has recognized the importance of cross-cultural interaction among students. However, this body of scholarship has largely examined this phenomenon across races, with few researchers examining within race interactions. Accordingly, the purpose of this study is to examine how native-born and foreign-born Black students interact in science, technology, engineering, and mathematics (STEM) classrooms. Findings reveal that there were both similarities and differences in

how each group perceived each other, and that ultimately, cross-cultural engagement was beneficial for their academic development. © 2016, © The Author(s) 2016.

AUTHOR KEYWORDS: Black immigrants; Black students; cross-cultural; higher education; STEM

DOCUMENT TYPE: Article

SOURCE: Scopus

Kiger, J.R., Annibale, D.J.

A new method for group decision making and its application in medical trainee selection (2016) *Medical Education*, 50 (10), pp. 1045-1053.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84987837078&partnerID=40&md5=79c6faef79e6b67314fb01a10a0added)

[84987837078&partnerID=40&md5=79c6faef79e6b67314fb01a10a0added](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84987837078&partnerID=40&md5=79c6faef79e6b67314fb01a10a0added)

DOI: 10.1111/medu.13112

AFFILIATIONS: Department of Pediatrics, Medical University of South Carolina, Charleston, SC, United States

ABSTRACT: Context: The problems associated with generating a collaborative ranked preference list represent a common source of dilemma in academic medicine and medical education. Such issues present during the process of choosing among applicants to medical schools, during the selection of postgraduate trainees, and in the course of performance assessments and the prioritising of financial expenditures. Currently, most institutions use pseudo-quantitative methods, such as the averaging of scores awarded on an arbitrary scale. These methods are mathematically problematic and may not accurately reflect group opinion. Methods: The present authors developed a novel algorithm for creating a collaborative preference list that generates and sorts a matrix of pairwise comparisons between applicants or choices without placing any reliance on arbitrary Likert scale-type scores. This method achieves equality in influence across individual assessors, as well as transparency and reproducibility. The authors report a case study of their experience using this new algorithm in the 2013 neonatal-perinatal fellowship match. Results: When used by this group in the selection of fellowship trainees, the method proposed here allowed for greater efficiency and created a rank-order list that did not require reshuffling or significant debate. A survey of faculty staff and fellows showed much higher levels of satisfaction with the new algorithm and a unanimous desire to use the new algorithm in the future, in preference to a score-based system. Conclusions: The algorithm developed and described here may reduce arbitrariness in processes that require the collaborative creation of a preference list. This method may have wide applicability in medical education and training, and beyond. The present authors' experience of using this algorithm during the National Resident Matching Program match showed improved perceptions of fairness, ease of use and efficiency. © 2016 John Wiley & Sons Ltd and The Association for the Study of Medical Education

DOCUMENT TYPE: Article

SOURCE: Scopus

Gómez-Chacón, I.M.^{a.a}, Romero Albaladejo, I.M.^{a.b}, del Mar García López, M.^{a.b}
Zig-zagging in geometrical reasoning in technological collaborative environments: a
Mathematical Working Space-framed study concerning cognition and affect
(2016) *ZDM - Mathematics Education*, 48 (6), pp. 909-924. Cited 1 time.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988420423&partnerID=40&md5=77aa265769846c7957ee99d0f9eca5ec)

[84988420423&partnerID=40&md5=77aa265769846c7957ee99d0f9eca5ec](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988420423&partnerID=40&md5=77aa265769846c7957ee99d0f9eca5ec)

DOI: 10.1007/s11858-016-0755-2

AFFILIATIONS: Facultad de Ciencias Matemáticas e Instituto de Matemática Interdisciplinar, Universidad Complutense de Madrid, Plaza de Ciencias 3, Madrid, Spain; Universidad de Almería, La Cañada de San Urbano s/n, Almería, Spain

ABSTRACT: This study highlights the importance of cognition-affect interaction pathways in the construction of mathematical knowledge. Scientific output demands further research on the conceptual structure underlying such interaction aimed at coping with the high complexity of its interpretation. The paper discusses the effectiveness of using a dynamic model such as that outlined in the Mathematical Working Spaces (MWS) framework, in order to describe the interplay between cognition and affect in the transitions from instrumental to discursive geneses in geometrical reasoning. The results based on empirical data from a teaching experiment at a middle school show that the use of dynamic geometry software favours students' attitudinal and volitional dimensions and helps them to maintain productive affective pathways, affording greater intellectual independence in mathematical work and interaction with the context that impact learning opportunities in

geometric proofs. The reflective and heuristic dimensions of teacher mediation in students' learning is crucial in the transition from instrumental to discursive genesis and working stability in the Instrumental-Discursive plane of MWS. © 2016, FIZ Karlsruhe.
AUTHOR KEYWORDS: Argumentation; Cognition-affect interplay; GeoGebra; Geometry; Mathematical Working Space; Secondary education
DOCUMENT TYPE: Article
SOURCE: Scopus

Muddeen, F., Mallalieu, K.
Examinations and remediation actions for the mathematics problem in electrical engineering at the University of the West Indies
(2016) International Journal of Electrical Engineering Education, 53 (4), pp. 314-330.
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84989929883&partnerID=40&md5=6f6f8529042bd4df6d76b1145880a57b>

DOI: 10.1177/0020720916630324

AFFILIATIONS: Department of Electrical and Computer Engineering, University of the West Indies, St Augustine Campus, St Augustine, NA, Trinidad and Tobago

ABSTRACT: The Department of Electrical and Computer Engineering at The University of the West Indies' (UWI') St Augustine Trinidad and Tobago Campus conducted a review and revision of its BSc mathematics programming in 2009. The review was framed to take account of strategic as well as operational imperatives of an accredited degree in the context of a number of resource and other constraints typical of small island developing states. Intake, content and delivery were examined and the findings were used to guide the revision exercise. Associated interventions were assessed five years later. This paper provides an account of the considerations and process for the review and revision exercises. It discusses student performance and other indicators before and after the interventions; and examines the new curriculum against fit for purpose criteria alongside programming in best in class institutions and UK-based accreditation reference points. The paper closes with recommendations for ongoing review and revision cycles applicable to the Department at the UWI and other similarly situated institutions. © The Author(s) 2016.

AUTHOR KEYWORDS: Engineering mathematics; math curriculum; mathematics competency
DOCUMENT TYPE: Article
SOURCE: Scopus

Smith, K.a , Shull, J.b , Dean, A.c , Shen, Y.d , Michaeli, J.e
SiGMA: A software framework for integrating advanced mathematical capabilities in serious game development
(2016) Advances in Engineering Software, 100, pp. 319-325.
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84982266718&partnerID=40&md5=67f3b48793efb72c1e2d0d024681e8ef>

DOI: 10.1016/j.advengsoft.2016.08.007

AFFILIATIONS: Old Dominion University, Department of Mathematics and Statistics, Department of Modeling, Norfolk, VA, United States;

Old Dominion University, Department of Modeling, Norfolk, VA, United States;

Old Dominion University, Norfolk, VA, United States;

Old Dominion University, Department of Modeling, Simulation and Visualization Engineering, Department of Electrical and Computer Engineering, United States;

Old Dominion University, Department of Engineering Technology, Norfolk, VA, United States

ABSTRACT: As games become more popular as an educational tool, an imbalance exists in the number of mathematics games that have been developed when compared to the number of games developed for other fields. Part of the reason for this gap can be attributed to the difficulty of symbolic manipulation and display of complex equations and graphs. To alleviate this, SiGMA, a symbolic toolkit for gaming mathematics, has been developed. This paper discusses the design and implementation of SiGMA, which has been utilized in a series of games developed as part of the Stern2STEM program that strives to assist military veterans on their path toward STEM degrees. This paper also reviews existing mathematics software and tools and presents game examples that utilized the SiGMA toolkit. © 2016 Elsevier Ltd

AUTHOR KEYWORDS: Mathematics education; Serious games; Software development
DOCUMENT TYPE: Article
SOURCE: Scopus

Han, S.a , Capraro, R.M.b , Capraro, M.M.b

How science, technology, engineering, and mathematics project based learning affects high-need students in the U.S.

(2016) Learning and Individual Differences, 51, pp. 157-166.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0->

84987926267&partnerID=40&md5=6ddabae4718cf159d17f842bc2189193

DOI: 10.1016/j.lindif.2016.08.045

AFFILIATIONS: Sungkyunkwan University, South Korea;

Texas A&M University, Aggie STEM Center, United States

ABSTRACT: The purpose of this study was to investigate how science, technology, engineering, and mathematics (STEM) project based learning (PBL) affected high-need students in the United States (U.S.) in terms of their academic achievement. Among high-need students in the U.S., we focused on two student groups: Hispanic and at-risk students. The participants included 528 students in the three STEM PBL high schools and 2688 students in non-STEM PBL schools in the same region. Approximately 71% of the participants were Hispanic, at-risk, or Hispanic and at-risk. Latent growth modeling with repeated measures was used to analyze the data. The data were mathematics tests from 2008 to 2010 of the Texas Assessment of Knowledge and Skills. STEM PBL instruction positively influenced Hispanic students' achievement in mathematics, but not at-risk students. The findings of this study imply that curriculum integrating STEM PBL may help Hispanic students having language and cultural differences improve communication and collaboration skills in classrooms. © 2016 Elsevier Inc.

AUTHOR KEYWORDS: Latent growth modeling; Longitudinal dataset; Project based learning; STEM education

DOCUMENT TYPE: Article

SOURCE: Scopus

Wilkins, J.L.M.

An Assessment of the Quantitative Literacy of Undergraduate Students

(2016) Journal of Experimental Education, 84 (4), pp. 639-665.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0->

84962119003&partnerID=40&md5=837baea8da86c459e3fbff6f576b9a6d

DOI: 10.1080/00220973.2015.1111854

AFFILIATIONS: Virginia Tech, Blacksburg, VA, United States

ABSTRACT: Quantitative literacy (QLT) represents an underlying higher-order construct that accounts for a person's willingness to engage in quantitative situations in everyday life. The purpose of this study is to retest the construct validity of a model of quantitative literacy (Wilkins, 2010). In this model, QLT represents a second-order factor that accounts for the interrelationship among three first-order factors: mathematical beliefs, mathematical disposition, and mathematical cognition. Using data from two samples of undergraduate students (n = 186 and n = 184), a series of confirmatory factor analyses were conducted. Results supported the hierarchical three-factor structure and confirmed its factorial invariance across multiple groups of students. Latent QLT scores from the model were used to compare and rank student QLT by gender and class standing. © 2016, Copyright © Taylor & Francis Group, LLC.

AUTHOR KEYWORDS: assessment; attitudes; beliefs; factor analysis; mathematics education; quantitative literacy; structural equation modeling

DOCUMENT TYPE: Article

SOURCE: Scopus

Fyfe, E.R.a b

Providing feedback on computer-based algebra homework in middle-school classrooms

(2016) Computers in Human Behavior, 63, pp. 568-574.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0->

84973340597&partnerID=40&md5=0928bb99834374ba452d1348644e83d1

DOI: 10.1016/j.chb.2016.05.082

AFFILIATIONS: Department of Psychology and Human Development, Vanderbilt University, United States;

Wisconsin Center for Education Research, University of Wisconsin-Madison, 970 Educational Sciences Building, 1025 West Johnson Street, Madison, WI, United States

ABSTRACT: Homework is transforming at a rapid rate with continuous advances in educational technology. Computer-based homework, in particular, is gaining popularity

across a range of schools, with little empirical evidence on how to optimize student learning. The current aim was to test the effects of different types of feedback on computer-based homework. In the study, middle school students completed a computer-based pretest, homework assignment, and posttest containing challenging algebraic problems. On the homework assignment, students were assigned to different feedback conditions. In Experiment 1 (N = 103), students received no feedback or correct-answer feedback after each problem. In Experiment 2 (N = 143), students received (1) no feedback, (2) correct-answer feedback, (3) try-again feedback, or (4) explanation feedback after each problem. For students with low prior knowledge, feedback resulted in better posttest performance than no feedback. However, students with high prior knowledge learned just as much whether they received feedback or not. Results suggest the provision of basic feedback on computer-based homework can benefit novice students' mathematics learning. © 2016 Elsevier Ltd.

AUTHOR KEYWORDS: Computer-based homework; Feedback; Mathematics learning; Problem solving

DOCUMENT TYPE: Article

SOURCE: Scopus

Seo, D.G.a , Park, Y.b , Kim, M.K.c , Park, J.d

Mobile phone dependency and its impacts on adolescents' social and academic behaviors (2016) Computers in Human Behavior, 63, pp. 282-292.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-4971280462&partnerID=40&md5=d85c2f3daed494478749d6b0e5238d82)

[4971280462&partnerID=40&md5=d85c2f3daed494478749d6b0e5238d82](https://www.scopus.com/inward/record.uri?eid=2-s2.0-4971280462&partnerID=40&md5=d85c2f3daed494478749d6b0e5238d82)

DOI: 10.1016/j.chb.2016.05.026

AFFILIATIONS: Dept. of Psychology, Hallym University, Chuncheon-si, Gangwon-do, South Korea;

Special Education Program, Dept. of Theory and Practice in Teacher Education, University of Tennessee, United States;

Department of Teaching and Learning, East Tennessee State University, Johnson City, TN, United States;

Dept. of Special Education, Pusan National University, Pusan, South Korea

ABSTRACT: This study aimed to examine the possible intrapersonal (i.e., attention, depression) and interpersonal (i.e., social relationships with friends, social relationships with teachers) problems related to mobile phone dependency and their impacts on academic achievement in adolescents in South Korea using a national sample of 2159 middle and high school students (1074 male and 1085 female). A structural equation modeling approach with mediation analysis was employed to test the seven hypotheses drawn from conceptual and empirical bases. Results showed that mobile phone dependency negatively predicted attention and positively predicted depression, which in turn, affect social relationships with friends and both Korean language arts and mathematics achievement. Also, the mediating roles of attention, depression, and relationships with friends were found between mobile phone dependency and the academic achievement of middle and high school students in S. Korea. Based on the findings, implications of the current study and future directions for research were discussed. © 2016 Elsevier Ltd.

AUTHOR KEYWORDS: Academic achievement; Adolescents; Attention; Depression; Mobile phone dependency

DOCUMENT TYPE: Article

SOURCE: Scopus

Huang, X.a , Mayer, R.E.b

Benefits of adding anxiety-reducing features to a computer-based multimedia lesson on statistics

(2016) Computers in Human Behavior, 63, pp. 293-303.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-4971330643&partnerID=40&md5=0a6bba2550af17a7b41814378ff46c22)

[4971330643&partnerID=40&md5=0a6bba2550af17a7b41814378ff46c22](https://www.scopus.com/inward/record.uri?eid=2-s2.0-4971330643&partnerID=40&md5=0a6bba2550af17a7b41814378ff46c22)

DOI: 10.1016/j.chb.2016.05.034

AFFILIATIONS: School of Teacher Education, College of Education and Behavioral Sciences, Western Kentucky University, Bowling Green, KY, United States;

Department of Psychological and Brain Sciences, University of California, Santa Barbara, CA, United States

ABSTRACT: The present study examined the effectiveness of techniques intended to reduce anxiety as students learn mathematical content from a computer-based lesson. In a between-subjects experiment, students learned statistical rules through worked examples

in a computer-based learning environment that either did (treatment group) or did not (control group) include anxiety reducing features - a coping message delivered through the lesson by an online pedagogical agent concerning how to manage feelings of anxiety, and prompts for expressive writing, in which students summarize their thoughts and feelings. An independent samples t-test showed that the treatment group, which received added anxiety-reducing features, showed higher accuracy than the control group on solving practice problems ($d = 0.71$) and retention problems ($d = 0.63$) and reported higher perceived effort on learning the multimedia lesson ($d = 0.66$). In addition, a standard multiple linear regression found that anxiety, self-efficacy, and cognitive load as a set predicted performance ($R^2 = 0.56$), with self-efficacy as the strongest predictor ($\beta = 0.63$). Adding anxiety-reducing features to an online lesson may encourage greater effort, which leads to better learning outcomes. © 2016 Elsevier Ltd. All rights reserved.

AUTHOR KEYWORDS: Anxiety; Computer-based learning; Multimedia instruction; Statistics learning

DOCUMENT TYPE: Article

SOURCE: Scopus

Ngu, B.H.a , Phan, H.P.a , Hong, K.S.b , Usop, H.b

Reducing intrinsic cognitive load in percentage change problems: The equation approach (2016) *Learning and Individual Differences*, 51, pp. 81-90.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84985919993&partnerID=40&md5=a1642f516cabef9e3e9df8eebc8d2002)

[84985919993&partnerID=40&md5=a1642f516cabef9e3e9df8eebc8d2002](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84985919993&partnerID=40&md5=a1642f516cabef9e3e9df8eebc8d2002)

DOI: 10.1016/j.lindif.2016.08.029

AFFILIATIONS: University of New England, Australia;

Universiti Malaysia Sarawak, Malaysia

ABSTRACT: We compared the equation approach and unitary approach in helping students ($n = 59$) learn percentage change problems from a cognitive load perspective. The equation approach emphasized a two-part learning process. Part 1 revised prior knowledge of percentage quantity; Part 2 integrated the percentage quantity and the original amount in an equation for solution. Central to the unitary approach is the concept of unit percentage (1%). The unitary approach would expect to incur high element interactivity because of the intrinsic nature of its solution steps, and the need to search and integrate quantity and percentage in order to act as a point of reference for calculating the unit percentage. Test results and the instructional efficiency measure favored the equation approach. It was suggested that the equation approach reduced the intrinsic cognitive load associated with percentage change problems via sequencing and prior knowledge. © 2016 Elsevier Inc.

AUTHOR KEYWORDS: Intrinsic cognitive load; Mathematics education; Percentage change problems; Problem solving

DOCUMENT TYPE: Article

SOURCE: Scopus

Porsch, R.a , Strietholt, R.b , Macharski, T.c , Bromme, R.d

Erratum to: *Mathematikangst im Kontext - Ein Inventar zur situationsbezogenen Messung von Mathematikangst bei angehenden Lehrkräften* (*J Math Didakt*, (2015), 36, (1-22),

[10.1007/s13138-014-0067-4](https://www.scopus.com/inward/record.uri?eid=2-s2.0-10.1007/s13138-014-0067-4))

(2016) *Journal fur Mathematik-Didaktik*, 37 (2), p. 375.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988384064&partnerID=40&md5=30852e2092cfdcc9c31bf9f0e07cea9e)

[84988384064&partnerID=40&md5=30852e2092cfdcc9c31bf9f0e07cea9e](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988384064&partnerID=40&md5=30852e2092cfdcc9c31bf9f0e07cea9e)

DOI: 10.1007/s13138-016-0095-3

AFFILIATIONS: Institut für Erziehungswissenschaft, Westfälische Wilhelms-Universität Münster, Bispinghof 5/6, Münster, Germany;

Institut für Schulentwicklungsforschung (IfS), Technische Universität Dortmund,

Vogelpothsweg 78, Dortmund, Germany;

Paradiesweg 19, Osnabrück, Germany;

Institut für Psychologie, Westfälische Wilhelms-Universität Münster, Fliednerstr. 21, Münster, Germany

ABSTRACT: Scarpello, G.V. (2005). The effect of mathematics anxiety on the course and career choice of high school vocational-technical education students Ph. D. Thesis. © 2016, GDM.

DOCUMENT TYPE: Erratum

SOURCE: Scopus

Delgadillo, E.M.a , Vivier, L.b c

Mathematical working space and paradigms as an analysis tool for the teaching and learning of analysis

(2016) ZDM - Mathematics Education, 48 (6), pp. 739-754.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988448011&partnerID=40&md5=0a1a79d250590f9d607e39ff894b1d1a)

[84988448011&partnerID=40&md5=0a1a79d250590f9d607e39ff894b1d1a](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988448011&partnerID=40&md5=0a1a79d250590f9d607e39ff894b1d1a)

DOI: 10.1007/s11858-016-0777-9

AFFILIATIONS: IMA, Pontificia Universidad Católica de Valparaíso, Valparaíso, Chile;

LDAR, Université Paris Diderot, Paris, France;

IMAG, Université de Montpellier, Montpellier, France

ABSTRACT: Mathematical working space (MWS) is a model that is used in research in mathematics education, particularly in the field of geometry. Some MWS elements are independent of the field while other elements must be adapted to the field in question. In this paper, we develop the MWS model for the field of analysis with an identification of paradigms. We show the advantages of this MWS model, which takes into account the epistemological and cognitive aspects of mathematical work, and more specifically the semiotic, instrumental and discursive geneses, by making them function as one system. By using examples and data from three countries, we illustrate how this model can be used to perform a priori analyses and analyses of class situations and individual student work. © 2016, FIZ Karlsruhe.

AUTHOR KEYWORDS: Analysis; Mathematical working space; Paradigms; Perspectives

DOCUMENT TYPE: Article

SOURCE: Scopus

Williams, K.E.a , White, S.L.J.a , MacDonald, A.b

Early mathematics achievement of boys and girls: Do differences in early self-regulation pathways explain later achievement?

(2016) Learning and Individual Differences, 51, pp. 199-209.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84989315938&partnerID=40&md5=c2bb2994ea8f65ac00686f9efc3f3865)

[84989315938&partnerID=40&md5=c2bb2994ea8f65ac00686f9efc3f3865](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84989315938&partnerID=40&md5=c2bb2994ea8f65ac00686f9efc3f3865)

DOI: 10.1016/j.lindif.2016.09.006

AFFILIATIONS: School of Early Childhood, Queensland University of Technology, GPO Box 2434, Brisbane, Queensland, Australia;

Research Institute for Professional Practice, Learning, and Education, Charles Sturt University, PO Box 789, Albury, New South Wales, Australia

ABSTRACT: The degree to which a true gender gap exists in mathematics achievement is still debated, and empirically-supported explanations for any gap rarely address very early childhood self-regulatory pathways. This study examines whether mathematics achievement at 8-9 years differs by gender, how achievement is associated with self-regulatory pathways beginning at 2-3 years of age, and whether these pathways differ by gender. Participants were 5107 children involved in the nationally-representative Longitudinal Study of Australian Children (LSAC). Boys outperformed girls in mathematics achievement and girls generally had better early attentional and emotional regulation. Path analysis revealed that attentional regulation was directly associated with mathematics achievement from 4 to 5 years, and emotional regulation was indirectly associated. These self-regulatory pathways to mathematics achievement were not moderated by gender. We discuss the implications for further research and new approaches to early years mathematics education that embed self-regulatory support and development for all children. © 2016 Elsevier Inc.

AUTHOR KEYWORDS: Early childhood; Gender; Mathematics; Self-regulation

DOCUMENT TYPE: Article

SOURCE: Scopus

Artigue, M.

Mathematical working spaces through networking lens

(2016) ZDM - Mathematics Education, 48 (6), pp. 935-939.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988344348&partnerID=40&md5=eed41ed63d4352f5d6d3c16a00b00425)

[84988344348&partnerID=40&md5=eed41ed63d4352f5d6d3c16a00b00425](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988344348&partnerID=40&md5=eed41ed63d4352f5d6d3c16a00b00425)

DOI: 10.1007/s11858-016-0810-z

AFFILIATIONS: LDAR, Université Paris Diderot - Paris 7, Paris, France

ABSTRACT: This issue of ZDM collects research works sharing a common reference to the theoretical framework of Mathematical Working Spaces (MWS), a construction which emerged

about one decade ago, and has progressively found its way in the mathematics education community, thanks to the collaborative work of an international group of researchers. In this reaction paper, I approach this new theoretical construction, using the concept of research praxeology which has been introduced to support practices of networking between theoretical approaches. After a short introduction, in the first section of this reaction paper, I introduce this concept and explain how it shapes my reading of the different contributions, before expressing the vision of the MWS framework and of its educational potential it leads to. In the final section, I point out some questions and challenges regarding the MWS theoretical framework emerging from the use of this specific lens. © 2016, FIZ Karlsruhe.

AUTHOR KEYWORDS: Anthropological theory of the didactic; Mathematical working spaces; Networking between theories; Research praxeology

DOCUMENT TYPE: Article

SOURCE: Scopus

Kuzniak, A.a , Nechache, A.a , Drouhard, J.P.b

Understanding the development of mathematical work in the context of the classroom (2016) ZDM - Mathematics Education, 48 (6), pp. 861-874. Cited 1 time.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988354436&partnerID=40&md5=e65d9d0e6dea0d7894494cc9a8a8c1cc)

[84988354436&partnerID=40&md5=e65d9d0e6dea0d7894494cc9a8a8c1cc](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988354436&partnerID=40&md5=e65d9d0e6dea0d7894494cc9a8a8c1cc)

DOI: 10.1007/s11858-016-0773-0

AFFILIATIONS: Laboratoire de Didactique André Revuz, Université Paris Diderot, Paris, France;

Universidad de Buenos Aires, Buenos Aires, Argentina

ABSTRACT: According to our approach to mathematics education, the optimal aim of the teaching of mathematics is to assist students in achieving efficient mathematical work. But, what does efficient exactly mean in that case? And how can teachers reach this objective? The model of Mathematical Working Spaces with its three dimensions—semiotic, instrumental, discursive—allows us to address these questions in an original way based on a multidimensional approach to the use of tools and instruments and on the notion of complete mathematical work. The Mathematical work is considered complete when a genuine relationship exists between epistemological and cognitive aspects, and when the three dimensions of the model are appropriately articulated. Two teaching situations in probability for Grades 9 and 10 (age 14 and 15) are used to illustrate how the model can help identify either misunderstandings that are not acknowledged by the teacher, or complete mathematical work despite some differences between intended and actual work. © 2016, FIZ Karlsruhe.

AUTHOR KEYWORDS: Mathematical work; Mathematical Working Spaces; Probability; Tools and instruments

DOCUMENT TYPE: Article

SOURCE: Scopus

Long, H.a , Pang, W.b

Family socioeconomic status, parental expectations, and adolescents' academic achievements: a case of China

(2016) Educational Research and Evaluation, pp. 1-22. Article in Press.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84989860075&partnerID=40&md5=2bce73ca130f1944a704e13a058f579d)

[84989860075&partnerID=40&md5=2bce73ca130f1944a704e13a058f579d](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84989860075&partnerID=40&md5=2bce73ca130f1944a704e13a058f579d)

DOI: 10.1080/13803611.2016.1237369

AFFILIATIONS: School of Education and Human Development, Florida International University, Miami, FL, USA;

School of Psychology and Cognitive Science, East China Normal University, Shanghai, China

ABSTRACT: This study examines direct and indirect effects of family socioeconomic status (SES) and parental expectations on adolescents' mathematics and problem-solving achievement in mainland China. SES here is composed of family wealth, home educational resources, and parental education. Over 5,000 ninth-grade students in 5 geographical districts of China participated in the study and were assessed by using the items adapted from the Programme for International Student Assessment (PISA). Results from structural equation modelling indicated that 2 components of SES - home educational resources and parental education - positively predicted parental expectations; however, the 3rd component - family wealth - negatively predicted parental expectations. Family wealth, parental education, and parental expectations significantly predicted mathematics achievement, and home educational resources, parental education, and parental

expectations significantly predicted problem-solving achievement. The 3 components of SES also had significant indirect effects on both mathematics and problem-solving achievement through parental expectations, and the effect of family wealth was a suppression effect. These results were further discussed from Chinese cultural contexts. © 2016 Informa UK Limited, trading as Taylor & Francis Group
AUTHOR KEYWORDS: Academic achievement; China; mediation; parental expectations; PISA; socioeconomic status
DOCUMENT TYPE: Article in Press
SOURCE: Scopus

Kuusisto, E.a , Gholami, K.b , Tirri, K.a
Finnish and Iranian teachers' views on their competence to teach purpose
(2016) Journal of Education for Teaching, pp. 1-15. Article in Press.
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84989229084&partnerID=40&md5=3427ae441c0736fb973b92f58a27845c>

DOI: 10.1080/02607476.2016.1226553

AFFILIATIONS: Department of Teacher Education, University of Helsinki, Helsinki, Finland; Department of Education, University of Kurdistan, Sanandaj, Iran

ABSTRACT: This paper examines Finnish (n = 464) and Iranian (n = 556) teachers' views on their competence to teach purpose. 'Purpose' is defined as a stable intention to accomplish something that is both meaningful to the self and of consequence beyond the self over time. The study revealed that all Iranian teachers evaluated their competence for teaching purpose as being high, regardless of the subject taught. In contrast, among Finnish teachers, there were statistically significant relationships between the subject taught and teachers' self-perceptions: religious education seemed to provide a subject in which Finnish teachers can guide students to consider explicitly their purpose in life and plans for the future, while science and mathematics appeared to offer the most challenging contexts for teaching purpose. Hence, the results challenge Finnish in-service and pre-service teacher education programmes to create new approaches and new cultures for mathematics and science education, which intentionally take into account the moral aspects of teaching. Moreover, regression analysis revealed that teachers' ethical sensitivity predicted their views on teaching purpose in both countries. Results indicate that improving teachers' ethical sensitivity skills in teacher education programmes could provide a significant path for supporting teachers' competence in teaching purpose. © 2016 Informa UK Limited, trading as Taylor & Francis Group

AUTHOR KEYWORDS: ethical sensitivity; Finland; Iran; Purpose in life; teacher; teaching

DOCUMENT TYPE: Article in Press
SOURCE: Scopus

Koch, M., Gorges, T.
Curricular Influences on Female Afterschool Facilitators' Computer Science Interests and Career Choices
(2016) Journal of Science Education and Technology, 25 (5), pp. 782-794.
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84980047590&partnerID=40&md5=cef24b40cbd917f3516468856f86c0b2>

DOI: 10.1007/s10956-016-9636-2

AFFILIATIONS: SRI International, Menlo Park, CA, United States

ABSTRACT: Underrepresented populations such as women, African-Americans, and Latinos/as often come to STEM (science, technology, engineering, and mathematics) careers by less traditional paths than White and Asian males. To better understand how and why women might shift toward STEM, particularly computer science, careers, we investigated the education and career direction of afterschool facilitators, primarily women of color in their twenties and thirties, who taught Build IT, an afterschool computer science curriculum for middle school girls. Many of these women indicated that implementing Build IT had influenced their own interest in technology and computer science and in some cases had resulted in their intent to pursue technology and computer science education. We wanted to explore the role that teaching Build IT may have played in activating or reactivating interest in careers in computer science and to see whether in the years following implementation of Build IT, these women pursued STEM education and/or careers. We reached nine facilitators who implemented the program in 2011-12 or shortly after. Many indicated that while facilitating Build IT, they learned along with the participants, increasing their interest in and confidence with technology and computer

science. Seven of the nine participants pursued further STEM or computer science learning or modified their career paths to include more of a STEM or computer science focus. Through interviews, we explored what aspects of Build IT influenced these facilitators' interest and confidence in STEM and when relevant their pursuit of technology and computer science education and careers. © 2016, Springer Science+Business Media New York.
AUTHOR KEYWORDS: Computer science; Educative curriculum materials; Gender; STEM
DOCUMENT TYPE: Article
SOURCE: Scopus

Fien, H.a , Doabler, C.T.a , Nelson, N.J.a , Kosty, D.B.b , Clarke, B.a , Baker, S.K.a
An Examination of the Promise of the NumberShire Level 1 Gaming Intervention for
Improving Student Mathematics Outcomes
(2016) Journal of Research on Educational Effectiveness, 9 (4), pp. 635-661.
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84975217455&partnerID=40&md5=3b95dc7d312f29e492c0c6c75324dc3e>

DOI: 10.1080/19345747.2015.1119229

AFFILIATIONS: University of Oregon, Eugene, OR, United States;
Oregon Research Institute, Eugene, OR, United States

ABSTRACT: The purpose of this study was to test the promise of the NumberShire Level 1 Gaming Intervention (NS1) to accelerate math learning for first-grade students with or at risk for math difficulties. The NS1 intervention was developed through the Institute of Education Sciences, Small Business Innovation Research Program (Gause, Fien, Baker, & Clarke, 2011) as a digitally based technology tool to allow educators to intervene early and strategically with students struggling to learn mathematics. This study used a randomized controlled trial design to test the promise of the NS1 intervention. In total, 250 first-grade students were randomly assigned within classrooms to the treatment condition or a control condition. Results indicate significant effects favoring the treatment group on proximal measures of whole-number concepts and skills. Intervention effects were not statistically significant for distal outcome measures. Treatment effects were not moderated by special education or English learner status; however, the condition by initial skill level interaction approached significance. Additionally, there was no relationship between dosage variables and students' response to the intervention. Limitations and future directions for research are discussed. © 2016 Taylor & Francis Group, LLC.

AUTHOR KEYWORDS: gaming; intervention; math

DOCUMENT TYPE: Article

SOURCE: Scopus

Bozick, R.a , Malchiodi, A.b , Miller, T.a
Premigration School Quality, Time Spent in the United States, and the Math Achievement of Immigrant High School Students
(2016) Demography, 53 (5), pp. 1477-1498.
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84982104032&partnerID=40&md5=017241ab8f031c931cf1d3e75c05efa8>

DOI: 10.1007/s13524-016-0497-3

AFFILIATIONS: RAND Corporation, 1776 Main Street, P.O. Box 2138, Santa Monica, CA, United States;

European Commission, Brussels, Belgium

ABSTRACT: Using a nationally representative sample of 1,189 immigrant youth in American high schools, we examine whether the quality of education in their country of origin is related to post-migration math achievement in the 9th grade. To measure the quality of their education in the country of origin, we use country-specific average test scores from two international assessments: the Programme for International Student Assessment (PISA) and the Trends in International Mathematics and Science Study (TIMSS). We find that the average PISA or TIMSS scores for immigrant youth's country of origin are positively associated with their performance on the 9th grade post-migration math assessment. We also find that each year spent in the United States is positively associated with performance on the 9th grade post-migration math assessment, but this effect is strongest for immigrants from countries with low PISA/TIMSS scores. © 2016, Population Association of America.

AUTHOR KEYWORDS: Assimilation; Immigrant youth; Immigration; Math achievement

DOCUMENT TYPE: Article

SOURCE: Scopus

Staples, M.a , Newton, J.b

Teachers' Contextualization of Argumentation in the Mathematics Classroom

(2016) Theory into Practice, 55 (4), pp. 294-301.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0->

84982258437&partnerID=40&md5=ec03f832f7c86819ec67378eebe550a6

DOI: 10.1080/00405841.2016.1208070

AFFILIATIONS: Mathematics Education at University of Connecticut, Neag School of Education, United States;

Mathematics Education at Purdue University, United States

ABSTRACT: This article addresses the purposes and types of opportunities for engaging students in argumentation in the mathematics classroom. Drawing on data from a research project, we document how argumentation—a practice that is central to the work of the mathematics community—can be contextualized in secondary mathematics classrooms to serve different purposes. We focus on 2 complementary purposes—argumentation for concept development and argumentation for mathematical practice development. We explore how the nature of opportunities provided for students to engage in argumentation may reflect different valued purposes of argumentation, ultimately shaping students' understanding of the practice of mathematical argumentation. We conclude with a discussion of tensions and recommendations related to offering students a robust view of this crucial practice. © 2016, Copyright © The College of Education and Human Ecology, The Ohio State University.

DOCUMENT TYPE: Article

SOURCE: Scopus

Tirri, K., Kuusisto, E.

Finnish student teachers' perceptions on the role of purpose in teaching

(2016) Journal of Education for Teaching, pp. 1-9. Article in Press.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0->

84989261654&partnerID=40&md5=96f7cda36fe784eb0d93a3fee93c286c

DOI: 10.1080/02607476.2016.1226552

AFFILIATIONS: Department of Teacher Education, University of Helsinki, Helsinki, Finland

ABSTRACT: This study identifies the nature of the purposes that Finnish student teachers of different subjects (N = 372) have for teaching and how these perceptions could inform teacher education. Earlier studies have shown that both American and Finnish students have found the role of their teachers to be very important in teaching and learning purpose. Finnish student teachers have also been found to be purposeful in their teaching. The data for this study were gathered in 2013 with quantitative questionnaires measuring different elements of purpose, such as purpose identification, goal-directedness, beyond-the-self orientation, and competence to teach purpose. Using K-Cluster analysis, four purpose profiles were identified among student teachers: Purposeful, Dabblers, Dreamers, and Disengaged. Student teachers of religious education were found to be the most purposeful in their profiles, while student teachers of mathematics differed from the others, with more than 40% having a Disengaged profile. The results indicate that student teachers of mathematics need special support for their purpose development, as well as education in purposeful teaching. © 2016 Informa UK Limited, trading as Taylor & Francis Group

AUTHOR KEYWORDS: Finnish teachers; purpose in teaching; purposeful teaching; Student teachers

DOCUMENT TYPE: Article in Press

SOURCE: Scopus

Dutilh Novaes, C.

Reductio ad absurdum from a dialogical perspective

(2016) Philosophical Studies, 173 (10), pp. 2605-2628.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0->

84964040018&partnerID=40&md5=09d864ab787d82fc1900d05ef3d546fc

DOI: 10.1007/s11098-016-0667-6

AFFILIATIONS: Faculty of Philosophy, University of Groningen, Groningen, Netherlands

ABSTRACT: It is well known that reductio ad absurdum arguments raise a number of interesting philosophical questions. What does it mean to assert something with the precise goal of then showing it to be false, i.e. because it leads to absurd conclusions? What kind of absurdity do we obtain? Moreover, in the mathematics education literature

number of studies have shown that students find it difficult to truly comprehend the idea of reductio proofs, which indicates the cognitive complexity of these constructions. In this paper, I start by discussing four philosophical issues pertaining to reductio arguments. I then briefly present a dialogical conceptualization of deductive arguments, according to which such arguments (especially mathematical proofs) are best understood as a dialogue between two (fictitious) participants—Prover and Skeptic. Finally, I argue that many of the philosophical and cognitive difficulties surrounding reductio arguments are dispelled or at least further clarified once one adopts a dialogical perspective. © 2016, The Author(s).

AUTHOR KEYWORDS: Dialogues; Mathematical proofs; Reductio ad absurdum

DOCUMENT TYPE: Article

SOURCE: Scopus

Dondlinger, M.J.a , McLeod, J.b , Vasinda, S.c

Essential Conditions for Technology-Supported, Student-Centered Learning: An Analysis of Student Experiences With Math Out Loud Using the ISTE Standards for Students (2016) Journal of Research on Technology in Education, 48 (4), pp. 258-273.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84983336926&partnerID=40&md5=054297dcf82eab7cc69010d77c08b62f)

[84983336926&partnerID=40&md5=054297dcf82eab7cc69010d77c08b62f](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84983336926&partnerID=40&md5=054297dcf82eab7cc69010d77c08b62f)

DOI: 10.1080/15391523.2016.1212633

AFFILIATIONS: Texas A&M University Commerce, United States;

Good Shepherd Episcopal School, Dallas, TX, United States;

Oklahoma State University, United States

ABSTRACT: This article explores links between student experiences with technology-rich mathematics instruction and the ISTE Standards for Students. Research methods applied constructivist grounded theory to analyze data from student interviews against the ISTE Standards for Students to identify which elements of the design of this learning environment seemed to support the attainment of both mathematics content objectives and the ISTE Standards for Students. Researchers then identify guiding principles for the effective design of technology-supported, student-centered learning environments based on analysis of the results. (Keywords: ISTE standards, mathematics education, student-created work, technology-rich learning) © 2016 ISTE.

DOCUMENT TYPE: Article

SOURCE: Scopus

Teuscher, D.a , Moore, K.C.b , Carlson, M.P.c

Decentering: A construct to analyze and explain teacher actions as they relate to student thinking

(2016) Journal of Mathematics Teacher Education, 19 (5), pp. 433-456.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84928155120&partnerID=40&md5=279c021a7fe88e0b324a09925601cda3)

[84928155120&partnerID=40&md5=279c021a7fe88e0b324a09925601cda3](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84928155120&partnerID=40&md5=279c021a7fe88e0b324a09925601cda3)

DOI: 10.1007/s10857-015-9304-0

AFFILIATIONS: Department of Mathematics Education, Brigham Young University, TMCB 191, Provo, UT, United States;

University of Georgia, Athens, GA, United States;

Arizona State University, Tempe, AZ, United States

ABSTRACT: Mathematics educators and writers of mathematics education policy documents continue to emphasize the importance of teachers focusing on and using student thinking to inform their instructional decisions and interactions with students. In this paper, we characterize the interactions between a teacher and student(s) that exhibit this focus. Specifically, we extend previous work in this area by utilizing Piaget's construct of decentering (The language and thought of the child. Meridian Books, Cleveland, 1955) to explain teachers' actions relative to both their thinking and their students' thinking. In characterizing decentering with respect to a teacher's focus on student thinking, we use two illustrations that highlight the importance of decentering in making in-the-moment decisions that are based on student thinking. We also discuss the influence of teacher decentering actions on the quality of student-teacher interactions and their influence on student learning. We close by discussing various implications of decentering, including how decentering is related to other research constructs including teachers' development and enactment of mathematical knowledge for teaching. © 2015, Springer Science+Business Media Dordrecht.

AUTHOR KEYWORDS: Decentering; Mathematical knowledge for teaching; Pedagogical actions; Secondary mathematics teachers; Student thinking

DOCUMENT TYPE: Article
SOURCE: Scopus

Jukić Matić, L.a , Glasnović Gracin, D.b

The use of the textbook as an artefact in the classroom: A case study in the light of a socio-didactical tetrahedron [Das Schulbuch als Artefakt in der Klasse: Eine Studie vor dem Hintergrund des sozioididaktischen Tetraeders]

(2016) Journal fur Mathematik-Didaktik, 37 (2), pp. 349-374.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988450783&partnerID=40&md5=52cd9799fa3654fa015dd371c8d72bdb)

[84988450783&partnerID=40&md5=52cd9799fa3654fa015dd371c8d72bdb](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988450783&partnerID=40&md5=52cd9799fa3654fa015dd371c8d72bdb)

DOI: 10.1007/s13138-016-0091-7

AFFILIATIONS: Department of Mathematics, University of Osijek, Trg Ljudevita Gaja 6, Osijek, Croatia;

Faculty of Teacher Education, University of Zagreb, Zagreb, Croatia

ABSTRACT: Mathematics textbooks have long been used as an educational tool for teaching and learning. They play an important role in various didactical situations both within and outside the classroom. After the previous large-scale quantitative research on the use of mathematics textbooks in lower secondary education in Croatia, a new study with a qualitative approach was conducted. The new study encompasses classroom observations and an in-depth interview with one mathematics teacher. The results of this study are explained using the socio-didactical tetrahedron and are compared with previous survey results on the extent to which mathematics textbooks are used in Croatian classrooms. The findings of this study indicate that the textbook has a significant role in mathematics lessons in which the aims of the teacher and the textbook are aligned. The study also offers some explanation as to why teachers rely on the textbook for preparation, teaching, and practicing. Here the extension of the didactical tetrahedron to a socio-didactical tetrahedron proved to be very valuable owing to the social factors involved in textbook use, which cannot be neglected. © 2016, GDM.

AUTHOR KEYWORDS: Curriculum; Learning; Mathematics; Teacher

DOCUMENT TYPE: Article

SOURCE: Scopus

Moore, A.M., vanMarle, K., Geary, D.C.

Kindergartners' fluent processing of symbolic numerical magnitude is predicted by their cardinal knowledge and implicit understanding of arithmetic 2 years earlier

(2016) Journal of Experimental Child Psychology, 150, pp. 31-47.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84969674101&partnerID=40&md5=316d0076c1b585ea7e332fca18bd5f26)

[84969674101&partnerID=40&md5=316d0076c1b585ea7e332fca18bd5f26](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84969674101&partnerID=40&md5=316d0076c1b585ea7e332fca18bd5f26)

DOI: 10.1016/j.jecp.2016.05.003

AFFILIATIONS: Department of Psychological Sciences, University of Missouri, Columbia, MO, United States

ABSTRACT: Fluency in first graders' processing of the magnitudes associated with Arabic numerals, collections of objects, and mixtures of objects and numerals predicts current and future mathematics achievement. The quantitative competencies that support the development of fluent processing of magnitude, however, are not fully understood. At the beginning and end of preschool (M = 3 years 9 months at first assessment, range = 3 years 3 months to 4 years 3 months), 112 children (51 boys) completed tasks measuring numeral recognition and comparison, acuity of the approximate number system, and knowledge of counting principles, cardinality, and implicit arithmetic and also completed a magnitude processing task (number sets test) in kindergarten. Use of Bayesian and linear regression techniques revealed that two measures of preschoolers' cardinal knowledge and their competence at implicit arithmetic predicted later fluency of magnitude processing, controlling domain-general factors, preliteracy skills, and parental education. The results help to narrow the search for the early foundation of children's emerging competence with symbolic mathematics and provide direction for early interventions. © 2016 Elsevier Inc.

AUTHOR KEYWORDS: Approximate number system; Cardinality; Development; Kindergarten; Mathematical cognition; Number sets test; Preschool

DOCUMENT TYPE: Article

SOURCE: Scopus

Jaciw, A.P.a , Hegseth, W.M.b , Lin, L.a , Toby, M.a , Newman, D.a , Ma, B.a , Zacamy, J.a

Assessing Impacts of Math in Focus, a "Singapore Math" Program
(2016) Journal of Research on Educational Effectiveness, 9 (4), pp. 473-502.
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84978969247&partnerID=40&md5=ceda81788b6b06201c56b9d8436fe0d3>

DOI: 10.1080/19345747.2016.1164777

AFFILIATIONS: Empirical Education Inc., Palo Alto, CA, United States;
University of Michigan, Ann Arbor, MI, United States

ABSTRACT: This study investigates, through a cluster randomized trial, the impact of Math in Focus, a core mathematics program modeled after instructional approaches used in Singapore, on third- through fifth-grade students' achievement in mathematics. The program is currently being used in more than 400 school districts in the United States. The program focuses on coherence of coverage of materials across grades, use of the Concrete to Pictorial to Abstract approach to instruction, and covering fewer topics, but addressing them more thoroughly. Twenty-two grade-level teams across 12 schools were randomized to the program or business as usual. Measures included indicators of fidelity to treatment, and student mathematics learning. Impacts on mathematics achievement ranged from .11 to .15 standard deviation units. No differences in impact were observed depending on level of incoming achievement, minority status, or grade level. Impact of Math in Focus did not vary across the procedures and problem-solving subscales. Discussion of findings includes the nature of the counterfactual, and possible future direction of impact studies that may focus in greater depth on the critical features of inquiry instruction unique to Math in Focus. © 2016 Empirical Education Inc.

AUTHOR KEYWORDS: Grades 3-5; impact evaluation; mathematics; Singapore Math

DOCUMENT TYPE: Article

SOURCE: Scopus

Zazkis, D.a , Weber, K.b , Mejía-Ramos, J.P.b

Bridging the gap between graphical arguments and verbal-symbolic proofs in a real analysis context

(2016) Educational Studies in Mathematics, 93 (2), pp. 155-173.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84965028222&partnerID=40&md5=e37bd409d67e3a7d20777af3a056ac01>

DOI: 10.1007/s10649-016-9698-3

AFFILIATIONS: Arizona State University, 901 S. Palm Walk, Tempe, AZ, United States;
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ABSTRACT: We examine a commonly suggested proof construction strategy from the mathematics education literature—that students first produce a graphical argument and then work to construct a verbal-symbolic proof based on that graphical argument. The work of students who produce such graphical arguments when solving proof construction tasks was analyzed to distill three activities that contribute to students' successful translation of graphical arguments into verbal-symbolic proofs. These activities are called elaborating, syntactifying, and rewarranting. We analyze how engaging in these activities relates to students' success in proof construction tasks. Additionally, we discuss how each individual activity contributes to the translation of a graphical argument into a verbal-symbolic proof. © 2016, Springer Science+Business Media Dordrecht.

AUTHOR KEYWORDS: Graphical argumentation; Proof; Toulmin scheme

DOCUMENT TYPE: Article

SOURCE: Scopus

Zhao, Q.a b , Yao, C.-G.c , Tang, J.d , Liu, L.-W.e

Study of spatial signal transduction in bistable switches

(2016) Frontiers of Physics, 11 (5), art. no. 110501, .

<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84964786220&partnerID=40&md5=1854e36ebe349a56c45b2ba7d45537a2>

DOI: 10.1007/s11467-016-0571-8

AFFILIATIONS: School of Mathematics, Liaoning University, Shenyang, China;
Research Center for Computer Simulating and Information Processing of Bio-Macromolecules of Liaoning Province, Shenyang, China;

Department of Mathematics, Shaoxing University, Shaoxing, China;

College of Science, China University of Mining and Technology, Xuzhou, China;

College of Science, Dalian Jiaotong University, Dalian, China

ABSTRACT: Bistable switch modules are among the most important fundamental motifs in signal-transduction pathways. To better understand their spatial signal transduction, we model the diffusion process in the one-dimensional (1-D) domain. We find that when none of the elements diffuse, the response of the system exhibits a spatial switch-like property. However, when one of the elements is highly diffusible, the response of the system does not show any spatial switching behavior. Furthermore, we observe that the spatial responses of the system are more sensitive to the time constant of the switch when none of the elements are diffusible. Further, a slow loop keeps the system in the high steady state more positions than that in the fast loop. Finally, we consolidate our numerical results analytically by performing a mathematical method. © 2016, Higher Education Press and Springer-Verlag Berlin Heidelberg.

AUTHOR KEYWORDS: nonlinear dynamics; reaction-diffusion model; signal processing; spatial switch
DOCUMENT TYPE: Article
SOURCE: Scopus

Clough, P.T.

Rethinking Race, Calculation, Quantification, and Measure

(2016) Cultural Studies - Critical Methodologies, 16 (5), pp. 435-441.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988515825&partnerID=40&md5=50e44288d117873fd8d60a1dc22819ab)

[84988515825&partnerID=40&md5=50e44288d117873fd8d60a1dc22819ab](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988515825&partnerID=40&md5=50e44288d117873fd8d60a1dc22819ab)

DOI: 10.1177/1532708616655760

AFFILIATIONS: City University of New York, Graduate Center, Queens College, 365 Fifth Avenue, New York City, NY, United States

ABSTRACT: Focusing on "new regimes of calculation" and the limits and possibilities of mobilizing critical theory to make sense of such shifts, the author uses Roderick Ferguson's Foucauldian call for a reordering of things to rethink of quantitative inquiry. The author is especially interested in race and the twists and turns of how the institutionalizing of the interdisciplines of area studies in higher education functioned to manage difference. The author pays particular attention to parallels between the institutionalization of the interdisciplines of area studies with the emerging interdisciplines- those forming between the humanities, the arts, and the social sciences and the mathematical sciences, computer sciences, digital studies, and the natural sciences. By elaborating both sociological and media studies disciplinary perspectives, something "beyond biopolitics and neoliberalism" becomes thinkable. © 2016 SAGE Publications.

AUTHOR KEYWORDS: data-fication; populations; probabiity; racism; Twenty-first-century media

DOCUMENT TYPE: Review

SOURCE: Scopus

Hornstra, L.a b , van der Veen, I.c , Peetsma, T.b

Domain-specificity of motivation: A longitudinal study in upper primary school

(2016) Learning and Individual Differences, 51, pp. 167-178.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84987881646&partnerID=40&md5=df66f931e3b76f1a0cd27b79f073c937)

[84987881646&partnerID=40&md5=df66f931e3b76f1a0cd27b79f073c937](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84987881646&partnerID=40&md5=df66f931e3b76f1a0cd27b79f073c937)

DOI: 10.1016/j.lindif.2016.08.012

AFFILIATIONS: Department of Education, Utrecht University, PO Box 80140, Utrecht, Netherlands;

Research Institute of Child Development and Education, University of Amsterdam, PO Box 15780, Amsterdam, Netherlands;

Kohnstamm Institute, Plantage Muidergracht 24, Amsterdam, Netherlands

ABSTRACT: The purpose of this study was to examine the domain-specificity of motivation in upper primary school. A sample of 722 students reported on their achievement goals, self-efficacy, and effort in language and mathematics twice a year during grade five and six. Results of confirmatory factor analyses and latent growth curve modeling showed that motivational constructs in language and mathematics were domain-specific in nature and developments in domain-specific motivational constructs mostly predicted achievement growth in corresponding subject domains. Yet, compared to previous studies in secondary or higher education, the degree of domain-specificity in upper primary school was found to be limited. High cross-domain correlations indicated a high degree of generality and similar longitudinal developments co-occurred across both domains. Especially achievement goals were highly domain-general. The results suggest that the degree of domain-

specificity depends on the nature of motivational constructs and students' age. Implications of these findings for practice and research are discussed. © 2016 Elsevier Inc.

AUTHOR KEYWORDS: Achievement goals; Domain-specificity; Effort; Motivation; Self-efficacy

DOCUMENT TYPE: Article

SOURCE: Scopus

Petridou, A.a b , Karagiorgi, Y.a

Cross-sectional predictors of 'risk' for school failure

(2016) International Journal of Research and Method in Education, 39 (4), pp. 365-382.

Cited 1 time.

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[84976307723&partnerID=40&md5=65eb086e0e84562fd57013a259b9cd6f](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84976307723&partnerID=40&md5=65eb086e0e84562fd57013a259b9cd6f)

DOI: 10.1080/1743727X.2016.1189896

AFFILIATIONS: Centre for Educational Research and Evaluation, Nicosia, Cyprus;

Department of Education, Faculty of Economics and Management, Open University of Cyprus, Nicosia, Cyprus

ABSTRACT: Since school failure has detrimental effects on students and on society, education policy needs to address students 'at risk', and support them to reach their potential. This study used data from the longitudinal national Programme for Functional Literacy (PfL) conducted in Cyprus to identify students 'at risk' and aimed to explore the factors with cross-sectional effect on the risk in mathematics and language, and the contribution of the school to the presence of risk across two assessment waves.

Hierarchical logistic regression analyses were employed, involving student-level and school-level variables. For both competencies, from demographic predictors, only gender is found consistently associated with risk across both waves, while from attitudinal variables, students' confidence, sense of belonging in school and general views regarding parental involvement. With regard to family-related variables, the total number of books at home and the mother's educational level are also found consistently associated with the risk. The contribution of the school to the risk reaches 7-9% for mathematics and 6-13% for language along the two waves. Implications for research and policy directions are further drawn, in particular the need to further explore variables, not included in the models of this study. © 2016 Informa UK Limited, trading as Taylor & Francis Group.

AUTHOR KEYWORDS: longitudinal programme; multilevel models; predictors of risk; school failure; Students at risk

DOCUMENT TYPE: Article

SOURCE: Scopus

Berg, L.a , Bäck, K.b , Vinnerljung, B.c , Hjern, A.a d

Parental alcohol-related disorders and school performance in 16-year-olds—a Swedish national cohort study

(2016) Addiction, 111 (10), pp. 1795-1803.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84986211309&partnerID=40&md5=bb8a93d474238cbbf1838eb05b9b296f)

[84986211309&partnerID=40&md5=bb8a93d474238cbbf1838eb05b9b296f](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84986211309&partnerID=40&md5=bb8a93d474238cbbf1838eb05b9b296f)

DOI: 10.1111/add.13454

AFFILIATIONS: Centre for Health Equity Studies, Stockholm University/Karolinska Institutet, Stockholm, Sweden;

Department of Södersjukhuset, Karolinska Institutet, Stockholm, Sweden;

Department of Social Work, Stockholm University, Stockholm, Sweden;

Clinical Epidemiology, Department of Medicine, Karolinska Institutet, Stockholm, Sweden

ABSTRACT: Aims: To study the links between parental alcohol-related disorders and offspring school performance and, specifically, whether associations vary by gender of parent or child and whether associations are mediated by other adverse psychosocial circumstances commonly appearing together with parental alcohol problems, such as parental mental health problems or criminal behaviour. Design: Register study in a national cohort. Setting: Sweden. Participants: A total of 740 618 individuals born in Sweden in 1990-96. Measurements: Parental hospital admissions for alcohol-related disorders and school performance in their offspring, in the final year of compulsory school at age 15-16 years was analysed in relation to socio-demographic confounders and psychosocial covariates, using linear and logistic regressions. Findings: Both mothers' and fathers' alcohol-related hospital admissions were associated with lower Z-scores of grades and national mathematics tests scores. After adjustment for parental education and

socio-demographic confounders, beta-coefficients of Z-scores of grades were -0.42 [95% confidence interval (CI) = $-0.45, -0.39$] and -0.42 (95% CI = $-0.43, -0.40$), and beta-coefficients of mathematics tests scores were -0.36 (95% CI = $-0.39, -0.33$) and -0.31 (95% CI = $-0.33, -0.29$), for mothers' and fathers' alcohol-related disorders, respectively. Adjusted odds ratios (ORs) for not being eligible for secondary school were 1.99 (95% CI = $1.84-2.15$) and 2.04 (95% CI = $1.95-2.15$) for mothers' and fathers' alcohol-related disorders, respectively. Adjusting the analyses for psychosocial factors in the family almost eradicated the statistical effects of parental alcohol-related disorders on offspring school performance to beta-coefficients of 0.03 to -0.10 and ORs of $0.89-1.15$. The effect of a mother's alcohol-related hospital admission on school performance was stronger in girls than in boys, whereas no gender differences were seen for a father's alcohol-related hospital admission. Conclusions: In Sweden, alcohol-related disorders in both mothers and fathers are associated with lower school performance in their children at age 15-16 years, with most of the statistical effects being attributed to psychosocial circumstances of the family, such as parental psychiatric disorders, drug use and criminality and receipt of social or child welfare interventions. © 2016 The Authors. Addiction published by John Wiley & Sons Ltd on behalf of Society for the Study of Addiction

AUTHOR KEYWORDS: Parental alcohol-related disorders; psychosocial factors; registry data; school performance; socio-economic factors; Sweden

DOCUMENT TYPE: Article

SOURCE: Scopus

Drake, M.R.A.

Learning to Coach in Practice-Based Teacher Education: A Self-Study [Aprendiendo a asesorar en una formación docente basada en la práctica: un self-study]

(2016) Studying Teacher Education, pp. 1-23. Article in Press.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84989246448&partnerID=40&md5=92b67d7fcc43329a2ea7710681c787fb)

[84989246448&partnerID=40&md5=92b67d7fcc43329a2ea7710681c787fb](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84989246448&partnerID=40&md5=92b67d7fcc43329a2ea7710681c787fb)

DOI: 10.1080/17425964.2016.1237871

AFFILIATIONS: Victoria University of Wellington, New Zealand

ABSTRACT: In some forms of practice-based teacher education, one important task for the teacher educator is to undertake in-the-moment coaching during rehearsals of practice. However, being such a coach is a new role for many teacher educators and requires a different skill set to other forms of teacher educator practice. In addition, there is little literature to which teacher educators can turn when seeking to address the problem of enactment in this context. This article seeks to address this gap in the literature. It reports a self-study undertaken by one mathematics teacher educator as he learned to coach pre-service teachers on the fly, while in turn they learned to orchestrate whole-class mathematical discussions. It seeks to illustrate how the process of journaling can support the journey of discovery that is the development of new practice. Through consulting the literature and story-telling, a picture is painted of how the educator addressed early concerns such as "what is a coach supposed to do?" and "what should a coach pause a rehearsal to talk about?" and began to master coaching - work that was never routine, but rather situated, adaptive, and responsive. The stories draw from a personal journal of field notes and reflections from such events as student rehearsals, lesson conferences, team meetings, reading student work, and professional reading. Journal entries from 12 rehearsal cycles over four years were consulted. © 2016 Informa UK Limited, trading as Taylor & Francis Group

AUTHOR KEYWORDS: coaching; enactment; Journaling; mathematics education; practice-based teacher education

DOCUMENT TYPE: Article in Press

SOURCE: Scopus

Li, W.a , Castro Superfine, A.b

Mathematics teacher educators' perspectives on their design of content courses for elementary preservice teachers

(2016) Journal of Mathematics Teacher Education, pp. 1-23. Article in Press.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84989162886&partnerID=40&md5=4d59a7e2a865f7bf2ee54268195aa61b)

[84989162886&partnerID=40&md5=4d59a7e2a865f7bf2ee54268195aa61b](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84989162886&partnerID=40&md5=4d59a7e2a865f7bf2ee54268195aa61b)

DOI: 10.1007/s10857-016-9356-9

AFFILIATIONS: Learning Sciences Research Institute, University of Illinois at Chicago, 1240 West Harrison Street MC 057, Chicago, IL, United States;

Department of Mathematics, Statistics, and Computer Science, Learning Sciences Research Institute, University of Illinois at Chicago, Chicago, IL, United States

ABSTRACT: This descriptive case study examines six mathematics teacher educators' (MTEs) perspectives on their design of content courses for elementary preservice teachers. By focusing on MTE's design goals and considerations for their mathematics content courses, the means by which they achieved these course design goals, and the challenges they encountered as they carried out their design goals, this study adds to the image of mathematics content courses, and sheds light on the work of MTEs. Our findings indicate that MTEs design content courses that take a learner-centered approach to instruction and that in designing learner-centered content courses, MTEs face a variety of challenges. Implications for the professional development of MTEs are discussed. © 2016 Springer Science+Business Media Dordrecht

AUTHOR KEYWORDS: Content courses for elementary preservice teachers; Course design; Mathematics teacher education; Mathematics teacher educators

DOCUMENT TYPE: Article in Press

SOURCE: Scopus

Iori, M.

Objects, signs, and representations in the semio-cognitive analysis of the processes involved in teaching and learning mathematics: A Duvalian perspective

(2016) Educational Studies in Mathematics, pp. 1-17. Article in Press.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-44989171923&partnerID=40&md5=4dc65c90d5aac785f3dc012027dcb79)

[44989171923&partnerID=40&md5=4dc65c90d5aac785f3dc012027dcb79](https://www.scopus.com/inward/record.uri?eid=2-s2.0-44989171923&partnerID=40&md5=4dc65c90d5aac785f3dc012027dcb79)

DOI: 10.1007/s10649-016-9726-3

AFFILIATIONS: NRD (Nucleo di Ricerca in Didattica della Matematica), University of Bologna, Bologna, Italy

ABSTRACT: In mathematical activities and in the analysis of mathematics teaching-learning processes, objects, signs, and representations are often mentioned, where the meaning assigned to those words is sometimes very broad, sometimes limited, other times intuitive, allusive, or not completely clear. On the other hand, as international research in mathematics education has shown, the confusion between objects, signs, and representations is one of the main reasons of the difficulties in learning mathematics. But what kinds of objects are involved in teaching-learning mathematics? Why should we distinguish a knowledge object, and in particular a mathematical object, from one of its representations? What is meant by "sign"? Can we equate the term "sign" with the term "representation"? In this article we will try to provide an answer to these questions, taking into account the main contributions to mathematics education made by the semiotic theories that are considered the most relevant in the analysis of the cognitive processes involved in mathematical activities. In particular, we will refer to the semiotic representation registers theory, on which Duval's semio-cognitive approach is based. In general it will be shown that the choice of a semiotic approach to mathematics education assumes a fundamental theoretical choice closely tied to the fundamental distinction between classifying signs and classifying semiotic systems, which is often implicit or rather not emphasized enough. The example presented shows how the semio-cognitive analysis of the processes involved in the solution of a mathematical problem provides new and effective professional reading keys of students' difficulties in learning mathematics. © 2016 Springer Science+Business Media Dordrecht

AUTHOR KEYWORDS: Learning mathematics; Objects; Representations; Semio-cognitive analysis; Semiotic representation registers; Signs

DOCUMENT TYPE: Article in Press

SOURCE: Scopus

Han, Y., Jia, G.

Optimizing product manufacturability in 3D printing

(2016) Frontiers of Computer Science, pp. 1-11. Article in Press.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-44988946139&partnerID=40&md5=090b6849f83a7d7f5399aae2a2ad9178)

[44988946139&partnerID=40&md5=090b6849f83a7d7f5399aae2a2ad9178](https://www.scopus.com/inward/record.uri?eid=2-s2.0-44988946139&partnerID=40&md5=090b6849f83a7d7f5399aae2a2ad9178)

DOI: 10.1007/s11704-016-6154-6

AFFILIATIONS: School of Economics and Management, Beihang University, Beijing, China

ABSTRACT: 3D printing has become a promising technique for industry production. This paper presents a research on the manufacturability optimization of discrete products under the influence of 3D printing technology. For this, we first model the problem using a tree structure, and then formulate it as a linear integer programming, where the total

production time is to be minimized with the production cost constraint. To solve the problem, a differential evolution (DE) algorithm is developed, which automatically determines whether traditional manufacturing methods or 3D printing technology should be used for each part of the production. The algorithm is further quantitatively evaluated on a synthetic dataset, compared with the exhaustive search and alternating optimization solutions. Simulation results show that the proposed algorithm can well combine the traditional manufacturing methods and 3D printing technology in production, which is helpful to attain optimized product design and process planning concerning manufacture time. Therefore, it is beneficial to provide reference of the widely application and further industrialization of the 3D printing technology. © 2016 Higher Education Press and Springer-Verlag Berlin Heidelberg

AUTHOR KEYWORDS: 3D printing; differential evolution algorithm; discrete products; manufacturability; optimization
DOCUMENT TYPE: Article in Press
SOURCE: Scopus

Mongillo, M.B.

Creating mathematicians and scientists: disciplinary literacy in the early childhood classroom

(2016) Early Child Development and Care, pp. 1-11. Article in Press.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84989261651&partnerID=40&md5=12c1a7184e2a5242d5c59917218b132e)

[84989261651&partnerID=40&md5=12c1a7184e2a5242d5c59917218b132e](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84989261651&partnerID=40&md5=12c1a7184e2a5242d5c59917218b132e)

DOI: 10.1080/03004430.2016.1236090

AFFILIATIONS: Department of Educational Leadership, Policy, and Instructional Technology, Central Connecticut State University, New Britain, CT, USA

ABSTRACT: Disciplinary literacy focuses on the specific ways a content area thinks, uses language, and shares information. While much of the literature on disciplinary literacy suggests it is an advanced language strategy to be taught to secondary students, early childhood classrooms may be the ideal environment in which to introduce this type of field-specific thinking and learning. Early childhood education (ECE) classrooms, through their approach to teaching and learning, classroom environment, curriculum organisation, and assessment practices, lend themselves to having young learners engage with content in discipline-specific ways. ECE teachers may find it easy to incorporate strategies that can lay the foundation for a deeper understanding of math and science. © 2016 Informa UK Limited, trading as Taylor & Francis Group

AUTHOR KEYWORDS: disciplinary literacy; early childhood education; math education; science education
DOCUMENT TYPE: Article in Press
SOURCE: Scopus

Lovin, L.H.a , Stevens, A.L.a , Siegfried, J.a , Wilkins, J.L.M.b , Norton, A.c
Pre-K-8 prospective teachers' understanding of fractions: An extension of fractions schemes and operations research

(2016) Journal of Mathematics Teacher Education, pp. 1-29. Article in Press.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988965260&partnerID=40&md5=1783fbef87bd34d85471a9d6d6105e7d)

[84988965260&partnerID=40&md5=1783fbef87bd34d85471a9d6d6105e7d](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988965260&partnerID=40&md5=1783fbef87bd34d85471a9d6d6105e7d)

DOI: 10.1007/s10857-016-9357-8

AFFILIATIONS: Department of Mathematics and Statistics, James Madison University, 305 Roop Hall, MSC 1911, Harrisonburg, VA, United States;
School of Education, 300C War Memorial Hall, Virginia Tech, Blacksburg, VA, United States;

Department of Mathematics, 434 McBryde Hall, Virginia Tech, Blacksburg, VA, United States

ABSTRACT: In an effort to expand our knowledge base pertaining to pre-K-8 prospective teachers' understanding of fractions, the present study was designed to extend the work on fractions schemes and operations to this population. One purpose of our study was to validate the fractions schemes and operations hierarchy with the pre-K-8 prospective teacher population to determine whether this population follows the same trajectory as upper elementary and middle school students. A second purpose of our study was to identify which of the fractions schemes and operations our sample of prospective teachers demonstrated evidence of having constructed along with what this tells us about prospective teachers' understanding of fractions. We were able to validate the hierarchy for this population, meaning that each lower-level fraction scheme/operation appeared to be a prerequisite to the higher-level schemes/operations. We found that although most of

the prospective teachers had constructed the lower-level schemes and operations, less than half had constructed the more sophisticated ones. An unexpected result related to the association between the coordination of three levels of units and the iterative fraction scheme is addressed. Prospective teachers' reliance on procedural knowledge related to fractions also presented a challenge to assessing, in particular, their ability to coordinate three levels of units. We conclude with implications for research and practice in mathematics courses intended for pre-K-8 prospective teachers. © 2016 Springer Science+Business Media Dordrecht

AUTHOR KEYWORDS: Fractions; Learning trajectory; Mathematical content knowledge; Prospective elementary teacher; Prospective middle school teacher; Teacher education
DOCUMENT TYPE: Article in Press
SOURCE: Scopus

Bozick, R.a , Srinivasan, S.b , Gottfried, M.c

Do high school STEM courses prepare non-college bound youth for jobs in the STEM economy? (2016) Education Economics, pp. 1-17. Article in Press.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84989235483&partnerID=40&md5=f2df71943fb44a0b22641364c0851c4a>

DOI: 10.1080/09645292.2016.1234585

AFFILIATIONS: RAND Corporation, Santa Monica, CA, USA;
Economic Commission for Latin America and the Caribbean, Santiago, Chile;
Gevirtz Graduate School of Education, University of California-Santa Barbara, Santa Barbara, CA, USA

ABSTRACT: Our study assesses whether high school science, technology, engineering, and mathematics (STEM) courses provide non-college bound youth with the skills and training necessary to successfully transition from high school into the STEM economy.

Specifically, our study estimates the effects that advanced math, advanced science, engineering, and computer science courses in high school have on the probability that non-college bound youth will obtain employment in the STEM economy and on wages within two years of graduating from high school. Our findings indicate that STEM coursework is unrelated with the probability of securing a job in the STEM economy and is unrelated with wages two years post high school graduation. © 2016 Informa UK Limited, trading as Taylor & Francis Group

AUTHOR KEYWORDS: school-to-work; STEM; vocational education
DOCUMENT TYPE: Article in Press
SOURCE: Scopus

Murphy, P.K.a , Firetto, C.M.a , Greene, J.A.b

Enriching Students' Scientific Thinking Through Relational Reasoning: Seeking Evidence in Texts, Tasks, and Talk

(2016) Educational Psychology Review, pp. 1-13. Article in Press.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988934671&partnerID=40&md5=b61582e30ceb409afe00c253ef8f0da7>

DOI: 10.1007/s10648-016-9387-x

AFFILIATIONS: Department of Educational Psychology, Counseling, and Special Education, The Pennsylvania State University, 102 CEDAR Building, University Park, PA, United States;
The University of North Carolina at Chapel Hill, Chapel Hill, NC, United States

ABSTRACT: As reflected in the Next Generation Science Standards, concerns about the adequacy of education and career preparation in science, technology, engineering, and mathematics (STEM) fields have led to fundamental shifts in the focus of K-12 science education. Such shifts are also highlighted in many of the articles within this special issue, and the issue focus on the role of relational reasoning in learning in STEM domains. Within this commentary, we reflect upon how the articles within this special issue align with, and shed new light on, the Next Generation Science Standards (NGSS), specifically with respect to relational reasoning. We then describe a novel pedagogical approach designed to augment students' acquisition of NGSS practices and core ideas (i.e., Quality Talk Science (QTs)) and how evidence from our research on QTs has shown increases in relational reasoning. In this section, we also provide multiple discourse excerpts that serve as exemplars for each of the four types of relational reasoning (i.e., analogy, anomaly, antinomy, and antithesis). Finally, we present specific exemplars from QTs that reinforce the ideas and findings forwarded by the authors of each

of the papers within this special issue and propose some thoughts regarding future directions for research. © 2016 Springer Science+Business Media New York
AUTHOR KEYWORDS: Classroom discussions; Critical-analytic thinking; Next Generation Science Standards; Relational reasoning
DOCUMENT TYPE: Article in Press
SOURCE: Scopus

Ireson, G.

Gender achievement and social, political and economic equality: a European perspective (2016) Educational Studies, pp. 1-11. Article in Press.
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988731070&partnerID=40&md5=f7c8a8970570810ff76e8cd6dbf53d7d>

DOI: 10.1080/03055698.2016.1237868

AFFILIATIONS: Nottingham Institute of Education, Nottingham Trent University, Nottingham, UK

ABSTRACT: Differences in gender equality based on social, political and economic factors is cited, by some writers, as a contributory factor in the differentially greater achievement of boys in STEM subjects through the concept of gender stratification. Gender differences, especially in mathematics, have been linked directly to gender parity in wider society. Such a link is predicted by gender stratification via both the gender similarities and gender stratification hypotheses. However analysis by others appearsto support the hypothesis that the gender gap is smaller, in mathematics, when the society has a higher equality index. However, more recently, evidence, based on PISA outcomes from 2000 to 2009, reports that there is little or no correlation between the gender gap and wider equality. This paper takes up this analysis using PISA data from the 2012 round, for both science and mathematics, and the Global Gender Gap Index in a European context. The results cast doubts on any link between national gender equality and achievement in science or mathematics. © 2016 Informa UK Limited, trading as Taylor & Francis Group

AUTHOR KEYWORDS: education; Equality; gender; mathematics; science

DOCUMENT TYPE: Article in Press

SOURCE: Scopus

Miyazaki, M.a , Fujita, T.b , Jones, K.c

Students' understanding of the structure of deductive proof (2016) Educational Studies in Mathematics, pp. 1-17. Article in Press.
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988353588&partnerID=40&md5=9582c422683b5e3297eb4fa329ca3a59>

DOI: 10.1007/s10649-016-9720-9

AFFILIATIONS: Institute of Education, Shinshu University, Roku-Ro Nishinagano, Nagano-Shi, Japan;

Graduate School of Education, University of Exeter, Exeter, United Kingdom; School of Education, University of Southampton, Southampton, United Kingdom

ABSTRACT: While proof is central to mathematics, difficulties in the teaching and learning of proof are well-recognised internationally. Within the research literature, a number of theoretical frameworks relating to the teaching of different aspects of proof and proving are evident. In our work, we are focusing on secondary school students learning the structure of deductive proofs and, in this paper, we propose a theoretical framework based on this aspect of proof education. In our framework, we capture students' understanding of the structure of deductive proofs in terms of three levels of increasing sophistication: Pre-structural, Partial-structural, and Holistic-structural, with the Partial-structural level further divided into two sub-levels: Elemental and Relational. In this paper, we apply the framework to data from our classroom research in which secondary school students (aged 14) tackled a series of lessons that provided an introduction to proof problems involving congruent triangles. Using data from the transcribed lessons, we focus in particular on students who displayed the tendency to accept a proof that contained logical circularity. From the perspective of our framework, we illustrate what we argue are two independent aspects of Relational understanding of the Partial-structural level, those of universal instantiation and hypothetical syllogism, and contend that accepting logical circularity can be an indicator of lack of understanding of syllogism. These findings can inform how teaching approaches might be improved so that students develop a more secure understanding of deductive proofs and proving in geometry. © 2016 The Author(s)

AUTHOR KEYWORDS: Hypothetical syllogism; Proof; Structure; Understanding; Universal instantiation

DOCUMENT TYPE: Article in Press

SOURCE: Scopus

Miller, B.G.a , Roehrig, G.b

Indigenous cultural contexts for STEM experiences: snow snakes' impact on students and the community

(2016) Cultural Studies of Science Education, pp. 1-28. Article in Press.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988419470&partnerID=40&md5=63bf149df845294fab0e1ff541d4a402)

[84988419470&partnerID=40&md5=63bf149df845294fab0e1ff541d4a402](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988419470&partnerID=40&md5=63bf149df845294fab0e1ff541d4a402)

DOI: 10.1007/s11422-016-9738-4

AFFILIATIONS: Department of Curriculum and Instruction, University of Idaho, 875

Perimeter Dr., Moscow, ID, United States;

University of Minnesota, St. Paul, United States

ABSTRACT: Opportunities for American Indian youth to meaningfully engage in school-based science, technology, engineering, and mathematics (STEM) experiences have historically been inadequate. As a consequence, American Indian students perform lower on standardized assessments of science education than their peers. In this article we describe the emergence of meaning for students—as well as their community—resulting from Indigenous culturally-based STEM curriculum that used an American Indian tradition as a focal context. Specifically, the game of snow snakes (Gooneginebig in Ojibwe) afforded an opportunity for STEM and culturally-based resources to work in unison. A case study research design was used with the bounded case represented by the community associated with the snow snake project. The research question guiding this study was: What forms of culturally relevant meaning do students and the community form as a result of the snow snake game? Results indicate evidence of increased student and community engagement through culturally-based STEM experiences in the form of active participation and the rejuvenation of a traditional game. Implications are discussed for using culturally-based contexts for STEM learning. © 2016 Springer Science+Business Media Dordrecht

AUTHOR KEYWORDS: Community; Culturally-based; Curriculum; Engagement; Snow snakes; STEM

DOCUMENT TYPE: Article in Press

SOURCE: Scopus

Xu, J.

Emotion regulation in mathematics homework: An empirical study

(2016) Journal of Educational Research, pp. 1-11. Article in Press.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84987918289&partnerID=40&md5=a4b72ce17b1ad6b73b63fc985cbf8c48)

[84987918289&partnerID=40&md5=a4b72ce17b1ad6b73b63fc985cbf8c48](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84987918289&partnerID=40&md5=a4b72ce17b1ad6b73b63fc985cbf8c48)

DOI: 10.1080/00220671.2016.1175409

AFFILIATIONS: Department of Counseling, Educational Psychology, and Foundations

Mississippi State University, Mississippi State, Mississippi, USA

ABSTRACT: The author examined 2 distinctive aspects of emotion regulation in mathematics homework, including emotion management and cognitive reappraisal. Participants were 1,799 high school students from 46 classes in China. Two multilevel models were run, 1 with emotion management and another with cognitive reappraisal as the dependent variable. Both emotion management and cognitive reappraisal were positively associated with 5 individual-level variables (monitoring motivation, managing time, learning-oriented reasons, self-concept, and teacher feedback) and 1 class-level variable (self-concept). In addition, at the individual level, emotion management was associated negatively with adult-oriented reasons but positively with arranging the environment and prior mathematics achievement. Meanwhile, cognitive reappraisal was positively associated with parent education at the class level. © 2016 Taylor & Francis

AUTHOR KEYWORDS: Cognitive reappraisal; cultural differences; emotion management; emotion regulation; homework; mathematics; self-regulation

DOCUMENT TYPE: Article in Press

SOURCE: Scopus

Knight, B.A.a b , McIntyre, H.D.a c d e , Hickman, I.J.e f , Noud, M.a b

Qualitative assessment of user experiences of a novel smart phone application designed to support flexible intensive insulin therapy in type 1 diabetes

(2016) BMC Medical Informatics and Decision Making, 16 (1), art. no. 119, .

<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84987860753&partnerID=40&md5=8cb677258d364fbf2f92869dd1dfa66a>

DOI: 10.1186/s12911-016-0356-6

AFFILIATIONS: Queensland Diabetes and Endocrine Centre, Mater Health Services, Brisbane, Australia;

Lady Cilento Children's Hospital, Brisbane, Australia;

School of Medicine, University of Queensland, Brisbane, Australia;

Mothers and Babies Theme, Mater Research Institute, University of Queensland, Brisbane, Australia;

Mater Research Institute, University of Queensland, Brisbane, Australia;

Department of Nutrition and Dietetics, Princess Alexandra Hospital, Brisbane, Australia

ABSTRACT: Background: Modern flexible multiple daily injection (MDI) therapy requires people with diabetes to manage complex mathematical calculations to determine insulin doses on a day to day basis. Automated bolus calculators assist with these calculations, add additional functionality to protect against hypoglycaemia and enhance the record keeping process, however uptake and use depends on the devices meeting the needs of the user. We aimed to obtain user feedback on the usability of a mobile phone bolus calculator application in adults with T1DM to inform future development of mobile phone diabetes support applications. Methods: Adults with T1DM who had previously received education in flexible MDI therapy were invited to participate. Eligible respondents attended app education and one month later participated in a focus group to provide feedback on the features of the app in relation to usability for patient-based flexible MDI and future app development. Results: Seven adults participated in the app training and follow up interview. App features that support dose adjustment to reduce hypoglycaemia risk and features that enable greater efficiency in dose calculation, record keeping and report generation were highly valued. Conclusions: Adults who are self managing flexible MDI found the Rapidcalc mobile phone app to be a useful self-management tool and additional features to further improve usability, such as connectivity with BG meter and food databases, shortcut options to economise data entry and web based storage of data, were identified. Further work is needed to ascertain specific features and benefit for those with lower health literacy. © 2016 The Author(s).

AUTHOR KEYWORDS: Applications; Diabetes technology; Intensive management; iphone; Self-management

DOCUMENT TYPE: Article

SOURCE: Scopus

Ker, H.-W.

The effects of motivational constructs and engagements on mathematics achievements: a comparative study using TIMSS 2011 data of Chinese Taipei, Singapore, and the USA (2016) Asia Pacific Journal of Education, pp. 1-15. Article in Press.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84987625206&partnerID=40&md5=0281f721cf29b3cd88a8da88c48029ca>

DOI: 10.1080/02188791.2016.1216826

AFFILIATIONS: Department of International Trade, Chihlee University of Technology, New Taipei City, Taiwan

ABSTRACT: Motivational constructs and students' engagements have great impacts on students' mathematics achievements, yet they have not been theoretically investigated using international large-scale assessment data. This study utilized the mathematics data of the Trends in International Mathematics and Science Study 2011 to conduct a comparative and empirical study on exploring: (1) the changes of motivational constructs from 4th grade to 8th grade; and (2) the effects of motivational constructs from the expectancy-value model and students' engagements on mathematics achievements. The countries investigated include Chinese Taipei, Singapore, and the USA. The results showed that: (1) students' motivations deteriorate over school years; (2) self-confidence in mathematics (SCM) has the strongest relationship with mathematics achievements. Furthermore, it is evident that Singapore has the most effective schools in students' mathematics education. More findings of this comparative study are subsequently discussed. © 2016 National Institute of Education, Singapore

AUTHOR KEYWORDS: ability perceptions; engagements; intrinsic values; Motivational constructs; TIMSS 2011

DOCUMENT TYPE: Article in Press

SOURCE: Scopus

Finau, T., Treagust, D.F., Won, M., Chandrasegaran, A.L.

Effects of a Mathematics Cognitive Acceleration Program on Student Achievement and Motivation

(2016) International Journal of Science and Mathematics Education, pp. 1-20. Article in Press.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-44987667419&partnerID=40&md5=002f9583ef1d1476150c068c788536d2)

[44987667419&partnerID=40&md5=002f9583ef1d1476150c068c788536d2](https://www.scopus.com/inward/record.uri?eid=2-s2.0-44987667419&partnerID=40&md5=002f9583ef1d1476150c068c788536d2)

DOI: 10.1007/s10763-016-9763-5

AFFILIATIONS: Science and Mathematics Education Centre, Curtin University, PO Box U1987, Perth, WA, Australia

ABSTRACT: This paper presents the effects of a cognitive acceleration program in mathematics classes on Tongan students' achievements, motivation and self-regulation. Cognitive Acceleration in Mathematics Education (CAME) is a program developed at King's College and implemented worldwide with the aim of improving students' thinking skills, mathematics performance and attitudes. The first author adapted the program materials to Tongan educational context and provided support to participating teachers for 8 months. This study employed a quasi-experimental design with 219 Year 8 students as the experimental group and 119 Year 8 students as the comparison group. There were a significant differences in the mean scores between the pre-test and post-test of the three instruments that were employed in the study, indicating that learning mathematics under the CAME program had a positive effect on levels of students' self-regulation, motivation and mathematics achievement. Students also reported changes to the ways they learn mathematics. © 2016 Ministry of Science and Technology, Taiwan

AUTHOR KEYWORDS: Achievement; Cognitive acceleration; Lower secondary schools; Mathematics learning; Motivation; Self-regulation

DOCUMENT TYPE: Article in Press

SOURCE: Scopus

Simon, M.A.

Explicating mathematical concept and mathematical conception as theoretical constructs for mathematics education research

(2016) Educational Studies in Mathematics, pp. 1-21. Article in Press.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-44987642330&partnerID=40&md5=0695089a653f5fbb616ad0a7407f4b94)

[44987642330&partnerID=40&md5=0695089a653f5fbb616ad0a7407f4b94](https://www.scopus.com/inward/record.uri?eid=2-s2.0-44987642330&partnerID=40&md5=0695089a653f5fbb616ad0a7407f4b94)

DOI: 10.1007/s10649-016-9728-1

AFFILIATIONS: Department of Teaching & Learning, New York University, 239 Greene St, #420, New York, NY, United States

ABSTRACT: Mathematical understanding continues to be one of the major goals of mathematics education. However, what is meant by "mathematical understanding" is underspecified. How can we operationalize the idea of mathematical understanding in research? In this article, I propose particular specifications of the terms mathematical concept and mathematical conception so that they may serve as useful constructs for mathematics education research. I discuss the theoretical basis of the constructs, and I examine the usefulness of these constructs in research and instruction, challenges involved in their use, and ideas derived from our experience using them in research projects. Finally, I provide several examples of articulated mathematical concepts. © 2016 Springer Science+Business Media Dordrecht

AUTHOR KEYWORDS: Instructional goals; Mathematical concept; Mathematical conception; Mathematical understanding; Mathematics learning

DOCUMENT TYPE: Article in Press

SOURCE: Scopus

Brandt, J., Lunt, J., Meilstrup, G.R.

Mathematicians' and Math Educators' Views on "Doing Mathematics"

(2016) PRIMUS, 26 (8), pp. 753-769.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-44976595884&partnerID=40&md5=a92a3f853010563fb66bbbda08f2f8fd)

[44976595884&partnerID=40&md5=a92a3f853010563fb66bbbda08f2f8fd](https://www.scopus.com/inward/record.uri?eid=2-s2.0-44976595884&partnerID=40&md5=a92a3f853010563fb66bbbda08f2f8fd)

DOI: 10.1080/10511970.2016.1166408

AFFILIATIONS: Department of Mathematics, Southern Utah University, United States

ABSTRACT: Educators often argue that mathematics should be taught so that the students in the course are actually "doing mathematics." Is there a consensus among mathematicians and mathematics educators as to the meaning of "doing mathematics?" In an effort to

answer this question, we administered a survey to hundreds of university-level mathematics and mathematics education faculty members. Participants ranked the importance of various mathematical activities and also responded to several open-ended questions. Responses to the open-ended questions were analyzed qualitatively to identify patterns. In this paper, we discuss the patterns we observed in analyzing the survey data, with a particular focus on the similarities and differences between mathematicians and mathematics educators. Copyright © Taylor & Francis Group, LLC.

AUTHOR KEYWORDS: doing mathematics; mathematical activities; mathematical tasks; Teacher beliefs

DOCUMENT TYPE: Article

SOURCE: Scopus

Griffith, K.M., Cataldo, R.D., Fogarty, K.H.

Do-It-Yourself: 3D Models of Hydrogenic Orbitals through 3D Printing

(2016) Journal of Chemical Education, 93 (9), pp. 1586-1590.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84987622068&partnerID=40&md5=5c445a2286deb9784e4a728e1225b64d)

[84987622068&partnerID=40&md5=5c445a2286deb9784e4a728e1225b64d](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84987622068&partnerID=40&md5=5c445a2286deb9784e4a728e1225b64d)

DOI: 10.1021/acs.jchemed.6b00293

AFFILIATIONS: Department of Chemistry, High Point University, One University Parkway, High Point, NC, United States

ABSTRACT: Introductory chemistry students often have difficulty visualizing the 3-dimensional shapes of the hydrogenic electron orbitals without the aid of physical 3D models. Unfortunately, commercially available models can be quite expensive. 3D printing offers a solution for producing models of hydrogenic orbitals. 3D printing technology is widely available, and the cost of 3D printing "inks" is relatively low. Creation of models requires graphing electron orbital probability distributions in spherical coordinates and exporting as stereolithography (.stl) files (a common format for 3D printing). There is both freeware (CalcPlot3D), and license-requiring (Matlab, Mathematica, Maple) software capable of plotting orbital equations and exporting in the required format. The process of creating the orbitals is relatively simple, and the 3D printing methodology is cost-effective. © 2016 The American Chemical Society and Division of Chemical Education, Inc.

AUTHOR KEYWORDS: Atomic Properties/Structure; First-Year Undergraduate/General; Hands-On Learning/Manipulatives; Inorganic Chemistry; Multimedia-Based Learning; Physical Chemistry; Quantum Chemistry; Upper-Division Undergraduate

DOCUMENT TYPE: Article

SOURCE: Scopus

Prendergast, M.a , O'Meara, N.b

A profile of mathematics instruction time in Irish second level schools

(2016) Irish Educational Studies, pp. 1-18. Article in Press.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84986213883&partnerID=40&md5=9f3cfc361399a415945f0ebd7d5630e4)

[84986213883&partnerID=40&md5=9f3cfc361399a415945f0ebd7d5630e4](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84986213883&partnerID=40&md5=9f3cfc361399a415945f0ebd7d5630e4)

DOI: 10.1080/03323315.2016.1229209

AFFILIATIONS: School of Education, Arts Block, Trinity College Dublin, Dublin, Ireland;

EPI-STEM, National Centre in STEM Education, University of Limerick, Limerick, Ireland

ABSTRACT: Similar to countries such as the UK and Netherlands, second level schools in Ireland are free to decide how to allocate instruction time between curriculum subjects. This results in variations between the quantum of time allocated to teaching mathematics in different schools and between different class groups within the same school. This quantitative study builds a profile for both lower second level (Junior Cycle) and upper second level (Senior Cycle) mathematics instruction time in Ireland. The results of the study highlight that although the proportion of time is on par with the OECD average, there are many issues of concern regarding instruction time in Ireland. These include the short length of the school year, experimentation with new teaching approaches, the high number of subjects studied, variations between individual school and class group allocations and the number of classes that do not take place. © 2016 Educational Studies Association of Ireland

AUTHOR KEYWORDS: education policy; mathematics instruction time; second level schools in Ireland

DOCUMENT TYPE: Article in Press

SOURCE: Scopus

Björklund, C.

Learning about "Half": Critical Aspects and Pedagogical Strategies in Designed Preschool Activities

(2016) Scandinavian Journal of Educational Research, pp. 1-19. Article in Press.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84987619484&partnerID=40&md5=465cbe242654ac52c4d7b7d7100a2547)

[84987619484&partnerID=40&md5=465cbe242654ac52c4d7b7d7100a2547](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84987619484&partnerID=40&md5=465cbe242654ac52c4d7b7d7100a2547)

DOI: 10.1080/00313831.2016.1212264

AFFILIATIONS: Department of Education, Communication and Learning, University of Gothenburg, Gothenburg, Sweden

ABSTRACT: This is an empirical inquiry concerning children's concept development and early mathematics teaching. The intention is to broaden the understanding of preschool children's perceptions of the concept "half" (as 1 of 2 equal parts of a whole), in designed mathematics teaching settings. Three teachers working with 4-5-year-old children participate in an in-service program, involving continuous and cooperative reflection and theoretically designed teaching activities. Observations of pedagogical strategies and children's responses reveal that: children show qualitatively different ways of experiencing the same concept; the ways of experiencing are critical for how the intended learning object is perceived; and the dimensions of the learning object are related to each other, suggesting a hierarchical organization of how to perceive aspects of "half."

© 2016 Scandinavian Journal of Educational Research

AUTHOR KEYWORDS: Concept development; early childhood education; half; pedagogical strategies

DOCUMENT TYPE: Article in Press

SOURCE: Scopus

Moreno, N.P., Tharp, B.Z., Vogt, G., Newell, A.D., Burnett, C.A.

Preparing Students for Middle School Through After-School STEM Activities

(2016) Journal of Science Education and Technology, pp. 1-9. Article in Press.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84986274553&partnerID=40&md5=fcab83c7af86aae33f1eb3123585c963)

[84986274553&partnerID=40&md5=fcab83c7af86aae33f1eb3123585c963](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84986274553&partnerID=40&md5=fcab83c7af86aae33f1eb3123585c963)

DOI: 10.1007/s10956-016-9643-3

AFFILIATIONS: Baylor College of Medicine, Houston, TX, United States

ABSTRACT: The middle school years are a crucial time for cultivating students' interest in and preparedness for future STEM careers. However, not all middle school children are provided opportunities to engage, learn and achieve in STEM subject areas. Engineering, in particular, is neglected in these grades because it usually is not part of science or mathematics curricula. This study investigates the effectiveness of an engineering-integrated STEM curriculum designed for use in an after-school environment. The inquiry-based activities comprising the unit, Think Like an Astronaut, were intended to introduce students to STEM careers—specifically engineering and aerospace engineering—and enhance their skills and knowledge applicable related to typical middle school science objectives. Results of a field test with a diverse population of 5th grade students in nine schools revealed that Think Like an Astronaut lessons are appropriate for an after-school environment, and may potentially help increase students' STEM-related content knowledge and skills. © 2016 Springer Science+Business Media New York

AUTHOR KEYWORDS: After school; Engineering education; Middle school preparedness; STEM

DOCUMENT TYPE: Article in Press

SOURCE: Scopus

Torres, D.D.

Cultural discontinuity between home and school and American Indian and Alaska Native children's achievement

(2016) Journal of Educational Research, pp. 1-17. Article in Press.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84987680085&partnerID=40&md5=bc83f6e48df9ccf470aeb13cfbb9e521)

[84987680085&partnerID=40&md5=bc83f6e48df9ccf470aeb13cfbb9e521](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84987680085&partnerID=40&md5=bc83f6e48df9ccf470aeb13cfbb9e521)

DOI: 10.1080/00220671.2015.1103686

AFFILIATIONS: Houston Education Research Consortium, Kinder Institute for Urban Research, Rice University, Houston, Texas, USA

ABSTRACT: An assumption of culture-based education with respect to American Indian and Alaska Native (AI/AN) children is that discontinuity between home and school cultures is responsible for educational underachievement. Using data from the 2009 round of the National Indian Education Study, a subset of the larger National Assessment of Education

Progress (NAEP), the author constructed a measure of cultural discontinuity and examined its relationship to AI/AN students' Grade 4 and 8 reading and mathematics achievement. Contrary to the cultural discontinuity hypothesis, there is no statistically significant negative relationship when the culture of the home is discontinued at school. On the Grade 4 NAEP reading assessment, in particular, cultural discontinuity was positively associated with students' achievement, net of both student- and school-level controls. Findings suggest that the assumptions of culture-based education may be overstated, though longitudinal data are still needed to be able to make causal claims. ©2016 Taylor & Francis Group, LLC

AUTHOR KEYWORDS: American Indian and Alaska Native education; cultural discontinuity; culture-based education

DOCUMENT TYPE: Article in Press

SOURCE: Scopus

Allen, J., Park Rogers, M., Borowski, R.

"I am Out of My Comfort Zone": Self-study of the Struggle of Adapting to the Professional Identity of a Teacher Educator ["Fuera de mi zona de comodidad": Un self-study de la dificultad para adaptarse a la identidad profesional de un formador docente]

(2016) Studying Teacher Education, pp. 1-13. Article in Press.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84986222767&partnerID=40&md5=48320f2710a3e9b8d584117db27a3734)

[84986222767&partnerID=40&md5=48320f2710a3e9b8d584117db27a3734](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84986222767&partnerID=40&md5=48320f2710a3e9b8d584117db27a3734)

DOI: 10.1080/17425964.2016.1228048

AFFILIATIONS: Indiana University, USA

ABSTRACT: It is often assumed that graduate students will develop as teacher educators simply by participating in a doctoral program. However, research has shown that doctoral students find the shift from teaching K-12 to preparing teachers to be a difficult transition. Within the context of a doctoral program community of practice established specifically for the purpose of examining this transition through self-study research, we sought to understand the shift in identity of a novice teacher educator working as an early field experience instructor with elementary science and mathematics preservice teachers. Our findings indicate that the process of self-study research, when supported within a community of practice, offered Jared the opportunity to recognize different aspects of his shifting professional identity, the dominance of particular aspects of his identity in certain situations, and the impact this was having on his students' development as teachers. Developing this awareness of his adapting professional teaching identity from a classroom teacher to a teacher educator should help as he continues to develop his knowledge and skills working with teachers in different contexts and at different grade levels. Implications for how teacher education programs could better support the professional identity development of novice teacher educators through the use of a self-study focused community of practice are discussed. © 2016 Informa UK Limited, trading as Taylor & Francis Group

AUTHOR KEYWORDS: community of practice; early field experience; preservice teacher education; Professional identity

DOCUMENT TYPE: Article in Press

SOURCE: Scopus

Garibay, J.C., Vincent, S.

Racially Inclusive Climates Within Degree Programs and Increasing Student of Color Enrollment: An Examination of Environmental/Sustainability Programs

(2016) Journal of Diversity in Higher Education, . Article in Press.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84984923487&partnerID=40&md5=100f159ffead08c5f5b2d64f2fc67fc0)

[84984923487&partnerID=40&md5=100f159ffead08c5f5b2d64f2fc67fc0](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84984923487&partnerID=40&md5=100f159ffead08c5f5b2d64f2fc67fc0)

DOI: 10.1037/dhe0000030

AFFILIATIONS: Dummy Address

ABSTRACT: Students of color remain severely underrepresented in many science, technology, engineering, and mathematics (STEM) disciplines, including environmental fields. Although there is a growing body of research on predictors of selecting a STEM major, generally, much less is known about factors, especially at the program level, that predict the enrollment of students of color into specific STEM degree programs. Additionally, theoretical frameworks and higher education research on college major choice have yet to consider whether the climate for racial/ethnic diversity specifically within academic degree programs may affect the enrollment of students of color in those programs. Given this theoretical and empirical gap, this study set out to investigate whether an

inclusive climate for diversity within a degree program may contribute to an increasing enrollment of students of color in interdisciplinary environmental and sustainability (IES) degree programs. Using a national sample of 343 IES degree programs and extending dimensions of an inclusive campus climate for racial/ethnic diversity to degree programs, findings show that IES degree programs with a more inclusive curriculum and greater student compositional diversity are significantly more likely to report an increasing enrollment of students of color. Implications of the findings for broadening participation and understanding diverse students' college major/career choice are examined. (PsycINFO Database Record (c) 2016 APA, all rights reserved).

AUTHOR KEYWORDS: Broadening participation; Climate for racial/ethnic diversity; College major choice; STEM; Students of color

DOCUMENT TYPE: Article in Press

SOURCE: Scopus

Xu, J.a , Du, J.b , Fan, X.b

Self-regulation of mathematics homework behavior: An empirical investigation (2016) Journal of Educational Research, pp. 1-11. Article in Press.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84986212744&partnerID=40&md5=c876bca54a08c409ccd476914696fa31)

[84986212744&partnerID=40&md5=c876bca54a08c409ccd476914696fa31](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84986212744&partnerID=40&md5=c876bca54a08c409ccd476914696fa31)

DOI: 10.1080/00220671.2015.1125837

AFFILIATIONS: Department of Counseling, Educational Psychology, and Foundations, Mississippi State University, Mississippi State, Mississippi, USA;

Faculty of Education, University of Macau, Taipa, Macau, China

ABSTRACT: The authors examined self-regulation of mathematics homework behavior (i.e., mathematics homework management). The participants consisted of 796 eighth-grade students (46 classes) in China. Multilevel results showed that mathematics homework management was positively associated with value belief at the class and individual level. At the individual level, students' management in mathematics homework was positively related to affective attitude, expectancy belief, learning-oriented reasons, homework interest, parent education, teacher feedback, adult-oriented reasons, and value belief. Meanwhile, students' management in mathematics homework was negatively related to time spent on television. Our findings were discussed in the context of related theoretical frameworks (e.g., self-regulation and expectancy value) as well as previous findings pertaining to homework. © 2016 Taylor & Francis

AUTHOR KEYWORDS: Homework; mathematics; middle school students; self-regulation

DOCUMENT TYPE: Article in Press

SOURCE: Scopus

Yi, H.S.a , Lee, Y.b

A latent profile analysis and structural equation modeling of the instructional quality of mathematics classrooms based on the PISA 2012 results of Korea and Singapore (2016) Asia Pacific Education Review, pp. 1-17. Article in Press.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84984906834&partnerID=40&md5=ed0c45250bf01ffc940d2853f99e5cae)

[84984906834&partnerID=40&md5=ed0c45250bf01ffc940d2853f99e5cae](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84984906834&partnerID=40&md5=ed0c45250bf01ffc940d2853f99e5cae)

DOI: 10.1007/s12564-016-9455-4

AFFILIATIONS: Department of Education, Konkuk University, 120 Neungdong-ro, Gwangjin-gu, Seoul, South Korea;

Graduate College, Konkuk University, 120 Neungdong-ro, Gwangjin-gu, Seoul, South Korea

ABSTRACT: Teachers' classroom behaviors and their effects on student learning have received significant attention from educators, because the quality of instruction is a critical factor closely tied to students' learning experiences. Based on a theoretical model conceptualizing the quality of instruction, this study examined the characteristics of instructional quality represented by cognitive activation, student-oriented teacher behavior, class management, and learning support and investigated the relationships between instructional quality and students' affective and cognitive outcomes. The PISA 2012 survey, administered to students in Korea and Singapore, was used to conduct a latent profile analysis and structural equation modeling. It was found that using more student-oriented instruction and less strategies of cognitive activation was positively associated with lower performance in math, while well-managed classroom and learning support were positively associated with higher performance. The level of instructional quality was generally higher for Singapore than Korea in every index at all achievement levels. Most affective characteristics and the math teachers' instructional focus were positively associated with higher profiles of instructional quality. However, discrepant

results were found between the two countries: Cognitive activation had positive effects on interest and self-concept in math as well as math performance for Korean students, whereas it only had a positive effect on math performance for Singaporean students. In contrast, student-oriented instruction had negative effects on interest in math as well as math performance in Korea, but a positive effect on interest in math in Singapore. The implications of each finding were discussed in detail. © 2016 Education Research Institute, Seoul National University, Seoul, Korea
AUTHOR KEYWORDS: Instructional quality; Math performance; PISA 2012 mathematics; Teachers' classroom behaviors
DOCUMENT TYPE: Article in Press
SOURCE: Scopus

Mackenzie, H.a , Tolley, H.a , Croft, T.b , Grove, M.c , Lawson, D.d
Senior management perspectives of mathematics and statistics support in higher education: moving to an 'ecological' approach
(2016) Journal of Higher Education Policy and Management, 38 (5), pp. 550-561.
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84975217342&partnerID=40&md5=0a2fe14bb8d755dc8805f54c8ec4a264>

DOI: 10.1080/1360080X.2016.1196932

AFFILIATIONS: Researchers for the sigma Network, Mathematics Education Centre, Loughborough University, Loughborough, United Kingdom;
Mathematics Education Centre, Loughborough University, Loughborough, United Kingdom;
School of Mathematics, University of Birmingham, Birmingham, United Kingdom;
Newman Management Group, Newman University, Birmingham, United Kingdom

ABSTRACT: This article explores the perspectives of three senior managers in higher education institutions in England regarding their mathematics and statistics support provision. It does so by means of a qualitative case study that draws upon the writing of Ronald Barnett about the identity of an 'ecological' university, along with metaphors associated with the notion of organisations as living 'organisms', suggested by Gareth Morgan. Using these ideas as a heuristic sheds light upon the view that whilst outwardly universities appear to represent a uniform landscape, mathematics and statistics support alternatively, can be seen as different 'species' within the higher education system. The study illustrates how three universities occupying contrasting ecological 'niches' are responding to the challenges they face by providing and planning different forms of learning support for mathematics and statistics. In conclusion, it is recommended that senior managers reflect upon the possibilities offered by the idea of 'ecological' identities in order to explore how they might respond strategically to a rapidly changing environment. This includes adapting various solutions and the further development of innovative ways of supporting students' transitions throughout the academic lifecycle. In addition, an ecological approach could also aid the formation of the co-creational relationships and networks required for the future success of those developments. © 2016 Association for Tertiary Education Management and the LH Martin Institute for Tertiary Education Leadership and Management.

AUTHOR KEYWORDS: Ecological university; higher education; management; mathematics and statistics support; student transition

DOCUMENT TYPE: Article

SOURCE: Scopus

Bautista, A.a , Tan, L.S.b , Ponnusamy, L.D.c , Yau, X.a
Curriculum integration in arts education: connecting multiple art forms through the idea of 'space'
(2016) Journal of Curriculum Studies, 48 (5), pp. 610-629.
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84945205363&partnerID=40&md5=c582400d7042ab6e42dc3b9d03bb264e>

DOI: 10.1080/00220272.2015.1089940

AFFILIATIONS: Education and Cognitive Development Laboratory, National Institute of Education, Nanyang Technological University, Singapore;
Centre for Research in Pedagogy and Practice, National Institute of Education, Nanyang Technological University, Singapore;
Early Childhood & Special Needs Education, National Institute of Education, Nanyang Technological University, Singapore

ABSTRACT: Abstract: Arts integration research has focused on documenting how the teaching of specific art forms can be integrated with 'core' academic subject matters (e.g.

science, mathematics and literacy). However, the question of how the teaching of multiple art forms themselves can be integrated in schools remains to be explored by educational researchers. This paper draws on data collected at a secondary school in Singapore. The case study analyses how three art teachers, using the idea of 'space' as organizing theme, implemented a module of instruction that connected concepts and processes from a variety of art forms (including dance, music, drama and visual arts). We present evidence from curriculum materials, lesson plans, student-teacher classroom interactions and students' productions. Students were able to reflect upon the importance of space within the arts, analyse the points of convergence and divergence among several art forms, experiment with space and create their own interdisciplinary performances. Our ultimate aim is to provide insights that might inspire art teachers in designing instructional units focused on 'big ideas'. We suggest that allowing more curricular freedom and providing teachers with adequate structures for interdisciplinary collaboration are key to achieving meaningful levels of integration. © 2015 Informa UK Limited, trading as Taylor & Francis Group.

AUTHOR KEYWORDS: arts education; classroom practice; Curriculum integration; integrated arts; teacher learning

DOCUMENT TYPE: Article

SOURCE: Scopus

Holmes, V.-L.a , Hwang, Y.b

Exploring the effects of project-based learning in secondary mathematics education (2016) Journal of Educational Research, 109 (5), pp. 449-463.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-849667111035&partnerID=40&md5=342e08af776913ee05ce067c52a59452)

[849667111035&partnerID=40&md5=342e08af776913ee05ce067c52a59452](https://www.scopus.com/inward/record.uri?eid=2-s2.0-849667111035&partnerID=40&md5=342e08af776913ee05ce067c52a59452)

DOI: 10.1080/00220671.2014.979911

AFFILIATIONS: Department of Mathematics, Hope College, Holland, MI, United States; Department of Education, Hope College, Holland, MI, United States

ABSTRACT: This mixed-method, longitudinal study investigated the benefits of project-based learning (PBL) on secondary-mathematics students' academic skill development and motivated strategies for learning (i.e., cognitive, social, and motivational). The focus of this study was academic skill development (algebra- and geometry-assessment scores) and other factors related to secondary mathematics learning, with comparable traditional high schoolers serving as the control group. In addition, the relationship between PBL and racially/ethnically and economically diverse secondary students was investigated. Results showed that at-risk and minority students benefited greatly from PBL in learning mathematics. The academic performance gap was present, but its width diminished significantly. Compared to their public school counterparts, PBL students were more intrinsically motivated, showed significantly higher critical thinking skills, and appreciated peer learning. Impact of socioeconomic status on the PBL approach needs further investigation. © 2016 Taylor & Francis.

AUTHOR KEYWORDS: Mathematics; motivation; PBL; project based learning; secondary; self-efficacy

DOCUMENT TYPE: Article

SOURCE: Scopus

Miyazaki, T.a b

Is changing teaching practice the mission impossible? A case study of continuing professional development for primary school teachers in Senegal (2016) Compare, 46 (5), pp. 701-722.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84933556912&partnerID=40&md5=0156f55f36fd2de1b13d59719342920c)

[84933556912&partnerID=40&md5=0156f55f36fd2de1b13d59719342920c](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84933556912&partnerID=40&md5=0156f55f36fd2de1b13d59719342920c)

DOI: 10.1080/03057925.2015.1043238

AFFILIATIONS: School of Education and Social Work, Department of Education, University of Sussex, Brighton, United Kingdom;

Japan International Cooperation Agency, Dakar, Senegal

ABSTRACT: This paper reports on research into a continuing professional development (CPD) project, Projet de Renforcement de l'Enseignement des Mathématiques, des Sciences et de la Technologie (PREMST) [Strengthening Mathematics, Science, and Technologies in Education Project]. The literature review reveals few examples of CPD changing the teaching practices of teachers, especially in sub-Saharan Africa. By using the cases of five teachers, this research seeks to understand the complexities of pedagogical change. The research found that PREMST has helped teachers envision how teaching should be

conducted, but it has not necessarily brought a positive change in the learning of pupils because it has not changed how teachers think about teaching. Given the difficulties involved in pedagogical change, emphasising specific skills may have been the necessary and practical first step, but changing these teaching practices is not enough. The research found that teachers still paid little attention to the learning of individual pupils. The research concludes that the recently initiated practice of lesson study shows considerable potential to build on what has already been achieved. © 2015 British Association for International and Comparative Education.

AUTHOR KEYWORDS: CPD; learner-centred; pedagogy; primary education; Senegal; teacher education

DOCUMENT TYPE: Article

SOURCE: Scopus

Bhathal, R.

An appraisal of an online tutorial system for the teaching and learning of engineering physics in conjunction with contextual physics and mathematics, and relevant mathematics (2016) European Journal of Engineering Education, 41 (5), pp. 504-511.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84945242227&partnerID=40&md5=b6776f7f7e5e523fb570d87b22149b94)

[84945242227&partnerID=40&md5=b6776f7f7e5e523fb570d87b22149b94](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84945242227&partnerID=40&md5=b6776f7f7e5e523fb570d87b22149b94)

DOI: 10.1080/03043797.2015.1095162

AFFILIATIONS: School of Computing, Engineering and Mathematics, University of Western Sydney, Penrith, Australia

ABSTRACT: The number of students entering engineering schools in Australian universities has increased tremendously over the last few years because of the Australian Federal Government's policy of increasing the participation rates of Higher School Certificate students and students from low social economic status backgrounds in the tertiary sector. They now come with a diverse background of skills, motivations and prior knowledge. It is imperative that new methods of teaching and learning be developed. This paper describes an online tutorial system used in conjunction with contextual physics and mathematics, and the revision of the relevant mathematical knowledge at the appropriate time before a new topic is introduced in the teaching and learning of engineering physics. Taken as a whole, this study shows that students not only improved their final examination results but there was also an increase in the retention rate of first-year engineering students which has financial implications for the university. © 2015 SEFI.

AUTHOR KEYWORDS: Active learning; blended learning; contextual physics and mathematics; MasteringPhysics (MP); online learning; relevant mathematics

DOCUMENT TYPE: Article

SOURCE: Scopus

Staffas, K.

Heuristic for learning common emitter amplification with bipolar transistors

(2016) European Journal of Engineering Education, pp. 1-15. Article in Press.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84984674622&partnerID=40&md5=a05120aea01c284bd2d853762173f4d7)

[84984674622&partnerID=40&md5=a05120aea01c284bd2d853762173f4d7](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84984674622&partnerID=40&md5=a05120aea01c284bd2d853762173f4d7)

DOI: 10.1080/03043797.2016.1226782

AFFILIATIONS: Department of Engineering Sciences, Uppsala University, Uppsala, Sweden

ABSTRACT: Mathematics in engineering education causes many thresholds in the courses because of the demand of abstract conceptualisation. Electronics depend heavily on more or less complex mathematics. Therefore the concepts of analogue electronics are hard to learn since a great deal of students struggle with the calculations and procedures needed. A survey was done focusing on students' struggle to pass a course in analogue electronics by introducing a top-down perspective and the revised taxonomy of Bloom. From a top-down perspective you can create learning environments from any spot in the taxonomy using a step-by-step approach of the verbs understand and apply. Three textbooks with a top-down perspective on analogue electronics are analysed on the concept of amplifying with a transistor circuit. The study claims issues when losing the top-down perspective to present concepts and procedures of the content to be learned. © 2016 SEFI

AUTHOR KEYWORDS: deep and surface learning; facts; heuristic; procedural and conceptual knowledge; Top-down

DOCUMENT TYPE: Article in Press

SOURCE: Scopus

Samuels, W.E.a , Tournaki, N.a , Blackman, S.b , Zilinski, C.b

Executive functioning predicts academic achievement in middle school: A four-year longitudinal study

(2016) Journal of Educational Research, 109 (5), pp. 478-490.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-44969799398&partnerID=40&md5=12eaf6e1e3099739b00c411b28f53595)

[44969799398&partnerID=40&md5=12eaf6e1e3099739b00c411b28f53595](https://www.scopus.com/inward/record.uri?eid=2-s2.0-44969799398&partnerID=40&md5=12eaf6e1e3099739b00c411b28f53595)

DOI: 10.1080/00220671.2014.979913

AFFILIATIONS: School of Education, College of Staten Island/The City University of New York, Staten Island, NY, United States;

John W. Lavelle Preparatory Charter School, Staten Island, NY, United States

ABSTRACT: Executive functioning (EF) is a strong predictor of children's and adolescents' academic performance. Although research indicates that EF can increase during childhood and adolescence, few studies have tracked the effect of EF on academic performance throughout the middle school grades. EF was measured at the end of Grades 6-9 through 21 teachers' and 22 teacher assistants' assessments of 322 adolescents from disadvantaged backgrounds who attended an urban, chartered middle/high school. Assessment of EF was done through the completion of the Behavior Rating Inventory of Executive Function (BRIEF). BRIEF global executive composite scores (GEC) predicted both current and future English/language arts, mathematics, science, social studies, and Spanish annual grade point averages (GPAs). The effect of BRIEF GEC scores often overshadowed the effects of gender, poverty, and having an individual education plan; the other, non-BRIEF-related effects retained slightly more impact among teacher assistant-derived data than teacher-derived data. The strong relationships between BRIEF GEC scores and these GPAs also remained constant over these 4 years: There was little evidence that EF changed over the measured grades or that the relationship between EF and grades itself regularly changed. The findings indicate that EF scores during early middle grades can well predict academic performance in subsequent secondary-school grades. Although methodological constraints may have impeded the abilities of other factors (i.e., poverty) to be significantly related to GPAs, the effects of EF were strong and robust enough to prompt us to recommend its use to guide long-term, academic interventions. © 2016 Taylor & Francis.

AUTHOR KEYWORDS: Academic achievement; executive functioning; IEPs; individual education plans; longitudinal research; middle school

DOCUMENT TYPE: Article

SOURCE: Scopus

Aunio, P.a , Räsänen, P.b

Core numerical skills for learning mathematics in children aged five to eight years - a working model for educators

(2016) European Early Childhood Education Research Journal, 24 (5), pp. 684-704.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-44921333737&partnerID=40&md5=a3c2bd696e397a090e9e263ef0aa2144)

[44921333737&partnerID=40&md5=a3c2bd696e397a090e9e263ef0aa2144](https://www.scopus.com/inward/record.uri?eid=2-s2.0-44921333737&partnerID=40&md5=a3c2bd696e397a090e9e263ef0aa2144)

DOI: 10.1080/1350293X.2014.996424

AFFILIATIONS: Department of Teacher Education, University of Helsinki, Helsinki, Finland; Niilo Mäki Institute, University of Jyväskylä, Jyväskylä, Finland

ABSTRACT: The aim of this study was to model the most crucial numerical factors to the development of mathematical skills among children aged five to eight years (i.e. kindergarten, preschool, first and second graders). We categorised numerical skills into four main groups based on the results of longitudinal studies. A series of analyses of test batteries designed to measure the development of mathematical skills in children yielded results in support of this construct. Based on our findings we propose a working model for teachers of core numerical skills that focuses on four major factors: (1) symbolic and non-symbolic number sense; (2) understanding mathematical relations (early mathematical-logical principles, arithmetic principles, mathematical operational symbols, place-value and base-ten system); (3) counting skills (knowledge of number-symbols, number word-sequence, enumeration with concrete objects); and (4) basic skills in arithmetic (arithmetic combinations, addition and subtraction skills with number symbols). The adoption of this working model could improve the efficacy of the assessment of numerical skills of children, but also help educators to structure their support more comprehensively. © 2015 EECERA.

AUTHOR KEYWORDS: assessment; early childhood education; early numeracy; learning; mathematics

DOCUMENT TYPE: Article

SOURCE: Scopus

Hofmann, R., Mercer, N.

Teacher interventions in small group work in secondary mathematics and science lessons (2016) *Language and Education*, 30 (5), pp. 400-416.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0->

84951287029&partnerID=40&md5=23fa74e68d448fdf42148b969508a76f

DOI: 10.1080/09500782.2015.1125363

AFFILIATIONS: Faculty of Education, University of Cambridge, Cambridge, United Kingdom

ABSTRACT: Collaborative problem solving, when students work in pairs or small groups on a curriculum-related task, has become an increasingly common feature of classroom education. This paper reports a study of a topic which has received relatively little attention: how teachers can most usefully intervene when students are working in a group, but have encountered some sort of problem. The data used comes from a large-scale interventional study of mathematics and science teaching in secondary schools in south-east England, in which interactions between teachers and students were recorded in their usual classrooms. We identify the typical problem situations which lead to teachers' interventions, and describe the different ways teachers were observed to intervene. We examine the different types of intervention, and consider how effective they are in helping group work proceed in a productive manner. Finally, we offer some conclusions about the practical implications of these findings. © 2015 The Author(s). Published by Taylor & Francis.

AUTHOR KEYWORDS: change in professional practice; classroom talk; Collaborative group work; learning through dialogue; secondary classroom; teaching mathematics and science

DOCUMENT TYPE: Article

SOURCE: Scopus

Swars, S.L.a , Smith, S.Z.a , Smith, M.E.b , Carothers, J.a , Myers, K.a

The preparation experiences of elementary mathematics specialists: examining influences on beliefs, content knowledge, and teaching practices

(2016) *Journal of Mathematics Teacher Education*, pp. 1-23. Article in Press.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0->

84984878637&partnerID=40&md5=e5db4cd0148df0587d9a24fa2cdc10b8

DOI: 10.1007/s10857-016-9354-y

AFFILIATIONS: Department of Early Childhood and Elementary Education, Georgia State University, P.O. Box 3978, Atlanta, GA, United States;

Department of Elementary and Early Childhood Education, Kennesaw State University, 1000 Chastain Road, Kennesaw, GA, United States

ABSTRACT: Many in the field of mathematics education call for elementary schools to have elementary mathematics specialists (EMSs) who provide needed mathematical expertise and support for children and teachers. EMSs serve as a reasonable, immediate alternative to the challenges generated by elementary teachers needing improved mathematical knowledge for teaching in the classroom. However, limited inquiry has explored how to best prepare EMSs and how program features and learning activities influence their development. This mixed-method study identifies some of the interrelated benefits from a K-5 Mathematics Endorsement Program designed to prepare EMSs through examining changes in mathematical beliefs, specialized content knowledge (SCK), and classroom teaching practices during the program. Data (n = 32) were collected over the 2-semester program via belief surveys, a content knowledge assessment, observations of teaching practices, and individual interviews from elementary teachers participating in the program. The findings show some changes in beliefs can be made relatively quickly, other shifts in beliefs take more time and continued support, and changes in SCK and adoption of various aspects of standard-based pedagogy require considerably greater opportunities to learn. The described program features and learning experiences provided a context for these changes and offer considerations for EMS preparation programs. © 2016 Springer Science+Business Media Dordrecht

AUTHOR KEYWORDS: Beliefs; Classroom teaching practices; Content knowledge; Elementary mathematics specialists; Teacher development; Teacher preparation

DOCUMENT TYPE: Article in Press

SOURCE: Scopus

Pittayachawan, S.a , Macauley, P.a , Evans, T.b

Revealing future research capacity from an analysis of a national database of discipline-coded Australian PhD thesis records

(2016) *Journal of Higher Education Policy and Management*, 38 (5), pp. 562-575.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84974851852&partnerID=40&md5=2b6feb60a3c0156cf5190b917e1ce6c1>

DOI: 10.1080/1360080X.2016.1196936

AFFILIATIONS: School of Business IT and Logistics, College of Business, RMIT University, Melbourne, Australia;

Faculty of Arts and Education, Deakin University, Geelong, Australia

ABSTRACT: This article reports how statistical analyses of PhD thesis records can reveal future research capacities for disciplines beyond their primary fields. The previous research showed that most theses contributed to and/or used methodologies from more than one discipline. In Australia, there was a concern for declining mathematical teaching and research capacity. We decided to investigate the 'hidden' mathematics research capacity in PhDs outside of mathematics. Australian PhD records were re-coded with up to three fields. Records with mathematics as one of their codes were selected and analysed for their relationships to disciplines in their other codes. Triple-coding revealed 'hidden' mathematical research capacity that had previously been single-coded in another field had mathematics as one of their subsequent fields. Our findings have implications for policy and planning for mathematics in Australia, and multiple coding of PhD theses records enables analyses for other disciplines to be undertaken to show their research capacities. © 2016 Association for Tertiary Education Management and the LH Martin Institute for Tertiary Education Leadership and Management.

AUTHOR KEYWORDS: Australian PhD data; discipline-coded thesis records; future research capacity; mathematical sciences PhDs; PhD theses

DOCUMENT TYPE: Article

SOURCE: Scopus

Kirwan, L., Hall, K.

The mathematics problem: the construction of a market-led education discourse in the Republic of Ireland

(2016) *Critical Studies in Education*, 57 (3), pp. 376-393.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84945319319&partnerID=40&md5=48f5968fba89e8aa2d9f9b2e53413f1c>

DOI: 10.1080/17508487.2015.1102752

AFFILIATIONS: School of Education, University College Cork, Cork, Ireland

ABSTRACT: Educational change in the neoliberal state is permeated by the effects of forces from outside the field of education itself. The process of governmentality welcomes, indeed demands, the participation of those non-state actors valorised by neoliberalism as well as government agencies dedicated to the advancement of such groups. Inevitably, the concerns of such organisations become central to how the state sees education. This article traces the assembly of national and international agents from industry, business and special interest groups around the concept of 'knowledge economy'. It treats this assemblage as an apparatus (dispositif), examining how the construction of an economic problem is brought to bear on the demand for educational change, and how this construction of the problem is used to shape public opinion in order to prepare the public for a radical change of direction. Confining itself to the reform of mathematics education introduced in the Republic of Ireland in 2010, this article traces the emergence of a mathematics discourse focused on market-led education. It interrogates the construction of 'the mathematics problem' or 'crisis in maths' and argues that the discourse of the present construction is economic in nature, centring as it does on human capital production and market-led reform. © 2015 Informa UK Limited, trading as Taylor & Francis Group.

AUTHOR KEYWORDS: governmentality; human capital; Ireland; knowledge economy; market-led education; mathematics education; neoliberalism; Project Maths

DOCUMENT TYPE: Article

SOURCE: Scopus

Darragh, L.a b

Identity research in mathematics education

(2016) *Educational Studies in Mathematics*, 93 (1), pp. 19-33.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84961832135&partnerID=40&md5=3aa3b66b6a23478b76c263f5f171793e>

DOI: 10.1007/s10649-016-9696-5

AFFILIATIONS: Centro de Investigacion Avanzada en Educacion, Universidad de Chile, Santiago, Chile;

Centre for Mathematical Modelling, Universidad de Chile, Beauchef 851, Santiago, Chile

ABSTRACT: This paper examines the literature on identity within mathematics education published in journals over the past two decades. It analyses the theoretical underpinnings, research methods and definitions of identity, providing a critique rather than a summary of the literature. A total of 188 articles from 85 different journals are reviewed in the sample. This review finds support for common complaints of this research area as lacking in definitions of the concept of identity and suggests that the writing in this topic is at times theoretically incompatible. Furthermore, the work in this field may be coming from two distinct paradigms. Identity may be seen as an action and fit within a sociological frame or it may be seen as an acquisition, fitting within a psychological framing. Defining identity as something we do, as an action, and in particular as performative is promoted in this paper. Finally, suggestions are made for future directions in identity research. © 2016, Springer Science+Business Media Dordrecht.

AUTHOR KEYWORDS: Identity; Literature review; Mathematics education; Performative

DOCUMENT TYPE: Review

SOURCE: Scopus

Aladé, F., Lauricella, A.R., Beaudoin-Ryan, L., Wartella, E.

Measuring with Murray: Touchscreen technology and preschoolers' STEM learning

(2016) Computers in Human Behavior, 62, pp. 433-441. Cited 1 time.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84963705510&partnerID=40&md5=4a75bc7bad448bc92c606aae339fcdbb)

[84963705510&partnerID=40&md5=4a75bc7bad448bc92c606aae339fcdbb](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84963705510&partnerID=40&md5=4a75bc7bad448bc92c606aae339fcdbb)

DOI: 10.1016/j.chb.2016.03.080

AFFILIATIONS: Center on Media and Human Development, School of Communication, Northwestern University, Frances Searle Building 2-147, 2240 Campus Drive, Evanston, IL, United States

ABSTRACT: American students rank well below international peers in the disciplines of science, technology, engineering, and mathematics (STEM). Early exposure to STEM-related concepts is critical to later academic achievement. Given the rise of tablet-computer use in early childhood education settings, interactive technology might be one particularly fruitful way of supplementing early STEM education. Using a between-subjects experimental design, we sought to determine whether preschoolers could learn a fundamental math concept (i.e., measurement with non-standard units) from educational technology, and whether interactivity is a crucial component of learning from that technology.

Participants who either played an interactive tablet-based game or viewed a non-interactive video demonstrated greater transfer of knowledge than those assigned to a control condition. Interestingly, interactivity contributed to better performance on near transfer tasks, while participants in the non-interactive condition performed better on far transfer tasks. Our findings suggest that, while preschool-aged children can learn early STEM skills from educational technology, interactivity may only further support learning in certain contexts. © 2016 Elsevier Ltd. All rights reserved.

AUTHOR KEYWORDS: Informal learning; Interactivity; Preschoolers; STEM education; Touchscreens

DOCUMENT TYPE: Article

SOURCE: Scopus

Foshee, C.M.a , Elliott, S.N.b , Atkinson, R.K.b

Technology-enhanced learning in college mathematics remediation

(2016) British Journal of Educational Technology, 47 (5), pp. 893-905.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84928740210&partnerID=40&md5=689b9a1924ef22bb3827b66f8f802a97)

[84928740210&partnerID=40&md5=689b9a1924ef22bb3827b66f8f802a97](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84928740210&partnerID=40&md5=689b9a1924ef22bb3827b66f8f802a97)

DOI: 10.1111/bjet.12285

AFFILIATIONS: Cleveland Clinic Foundation, Cleveland Clinic Lerner College of Medicine of Case Western University, United States;
Arizona State University, United States

ABSTRACT: US colleges presently face an academic plight; thousands of high school graduates are performing below the expected ability for college-level mathematics. This paper describes an innovative approach intended to improve the mathematics performance of first-year college students, at a large US university. The innovation involved the integration of faculty-led instruction with technology-enhanced learning (TEL). In this

case, TEL refers to a sophisticated software program that delivers mathematics education using an adaptive, self-paced, individualized, mastery-based approach. The purpose of this investigation was to examine the extent to which TEL met the educational requirements of college students in need of remediation and to explore the effects of TEL on students' beliefs about their academic ability and academic behaviors (academic competence). The sample of 2880 included all the students enrolled in a single semester of remedial mathematics. Results suggested successful remediation, as indicated by the end-of-semester course completion rate, with 75% of students eligible to enroll in a first-year sequence mathematics course and an additional 18% on track for eligibility by the following semester. TEL also appeared to have a positive, statistically significant effect on students' learning and academic competence. For these findings, we discuss study limitations and implications for future research. © 2015 British Educational Research Association
DOCUMENT TYPE: Article
SOURCE: Scopus

Aydın, E., Delice, A., Demiroğlu, D.
An analysis of history of mathematics research literature in Turkey: the mathematics education perspective
(2016) BSHM Bulletin, pp. 1-15. Article in Press.
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84987896840&partnerID=40&md5=a4ced66f2188fec70f097effd62c0cbc>

DOI: 10.1080/17498430.2016.1190201
AFFILIATIONS: Marmara University, Turkey
ABSTRACT: Research in history of mathematics gained momentum in the past two decades in Turkey. The present paper aims to describe the patterns in the history of mathematics research in Turkey and to analyse the research in Turkey using a mathematics education framework. The qualitative paradigm and a case study design are used in the study. The obtained data were analysed by using the document analysis technique with the help of a content analysis. The study group which is comprised of twenty-two postgraduate theses at master's or doctoral level were purposefully selected from the higher education council postgraduate theses database. Findings indicate a dearth of research in the area and that most of the theses are done in the area of mathematics education. Moreover, the focus, in general, was on attitudinal variables, and cognitive aspects seemed to be ignored. © 2016 British Society for the History of Mathematics
DOCUMENT TYPE: Article in Press
SOURCE: Scopus

James, S.M.a , Singer, S.R.b c
From the NSF: The national science foundation's investments in broadening participation in science, technology, engineering, and mathematics education through research and capacity building
(2016) CBE Life Sciences Education, 15 (3), art. no. fe7, .
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84986551092&partnerID=40&md5=89cdf40c060bccf84f997acbd6b7f2f1>

DOI: 10.1187/cbe.16-01-0059
AFFILIATIONS: Division of Human Resource Development, Directorate for Education and Human Resources, National Science Foundation, Arlington, VA, United States;
Biology and Cognitive Science Departments, Carleton College, Northfield, MN, United States;
Division of Undergraduate Education, Directorate for Education and Human Resources, National Science Foundation, Arlington, VA, United States
ABSTRACT: The National Science Foundation (NSF) has a long history of investment in broadening participation (BP) in science, technology, engineering, and mathematics (STEM) education. A review of past NSF BP efforts provides insights into how the portfolio of programs and activities has evolved and the broad array of innovative strategies that has been used to increase the participation of groups underrepresented in STEM, including women, minorities, and persons with disabilities. While many are familiar with these long-standing programmatic efforts, BP is also a key component of NSF's strategic plans, has been highlighted in National Science Board reports, and is the focus of ongoing outreach efforts. The majority of familiar BP programs, such as the Louis Stokes Alliances for Minority Participation (now 25 years old), are housed in the Directorate for Education and Human Resources. However, fellowship programs such as the Graduate

Research Fellowships and Postdoctoral Research Fellowships under the Directorate for Biological Sciences (and parallel directorates in other STEM disciplines) are frequently used to address underrepresentation in STEM disciplines. The FY2016 and FY2017 budget requests incorporate funding for NSF INCLUDES, a new cross-agency BP initiative that will build on prior successes while addressing national BP challenges. NSF INCLUDES invites the use of innovative approaches for taking evidence-based best practices to scale, ushering in a new era in NSF BP advancement. © 2016 S. M. James and S. R. Singer.

DOCUMENT TYPE: Article

SOURCE: Scopus

Smith, C., Wingate, L.

Strategies for Broadening Participation in Advanced Technological Education Programs: Practice and Perceptions

(2016) Community College Journal of Research and Practice, 40 (9), pp. 779-796.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84955095573&partnerID=40&md5=e134cd42d0da4491904be21327862412)

[84955095573&partnerID=40&md5=e134cd42d0da4491904be21327862412](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84955095573&partnerID=40&md5=e134cd42d0da4491904be21327862412)

DOI: 10.1080/10668926.2015.1108252

AFFILIATIONS: The Evaluation Center, Western Michigan University, Kalamazoo, MI, United States

ABSTRACT: Expanding and diversifying the STEM (science, technology, engineering, and mathematics) workforce is a national priority. The National Science Foundation is investing efforts at post secondary education institutions to engage individuals who have been historically underrepresented in STEM. This paper investigated the use of strategies to broaden participation in STEM by grantees of NSF's Advanced Technological Education (ATE), who are primarily located at 2-year colleges. The ATE program focuses on developing and improving technician training programs to prepare students for employment in fields that rely on advanced technologies such as nanotechnology, photonics, and mechatronics. A survey, conducted annually by the authors of this study, was used to collect data from ATE grantees on their use and perceptions of strategies to broaden participation in STEM. The findings showed that strategies related to motivation and access to enhance recruitment are more widely used than strategies that improve retention. Respondents identified strategies related to providing financial assistance, mentoring, and conducting outreach activities as the most effective for reaching and engaging underrepresented minority students in academic programs. Despite these perceptions, these strategies seem to be underutilized among this group. © 2016 Taylor & Francis.

DOCUMENT TYPE: Article

SOURCE: Scopus

Brizuela, B.M.

Variables in elementary mathematics education

(2016) Elementary School Journal, 117 (1), pp. 46-71.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84984904128&partnerID=40&md5=8fd9dc49b940ddce1876507ddb3538ed)

[84984904128&partnerID=40&md5=8fd9dc49b940ddce1876507ddb3538ed](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84984904128&partnerID=40&md5=8fd9dc49b940ddce1876507ddb3538ed)

AFFILIATIONS: Tufts University, Department of Education, United States

ABSTRACT: In this article, I analyze episodes from two third-grade classrooms drawn from a larger classroom teaching experiment to explore how these students began to incorporate nonnumerical symbols in their mathematical expressions when asked to represent indeterminate quantities. The article addresses two research questions: What understandings did these third-grade students construct when they used nonnumerical symbols to represent indeterminate quantities, and how did these understandings vary during the course of working on a single task? What were some of the challenges these third-grade students faced when they first used nonnumerical symbols to represent indeterminate quantities, and how did these challenges vary while working on the Candy Boxes task? Using the constructs of semantic space and form/function relationships, I argue that teaching and learning environments that encourage children's use of nonnumerical symbols, such as variable notation, to represent indeterminate quantities can support children's construction of understandings of variables. © 2016 by The University of Chicago. All rights reserved.

DOCUMENT TYPE: Article

SOURCE: Scopus

Sandoval-Hernández, A.a b , Białowolski, P.a c

Factors and conditions promoting academic resilience: a TIMSS-based analysis of five Asian education systems

(2016) Asia Pacific Education Review, 17 (3), pp. 511-520.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84980011674&partnerID=40&md5=9cb5ab4598a94eb07977a94859ba38a6)

[84980011674&partnerID=40&md5=9cb5ab4598a94eb07977a94859ba38a6](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84980011674&partnerID=40&md5=9cb5ab4598a94eb07977a94859ba38a6)

DOI: 10.1007/s12564-016-9447-4

AFFILIATIONS: Data Processing and Research Center, International Association for the Evaluation of Educational Achievement, Hamburg, Germany;

University of Bath, Bath, United Kingdom;

Warsaw School of Economics, Warsaw, Poland

ABSTRACT: It is well documented that academic achievement of students from families of low socioeconomic status (SES) tends to be below their more socially advantaged peers. Several studies have identified factors and conditions that facilitate academic success for disadvantaged students (i.e., promote academic resilience). However, one of the main criticisms of this body of research is in the set of variables that explain academic success for low-SES students and which is not very different from the variables that would explain academic success for all students. The objectives of this article are dual: firstly, to identify factors and conditions associated with academic success, regardless of student SES, and secondly, to identify factors and conditions associated with academic resilience, that is, exclusively for low-SES students. To this end, we used data from Singapore, South Korea, Hong Kong, Chinese Taipei, and Japan in the Trends in International Mathematics and Science Study (TIMSS) 2011. The study sample covered 23,354 students in 720 schools in the five countries. The strategy for analysis was driven by fit of logistic regression models, first predicting the probability of academic success and then subsequent identification of variables significant as predictors for success within the pool of low-SES students. Results indicated that variables, such as positive student attitude to mathematics, teacher confidence in student performance and the test language being spoken at home, were associated with greater chances of academic success. High academic expectations and time spent on mathematics at home demonstrated a differential effect between disadvantaged and non-disadvantaged students in Singapore. In Korea, being male (gender) and in Taipei, low levels of bullying at school, increased the likelihood of resilience. Results suggested that interventions impacting behavior reflected in differentially associated variables could help disadvantaged students to become academically resilient. © 2016, The Author(s).

AUTHOR KEYWORDS: Academic resilience; Educational achievement; Socioeconomic status; TIMSS

DOCUMENT TYPE: Article

SOURCE: Scopus

Lai, C.-L., Hwang, G.-J.

A self-regulated flipped classroom approach to improving students' learning performance in a mathematics course

(2016) Computers and Education, 100, pp. 126-140.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84969654954&partnerID=40&md5=105411e098af255ab279f35a433b42e6)

[84969654954&partnerID=40&md5=105411e098af255ab279f35a433b42e6](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84969654954&partnerID=40&md5=105411e098af255ab279f35a433b42e6)

DOI: 10.1016/j.compedu.2016.05.006

AFFILIATIONS: Graduate Institute of Digital Learning and Education, National Taiwan University of Science and Technology, 43, Keelung Rd., Taipei, Taiwan

ABSTRACT: The flipped classroom is a well-recognized learning mode that enables effective practice and interactions among teachers and students in the class by switching the in-class instructional time and out-of-class practicing time. However, owing to their lack of self-regulated competence, most students might fail to browse and comprehend the instructional materials out of class by themselves. In this paper, a self-regulated flipped classroom approach is proposed to help students schedule their out-of-class time to effectively read and comprehend the learning content before class, such that they are capable of interacting with their peers and teachers in class for in-depth discussions. In order to evaluate the effectiveness of the proposed approach, a quasi-experimental design was employed in an elementary school Mathematics course. The experimental group students learned with the self-regulated flipped classroom approach, while the control group students learned with the conventional flipped classroom approach. The study was conducted using a quantitative approach. The instruments used were a performance test, and questionnaires of self-efficacy and self-regulation. The experimental results indicated that the post-test score of the experimental group was significantly higher

than that of the control group. It was also found that the higher self-regulation students showed significantly different learning achievements when learning with different approaches, while there was no significant difference between lower self-regulation students with the different learning approaches. Moreover, the experimental group showed significantly higher self-efficacy than the control group. In addition, the learning log analysis results further showed that, conforming to the objective of the self-regulated strategy, the students would determine the goals for the next learning phase based on their current performance. To sum up, the findings of this study indicate that integrating the self-regulated strategy into flipped learning can improve students' self-efficacy as well as their strategies of planning and using study time, and hence they can learn effectively and have better learning achievements. © 2016 Elsevier Ltd. All rights reserved.

AUTHOR KEYWORDS: Applications in subject areas; Elementary education; Interactive learning environments; Teaching/learning strategies

DOCUMENT TYPE: Article

SOURCE: Scopus

Didis, M.G.a , Erbas, A.K.b , Cetinkaya, B.b , Cakiroglu, E.c , Alacaci, C.d
Exploring prospective secondary mathematics teachers' interpretation of student thinking through analysing students' work in modelling

(2016) Mathematics Education Research Journal, 28 (3), pp. 349-378.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-44985991700&partnerID=40&md5=07a54ca2bae777f3da72aa3c5e3ca5ab)

[44985991700&partnerID=40&md5=07a54ca2bae777f3da72aa3c5e3ca5ab](https://www.scopus.com/inward/record.uri?eid=2-s2.0-44985991700&partnerID=40&md5=07a54ca2bae777f3da72aa3c5e3ca5ab)

DOI: 10.1007/s13394-016-0170-6

AFFILIATIONS: Faculty of Education, Department of Elementary Education, Gaziosmanpasa University, Tokat, Turkey;

Faculty of Education, Department of Secondary Science and Mathematics Education, Middle East Technical University, Ankara, Turkey;

Faculty of Education, Department of Elementary Education, Middle East Technical University, Ankara, Turkey;

Faculty of Education, Department of Elementary Education, Istanbul Medeniyet University, Istanbul, Turkey

ABSTRACT: Researchers point out the importance of teachers' knowledge of student thinking and the role of examining student work in various contexts to develop a knowledge base regarding students' ways of thinking. This study investigated prospective secondary mathematics teachers' interpretations of students' thinking as manifested in students' work that embodied solutions of mathematical modelling tasks. The data were collected from 25 prospective mathematics teachers enrolled in an undergraduate course through four 2-week-long cycles. Analysis of data revealed that the prospective teachers interpreted students' thinking in four ways: describing, questioning, explaining, and comparing. Moreover, whereas some of the prospective teachers showed a tendency to increase their attention to the meaning of students' ways of thinking more while they engaged in students' work in depth over time and experience, some of them continued to focus on only judging the accuracy of students' thinking. The implications of the findings for understanding and developing prospective teachers' ways of interpreting students' thinking are discussed. © 2016, Mathematics Education Research Group of Australasia, Inc.

AUTHOR KEYWORDS: Interpretations of students' thinking; Mathematics education; Modelling; Prospective teachers; Students' work

DOCUMENT TYPE: Article

SOURCE: Scopus

Sparavigna, A.C.a , Baldi, M.M.b

Symmetry and the golden ratio in the analysis of a regular pentagon

(2016) International Journal of Mathematical Education in Science and Technology, pp. 1-11. Article in Press.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-44988667363&partnerID=40&md5=c3636055b7f031f95422df4d343c349c)

[44988667363&partnerID=40&md5=c3636055b7f031f95422df4d343c349c](https://www.scopus.com/inward/record.uri?eid=2-s2.0-44988667363&partnerID=40&md5=c3636055b7f031f95422df4d343c349c)

DOI: 10.1080/0020739X.2016.1233587

AFFILIATIONS: Department of Applied Science and Technology, Politecnico di Torino, Torino, Italy;

Department of Control and Computer Engineering, Politecnico di Torino, Torino, Italy

ABSTRACT: The regular pentagon had a symbolic meaning in the Pythagorean and Platonic philosophies and a subsequent important role in Western thought, appearing also in arts

and architecture. A property of regular pentagons, which was probably discovered by the Pythagoreans, is that the ratio between the diagonal and the side of these pentagons is equal to the golden ratio. Here, we will study some relations existing between a regular pentagon and this ratio. First, we will focus on the group of fivefold rotational symmetry, to find the position in the complex plane of the vertices of this geometric figure. Then, we will propose an analytic method to solve the same problem based on the Cartesian coordinates, a method where we find the golden ratio without any specific geometric consideration. This study shows a comparison of the use of complex numbers, symmetries and analytic methods, applied to a subject which can be interesting for general education in mathematics. In fact, the proposed approach can convey and link several concepts, requiring only a general pre-college education, showing at the same time the richness that mathematics can offer in solving geometric problems. © 2016 Informa UK Limited, trading as Taylor & Francis Group
AUTHOR KEYWORDS: Geometry; golden ratio; mathematics; mathematics education; symmetry
DOCUMENT TYPE: Article in Press
SOURCE: Scopus

Son, J.-W.

Moving beyond a traditional algorithm in whole number subtraction: Preservice teachers' responses to a student's invented strategy
(2016) Educational Studies in Mathematics, 93 (1), pp. 105-129.
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84958742451&partnerID=40&md5=3ce7810159e5b9223368e2ca41b5b795>

DOI: 10.1007/s10649-016-9693-8

AFFILIATIONS: Department of Learning and Instruction, Graduate School of Education, University at Buffalo - The State University of New York, 569 Baldy Hall, Buffalo, NY, United States

ABSTRACT: Although students' invented strategies typically prove to be meaningful and effective in improving the students' mathematical understanding, much remains unexplored in the current literature. This study examined, through a teaching-scenario task, the nature of 80 preservice teachers' reasoning and responses to students' informal and formal strategies for whole number subtraction. This study also examined challenges reported by preservice teachers attempting to connect students' informal strategies to a traditional method. The broader implications of this study for the international community are discussed, and recommendations for teacher education programs are presented in accordance with the findings of the study. © 2016, Springer Science+Business Media Dordrecht.

AUTHOR KEYWORDS: Preservice teacher education; Student-invented strategy; Whole number subtraction
DOCUMENT TYPE: Article
SOURCE: Scopus

Argiolas, A.a b , Mac Murray, B.C.c , Van Meerbeek, I.d , Whitehead, J.d , Sinibaldi, E.a , Mazzolai, B.a , Shepherd, R.F.d
Sculpting Soft Machines
(2016) Soft Robotics, 3 (3), pp. 101-108.
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84987881503&partnerID=40&md5=6210c9ad050fe56238097c7aae9a623e>

DOI: 10.1089/soro.2016.0004

AFFILIATIONS: Center for Micro-BioRobotics, Istituto Italiano di Tecnologia, Pontedera, Italy;

BioRobotics Institute, Scuola Superiore sant'Anna, Pontedera, Italy;

Department of Materials Science and Engineering, Cornell University, Ithaca, NY, United States;

Sibley School of Mechanical and Aerospace Engineering, Cornell University, 277 Kimball Hall, Ithaca, NY, United States

ABSTRACT: This article describes an easily accessed manufacturing process for soft actuators. It does not require molds and uses safe, readily available materials: table salt and rubber molding compounds. This process involves sculpting or casting uncured rubber compounds and results in soft, open-cell foam structures, which can be sealed to form actuators. The foams have low elastic moduli ranging from 20 to 30 kPa, large ultimate strains over 3.5, and rapid fluid transport rates up to 30 L min⁻¹ cm⁻². To demonstrate the capabilities of this process, we sculpted a simple bending actuator, a

gripper, and many other 3D shapes. Blocked-force measurements demonstrated that the simple bending actuator can exert up to 5 N of force at its tip, and the gripper picked up a 200 g object. This technique could enable engineers of all ages and skill levels to engage in soft robot fabrication, contributing to K-12 STEM education. In addition, the proposed manufacturing technique could be also interesting for the STEAM (Science, Technology, Engineering, Arts, and Mathematics) community, thus combining science and arts. In addition, this work has the potential to inspire a new, more inventive form of engineering by combining the artistic practice of free-form sculpting with robot fabrication. © Copyright 2016, Mary Ann Liebert, Inc. 2016.

AUTHOR KEYWORDS: Actuator; Education; Foam; Pneumatic; School; Silicone

DOCUMENT TYPE: Article

SOURCE: Scopus

Galan, Y.a , Zoriy, Y.a , Briskin, Y.b , Pityn, M.b

Orienteering to optimize the psychophysical wellbeing of young teens (13 to 14-year-old) (2016) Journal of Physical Education and Sport, 16 (3), art. no. 144, pp. 914-920.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988965385&partnerID=40&md5=ee07f4ba244055d56a2d82cbd48930f0)

[84988965385&partnerID=40&md5=ee07f4ba244055d56a2d82cbd48930f0](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988965385&partnerID=40&md5=ee07f4ba244055d56a2d82cbd48930f0)

DOI: 10.7752/jpes.2016.03144

AFFILIATIONS: Yuriy Fedkovych Chernivtsi National University, Chernivtsi, Ukraine; Department of Olympic, Professional and Adaptive Sport, Lviv State University of Physical Culture, Lviv, Ukraine

ABSTRACT: Available research suggests that the learning process in a state-of-art school is a multifaceted phenomenon, characterized by students' cognitive capacity to embrace and process a plethora of information within a short span of time; technicalization and innovation of education; and consequently, without any doubt, it strongly affects students' psycho-emotional and psychophysical wellbeing. Purpose: theoretically prove and develop a complex program of enhancing positive effect of orienteering on young teens' (13-14-year-olds) psychophysical wellbeing and experimentally verify its effectiveness. Material and methods: Judging the validity of the study, the authors provided a clear and precise description of the research methods as followed: theoretical analysis, generalization of the body of specialized and documentary evidence, pedagogical, sociological, anthropometrical, physiological, psycho-physiological techniques, methods of sickness rate assessment, evaluation of health status, and method of mathematical statistics. Results. According to the results of psycho-physiological test on the nervous system response, valid outcomes were measured, that both EG female and male students differ ($p < 0.05$) from CG female and male students, assessing the extent to which the groups were varying in visual-motor response speed, reaction to sound, cognitive reflection and decision making. This fact points out the presence of high-speed component determining high efficiency detection and involving EG students' visual, conceptual, and visuomotor tracking. EG male and female students' results of Romberg's test are higher ($p < 0.05$) and meet age requirements. © JPES.

AUTHOR KEYWORDS: Improvement; Orienteering; Physical education; Program;

Psychophysical training; Psychophysical wellbeing; Students/young teens; Syllabus

DOCUMENT TYPE: Article

SOURCE: Scopus

Silber, S.a , Cai, J.b

Pre-service teachers' free and structured mathematical problem posing

(2016) International Journal of Mathematical Education in Science and Technology, pp. 1-22. Article in Press.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988583243&partnerID=40&md5=024d91b7512bd7512e3126391a840149)

[84988583243&partnerID=40&md5=024d91b7512bd7512e3126391a840149](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988583243&partnerID=40&md5=024d91b7512bd7512e3126391a840149)

DOI: 10.1080/0020739X.2016.1232843

AFFILIATIONS: School of Education, University of Delaware, Newark, DE, USA; Department of Mathematical Sciences, University of Delaware, Newark, DE, USA

ABSTRACT: This exploratory study examined how pre-service teachers (PSTs) pose mathematical problems for free and structured mathematical problem-posing conditions. It was hypothesized that PSTs would pose more complex mathematical problems under structured posing conditions, with increasing levels of complexity, than PSTs would pose under free posing conditions, because the structured posing condition would guide PSTs to more closely consider the mathematical relationships in a posing situation. Sixty-five PSTs - 61 participating in a written assessment and 4 participating in task-based interviews -

responded to problem-posing tasks under free or structured posing conditions. Two-way independent samples t-tests and chi-square tests were used to test the hypothesis, along with a qualitative analysis of the task-based interviews. We found that while the task format had limited impact on the complexity of problems posed, PSTs in the structured-posing condition may have more closely attended to the mathematical concepts in each task, and may have also impacted their process of posing problems than those in the free posing condition. © 2016 Informa UK Limited, trading as Taylor & Francis Group
AUTHOR KEYWORDS: Mathematics education; posing conditions; pre-service teachers; problem posing
DOCUMENT TYPE: Article in Press
SOURCE: Scopus

Logue, A.W., Watanabe-Rose, M., Douglas, D.
Should Students Assessed as Needing Remedial Mathematics Take College-Level Quantitative Courses Instead? A Randomized Controlled Trial
(2016) Educational Evaluation and Policy Analysis, 38 (3), pp. 578-598.
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84979619694&partnerID=40&md5=7bea5a537c06b93a5c1e6ab5eed1212e>

DOI: 10.3102/0162373716649056

AFFILIATIONS: The City University of New York, United States

ABSTRACT: Many college students never take, or do not pass, required remedial mathematics courses theorized to increase college-level performance. Some colleges and states are therefore instituting policies allowing students to take college-level courses without first taking remedial courses. However, no experiments have compared the effectiveness of these approaches, and other data are mixed. We randomly assigned 907 students to (a) remedial elementary algebra, (b) that course with workshops, or (c) college-level statistics with workshops (corequisite remediation). Students assigned to statistics passed at a rate 16 percentage points higher than those assigned to algebra ($p < .001$), and subsequently accumulated more credits. A majority of enrolled statistics students passed. Policies allowing students to take college-level instead of remedial quantitative courses can increase student success. © 2016, © 2016 AERA.

AUTHOR KEYWORDS: corequisite remediation; higher education; mathematics; randomized controlled trial
DOCUMENT TYPE: Article
SOURCE: Scopus

Endicott, J.

7th Lumb Lecture 10th October 2012 "Peter Lumb's legacy, soil mechanics = simple concepts + mathematical processes + lateral thinking"
(2016) Geotechnical Engineering, 47 (3), pp. 37-50.
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84984920933&partnerID=40&md5=2792e6c5cbbb078c9df85e9d85cbac4f>

AFFILIATIONS: AECOM Asia Ltd., Grand Central Plaza Tower II, 8/F 138 Shatin Rural Committee Road, Sha Tin, N.T., Hong Kong

ABSTRACT: Professor Peter Lumb's legacy to the Hong Kong geotechnical engineering profession was 32 years of service at the University of Hong Kong. For this he is fondly remembered by his many students as a quiet teacher, a contemplative man. The majority of his time Peter had grappled with tropical weathering and its consequence in engineering properties as well as the performance of soils and rock in an industry that was mostly not very enlightened for some 24 years before the Geotechnical Control Office (GCO), was established. In his early days reliable laboratory testing was not common. Peter built the first testing laboratory in Hong Kong. Computers were under development and not in use. Peter taught assessment, insight and auditable hand calculations. Faced with a heavily regulatory system designed to compensate for inadequacies of the not well informed amongst the practitioners, he shied away from getting involved with day to day projects. As a profound thinker, when Ken Roscoe at Cambridge University was working on Critical State Soil Mechanics and Alan Bishop at Imperial College London was trying to perfect uni-axial compression tests, Peter realised that statistics was a means of handling variation, uncertainty and risk. Like some other geotechnical people, trained to investigate, he branched out into a new field and became a worldwide specialist in statistical theory not related to applications to soil mechanics. He retired 26 years ago. What have been the fruits of his legacy? The most obvious results are dozens of his former students who have carried on his tradition, not necessarily in soil mechanics, and

have achieved high positions and led worthwhile lives. The industry has changed. Testing laboratories are accredited. Deep excavations with lateral support and foundations are designed rationally. Much reclamation have been completed without the mud waves of the kind that were generated in the 1970's. Thanks to the efforts of the Geotechnical engineering Office (GEO), landslide risk has been significantly reduced. The subject of stability of slopes is complex and there is fascinating on-going research into the performance of slopes. Computers are taken for granted. Computations can be carried out quickly and more intricately than he imagined. Mathematics was a predictive tool, now it is hidden behind icons which can be invoked without thought. Mathematics has been a principal tool behind the soil mechanics that Peter taught. Coulomb and Terzaghi were mathematicians. However solutions have given place to processes. Numerical modelling is very useful and is now made freely available to engineers. The collapse of the Nicholl Highway in Singapore was initially blamed on the mis-use of numerical modelling. Within limits debris flow can be analysed but prediction of flow remains difficult. Numerical models can predict slopes moving uphill in the dry season. Statistics are being adopted to a limited degree. Quantitative Risk Assessment and Fractal Analysis require large supplies of relevant data. Today gigabytes of data are transmitted in minutes. One wonders whether Peter would have approached statistics in a less theoretical way had he been working 26 years later? Geotechnical Engineers file data spatially as Geographic Information Systems (GIS). Very much as Peter thought laterally and was attracted to statistics likewise GIS people, thinking laterally, have moved into asset management and a variety of other fields. The legacy of Peter Lumb lives on; it is the better side of human nature. © 2016. Southeast Asian Geotechnical Society. All rights reserved.

DOCUMENT TYPE: Conference Paper

SOURCE: Scopus

Jones, S.L.

A different perspective of the teaching philosophy of RL Moore
(2016) International Journal of Mathematical Education in Science and Technology, pp. 1-6. Article in Press.

<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988646839&partnerID=40&md5=05da25d506baced3e4708a48dc6ec0e9>

DOI: 10.1080/0020739X.2016.1232444

AFFILIATIONS: Department of Mathematics, CalState University LA, Los Angeles, CA, USA

ABSTRACT: Dr RL Moore was undoubtedly one of the finest mathematics teachers ever. He developed a unique teaching method designed to teach his students to think like mathematicians. His method was not designed to convey any particular mathematical knowledge. Instead, it was designed to teach his students to think. Today, his method has been modified to focus on using student participation toward the goal of the conveyance of mathematical knowledge rather than on Dr Moore's goal of teaching students to think. This article proposes that undergraduates would be better served if they took at least one course using Dr Moore's original method and his original goal. © 2016 Informa UK Limited, trading as Taylor & Francis Group

AUTHOR KEYWORDS: Mathematics education; Moore method; RL Moore; teaching thinking

DOCUMENT TYPE: Article in Press

SOURCE: Scopus

Hryciw, R.D.a , Zheng, J.b , Shetler, K.b

Particle roundness and sphericity from images of assemblies by chart estimates and computer methods

(2016) Journal of Geotechnical and Geoenvironmental Engineering, 142 (9), art. no. 04016038, .

<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84982118835&partnerID=40&md5=1d6ceb427ff99781f3f90e33c34dd0d1>

DOI: 10.1061/(ASCE)GT.1943-5606.0001485

AFFILIATIONS: Dept. of Civil and Environmental Engineering, Univ. of Michigan, 2366 GG Brown, Ann Arbor, MI, United States;

Dept. of Civil and Environmental Engineering, Univ. of Michigan, 2340 GG Brown, Ann Arbor, MI, United States

ABSTRACT: Soil particle roundness (R) and sphericity (S) are two important intrinsic properties that govern a soil's mechanical behavior. Although R and S have well-established mathematical definitions dating back to the 1930s, the values are much more typically estimated using charts developed in the 1940s and 1950s. The charts, are based

on the earlier mathematical definitions. Using these charts, a class of undergraduate civil engineering students at the University of Michigan were asked to estimate (R_c and S_c) from images of twenty geologically and geographically diverse sands spanning a range of actual R and S values. The images were of three-dimensional (3D) assemblies of the sands as they would be found in images taken remotely or in situ. The students' estimates were statistically analyzed and compared with rigorously determined R and S using a recently developed computational geometry algorithm. Overall, the students' estimates were scattered, particularly for natural sands exhibiting intermediate values of R and low values of S . On average, the students underestimated R_c and S_c . Reasons for the diverse responses and underestimates of the actual R and S are proposed. © 2016 American Society of Civil Engineers.

DOCUMENT TYPE: Article

SOURCE: Scopus

Coto, B., Arencibia, A., Suárez, I.

Monte Carlo method to explain the probabilistic interpretation of atomic quantum mechanics

(2016) Computer Applications in Engineering Education, 24 (5), pp. 765-774.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84971325191&partnerID=40&md5=26701d7c88039d1f4bc75013bba0465b)

[84971325191&partnerID=40&md5=26701d7c88039d1f4bc75013bba0465b](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84971325191&partnerID=40&md5=26701d7c88039d1f4bc75013bba0465b)

DOI: 10.1002/cae.21749

AFFILIATIONS: Department of Chemical and Energy Technology, ESCET, Universidad Rey Juan Carlos, C/ Tulipán s/n, Móstoles (Madrid), Spain

ABSTRACT: Quantum mechanics description of physical and chemical systems is included in books of Physics, General Chemistry or Physical Chemistry including mathematical, graphical, and conceptual descriptions. Mathematical calculations are complex and are covered only in advanced courses. Main problem in the first degree courses is the understanding of the probabilistic interpretation of quantum mechanics. The Monte Carlo method is based on probabilistic concepts and its application to quantum calculations can be carried out quite straightforward. In this work, a simple Monte Carlo method was used to obtain a sequence of random electron coordinates according to the probability given by the wave function. Electron is seen as a shot whose appearance is only accepted and plotted when probability is high enough. Hydrogen atom was studied as it is a familiar system for most students and its description can be easily related to previous knowledge of atomic orbitals. The objective of the present work is to supply all the crucial points that students need to create their own program to plot atomic orbitals according to the above ideas. All the numerical details are indicated in order to get the proposed programming project as a simple task. Student should be able to generate random electron coordinates, to compute wave functions and probabilities, and to obtain plots according to the right probabilistic interpretation of quantum mechanics. In order to show the quantitative obtained plots some results were shown. Typical s , p , and d orbitals were obtained and compared to the usual angular and radial representation. © 2016 Wiley Periodicals, Inc. Comput Appl Eng Educ 24:765-774, 2016; View this article online at wileyonlinelibrary.com/journal/cae; DOI 10.1002/cae.21749. © 2016 Wiley Periodicals, Inc.

AUTHOR KEYWORDS: atomic orbital; Monte Carlo method; orbital plot

DOCUMENT TYPE: Article

SOURCE: Scopus

Cui, Z.C.a , Yang, Y.Z.a , Gao, X.L.a , Xiao, H.a , Liu, H.C.b

Research and application of ecological river courses restoration technology

(2016) IOP Conference Series: Earth and Environmental Science, 39 (1), art. no. 012040, .

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988914107&partnerID=40&md5=59df847958da3ba9fbbb415eab148064)

[84988914107&partnerID=40&md5=59df847958da3ba9fbbb415eab148064](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84988914107&partnerID=40&md5=59df847958da3ba9fbbb415eab148064)

DOI: 10.1088/1755-1315/39/1/012040

AFFILIATIONS: Shandong Water Polytechnic, Shandong Province, Rizhao, China; Dongying Water Conservancy Survey Design Institute, Dongying, Shandong Province, China

ABSTRACT: In this paper, a practical method of ordered binary comparison determined by weight vector is proposed, as based on correlative concepts of the dualistic relative comparative method in fuzzy mathematics. By taking advantage of the proposed method, subordinated degree of evaluation indicators can be defined, such as weightiness and the degree of importance of ecological restoration of river courses, and a mathematical model can be established. The proposed mathematical model is clear in its physical conception and offers convenient calculations, and provides a theoretical foundation for the

ecological restoration of river courses. This paper employs "standard values" of the evaluation index system (EIS) of ecological river networks as derived by previous literature [1] as the theoretical basis for the ecological restoration river courses. © Published under licence by IOP Publishing Ltd.
DOCUMENT TYPE: Conference Paper
SOURCE: Scopus

Brooks, N., Goldin-Meadow, S.
Moving to Learn: How Guiding the Hands Can Set the Stage for Learning
(2016) Cognitive Science, 40 (7), pp. 1831-1849.
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84945260802&partnerID=40&md5=d4ded58f940b68fe87b29d2e5a180bd1>

DOI: 10.1111/cogs.12292
AFFILIATIONS: Department of Psychology, University of Chicago, United States
ABSTRACT: Previous work has found that guiding problem-solvers' movements can have an immediate effect on their ability to solve a problem. Here we explore these processes in a learning paradigm. We ask whether guiding a learner's movements can have a delayed effect on learning, setting the stage for change that comes about only after instruction. Children were taught movements that were either relevant or irrelevant to solving mathematical equivalence problems and were told to produce the movements on a series of problems before they received instruction in mathematical equivalence. Children in the relevant movement condition improved after instruction significantly more than children in the irrelevant movement condition, despite the fact that the children showed no improvement in their understanding of mathematical equivalence on a ratings task or on a paper-and-pencil test taken immediately after the movements but before instruction. Movements of the body can thus be used to sow the seeds of conceptual change. But those seeds do not necessarily come to fruition until after the learner has received explicit instruction in the concept, suggesting a " sleeper effect " of gesture on learning.
Copyright © 2015 Cognitive Science Society, Inc.
AUTHOR KEYWORDS: Education; Embodied cognition; Gesture; Mathematical equivalence
DOCUMENT TYPE: Article
SOURCE: Scopus

Zakharov, A.a , Tshenko, G.b , Carnoy, M.c
Do "better" teachers and classroom resources improve student achievement? A causal comparative approach in Kenya, South Africa, and Swaziland
(2016) International Journal of Educational Development, 50, pp. 108-124.
<https://www.scopus.com/inward/record.uri?eid=2-s2.0-84978196574&partnerID=40&md5=236088a4c2ce959cf7b8dalb2e8f1082>

DOI: 10.1016/j.ijedudev.2016.07.001
AFFILIATIONS: National Research University Higher School of EconomicsMoscow, Russian Federation;
University of Botswana, Botswana;
Stanford University, United States and the National Research University Higher School of EconomicsMoscow, Russian Federation
ABSTRACT: We use the 2007 SACMEQ data to make traditional "upwardly biased" estimates of teacher and classroom resource correlates of 6th grade student achievement in Swaziland, Kenya, and South Africa using an OLS model, and a "less biased causal" approach using a student fixed effects model. Our fixed effects model exploits the fact that most students in all three countries have different teachers for reading and mathematics. Each student is therefore subject to the "treatment" of different teacher characteristics and classroom resources, yielding a relatively unbiased but rather "stringent" estimate of teacher and classroom effects. Our results suggest that: (a) several important identifiable teacher characteristics and classroom resources affect student achievement in each country; that (b) those characteristics and resources may differ from one national context to another, between male and female students, and across socioeconomic groups of students; and that (c) the "upwardly biased" results generally differ from the "less biased causal" results. We discuss and attempt to explain these differences. © 2016
AUTHOR KEYWORDS: Causal analysis; Comparative education; Student achievement; Student fixed effects; Teacher effects
DOCUMENT TYPE: Article
SOURCE: Scopus

Jawad, S.

More Differentiability for the Parameter Integral

(2016) Results in Mathematics, 70 (1-2), pp. 197-208.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84931846944&partnerID=40&md5=b179b948dafc292be6f883dbaf54aa3d)

[84931846944&partnerID=40&md5=b179b948dafc292be6f883dbaf54aa3d](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84931846944&partnerID=40&md5=b179b948dafc292be6f883dbaf54aa3d)

DOI: 10.1007/s00025-015-0473-z

AFFILIATIONS: Elisenstr. 17, Hannover, Germany

ABSTRACT: In this paper we present new and generalized results on the differentiability of the parameter integral, in abstract spaces as well. © 2015, Springer Basel.

AUTHOR KEYWORDS: absolutely continuous functions; Abstract differentiation theory; continuity and related questions; differential calculus; differentiation; elementary functions; integral calculus; integrals of Riemann; Lipschitz classes; mathematics education; nondifferentiability; Stieltjes and Lebesgue type

DOCUMENT TYPE: Article

SOURCE: Scopus

Louie, J.a , Rhoads, C.b , Mark, J.a

Challenges to Using the Regression Discontinuity Design in Educational Evaluations: Lessons From the Transition to Algebra Study

(2016) American Journal of Evaluation, 37 (3), pp. 381-407.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84979693191&partnerID=40&md5=ade4373ac7ef949849500d315666e182)

[84979693191&partnerID=40&md5=ade4373ac7ef949849500d315666e182](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84979693191&partnerID=40&md5=ade4373ac7ef949849500d315666e182)

DOI: 10.1177/1098214015621787

AFFILIATIONS: Education Development Center, Waltham, MA, United States;

University of Connecticut, Storrs, CT, United States

ABSTRACT: Interest in the regression discontinuity (RD) design as an alternative to randomized control trials (RCTs) has grown in recent years. There is little practical guidance, however, on conditions that would lead to a successful RD evaluation or the utility of studies with underpowered RD designs. This article describes the use of RD design to evaluate the impact of a supplemental algebra-readiness curriculum, Transition to Algebra, on students' mathematics outcomes. Lessons learned highlight the need for evaluators to understand important data requirements for strong RD evaluation studies, the need to collaborate with informed and committed partners to ensure successful RD design implementation, the value of embedding an RCT within an RD design whenever possible, and the need for caution when contemplating an RD design with a small sample. Underpowered RD studies—unlike underpowered RCTs—may not produce useful evaluation results, particularly if other RD data requirements are not met. © The Author(s) 2016.

AUTHOR KEYWORDS: algebra support; education; evaluation design; regression discontinuity

DOCUMENT TYPE: Article

SOURCE: Scopus

Dores, W., Benevenuto, F., Laender, A.H.F.

Extracting academic genealogy trees from the networked digital library of theses and dissertations

(2016) Proceedings of the ACM/IEEE Joint Conference on Digital Libraries, 2016-September, art. no. 7559579, pp. 163-166.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84989888634&partnerID=40&md5=e80f3669125f0bd42c6c408e93f9028c)

[84989888634&partnerID=40&md5=e80f3669125f0bd42c6c408e93f9028c](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84989888634&partnerID=40&md5=e80f3669125f0bd42c6c408e93f9028c)

DOI: 10.1145/2910896.2910916

AFFILIATIONS: Department of Computer Science, Universidade Federal de Minas Gerais, Belo Horizonte, MG, Brazil

ABSTRACT: Along the history, many researchers provided remarkable contributions to science, not only advancing knowledge but also in terms of mentoring new scientists. Currently, identifying and studying the formation of researchers over the years is a challenging task as current repositories of theses and dissertations are cataloged in a decentralized way through many local digital libraries. In this paper, we give a first step towards building a large repository that records the academic genealogy of researchers across fields and countries. We crawled data from the Networked Digital Library of Theses and Dissertations (NDLTD) and develop a framework to extract academic genealogy trees from this data and provide a series of analyses that describe the main properties of the academic genealogy trees. Our effort identified interesting findings

related to the structure of academic formation, which highlight the importance of cataloging academic genealogy trees. We hope our initial framework will be the basis of a much larger crowdsourcing system. © 2016 ACM.

AUTHOR KEYWORDS: Academic Genealogy Trees; ETD; NDLTD

DOCUMENT TYPE: Conference Paper

SOURCE: Scopus

Tikhomirov, V.M.

Course of Mathematics

(2016) Journal of Mathematical Sciences (United States), 217 (6), pp. 773-802.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84982133160&partnerID=40&md5=a919eba71fb7de17f21425a40febc42a)

[84982133160&partnerID=40&md5=a919eba71fb7de17f21425a40febc42a](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84982133160&partnerID=40&md5=a919eba71fb7de17f21425a40febc42a)

DOI: 10.1007/s10958-016-3004-x

AFFILIATIONS: Moscow State University, Moscow, Russian Federation

ABSTRACT: This paper is devoted to problems of modern mathematical education. Fundamental problems of mathematics are considered in their unity. © 2016, Springer Science+Business Media New York.

DOCUMENT TYPE: Article

SOURCE: Scopus

Hoogland, K.a , Pepin, B.b , Bakker, A.c , de Koning, J.d , Gravemeijer, K.b

Representing contextual mathematical problems in descriptive or depictive form: Design of an instrument and validation of its uses

(2016) Studies in Educational Evaluation, 50, pp. 22-32.

[https://www.scopus.com/inward/record.uri?eid=2-s2.0-](https://www.scopus.com/inward/record.uri?eid=2-s2.0-84976402713&partnerID=40&md5=6d29dc0116d7bab0c3b56d12b1c733fa)

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ABSTRACT: The aim of this study is to contribute to the body of knowledge on the use of contextual mathematical problems. Word problems are a predominant genre in mathematics classrooms in assessing students' ability to solve problems from everyday life. Research on word problems, however, reveals a range of difficulties in their use in mathematics education. In our research we took an alternative approach: we designed image-rich numeracy problems as alternatives for word problems. A set of word problems was modified by systematically replacing the descriptive representation of the problem situation by a more depictive representation and an instrument was designed to measure the effect of this modification on students' performance. The instrument can measure the effect of this alternative approach in a randomized controlled trial. In order to use the instrument at scale, we made this instrument also usable as a diagnostic test for an upcoming nationwide examination on numeracy. In this article we explain and discuss the design of the instrument and the validation of its intended uses. © 2016 The Authors.

AUTHOR KEYWORDS: Contextual mathematical problems; Design; Image-rich numeracy problem; Validation; Word problem

DOCUMENT TYPE: Article

SOURCE: Scopus

İvrendi, A.

Investigating kindergarteners' number sense and self-regulation scores in relation to their mathematics and Turkish scores in middle school

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DOI: 10.1007/s13394-016-0172-4

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ABSTRACT: Number sense and self-regulation are considered foundational skills for later school learning. This study aimed to investigate the predictive power of kindergarten children's number sense and self-regulation scores on their mathematics and Turkish

language examination scores in the 5th and 6th grades. The participants in this study were 5th grade (n = 46) and 6th grade (n = 28) students, whose number sense and self-regulation skills were measured when they were in kindergarten in 2009 and 2010. Data were analyzed through multiple regression. The results showed positive and mid-level correlations. The children's kindergarten number sense and self-regulation scores significantly predicted their 5th and 6th grade mathematics and Turkish language examination scores. Self-regulation was the stronger predictor of mathematics scores, whereas number sense scores were the better predictor of Turkish language examination scores. The findings from this study provide further evidence as to the critical role of children's early skills in middle school mathematics and language achievement. © 2016, Mathematics Education Research Group of Australasia, Inc.

AUTHOR KEYWORDS: Early mathematics; Number sense; School achievement; Self-regulation
DOCUMENT TYPE: Article
SOURCE: Scopus

Choy, B.H.

Snapshots of mathematics teacher noticing during task design

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ABSTRACT: Designing a mathematically worthwhile task is critical for promoting students' reasoning. To improve task design skills, teachers often engage in collaborative lesson planning activities such as lesson study. However, to learn from the process of lesson study, it is important for teachers to notice productively the concepts, students' confusion and the design of the task. But what researchers mean by productive noticing varies. In this article, I present the FOCUS Framework which highlights two characteristics of productive noticing: having an explicit focus for noticing and focusing noticing through pedagogical reasoning. Using these two characteristics, I develop snapshots of noticing as a representation of practice to present a fine-grained analysis of teacher noticing. Through vignettes of teachers discussing the design of a task to teach fractions, I illustrate how two teachers' noticing can be analysed and represented using snapshots of noticing. To conclude, I highlight what snapshots of noticing tell us about a teacher's noticing and suggest ways to use these snapshots in future studies of noticing. © 2016, Mathematics Education Research Group of Australasia, Inc.

AUTHOR KEYWORDS: Fractions; Mathematics teacher noticing; Productive teaching practices; Representations of practice; Task design

DOCUMENT TYPE: Article

SOURCE: Scopus

Reinholz, D.L.

Developing mathematical practices through reflection cycles

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ABSTRACT: This paper focuses on reflection in learning mathematical practices. While there is a long history of research on reflection in mathematics, it has focused primarily on the development of conceptual understanding. Building on notion of learning as participation in social practices, this paper broadens the theory of reflection in mathematics learning. To do so, it introduces the concept of reflection cycles. Each cycle begins with prospective reflection, which guides one's actions during an experience, and ends with retrospective reflection, which consolidates the experience and informs the next reflection cycle. Using reflection cycles as an organizing framework, this paper synthesizes the literature on reflective practices at a variety of levels: (1) metacognition, (2) self-assessment, (3) noticing, and (4) lifelong learning. These practices represent a spectrum of reflection, ranging from the micro level (1) to macro level (4). © 2016, Mathematics Education Research Group of Australasia, Inc.

AUTHOR KEYWORDS: Metacognition; Reflection; Self-assessment; Self-regulation; Teacher noticing

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SOURCE: Scopus

Smit, J.a b , Bakker, A.b , van Eerde, D.b , Kuijpers, M.b

Using genre pedagogy to promote student proficiency in the language required for interpreting line graphs

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ABSTRACT: The importance of language in mathematics learning has been widely acknowledged. However, little is known about how to make this insight productive in the design and enactment of language-oriented mathematics education. In a design-based research project, we explored how language-oriented mathematics education can be designed and enacted. We drew on genre pedagogy to promote student proficiency in the language required for interpreting line graphs. In the intervention, the teacher used scaffolding strategies to focus students' attention on the structure and linguistic features of the language involved in this particular domain. The research question addressed in this paper is how student proficiency in this language may be promoted. The study comprised nine lessons involving 22 students in grades 5 and 6 (aged 10-12); of these students, 19 had a migrant background. In light of the research aim, we first describe the rationale behind our design. Next, we illustrate how the design was enacted by means of a case study focusing on one student in the classroom practice of developing proficiency in the language required for interpreting line graphs. On the basis of pre- and posttest scores, we conclude that overall their proficiency has increased. Together, the results indicate that and how genre pedagogy may be used to help students become more proficient in the language required in a mathematical domain. © 2016, The Author(s).

AUTHOR KEYWORDS: Design study; Genre pedagogy; Graphs; Mathematical language; Scaffolding; Teaching and learning cycle

DOCUMENT TYPE: Article

SOURCE: Scopus

Talbot, D.

'To be numerate is to be someone...': Tracing the doings of students labelled 'at risk' (2016) Australian Educational Researcher, 43 (4), pp. 419-436.

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DOI: 10.1007/s13384-016-0207-6

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ABSTRACT: Scores from the Australian National Assessment Program-Literacy and Numeracy (NAPLAN) identify students 'at risk' of not meeting minimum standards deemed necessary for future success in school and employment. The NAPLAN tests include items related to numeracy but also mathematics content and skills. Research in the area of mathematics education examining the effectiveness of pedagogical interventions in improving student scores on NAPLAN and other international measures is not only shaped by the standardised testing regime, it also effectively corrals the problem within the school context. As such, it is unable to answer questions related to other factors implicated in the lives of those who continue to 'fail' in relation to numeracy outcomes. This paper critically examines the type of funded research being done in relation to numeracy and mathematics education, the 'social' turn and the disconnect between this research and the widening 'gap' in NAPLAN numeracy outcomes. It argues for a research approach informed by institutional ethnography that begins with the 'doings' of individual students labelled 'at risk'. © 2016, The Australian Association for Research in Education, Inc.

AUTHOR KEYWORDS: At risk; Institutional ethnography; NAPLAN; Numeracy; Sociological theory

DOCUMENT TYPE: Article

SOURCE: Scopus

Rai, A.a , Robinson, J.A.a , Tate-Brown, J.b , Buckley, N.c , Zell, M.d , Tasaki, K.e ,
Karabadzhak, G.f , Sorokin, I.V.g , Pignataro, S.h

Expanded benefits for humanity from the International Space Station

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84978200052&partnerID=40&md5=4110574f830a8def5b48b9c09a57b319

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Italian Space Agency (ASI), Italy

ABSTRACT: In 2012, the International Space Station (ISS) (Fig. 1) partnership published the updated International Space Station Benefits for Humanity [1], a compilation of stories about the many benefits being realized in the areas of human health, Earth observations and disaster response, and global education. This compilation has recently been revised to include updated statistics on the impacts of the benefits, and new benefits that have developed since the first publication. Two new sections have also been added to the book, economic development of space and innovative technology. This paper will summarize the updates on behalf of the ISS Program Science Forum, made up of senior science representatives across the international partnership. The new section on "Economic Development of Space" highlights case studies from public-private partnerships that are leading to a new economy in low earth orbit (LEO). Businesses provide both transportation to the ISS as well as some research facilities and services. These relationships promote a paradigm shift of government-funded, contractor-provided goods and services to commercially-provided goods purchased by government agencies. Other examples include commercial firms spending research and development dollars to conduct investigations on ISS and commercial service providers selling services directly to ISS users. This section provides examples of ISS as a test bed for new business relationships, and illustrates successful partnerships. The second new section, "Innovative Technology," merges technology demonstration and physical science findings that promise to return Earth benefits through continue