

Reconceptualizing Stem Education The Central Role Of Practices Teaching And Learning In Science Series

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Re-Conceptualizing Safe Spaces - Kate Winter 2021-10-25

This book broadens the idea of a safe space that is traditionally discussed in feminist studies, to include gendered identities intersecting with class, race/ethnicity, sexual orientation, and ability within multiple aspects of education. This collection showcases work supporting access to education of persistently marginalized individuals.

STEM Teacher Preparation and Practice for the 21st Century - Patrick M. Jenlink 2022-09-01

STEM Teacher Preparation and Practice for the 21st Century: Research-based Insights introduces the reader to a collection of thoughtful, research-based works by authors that represent current thinking about the future of science, technology, engineering, and mathematics or STEM as it known today, as well as STEM education for a rapidly evolving global society and the preparation of STEM teachers to meet the educational needs of a changing educational landscape. Each chapter focuses on STEM teaching and the preparation of teachers who will enter classrooms to instruct the next generation of students in STEM. Research in the learning sciences focuses on the cognitive, epistemological, and socio-cultural characteristics of scientific and engineering research communities in their efforts to improve Science, Technology, Engineering, and Mathematics (STEM) education. STEM education is a means to help individuals develop different strategies in order to solve interdisciplinary problems and gain skills and knowledge as they are engaged with STEM related activities through formal and informal learning programs. Research also suggests that STEM may well stand as the new general education for the 21st century. In much of the current discourse on teacher quality and preparation, two essential points for consideration have emerged: the strength of the relationship between teacher content knowledge and student achievement, and the specific representations of knowledge that are most conducive to effective teaching. Add to these two points one additional: the nature of transforming a chaotic system of discreet preparation and clinical experiences into a coherent, aligned and logical system of continuous and progressive development and support throughout a teacher's career. These three points apply to STEM teacher preparation, induction and professional learning as well as to teacher preparation, induction and professional learning in general. Importantly, the contributing authors to this book have brought to the foreground research-based insights concerning STEM teacher preparation. Each chapter presents clear paths to understanding and reimagining STEM teaching and the importance of STEM teacher preparation, acknowledging the value of STEM literacy and the interdisciplinary nature of STEM teaching.

STEM, Robotics, Mobile Apps in Early Childhood and Primary Education - Stamatios Papadakis 2022-04-21

This book brings together a collection of work from around the world in order to consider effective STEM, robotics, mobile apps education from a range of perspectives. It presents valuable perspectives—both practical and theoretical—that enrich the current STEM, robotics, mobile apps education agenda. As such, the book makes a substantial contribution to the literature and outlines the key challenges in research,

policy, and practice for STEM education, from early childhood through to the first school age education. The audience for the book includes college students, teachers of young children, college and university faculty, and professionals from fields other than education who are unified by their commitment to the care and education of young children.

Writing STEAM - Vivian Kao 2022-03-04

This edited collection positions writing at the center of interdisciplinary higher education, and explores how writing instruction, writing scholarship, and writing program administration bring STEM and the humanities together in meaningful, creative, and beneficial ways. Writing professionals are at the forefront of a cross-pollination between STEM (Science, Technology, Engineering, and Mathematics) and the arts and humanities. In their work as educators, scholars, and administrators, they collaborate with colleagues in engineering, scientific, technical, and health disciplines, offer new degree programs that allow students to bring the humanities to bear on design experiments, and build an academic culture that promotes a vision of the humanities in the twenty-first century, as well as a vision of technology that is decidedly human. This collection surveys and promotes that work through chapters focused on writing instruction, writing scholarship, and writing program administration, covering topics that include data-driven writing courses, public science communication, non-traditional college students, creative writing, gamification, skills transfer, and Writing Across the Curriculum programs. *Writing STEAM* will be essential reading for scholars, instructors, and administrators in writing studies, rhetoric and composition, STEM, and a variety of interdisciplinary programs; it will aid in teacher training for both humanities and STEM courses focused on writing and communication.

Reconceptualising Maths and Science Teaching and Learning - Stephen Dinham 2018

"How do we enable young people to imagine themselves as the next generation of STEM professionals? How do we do this in a way that engages the desire to learn and explore? In Australia, there is increasing concern at the declining participation in advanced-level school mathematics and physical sciences; fewer students electing to study STEM programs at university; and, evidence of declining performance of Australian students on international comparative tests in mathematics and science. This timely book highlights the need to reconceptualise Maths and Science Teacher Education Programs (ReMSTE).

Handbook of Research on Science Education - Norman G. Lederman 2014-07-11

Building on the foundation set in Volume I—a landmark synthesis of research in the field—Volume II is a comprehensive, state-of-the-art new volume highlighting new and emerging research perspectives. The contributors, all experts in their research areas, represent the international and gender diversity in the science education research community. The volume is organized around six themes: theory and methods of science education research; science learning; culture, gender, and society and science learning; science teaching; curriculum and assessment in science; science teacher education. Each chapter presents an

integrative review of the research on the topic it addresses—pulling together the existing research, working to understand the historical trends and patterns in that body of scholarship, describing how the issue is conceptualized within the literature, how methods and theories have shaped the outcomes of the research, and where the strengths, weaknesses, and gaps are in the literature. Providing guidance to science education faculty and graduate students and leading to new insights and directions for future research, the Handbook of Research on Science Education, Volume II is an essential resource for the entire science education community.

Critical Questions in STEM Education - Valarie L. Akerson 2020-11-05

This edited volume offers a crosscutting view of STEM and is comprised of work by scholars in science, technology, engineering, and mathematics education. It offers a view of STEM from the disciplines that comprise it, while adhering to the idea that STEM itself is an interdisciplinary treatment of all the associated disciplines in a meaningful way. This book raises and answers questions regarding the meaning of STEM education and research. This volume is divided into three sections: the first one describes the nature of the component disciplines of STEM. The next section presents work from leaders representing all STEM disciplines and deals with aspects such as K-12 and post-secondary education. The last section draws conclusions regarding the natures of the disciplines, challenges and advantages of STEM education in terms of theoretical and practical implications. The two final chapters compile arguments from the research chapters, describing themes in research results, and making recommendations for best STEM education practice, and examining areas for future research in STEM education.

[A Companion Guide to Handbook of Urban Educational Leadership](#) - Rene O. Guillaume 2022-01-31

The Companion Guide activities will help illuminate salient theoretical concepts related to urban education and leadership.

Enhancing Entrepreneurial Mindsets Through STEM Education - Sila Kaya-Capocci 2023-01-01

Entrepreneurship is defined in different fields with definitions ranging from a specific perspective such as starting a business to a broader perspective such as a process of establishing new social, economic, environmental, institutional, cultural and/or scientific environments. There has been some movement toward entrepreneurship in STEM education through hackathons and makerspaces, but they tend to be limited to informal settings. In higher education, there seems to be a border line between business schools and education departments. This book aims to remove the borders between the Business Schools and the Department of Education and help Business Schools to develop their educational practices further and help Education Departments to develop their knowledge of entrepreneurship from its formal discipline. The purpose of this book is to bring together experts from STEM education and the formal discipline of entrepreneurship to explore the role of STEM in everyday life through an entrepreneurial lens and show how this integration can broaden STEM education practices.

[Too Scared to Learn](#) - Jenny Horsman 2000

Too Scared to Learn explores the impact of women's experiences of violence on their learning, and proposes radical changes to educational programs through connecting therapeutic and educational discourses. Little attention has previously been paid to the impact of violence on learning. A large percentage of women who come to adult literacy programs have experienced, or are currently experiencing, violence in their lives. This experience of violence negatively affects their ability to improve their literacy skills. Literacy programs and other educational programs have not integrated this reality into their work. This book builds on extensive research that revealed the wide range of impacts violence has on adult literacy learning. Interviews with counselors and therapists, literacy learners, and educators working in different situations, and a wide range of theoretical and experiential literature, form the basis of the analysis. Educators are offered information to support reconceptualizing programs and practices and making concrete changes that will enable women to learn more effectively. The book makes clear that without an acknowledgment of the impact of violence on learning, women, rather than getting a chance to succeed and improve their literacy skills, get only a chance to fail, confirming to themselves that they really cannot learn. Essential reading for literacy and adult education practitioners, teachers of English as a second language, and education theorists, Too Scared to Learn explores the intersection among trauma, psychological theory, and pedagogy. The book is filled with a wealth of practical ideas, possibilities, and thoughts about what practitioners might do differently in

classrooms and educational institutions if we begin to think differently about violence.

Handbook of Formative Assessment in the Disciplines - Heidi L. Andrade 2019-05-14

The Handbook of Formative Assessment in the Disciplines meaningfully addresses current developments in the field, offering a unique and timely focus on domain dependency. Building from an updated definition of formative assessment, the book covers the integration of measurement principles into practice; the operationalization of formative assessment within specific domains, beyond generic strategies; evolving research directions including student involvement and self-regulation; and new approaches to the challenges of incorporating formative assessment training into pre-service and in-service educator training. As supporters of large-scale testing programs increasingly consider the potential of formative assessments to improve teaching and learning, this handbook advances the subject through novel frameworks, intersections of theory, research, and practice, and attention to discernible disciplines. Written for instructors, graduate students, researchers, and policymakers, each chapter provides expert perspectives on the procedures and evaluations that enable teachers to adapt teaching and learning in-process toward student achievement.

Integrated Approaches to STEM Education - Judy Anderson 2020-12-23

This book provides a platform for international scholars to share evidence for effective practices in integrated STEM education and contributes to the theoretical and practical knowledge gained from the diversity of approaches. Many publications on STEM education focus on one or two of the separate STEM disciplines without considering the potential for delivering STEM curriculum as an integrated approach. This publication analyzes the efficacy of an integrated STEM curriculum and instruction, providing evidence to examine and support various integrations. The volume focuses on the problems seen by academics working in the fields of science, technology, engineering and mathematics (STEM) and provides valuable, high quality research outcomes and a set of valued practices which have demonstrated their use and viability to improve the quality of integrated STEM education.

Re-conceptualizing Deficit and Homogenizing Views - Karen Lynne Lowenstein 2004

Teaching STEM Education through Dialogue and Transformative Learning - Catherine Montgomery 2020-06-30

This book focuses on reconceptualising the teaching of STEM education through dialogue and transformative learning, presenting examples of research from Mexico and the UK. It centres on research which introduces critical pedagogies in the teaching of STEM, where in the past there has been an over-emphasis on content and a technicist perspective on science. The research in this book considers critical and dialogic approaches to teacher education for STEM subjects and emphasises the crucial role that teachers play in improving life chances for marginalised young people and their communities. STEM education is not just a way of improving a country's GDP, but if taught through dialogic and transformative pedagogies it can enable teachers to empower students to improve their own lives. The collaboration between these two countries is timely and comes as Mexico is developing and emerging as a key global economic nation. The work presented here engages in theoretical and empirical work that has application beyond the two countries. This book was originally published as a special issue of the Journal of Education for Teaching.

[Science Education and Teacher Professional Development](#) - Elizabeth A. C. Rushton 2021-03-24

This book presents a radical reconceptualization of subject-focused and research-led teacher professional development. Drawing on the experiences of more than 50 high school teachers and technicians who participated in science-based research with their students, the author examines how this enables teachers to develop a 'Teacher Scientist' model of professional identity. Through active participation in research, science teachers and technicians can implement socially just approaches to education, where students' differences are valued and, through research, their social and academic development is supported. Central to the 'Teacher Scientist' identity is the development of, and sustained interaction with, complex and collaborative professional networks which include researchers, university-staff and teachers and students in other schools. In the context of persistent recruitment and retention challenges, the 'Teacher Scientist' model provides a research-led approach which may offer an alternative to strategies focused on financial incentives.

Rural Poverty in the United States - Ann R. Tickamyer 2017-08-22

America's rural areas have always held a disproportionate share of the nation's poorest populations. Rural

Poverty in the United States examines why. What is it about the geography, demography, and history of rural communities that keeps them poor? In a comprehensive analysis that extends from the Civil War to the present, *Rural Poverty in the United States* looks at access to human and social capital; food security; healthcare and the environment; homelessness; gender roles and relations; racial inequalities; and immigration trends to isolate the underlying causes of persistent rural poverty. Contributors to this volume incorporate approaches from multiple disciplines, including sociology, economics, demography, race and gender studies, public health, education, criminal justice, social welfare, and other social science fields. They take a hard look at current and past programs to alleviate rural poverty and use their failures to suggest alternatives that could improve the well-being of rural Americans for years to come. These essays work hard to define rural poverty's specific metrics and markers, a critical step for building better policy and practice. Considering gender, race, and immigration, the book appreciates the overlooked structural and institutional dimensions of ongoing rural poverty and its larger social consequences.

International Handbook of Computer-Supported Collaborative Learning - Ulrike Cress 2021-10-08

CSCL has in the past 15 years (and often in conjunction with Springer) grown into a thriving and active community. Yet, lacking is a comprehensive CSCL handbook that displays the range of research being done in this area. This handbook will provide an overview of the diverse aspects of the field, allowing newcomers to develop a sense of the entirety of CSCL research and for existing community members to become more deeply aware of work outside their direct area. The handbook will also serve as a ready reference for foundational concepts, methods, and approaches in the field. The chapters are written in such a way that each of them can be used in a stand-alone fashion while also serving as introductory readings in relevant study courses or in teacher education. While some CSCL-relevant topics are addressed in the *International Handbook of the Learning Sciences* and the *International Handbook of Collaborative Learning*, these books do not aim to present an integrated and comprehensive view of CSCL. The *International Handbook of Computer-Supported Collaborative Learning* covers all relevant topics in CSCL, particularly recent developments in the field, such as the rise of computational approaches and learning analytics.

Centering Race in the STEM Education of African American K-12 Learners - Glenda M. Prime 2019

Centering Race in the STEM Education of African American K-12 Learners boldly advocates for a transformative approach to the teaching of STEM to African American K-12 learners. The achievement patterns of African American learners, so often described as an "achievement gap" between them and their White peers, is in fact the historical legacy of slavery and the racial hierarchy that was necessary to maintain it. The achievement gap is a contemporary manifestation of the racial hierarchy that continues in STEM to the present time. The racial hierarchy in STEM education is upheld by structural arrangements, policies, and practices, sometimes invisible, but ultimately denies access and depresses performance of African American K-12 learners in STEM. This book argues that disrupting these patterns of achievement and realizing more equitable outcomes for this demographic is essentially a political act that requires that race be overtly addressed and centered in the STEM education of these children--an approach called "race-visible pedagogy." While this approach incorporates some of the elements of culturally responsive pedagogy and other anti-racist or liberatory pedagogies, it advances the thinking about such approaches by shifting the emphasis from the outcomes of such pedagogies to the experience of them. This book covers a range of issues related to the STEM education of African American K-12 learners and includes theoretical pieces that offer insightful, new, and asset-based, as opposed to deficit-based, frameworks for understanding and disrupting the patterns of achievement of African American children, as well examples of the practice of race-visible pedagogies.

Socioscientific Issues-Based Instruction for Scientific Literacy Development - Powell, Wardell A. 2020-09-11

Socioscientific issues require individuals to use moral and ethical considerations to help in their evaluation of evidence and decision making, entailing controversial scientific phenomena. Such issues include genetic engineering and biotechnology. Socioscientific issues pedagogy has the potential to enhance students' overall conceptual understanding of scientific phenomena that affect the daily lives of people across the globe. *Socioscientific Issues-Based Instruction for Scientific Literacy Development* is a critical scholarly publication that examines the development of a research-based integrated socioscientific issues pedagogy

for use in the K-12 system, teacher education preparation, and informal education centers. The publication focuses on science education researchers and pre-service and in-service teachers' abilities to design and implement meaningful learning opportunities for students to use rationalistic, intuitive, and emotive perspectives as they engage in information reasoning on scientific topics, such as climate change and CRISPR, that are of utmost importance. Teachers in the K-12 system and informal education settings will be able to use this text to enhance scientific literacy among their students. Instructors in teacher preparation programs will be able to use this research-based text to improve pre-service and in-service teachers' abilities to use socioscientific issues pedagogy to enhance scientific literacy among K-12 students. Additionally, audiences including researchers, administrators, academicians, policymakers, and students will find this book beneficial for their studies.

Reconceptualizing Libraries - Victor R. Lee 2018-08-15

Reconceptualizing Libraries brings together cases and models developed by experts in the information and learning sciences to identify the potential for libraries to adapt and transform in the wake of new technologies for connected learning and discovery. Chapter authors explore the ways that the increased interest in the design research methods, digital media emphases, and technological infrastructure of the learning sciences can foster new collaborations and formats for education within physical library spaces. Models and case studies from a variety of library contexts demonstrate how library professionals can act as change agents and design partners and how patrons can engage with these evolving experiences. This is a timely and innovative volume for understanding how physical libraries can incorporate and thrive as educational resources using new developments in technology and in the learning sciences.

STEM Education: An Emerging Field of Inquiry - 2018-11-01

This book presents a contemporary focus on significant issues in STEM teaching, learning and research that are valuable in preparing students for a digital 21st century. The book chapters cover a wide spectrum of issues and topics using a wealth of research methodologies and methods.

The Next Generation of STEM Teachers - Patrick M. Jenlink 2019-04-13

STEM Teaching: An Interdisciplinary Approach breaks from the more historical idea of making knowledge within disciplines and seeks to engage the reader in a growing conversation that is gaining momentum and is focused on an 'interdisciplinarity of STEM education', which seeks to embrace and/or present emerging perspectives on the standards.

Science Education - Keith S. Taber 2016-12-27

"This book comprises a wide range of scholarly essays introducing readers to key topics and issues in science education. Science education has become a well established field in its own right, with a vast literature, and many active areas of scholarship. *Science Education: An International Course Companion* offers an entry point for students seeking a sound but introductory understanding of the key perspectives and areas of thinking in science education. Each account is self-contained and offers a scholarly and research-informed introduction to a particular topic, theme, or perspective, with both citations to key literature and recommendations for more advanced reading. *Science Education: An International Course Companion* allows readers (such as those preparing for school science teaching, or seeking more advanced specialist qualifications) to obtain a broad familiarity with key issues across the field as well as guiding wider reading about particular topics of interest. The book therefore acts as a reader to support learning across courses in science education internationally. The broad coverage of topics is such that that the book will support students following a diverse range of courses and qualifications. The comprehensive nature of the book will allow course leaders and departments to nominate the book as the key reader to support students - their core 'course companion' in science education."

Re-Conceptualizing Safe Spaces - Kate Winter 2021-10-25

This book broadens the idea of a safe space that is traditionally discussed in feminist studies, to include gendered identities intersecting with class, race/ethnicity, sexual orientation, and ability within multiple aspects of education. This collection showcases work supporting access to education of persistently marginalized individuals.

Cognition, Metacognition, and Culture in STEM Education - Yehudit Judy Dori 2017-12-01

This book addresses the point of intersection between cognition, metacognition, and culture in learning and

teaching Science, Technology, Engineering, and Mathematics (STEM). We explore theoretical background and cutting-edge research about how various forms of cognitive and metacognitive instruction may enhance learning and thinking in STEM classrooms from K-12 to university and in different cultures and countries. Over the past several years, STEM education research has witnessed rapid growth, attracting considerable interest among scholars and educators. The book provides an updated collection of studies about cognition, metacognition and culture in the four STEM domains. The field of research, cognition and metacognition in STEM education still suffers from ambiguity in meanings of key concepts that various researchers use. This book is organized according to a unique manner: Each chapter features one of the four STEM domains and one of the three themes—cognition, metacognition, and culture—and defines key concepts. This matrix-type organization opens a new path to knowledge in STEM education and facilitates its understanding. The discussion at the end of the book integrates these definitions for analyzing and mapping the STEM education research. Chapter 4 is available open access under a Creative Commons Attribution 4.0 International License via link.springer.com

Sensemaking in Elementary Science - Elizabeth A. Davis 2019-11-04

Grounded in empirical research, this book offers concrete pathways to direct attention towards elementary science teaching that privileges sensemaking, rather than isolated activities and vocabulary. Outlining a clear vision for this shift using research-backed tools, pedagogies, and practices to support teacher learning and development, this edited volume reveals how teachers can best engage in teaching that supports meaningful learning and understanding in elementary science classrooms. Divided into three sections, this book demonstrates the skills, knowledge bases, and research-driven practices necessary to make a fundamental shift towards a focus on students' ideas and reasoning, and covers topics such as: An introduction to sensemaking in elementary science; Positioning students at the center of sensemaking; Planning and enacting investigation-based science discussions; Designing a practice-based elementary teacher education program; Reflections on science teacher education and professional development for reform-based elementary science. In line with current reform efforts, including the Next Generation Science Standards (NGSS), *Sensemaking in Elementary Science* is the perfect resource for graduate students and researchers in science education, elementary education, teacher education, and STEM education looking to explore effective practice, approaches, and development within the elementary science classroom.

Successful STEM Education - National Research Council 2011-10-15

What students learn about the science disciplines, technology, engineering, and mathematics during their K-12 schooling shapes their intellectual development, opportunities for future study and work, and choices of career, as well as their capacity to make informed decisions about political and civic issues and about their own lives. Most people share the vision that a highly capable STEM workforce and a population that understands and supports the scientific enterprise are key to the future place of the United States in global economics and politics and to the well-being of the nation. Indeed, the solutions to some of the most daunting problems facing the nation will require not only the expertise of top STEM professionals but also the wisdom and understanding of its citizens. Although much is known about why schools may not succeed, it is far less clear what makes STEM education effective. *Successful STEM Education: A Workshop Summary* discusses the importance of STEM education. The report describes the primary types of K-12 schools and programs that can support successful education in the STEM disciplines and examines data and research that demonstrate the effectiveness of these school types. It also summarizes research that helps to identify both the elements that make such programs effective and what is needed to implement these elements.

Reconceptualizing the Nature of Science for Science Education - Sibel Erduran 2014-08-20

Prompted by the ongoing debate among science educators over 'nature of science', and its importance in school and university curricula, this book is a clarion call for a broad re-conceptualizing of nature of science in science education. The authors draw on the 'family resemblance' approach popularized by Wittgenstein, defining science as a cognitive-epistemic and social-institutional system whose heterogeneous characteristics and influences should be more thoroughly reflected in science education. They seek wherever possible to clarify their developing thesis with visual tools that illustrate how their ideas can be practically applied in science education. The volume's holistic representation of science, which includes the aims and values, knowledge, practices, techniques, and methodological rules (as well as science's social and

institutional contexts), mirrors its core aim to synthesize perspectives from the fields of philosophy of science and science education. The authors believe that this more integrated conception of nature of science in science education is both innovative and beneficial. They discuss in detail the implications for curriculum content, pedagogy, and learning outcomes, deploy numerous real-life examples, and detail the links between their ideas and curriculum policy more generally.

Quantitative Reasoning in Mathematics and Science Education - Gülseren Karagöz Akar 2023-01-01

This book focuses on quantitative reasoning as an orienting framework to analyse learning, teaching and curriculum in mathematics and science education. Quantitative reasoning plays a vital role in learning concepts foundational to arithmetic, algebra, calculus, geometry, trigonometry and other ideas in STEM. The book draws upon the importance of quantitative reasoning and its crucial role in education. It particularly delves into quantitative reasoning related to the learning and teaching diverse mathematics and science concepts, conceptual analysis of mathematical and scientific ideas and analysis of school mathematics (K-16) curricula in different contexts. We believe that it can be considered as a reference book to be used by researchers, teacher educators, curriculum developers and pre- and in-service teachers.

Reconceptualizing STEM Education - Richard A. Duschl 2016-01-08

Reconceptualizing STEM Education explores and maps out research and development ideas and issues around five central practice themes: Systems Thinking; Model-Based Reasoning; Quantitative Reasoning; Equity, Epistemic, and Ethical Outcomes; and STEM Communication and Outreach. These themes are aligned with the comprehensive agenda for the reform of science and engineering education set out by the 2015 PISA Framework, the US Next Generation Science Standards and the US National Research Council's A Framework for K-12 Science Education. The new practice-focused agenda has implications for the redesign of preK-12 education for alignment of curriculum-instruction-assessment; STEM teacher education and professional development; postsecondary, further, and graduate studies; and out-of-school informal education. In each section, experts set out powerful ideas followed by two eminent discussant responses that both respond to and provoke additional ideas from the lead papers. In the associated website highly distinguished, nationally recognized STEM education scholars and policymakers engage in deep conversations and considerations addressing core practices that guide STEM education.

Science Education for Diversity - Nasser Mansour 2013-06-18

Reflecting the very latest theory on diversity issues in science education, including new dialogic approaches, this volume explores the subject from a range of perspectives and draws on studies from around the world. The work discusses fundamental topics such as how we conceptualize diversity as well as examining the ways in which heterogeneous cultural constructs influence the teaching and learning of science in a range of contexts. Including numerous strategies ready for adoption by interested teachers, the book addresses the varied cultural factors that influence engagement with science education. It seeks answers to the question of why increasing numbers of students fail to connect with science education in schools and looks at the more subtle impact that students' individually constructed identities have on the teaching and learning of science. Recognizing the diversity of its audience, the book covers differing levels and science subjects, and examines material from a range of viewpoints that include pedagogy, curricula, teacher education, learning, gender, religion, and ICT, as well as those of in-service and trainee teachers at all levels.

Reprogrammable Rhetoric - Michael J. Faris 2022-09-01

Reprogrammable Rhetoric offers new inroads for rhetoric and composition scholars' past and present engagements with critical making. Moving beyond arguments of inclusion and justifications for scholarly legitimacy and past historicizations of the "material turn" in the field, this volume explores what these practices look like with both a theoretical and hands-on "how-to" approach. Chapters function not only as critical illustrations or arguments for the use of reprogrammable circuits but also as pedagogical instructions that enable readers to easily use or modify these compositions for their own ends. This collection offers nuanced theoretical perspectives on material and cultural rhetorics alongside practical tutorials for students, researchers, and teachers to explore critical making across traditional areas such as wearable sensors, Arduinos, Twitter bots, multimodal pedagogy, Raspberry Pis, and paper circuitry, as well as underexplored areas like play, gaming, text mining, bots, and electronic monuments. Designed to be taught in upper division undergraduate and graduate classrooms, these tutorials will benefit non-expert and expert critical

makers alike. All contributed codes and scripts are also available on Utah State University Press's companion website to encourage downloading, cloning, and repurposing. Contributors: Aaron Beveridge, Kendall Gerdes, Kellie Gray, Matthew Halm, Steven Hammer, Cana Uluak Itchuaqiyag, John Jones, M.Bawar Khan, Bree McGregor, Sean Morey, Ryan Omizo, Andrew Pilsch, David Rieder, David Sheridan, Wendi Sierra, Nicholas Van Horn

Methodological Approaches to STEM Education Research Volume 1 - Peta J. White 2020-08-13

This book addresses the changing nature of the methodologies that underpin research in mathematics, science, health and environmental education. This is a constantly shifting landscape that educational researchers need to engage with in order for research to continue to impact educational practice. The novelty of this book in the context of the existing publishing landscape is that it has a singular focus on methodology and methods, not in service of research findings but as something worth considering in itself, bringing methodology to the forefront of educational research.

Handbook of Research on Learning and Instruction - Richard E. Mayer 2016-10-04

During the past 30 years, researchers have made exciting progress in the science of learning (i.e., how people learn) and the science of instruction (i.e., how to help people learn). This second edition of the Handbook of Research on Learning and Instruction is intended to provide an overview of these research advances. With chapters written by leading researchers from around the world, this volume examines learning and instruction in a variety of learning environments including in classrooms and out of classrooms, and with a variety of learners including K-16 students and adult learners. Contributors to this volume demonstrate how and why educational practice should be guided by research evidence concerning what works in instruction. The Handbook is written at a level that is appropriate for graduate students, researchers, and practitioners interested in an evidence-based approach to learning and instruction. The book is divided into two sections: learning and instruction. The learning section consists of chapters on how people learn in reading, writing, mathematics, science, history, second language, and physical education, as well as how people acquire the knowledge and processes required for critical thinking, studying, self-regulation, and motivation. The instruction section consists of chapters on effective instructional methods—feedback, examples, questioning, tutoring, visualizations, simulations, inquiry, discussion, collaboration, peer modeling, and adaptive instruction. Each chapter in this second edition of the Handbook has been thoroughly revised to integrate recent advances in the field of educational psychology. Two chapters have been added to reflect advances in both helping students develop learning strategies and using technology to individualize instruction. As with the first edition, this updated volume showcases the best research being done on learning and instruction by traversing a broad array of academic domains, learning constructs, and instructional methods.

Reconceptualizing Connections between Language, Literacy and Learning - Sangeeta Bagga-Gupta 2020-01-11

This edited volume unpacks the familiar concepts of language, literacy and learning, and promotes dialogue and bridge building within and across these concepts. Its specific interest lies in bridging the gap between Literacy Studies (or New Literacy Studies), on the one hand, and SLA and scholarship in learning in multilingual contexts, on the other. The chapters in the volume center-stage empirical analysis, and each addresses gaps in the scholarship between the two domains. The volume addresses the need to engage with the concepts, categorizations and boundaries that pertain to language, literacy and learning. This need is especially felt in our globalized society, which is characterized by constant, fast and unpredictable mobility of people, goods, ideas and values. The editors of this volume are founding members of the Nordic Network LLL (Language, Literacy and Learning). They have initiated a string of workshops and have discussed this theme at Nordic meetings and at symposia at international conferences.

Teaching Biology in Schools - Kostas Kampourakis 2018-05-23

An indispensable tool for biology teacher educators, researchers, graduate students, and practising teachers, this book presents up-to-date research, addresses common misconceptions, and discusses the pedagogical content knowledge necessary for effective teaching of key topics in biology. Chapters cover core subjects such as molecular biology, genetics, ecology, and biotechnology, and tackle broader issues that cut across topics, such as learning environments, worldviews, and the nature of scientific inquiry and explanation.

Written by leading experts on their respective topics from a range of countries across the world, this international book transcends national curricula and highlights global issues, problems, and trends in biology literacy.

The Bloomsbury Handbook of Rural Education in the United States - Amy Price Azano 2021-09-09

This handbook begins with a foundational overview of rural education, examining the ways in which definitions, histories, policies, and demographic changes influence rural schools. This foundational approach includes how corporatization, population changes, poverty, and the role of data affect everyday learning in rural schools. In following sections, the contributors consider how school closures, charter schools, and district governance influence decision making in rural schooling, while also examining the influence of these structures on higher education attainment, rural school partnerships, and school leadership. They explore curriculum studies in rural education, including place-based and trauma-informed pedagogies, rural literacies, rural stereotype threat, and achievement. Finally, they engage with issues of identity and equity in rural schools by providing an overview of the literature related to diverse populations in rural places, including Indigenous, Black, and Latinx communities, and exceptional learners. Importantly, this handbook applies theoretical tools to rural classroom experiences, demonstrating the potential of work centered at the intersection of theory, rurality, and classroom practice. Each section concludes with a response by an international scholar, situating the topics covered within the broader global context.

Supporting Self-Directed Learning in Science and Technology Beyond the School Years - Léonie J. Rennie 2018-12-21

While much has been written about science education from pre-K through to postgraduate study, interaction with science and technology does not stop when schooling ends. Moving beyond scholarship on conventional education, this book extends the research and provides an original in-depth look at adult and lifelong learning in science and technology. By identifying the knowledge and skills that individuals need to engage in self-directed learning, the book highlights how educators can best support adult learners beyond the years of formal schooling. Through case studies and empirical analysis, the authors offer a research-based exploration of adults' self-directed learning and provide tools to support adults' learning experiences in a wide range of environments while being inclusive of all educational backgrounds.

Inequalities in the Early Years - Bonnie Johnson 2018-06-14

Inequalities in the Early Years examines poverty's effects on children and provides workable solutions for decreasing childhood inequalities through the formal education process. This powerful edited collection explores early childhood inequalities across ten disciplines: earth sciences and geography, life sciences, physical sciences, technology, mathematics, history, society and social institutions, business and economy, the arts, and sports and recreation, following Kipfer's delineation of broad subject areas of knowledge. The volume reaches beyond the domain of education to include multiple perspectives from scholars in the aforementioned disciplines.

Reconceptualizing Curriculum Development - James Henderson 2014-12-05

Reconceptualizing Curriculum Development provides accessible, clear guidance on curriculum problem solving and educational leadership through the practice of a synoptic curriculum study. This practice integrates three influential interpretations of curriculum—curriculum as deliberative artistry, curriculum as complicated conversation, and curriculum as currere—with John Dewey's lifetime work on reflective inquiry. At its heart, the book advances a way of studying as a way of living with reference to the question: How might I live as a democratic educator? The study guidance is organized as an open-ended scaffolding of three embedded reflective inquiries informed by four deliberative conversations. Study recommendations are provided by a carefully selected team. The field-tested study-based approach is illustrated through a multi-layered, multi-voiced narrative collage of four experienced teachers' personal journeys of understanding in a collegial study context. Applying William Pinar's argument that a "conceptual montage" enabling teachers to lead complicated conversations should be the focus for curriculum development in the field's current 'post-reconceptualist' moment, the book moves forward the educational aim of facilitating a holistic subject/self/social understanding through the practice of a balanced hermeneutics of suspicion and trust. It closes with a discussion of cross-cultural collaboration and advocacy, reflecting the interest of curriculum scholars in a wide range of countries in this study-based, lead-learning approach to curriculum development.