

Education for the Future: Knowledges and emancipatory practices

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Identity in Mathematics Education: A Critical Realist Perspective

Presenter: Aarifah-Gardee

Organisation: University of Witwatersrand

Abstract

The concept of identity has become increasingly researched in the field of mathematics education, with most researchers turning to interpretivist accounts to define and explain identity. When identity is defined only as a social becoming, the role of the individual and their capacities to exercise agency are underplayed. This paper explores the use of critical realism as an alternative theoretical perspective in researching learners' mathematical identities, giving equal emphasis to social and personal aspects of identity. Using critical realism, I define identity as a social phenomenon existing in the real world, emerging from relations between three key generative mechanisms: social identity, personal identity and agency. I develop an explanatory framework, through which I examine how the relationships between generative mechanisms are responsible for the emergence of secondary school learners' mathematical identities. I exemplify the framework using data collected over two years, involving 19 learner participants and their 5 mathematics teachers. The conditions for emancipation and the transformation of learners' mathematical identities are discussed.

It's an Emergency: A Critical Realist-Critical Race Approach to Institutional Racism at Work

Presenter: Angela Martinez Dy
Organisation: Loughborough University London

Abstract

This paper makes the case for adopting a critical realist perspective to explain how institutional racism, in subtle, covert, and overt forms, manifests within organisations via processes of emergence. It proposes a methodological intervention by which empirical observations, at interpersonal as well as organisational levels of analysis, could be explained by integrating key assumptions from critical race theory with a critical realist methodology, in order to better theorise, explain, and eventually reduce structurally racist occurrences and outcomes. It is suggested that adopting this innovative methodological approach, combined with the implications of such findings for policy and practice, has the potential to more effectively help organisations identify, explain and intervene in emergent processes and outcomes of structural racism, in order to ameliorate and reduce racist harm experienced by organisation members.

To illustrate these theoretical arguments, the paper conducts a critical realist interrogation of a fictionalised, composite UK higher education institution, as an illustrative case for the generative potential of a critical realist approach to the study of race and the reproduction of institutional racism within organisations. It develops an innovative 'whisper network' approach to generating compelling and affective scenarios that bring together accounts from across multiple UK universities, and uses retrodiction to examine and explain emergence within three typical problem spaces arising because of institutional racism. As such, it constructs a conceptual prism which can refract an image of how such structural inequality emerges. The paper advances theory on the ontological manifestations of institutional racism within the context of organisations by drawing together currently disparate literatures on critical realist emergence and critical race theory, and contributing a novel method of counter-storytelling in the critical race theory tradition. It offers a range of relevant implications and recommendations for anti-racist organisational policy and practice.

Presenter: Inga Hornei

Organisation: University of Duisburg-Essen

Abstract

Multiple crisis currently reinforce one another. From the perspective of public sociology teaching, the poly-crisis manifests in several existential and social issues, which has to be understood and explained by real terms of stratification and differentiation.

While there seems to be a plausible causality of reason for a public realist citizenship education, the implementation is challenging for practitioners working in the public realm and social science due to several interrelated reasons.

Criticizing the predominant type of education – only meant for profit – Nussbaum (2016) diagnoses that „moral imagination too often becomes numbed under the sway of technical mastery (S.21)“.

In practice, the concrete utopia of Nussbaum has to deal with unfolding contradictions of liberal democracy. Although the suggested topic is of imminent value, the political system does not promote to develop capabilities of collective rationality, as observed in sociological teaching.

Considering that curricula for sustainable development in public schools are lacking depth, Nussbaum's formulation of a transitory need gains significance. She defines abilities necessary to produce capable, global and democratic citizens.

While Nussbaum proposes socratic teaching to practice explanatory critique and to provide insights into emancipatory rationality utilizing examples in art and humanities, realist citizenship education needs to be based in social science and the capacity to seek truth in complex, applied and multi-layered cases.

Building on a case in the degree programme teaching social science for secondary schools, a digital emancipatory teaching project will be described. Students had the possibility to critically engage and reflect complex issues in use of social theory and practice of social science, but several blockages for future exercises of realist citizenship education became evident. It will be shown how CR-tools can be applied in academic teaching to map contradictions and create pathways to absent absences.

Liberal Arts Education for Global Citizen Cultivation: Capabilities for a Sustainable Future in the Post-Pandemic World

Presenter: Leping Mou
Organisation: University of Toronto

Abstract

At a time of increasing global political, economic, environmental, and humanitarian instabilities around the world, the role that higher educational institutions play in sustainable development has become of paramount importance (Beynaghi et al., 2016; Ferrer-Balas et al., 2009; Karatzoglou, 2013; Leal Filho et al., 2019). Especially, facing the current pandemic-afflicted world and preparing for a post-pandemic era, scholars call upon higher education to deal with the challenges and to tackle the urgent developmental task of boosting the resilience of both individuals and the society as a whole for sustainable futures (Oleksiyenko et al., 2020). Most recently, liberal arts education (LAE) has come to the fore in educational research with its focus on cultivating graduates for 21st century challenges (CBC Radio, 2020; Godwin, 2015; Nishimura & Sasao, 2018). This study explores what capabilities do the LAE institutions aim to cultivate in their graduates for a sustainable future in a post-pandemic world.

Employing document analysis, I examined the documents of educational goals, mission and vision from 55 LAE institutions in the Alliance of Asian Liberal Arts Universities (AALAU) and the Global Liberal Arts Alliance (GLAE). Although institutions in the two associations are from different social contexts and traditions across the globe, they share the common goal of cultivating graduates with capabilities through LAE within their specific contexts to address pressing challenges in the globalized 21st century (AALAU, 2020; GLAA, 2020). The data are analysed under the theoretical framework of capabilities approach (Nussbaum, 2009; Sen, 1993). The study finds that the LAE institutions aim to cultivate their graduates for addressing the current need and future challenges on peace, inclusivity, harmony, diversity, and social justice. The findings shed light for administrators and policy makers to implement LAE in higher education for the purpose of cultivating graduates for a sustainable future the post-pandemic global society.

Presenter: Maeve O' Regan
Organisation: Trinity College Dublin

Abstract

Since March 2020 educators worldwide have moved education from face-to-face to online platforms to limit social interaction and combat the spread of the COVID-19 virus. In essence this has highlighted the challenges of learning at a distance from the physical campus setting, communities and resources. Researchers have critiqued a tendency within Education studies to adopt a human centred approach to understanding learners' experiences of engaging with academic programmes and institutions and recommend greater attention to the role of non-human and material resources, for example digital technologies as influencing (Fenwick and Edwards, 2012) learners' experiences and progression with educational pursuits.

This paper proposes a new approach to exploring learners' experiences of navigating doctoral studies beyond assumptions of the learner as socialised (Gardner, 2008) and situated within the academic institution (Pearson et al, 2016) during candidature. A conceptual framework influenced by Actor Network Theory (Latour, 2005) and Theories of Agency (Archer, 2003) is presented to offer a new way to look at inclusion, engagement and academic progression beyond an emphasis on the learner as situated within the campus environment. Actor-Network Theory (Latour, 2005) offers a way to understand the role of technology and interaction between human and non-human agents as influencing knowledge generation and Theories of Agency (Archer, 2003) provide a way to understand individual agency and interaction with cultural and social factors as influencing progression and completion of academic studies. The conceptual model proposed in this paper offers a way to go beyond who learners are (e.g. full-time, part-time or international), to consider where they are (within or outside the campus setting) and what else is going on in life (e.g. work and caring roles) as influencing academic progression and quality of the student's experience.

Presenter: Margaret Blackie
Organisation: Stellenbosch University

Abstract

The call for decolonisation is often dismissed as being irrelevant to the natural sciences. The allegiance to a notion of objectivity in these disciplines leads a naïve presumption that science is socially neutral. In this paper, using Critical Realism as a foundation, I will show the idea of scientists as the neutral observer and therefore the locus of objectivity is in fact erroneous. It is the real mechanism that is independent of human activity that is the source of reproducibility and reliability in science. The task of the scientist is that of an active agent who intentionally closes or isolates the real mechanism in operation in order to investigate the actual events which are precipitated. The reproducibility of science resides in both the reality of the mechanism in operation and the capacity of the scientist to reliably describe the conditions of closure. This means that the scientist is not a passive observer but an active participant.

This separation between the real mechanism and the activity of the scientist then allows for the recognition of the creative contribution of the individual scientist. The scientist with training in chemistry and mathematics will approach a problem in a different manner to one trained in chemistry and microbiology. Likewise scientists who have grown up in different cultures will have different mental models through which they interpret scientific theory. When we no longer locate objectivity in the person of the scientist, but rather in the combination of the real mechanism combined with the scientist's clarity of description of experimental activities, the diversity of life and educational experience becomes an asset to science not a threat.

Ensuring Meaningful Access to Powerful Knowledge to Enable Success of Students from Rural Areas in the Field of Science in Higher Education

Presenter: Nathi Madondo

Organisation: Mangosuthu University of Technology

Abstract

The dominant discourse in higher education which rather simplistically equates hard work with success, serves to privilege the already privileged, with their background in particular forms of knowledge and learning. We want to believe that higher education is a meritocracy where it is hard work and bright minds that result in success but the reality is that around the world, middle class students get rewarded for their privilege. When students enroll in universities they do so to access powerful knowledge. Powerful knowledge is abstracted from immediate context and helps us to understand the world, to solve problems and to imagine things not yet in existence. However, accessing powerful knowledge is sometimes conflated with accessing the knowledge of the powerful with the result that success of subordinated students, including those from rural areas is likely to be compromised, and thus, maintain the status quo. As a consequence, these students are unlikely to draw on knowledge resources that they bring with them to university since they find them unrecognized and unrewarded. Through empirical qualitative data drawn from digital documentaries of 2nd year science students at Rhodes University, I argue that knowledges outside of the academy, for example, in rural homes could be used as a pathway to access powerful knowledge, and thus maintain lifelong learning. To contribute to the debates regarding access to powerful knowledge in the field of science, I draw on the theoretical lens of critical realism to develop an understanding of students' prior experience, and to draw on it in the classroom for better educational outcomes. A decolonial gaze is adopted to critique how university space, physical, ideological and intellectual, could constrain access to powerful knowledge and make a case for the recognition and reward for forms of rural originated knowledge and knowledge practice currently ignored in higher education.

Presenter: Deepak Saxena, P. J. Wall
Organisation: BITS Pilani, Trinity College Dublin

Abstract

Artificial Intelligence (AI) is no longer a staple of science fiction and is now influencing every part of our lives. From what we watch on streaming services to with whom we interact on social media, and from what interest rates we are offered by credit card companies to the shortlisting for jobs, AI is influencing us at many personal and professional levels. Therefore, the importance of a conversation on AI ethics cannot be overstated. However, the discussion on AI ethics seems to suffer from similar lacunae that is observed in general discourse on engineering or business ethics, and initial approaches to AI ethics have traditionally focused on the agency of the technology companies and of those working on AI projects (e.g. Google AI principles). More recent approaches focus more on wider structure and frameworks that may support responsible AI design (e.g. Ethically Aligned Design framework by IEEE).

In this paper, we argue that the approaches outlined above are incomplete and insufficient. These approaches either give primacy to agency or to structure. In the former case, it ignores the influences of wider society and structure and views developers' action as divorced from the wider context. In the latter case, the focus is more on wider principles and grand structures, ignoring the potential inherent in human agency. In both approaches, interestingly, emancipation of those for whom AI is designed is completely ignored. The focus remains on either the AI developers or the global collaborations when it comes to AI ethics, with users or other stakeholders having very little say.

To remove this lacunae, we suggest an emancipatory approach to AI ethics based on the key tenets of critical realism. We propose to draw from the key concepts of critical realism – stratified ontology, generative mechanisms, and reflexivity. Roy Bhaskar's stratified ontology of critical realism suggests that structural conditions may be modified in such a way that activate the mechanisms supporting desired outcome (e.g., bias-free AI). Moreover, an emancipatory approach to critical realism works towards activating the mechanisms supporting the reflexivity of the stakeholders in the AI context. Examples of such structural changes include explainable AI, AI-enabled bias recognition, and citizen think-ins.

Presenter: Kehinde Adeniji

Organisation: University of Witwatersrand

Abstract

One major challenge in education, and mathematics education in particular, is how to conceptualize and theorize teaching, learning and subject content coherently and comprehensively. Attempts have been made to address this challenge, but it is either one or two of these elements are reduced to the background, or they are not robustly linked together. I address these issues in my study by conceptualizing social relationships, mathematical identity and mathematics achievement, and the relationships between them. Drawing from the critical realist perspective, I propose a framework that shows the structures and generative mechanisms that explain why and how: social relationship enabled by the teachers, mathematical identity constructed and mathematics achievement attained by the learners influence one another. Building on the comprehensiveness of the framework, I also developed an intervention program to improve the relationships between the: teacher-learner relationships and mathematical identities; mathematical identities and mathematics achievement; and mathematics achievement and teacher-learner relationships among rural learners. The study, when completed, is expected to enrich our knowledge on mathematics teaching, learning and achievement, and to be a source of formulating effective teachers' social practices.

“My Dream was to Become a Doctor”. Practices, Policies and Perspectives on Educational Paths

Presenter: Roberta Ricucci, Giulia Marroccoli, Stella Pinna Pintor
Organisation: University of Turin

Abstract

The paper focuses on the passage from lower to secondary school considering the peculiar group of immigrant students recently arrived. Statistics and empirical data show that immigrant youths have a higher risk to choose vocational schools compared to natives due to lack of information and unequal treatment as both literature and research findings still continue to point out (Feliciano 2005; Gobbo & Ricucci 2011; Murulli & Belavi 2021). Discussing the typology of secondary school is crucial for two reasons: first, the choice of the school influences the future educational attainments of the students; second, the lower incidence of foreign students in the high schools might be investigated for avoiding the risk of school segregation process. Through 30 interviews with foreign young people enrolled in university paths (i.e. life stories gathered in Turin – Italy) and 10 teachers in 2019-2020, the authors will discuss practices and discourses intervening in the decision-making process of school choosing outlining practices for avoiding the risks to downgrade and segregate pupils on the basis of migratory background. The aim of this work is to investigate the effects of personal motivation, parental attitudes and schools' orientation mechanisms. This last point will be pointed out describing which approaches schools (and teachers) could eventually pursue in counselling both foreign families and students in choosing the educational track.

Supervisor Perspectives in STEM PhD Supervision: A Novel Analysis through a Social Realist Lens

Presenter: Alan Cornell, Wesley Doorsamy, Kershree Padayachee

Organisation: University of Johannesburg, University of Witwatersrand

Abstract

The traditional academic pipeline from graduate studies to academia has branched out significantly in recent years. The motivation of students pursuing higher degrees has also changed dramatically in response to wider socio-economic need. Supervisors of PhD students are consequently faced with the need to adapt supervision practices to equip graduates with a broader suite of workplace competencies. The supervision process does not however, occur in a vacuum. PhD supervision is a practice located in the broader socio-cultural setting of a higher education system, conditioned by a number of factors. Our aim was to examine this system to elucidate the factors that impact on PhD supervision, drawing on data gleaned from semi-structured focus group interviews conducted with three groups of four PhD supervisors who were invited to reflect on a number of questions related to PhD supervision. Each group consisted of supervisors with varying level of supervision experience and from different STEM disciplines (physics, mathematics, engineering, biology, computer science fields). Transcripts of the recorded interviews were analysed relative to the themes underpinning the interview questions, viz., Motivations for pursuing PhD, Time to Completion, Liminality and Dispositions and Challenges. These responses were further analysed using the major concepts of Archer's Social Realist theoretical framework, namely 'structure', 'culture and 'agency', to explain the state of PhD supervision practices and the undergirding factors influencing these practices. Explicating the responses within the context of the research themes and social realist concepts not only enabled a route for conducting a comparative analysis between groups, across themes; it also enabled a novel visual representation in the form of a heat map which makes the salient aspects of the data more accessible. Our findings highlight the complex nature of supervision practices and the conditions that may be leveraged to shift praxis.

Presenter: Presha Ramsarup, Simon McGrath, Jo-Anna Russon

Organisation: University of Witwatersrand, University of Nottingham

In this paper we argue that skill discourses have largely been trapped in an individualistic fallacy, which has often assumed that people apply their skills and knowledge in decontextualized situations. This focus on the individual is a constraint in enabling transitions and contradicts the deep systemic co-evolution needed for a just transition. A focus on skills for a just transition requires a framing that moves beyond the individual: a framing of skills that involves individuals, organisations and systems as a systemic collective to drive regime change and work against the lock-ins within the skills ecosystem.

In response, we offer a framing of skills ecosystems that explores skills for a just transition as situated within a laminated skills ecosystem. Drawing from data on the Durban maritime economy, we do an absence and emergence analysis that illuminates the relational dynamics within the skills ecosystem. Here we draw on Bhaskar (2016) who argued for a “relational conception of the subject matter of social science” grounded in an adequate non-reductionist account of generative tendencies, structures and mechanisms, and the conditions under which structures can be transformed via agency involving the ontologically constituted dialectic of absence and emergence. He argues that such mechanisms operate at different levels of scale, and an adequate analysis should therefore take the different levels of scale into account for generative dialectical change.

Using this framework, we develop an immanent critique of the skills, then identify significant absences at different levels of the laminated system and explore practices at other levels of the ecosystem to contribute to building a new orientation to skills ecosystems. Real absence, according to Bhaskar (2016), opens ontological possibilities for change (via the act of absenting the absence); while emergence draws attention to those interactions which constitute the social world involving agents and their reasons and intentions, and the manner in which structures cultivate (enable and constrain) particular forms of activity and agency.

Presenter: Thomas Salmon
Organisation: Rhodes University

Abstract

In a crisis where the overriding aim is now stability, politics has slowly become part of a wider system of simply managing the world. Our entanglements within this erosion of democracy are reflected within problematic approaches to building social cohesion. This paper outlines how a doctoral study examining teachers as agents of social cohesion within a PGCE programme in South Africa draws upon a critique of comparative education's methodological nationalism to reflect upon how frameworks for justice and freedom within it are often bent towards an ontological insistence upon a western, liberal Eurocentric view of the individual. The paper problematises how master narratives of social cohesion in South Africa derive a basis from Eurocentric modern social theory, and by moving beyond these certainties, reframes them reflexively as 'social cohesion work' within the PGCE programme. The paper takes issue with the reliance upon notions of participation parity, social capital, or individual capabilities, as an outcome, or metric that can be indexed to a social norm. It argues that both capability indexes and critical approaches within education can impose problematic notions of framing and functioning from above.

Within teacher education this study proposes that taking account of absenting as a process of reflexive learning, agency and action is a generative way to open up spaces to work towards alternative futures through a dialectic process of moving from 'is' to 'ought' within dialectical critical realism. It elaborates an anti-colonial approach that resists the ontological insistence upon comparison through a process of delinking from the matrices of coloniality to unsettle modernist certainties and settler grammars. It frames this as a reconstructive stance to move beyond 'thin inclusion', to create spaces toward developing what may be tentatively called "ecolog[ies] of knowledges" that can speak back to the uncritical application of social theories to non-Western societies.

The Search for Morphogenesis: Analysis of Implementation of a Professional Development Programme for Education for Sustainable Development

Presenter: Caleb Mandikonza

Organisation: University of Witwatersrand

Abstract

This presentation demonstrates how the change project approach was used to structure and drive course-mediated agency in institutionally and practice-based located capacity development activities for mainstreaming Education for Sustainable Development (ESD). The educator would engage change processes in their practice and within a community of practice. This presentation shows how the morphogenetic theory (Archer, 1995) was used to analyze social change processes and evaluate usefulness of the change project during this implementation.

Data were generated through interviews and observations. Structural emergent properties (SEPs), Cultural Emergent Properties (CEPs) and People Emergent Properties (PEPs), were used as a lens to qualitatively investigate the deep contextual educational and institutional processes that influence individual and collective action. Upon implementation of change projects in their workplaces course participants experience different levels of success due to their differential contexts.