



Educational Process: International Journal

ISSN: 2147-0901 | e-ISSN: 2564-8020 | www.edupij.com

Educational Process International Journal • Volume 7 • Issue 3 • 2018

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To cite this article: Jessani, S. I. (2018). Pitfalls of Globalization: A Case of Science Education in Less Developed Countries. *Educational Process: International Journal*, 7(3), 180-188.

To link to this article: <http://dx.doi.org/10.22521/edupij.2018.73.2>

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Pitfalls of Globalization: A Case of Science Education in Less Developed Countries

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Abstract

The purpose of this paper is two-fold; to explain the ideological thrust of globalization in shaping different approaches of science education; and to discuss the impact of neo-liberal agenda on the science education reforms in LDCs. The structure of the paper is as follow. First, the trends and approaches of western science education along with their theoretical assumptions are discussed. Then, the linkage of neo-liberal ideology with the concept of globalization and current science education is explored. Next, the role of English language, aid agencies and educational research in the context of science education are debated in defining the status of LDCs in knowledge economy. Finally, a call for “indigenization” in curriculum, policies and practices of LDCs is made, in order to achieve the goal of a relevant and context-sensitive science education.

Keywords: science education, neo-liberal agenda, less developed countries.



DOI: 10.22521/edupij.2018.73.2

EDUPIJ • ISSN 2147-0901 • e-ISSN 2564-8020

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Introduction

Globalization is the driving force that has shaped the world's education system in the pursuit of economic growth and political stability. Likewise, it is impossible to see contemporary science education in isolation from the globalization; as this phenomenon has brought about major shifts in the approaches, policies, and curriculum of science education across the globe. Emergence of new trends and practices of science education in less developed countries (LDCs) also reflects the influence of global agenda and neo-liberal ideology. However, dependency on the intellectual models of the west opens new challenges for LDCs in terms of identity, relevance and efficacy (Shizha, 2014). Therefore, my positionality in this paper is rather critique to pro-globalist view; as the over-reliance on west dominated models leads to decline in the generation and importance of local knowledge in LDCs. Niyozov and Dastambuev (2012) highlight the need to “demonopolize and de-essentialize the discourse of globalization” (p. 2) while questioning its existing form based on neo-liberal ideology. This academic paper, therefore, invites critical discourse on how the neo-liberal form of globalization has shaped science education in LDCs and how these changes impact on their role in knowledge society.

Trends and Approaches of Global Science Education

The goal of making science education relevant, interesting, and meaningful to all students has been a real challenge for both developed and less developed countries. De Jong (2007) describes three waves of reform in science education in the west. First reform was carried out during the Sputnik era when policymakers of the United States of America (USA) realized the ineffectiveness of fact-oriented and overloaded science curriculum. School science was unable to evoke students' interest and thus contributed less to the science and technology advancement of the nation. A great deal of effort and investment were made in making curriculum innovative and less factual, however, the dominance of expert perspective instead of student perspective in new curriculum resulted in the failure of that reform (De Jong, 2007). During 1983, after the US report, “A Nation at Risk,” a new movement of curriculum reform began, based on engaging students actively in the learning process through “guided discovery learning.” This, however, produced disappointing results in comparison to what was expected. Consequently, in the 20th century, a third wave of innovative science education was initiated where many developed countries started integrating sociocultural perspective into science curriculum as an effort to make science concepts and processes relevant to everyday life. New science education approaches, like Science, Technology and Society (STS) was introduced with the goal of developing scientific literacy among students. STS is based on the socio-constructivist perspective of learning where learners construct knowledge based on their actual experience, prior understanding and social and cultural contexts (Carter & Dediwalage, 2010; Jessani, 2007). Despite major differences in learning philosophy, all three waves of science education reform have emerged from the economic driven agenda that is developing an intellectual force to lead scientific advancement and to give power and prosperity to nations.

Recent development in school science has brought two distinct approaches of science education upfront; scientist approach and citizenship approach. Scientist approach aims to develop human capital, which according to the theorists like Shultz, Mincer, and Becker, leads to economic progress and technological advancement of a nation by contributing to its

knowledge economy through modern inventions and discoveries. On the other hand, the citizenship approach focuses on developing scientifically literate citizens who can take informed ethical decisions and participate in civic and cultural affairs with thorough understanding of scientific concepts and their relevance to society and technology (Jessani, 2015; Stuckey, Hofstein, Mamlok-Naaman, & Eilks, 2013). Among these two approaches, the latter seemed an unrealistic goal for two reasons. First, citizenship approach is based on human development theory that aims to create holistic welling and progress within society. Sen's human capability or development theory suggests an open framework for public participation to decide the path for achieving ethical individuals; however, this abstractness makes this concept intangible and impractical to implement. The second reason are the clear differences in the two approaches in terms of their goals, ideologies and expectations from its learners. For example, the scientist approach requires depth of theoretical science concepts in the curriculum; whereas, the citizenship approach prefers application dimension of scientific understanding. This clash of priorities makes it difficult to balance the two approaches in practice. Due to the above theoretical and practical issues in citizenship approach, current science education in many countries only suffices the human capital agenda.

On the other hand, Stuckey et al. (2013) critique the inadequate conceptualization of the notion of relevance in current science education and explain the complexities that may arise due to its widely variate meaning. This challenge becomes multifold for LDCs, who borrow western approaches without true understanding of the concept and without looking into the realities of their own context; hence innovations remain unworkable and rather frustrating for LDCs (Portnoi, 2016; Raina, 1999). For example, Pakistan in 2007 included sociocultural perspective in the form of STS objectives into the National Curriculum of general science across the grade levels. This required culturally relevant content and pedagogy in science classrooms where teachers use students' experiences, cultural values, and beliefs as learning resource while teaching science concepts. However, no such alignment for STS approach of science education is seen in teacher education curriculum, which resulted in a lack of capacity and willingness of teachers for actual classroom implementation (Jessani, 2015).

Ideological Underpinnings: Neo-liberalism, Globalization and Science Education

Globalization and modern science education are interwoven in the neo-liberal market ideology where knowledge is considered as the capital and international commodity leading to poverty alleviation, occupational growth and social wellbeing of any nation. This approach has brought about a shift in science education curriculum (including content, pedagogy, and assessment) in many LDCs, mimicking the trend in industrialized countries (Carter & Dediwalage, 2010). Likewise, Pakistan has adopted market-oriented educational policy to create its space in the global economic race (Ashraf & Kopweh, 2012; Chang, 2014; Kazmi, 2005). Emphasis on English language, standardized testing, and communication and technology through educational policies and reforms shows the intention of preparing students for the global knowledge economy. This can be understood in the context of Weber's modernization theory where following the best practices of the West is considered as unlocking the door of modernization and producing a modern economy. Dussel, as cited in Pirbhai-Illich, Shauneen, and Fran (2017), argues that the concept of modernity itself is a colonial idea that looks at development as a linear process; meaning moving from one

period to the other while leaving the old and backward; to attain the advanced way of being and thinking. This, however, creates the discourse of “others”; and provides justification of all colonial projects; hence results into the dichotomy of us-them, like-unlike, civilized-uncivilized, and global north and global south. The colonial masters consider it their prerogative to influence the policy and practices of their colonies, with the general perception that what is good for them will equally be good for their colonies. Also, due to the control of developed countries (the Centre) over less developed countries (the Periphery), LDCs are being used as laboratory to experiment western ideas, theories and philosophies. These top-down reforms most of the time are in tension with the value system, beliefs, needs, and capacities of the educationists in LDCs. For example, Koosimile and Suping (2015) share how the traditional instructional behavior and teacher dominant pedagogical practices in schools failed the progressive science education reforms in Africa. Studies conducted in Pakistan highlight certain contextual issues like lack of quality instructional materials, unqualified teachers and poor environment that widens the gap between intended and enacted science curriculum (Ashraf & Kopweh, 2012; Halai, 2008; Jessani, 2015; Kazmi, 2005). This shows that neither customization nor homogenization of western science is easy for LDCs. A few countries like India have made local adaptation of global reforms (Portnoi, 2016); however, Raina (1999) considered these changes as cosmetic and ineffective for long-term sustainability.

Role of LDCs in Knowledge Society: Key Challenges

According to Shrestha and Khanal (2016), “education is the means to reclaim and rediscover the accumulated wisdom of our traditions” (p. 143). This, however, seems an idealistic goal for LDCs due to their dependency on the borrowed wisdom from the west. According to Raina (1999), this reliance reflects the detrimental influence of colonial period on the educational system in the LDCs, usually called the “Third World.” He points out that even after independence, most of the LDCs retained rather expanded the dominance of their colonial masters by aiming to follow the development path of the colonizers. Education in LDCs offers the menu suggested by the West without realizing varying cultural aspects and physical settings. No space in the local education system has been created yet for the ideas of native thinkers, culturally appropriate pedagogies and societal perspective. For example, use of active pedagogies based on cultural heritage of Asian and African countries, like storytelling, art, and music is missing which could have been more acceptable than the imported model (Raina, 1999; Shizha, 2014).

The western tradition is not only reflected in the curriculum, language of education, and administrative structure of institutions, but has also penetrated deep into the psyche of the colonized. For example, people trained in the West with little experience are given more respect than the professionals trained in their home country. These ideological trap and colonial legacy extend a challenge for LDCs to escape from the long colonial past; hence, resulted in the intellectual dependence on the western models, which are considered as universal and best model for the global world. Following section talks about this colonial imprint in the areas; like language of instructions, role of aid agencies and research trend in science education; and their influence on the development agenda of LDCs.

Role of English language. Concept of learning is imbedded in the language of instruction and therefore, greatly influenced by the learners’ command on the target language. Supremacy of English in knowledge production is evident across the globe as it is considered

as the international passport to access science and technology. Being the symbol of global belonging, English language plays its hegemonic role in all educational reform and knowledge base across the globe. However, its penetration to science education in LDCs creates many issues. For example, teachers' lack of capacity to explain scientific concepts in the foreign language has become major impediment in students' cognitive development and conceptual understanding of science. Further, overemphasis on English as medium of instructions leads to lack of learners' enthusiasm and class participation, communication gap between teachers and learners, and risk for survival of local languages (Mchombo, 2016; Shizha, 2014; Shrestha & Khanal, 2016). All such linguistic and conceptual problems, however, are undermined due to the value of English language as medium of globalization.

Koosimile and Suping (2015) present three schools of thought prevailing in LDCs in order to deal with this issue. Those advocating the status quo, believe that English is the sole medium of instruction as it is international language of science and knowledge. The other extreme who believes on the importance of mother tongue for students' involvement, conceptual understanding and improved self-concept, consider English as a threat to native languages and cultural identity. However, there are also those who compromise between the two extremes by agreeing on the position of English as an international language; yet supporting the use of local languages in classroom teaching. This, however, brings further complexities in science learning due to the use of different language media for educational resources (e.g. textbooks), classroom instructions, and assessment; hence creates confusion on the students' part.

Role of aid agencies. The influence of supranational aid agencies like The World Bank and the United Nations is very common in LDCs for shaping science education through policy development, curriculum reforms, teaching leaning resources and human resource development. Niyozov and Dastambuev (2012) consider the role of aid agencies as sales and marketing agents; believing on the commodification of knowledge. These organizations support western ideas, values, beliefs and practices and inculcate them through structural reform projects, science conferences, and in-service workshops in the form of funding and technical support. Several scholarships are offered to students to study western theories and philosophes abroad; where foreign universities do not promote research on local practices in their home countries. The best minds from the LDCs are then utilized by developed countries for their own economic and technological advancements; hence, the resulted is termed as brain drain. Even those who return to their home countries become ambassadors of western philosophies and practices rather than advocate of indigenous knowledge (Tyokumber, 2010).

Another area targeted by the aid agencies are assessments in the form of certain assessment packages with the motive of accountability, normalization, and return to investment. Pakistan's commitment to appear in the international testing process, PISA, reflects the captive role of government towards the aid agencies. Similarly, several interventions and huge investment in Pakistan were made by aid agencies to promote science education through teacher training and revision of educational policies, however, despite massive commitment, government is not successful in implementing those reforms at the grassroots level (Ashraf & Kopweh, 2012; Chang, 2014; Halaj, 2008).

Role of research and publications. Monopoly of colonial power on knowledge production is evident in science and social science areas which are more inclined towards western

models and paradigms. This reflects the neo-colonial tendency where connecting with the ideas of the West is considered as the symbol of prestige and status. On the other hand, western countries determine the intellectual agenda of LDCs by providing generous financial grants to institutions and individuals in LDCs “for selling their own academic agenda” (Raina, 1999, p.16). As a result, research in science education largely follows the western orientation. Raina (1999) informs that many studies in LDCs during last 10 years were conducted on the indirect teaching, discovery learning, and progressive focus, instead of memory and mechanical recitation procedure prevailing in the context. Hence, such research have not contributed to the development of a theoretical model of any indigenous practices. In the context where conceptual clarity of science is the biggest issue, research should respond to that need rather than following the western fashion. Because of the irrelevance of research contribution, universities unable to guide national policies and practices ultimately follow the path determined by the west. Furthermore, getting inspired by the research findings from the West and following those recommendations blindly has proven ineffective due to different sociocultural realities in both contexts. Raina (1999) highlighted key issues in research policies and practices that hinder knowledge generation in LDCs; for example, mindset of exclusive quantitative paradigm for degree, lack of connection between the research area and local needs, lack of research initiatives by universities, and political and access issues for conducting research.

Further, most of the interventions and new ideas in science education are initiated by developed countries; whereas, LDCs merely reproduce and reconfirm western knowledge. Lack of indigenous contribution and dependence on the western knowledge result in the noncritical and imitative behavior of LDCs rather than creative and contributory. As a result, the contribution of LDCs in international journals is so insignificant that even when something is published, most are considered of low quality and therefore rarely cited (Shrestha & Khanal, 2016). A review of international science education journals proved the claim that most publications are from the USA, the United Kingdom (UK) and from Australia, showing their unequivocal dominance which is equally evident from the country-wise representation in the editorial boards of such journals. For example, 23 out of 28 members of editorial committee for the Journal of Research in Science Teaching (JRST) in 2018 are from the USA. Likewise, less representation from the Asian countries in scholarly contribution poses a big question on the hegemony of scholars from European countries on knowledge society. Reasons for this, unbalanced power in publication could lie in the language dominance of the West; which, however, also reflects on the passive role of LDCs in knowledge production. The need arises to empower locally produced journals and to accept the findings which may challenge the western norms and bias (Tyukumber, 2010).

A Call for Indigenization

This paper covers the devastating aspect of neo-liberal globalization on science education; from the way curriculum is being designed, its language and philosophy to how it is being taught and assessed. This universalization, however, creates a distorted sense of identity, a loss of cultural languages, and disconnection with the cultural values and heritage among the learners from LDCs (Shizha, 2014). This raises the question: what fundamental changes are required to convert this western education model into an indigenous one so that local people may feel a sense of ownership and connectedness? According to Dei (as cited in Raina, 1999):

“It [indigenous knowledge] includes the cultural traditions, values, beliefs and worldviews of local people as distinguish from western scientific knowledge. Such local knowledge is the product of indigenous people’s direct experiences of the working of nature and its relationship with the social world. (p. 6)”

This means bringing indigenous values and using intercultural spaces within the classroom to explore the content and pedagogies that best serve the local people. Swift (1992) supported the view that “greater the indigenous knowledge and the less the imported knowledge, the more likely it is that latter will be assimilated and used” (p. 9). Cultural connections, situated knowledge and contextualized discipline engage learners into meaningful learning process. Shrestha and Khanal (2016) argue that culturally sensitive curriculum should involve: 1) integration of cultural perspective 2) knowledge construction through meaningful local activities, 3) content that respect other’s perspective and diversities, and 4) pedagogies suitable for the multicultural classroom and environment. Swift (1992) suggested simple ways of indigenization which include; using everyday situations to introduce scientific concepts, issue-based courses, extra-curricular science clubs to foster the indigenous knowledge, vocational education, and close association with nature. However, oversimplification of the concept and uncritical selection of native tradition are also as risky as the uncritical acceptance of western science.

According to Kazmi (2005), LDCs still strive to achieve a balance between global competitiveness and relevant context-sensitive education and training. For example, in Pakistan, neo-liberal attributes like individualism, performativity, competition, and accountability are evident in the pro-global policies and development agendas of Government (Chang, 2014). Therefore, complete replacement of global science education with the local knowledge is neither realistic nor desirable. On the contrary, its integration in content, pedagogies, language and assessment of learning is important to revive the forgotten treasure. Shrestha and Khanal (2016) therefore argues for developing “alternative visions of the future by synthesizing the best attributes of both traditions” (p. 143) rather taking any extreme position and expecting for a drastic shift.

Conclusion

Globalization is a human construct and is reflected by the mind-set, ideologies, priorities and actions of people. In the neo-liberal economy there is always a clash between globalization and localization; however, questioning and critiquing this discourse will lead to better understanding of these phenomena and to a balance between global and local constructs. This paper talks about the limitations of globalization for development agendas in LDC through science education and emphasizes in bringing local perspective in knowledge production, teaching learning process and language of instruction. It is expected that the so-far-neglected indigenous knowledge and thinking pattern would give LDCs the courage to play an active role in the knowledge society. However, comprehensive indigenous knowledgebase cannot be created overnight, but through sustained, collaborative, and directed efforts. This paper also recommends that instead of following a Eurocentric approach blindly, LDCs should develop an alternative science education model that can balance the best characteristics of global and local worldviews.

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