Co-Creating Interdisciplinary Integrated Powerful Knowledge

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Interdisciplinary and integrated powerful knowledge (IIPK) is the outcome of integrating multiple disciplinary perspectives and approaches to tackle challenging real-world issues. Using many disciplinary fields, IIPK is essential for problem solving, innovation, and technical breakthroughs that require careful, imaginative, and innovative application of a wide range of disciplinary knowledge. It is especially relevant when addressing socio-scientific issues, which require a comprehensive understanding of scientific, social, and ethical dimensions. Collaborative and interdisciplinary work among people with diverse backgrounds and expertise is necessary to advance IIPK, including professionals from different academic fields, policymakers, stakeholders, and community members who bring various perspectives and values to the table. The co-creation of IIPK could inform policy making, support informed decision making, and lead to more comprehensive, effective, and sustainable solutions. Theoretical underpinnings and practical applications of co-creating IIPK are discussed here based on several principles with the potential to impact current practices. The co-creation and dissemination of IIPK could use multiple platforms, such as scholarly articles, encyclopedias, and media, including social media. These platforms provide scope for co-creating powerful knowledge through a people participatory approach, which would lead to changes in practices.

Keywords: discipline knowledge ; interdisciplinary integrated powerful knowledge ; knowledge co-creation

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IIPK is a process of building the capacity to understand the world and make informed decisions for individuals as well as for the community [1]. However, the current structure of schooling and education across the globe presents difficulties in generating IIPK due to the fragmentation of disciplines and the lack of interdisciplinary integration in the curriculum. The curriculum could be expanded upon in a way that favours, directly or indirectly, academic specialisation above interdisciplinary integration [2]. To overcome this, a knowledge-based and integrated framework for the school curriculum is recommended by Nimela [3] in order to make better pedagogical arrangements and base learning on empirical evidence. The essential element is integration, which could result in a foundation for the formulation of conceptual facts and trigger the advancement of technological innovations for changing existing daily practices. This process might concentrate on educational practices and settings, such as schools [4]. Alignment in pedagogy, curricular structure, and the teaching/learning process are all elements that could benefit from an interdisciplinary and integrated approach. To develop effective interdisciplinary and integrated powerful knowledge (IIPK) in educational settings, it is suggested that the leverage of the balance between biotic and abiotic forces that maintain the structure and functions of the natural world should be focused. The living world relies on abiotic substances, such as water, oxygen, and minerals, for growth, maintenance, and sustenance [5]. By identifying connections between different disciplines and elements associated with a system, we can establish a framework for generating IIPK that can drive changes in practices [1][6]. For instance, we can explore the connections within the solar system in terms of gravity, magnetism, iron cores, movements, attraction, cells, blood, medicines, management, economy, and many more aspects, which will provide opportunities for formulating IIPK in a meaningful way and connected to real-world issues. IIPK eventually provides a platform for generating plans, technological devices (including artificial intelligence), processes, procedures, and protocols for people-friendly scenarios in daily life. The 21st century demands changes in practices and sustainability, and IIPK could help to generate sustainable practices. It is essential to accept and realise the drawbacks from the advancements of the industrial revolution, and to use this to lead to an efficient use of resources in both reversible and irreversible formats. Formulating a dynamic system capable of the efficient utilisation of natural resources and the practices that are required is what led to the co-creation of IIPK, using a blend of traditional knowledge with scientific technological knowledge.

The evolution of knowledge across disciplines can provide a fertile ground for innovation and progress, fueling the development of new technologies, practices, and systems that improve our lives and shape our societies [7]. An illustration of this would be a torch, which is an advanced technological form of an electric circuit consisting of a battery, cables, a globe, and a switch. This transformation of knowledge can result in significant innovations and changes in practice [8]. Co-creating and people participations are needed for the dissemination of such knowledge and platforms, including

encyclopedias and social media, which would play vital roles. The accumulation of knowledge is analogous to the growth of a seed into a large tree, which, in turn, produces an ecosystem rich in glucose and oxygen through the photosynthesis of carbon dioxide and water in the presence of sunlight. The tree itself would become an ecosystem of many living creatures, including insects and birds. The tree could be viewed from the perspectives of different disciplines, such as science, society, economy, business, etc., as well as different angles, such as timber, deforestation, fruits, shade, and so on. However, this all started with a seed. The process of acquiring all of this knowledge begins with the acquisition of preceding knowledge, continues with overcoming hurdles that are posed by existing knowledge, and ends with ownership of the knowledge [9]. Ownership of a large body of knowledge can serve as a launchpad for building bridges between disciplines, leading to the development of IIPK [10]. IIPK drives growth and innovation across many disciplines, and as society becomes more complicated and networked, its relevance will only expand [8]. Unprecedented unknown scenarios create challenges and are hurdles for faster developments, but most of these challenges could be effectively solved by using co-created IIPK, which could equip with citizens the capacity and competence to build and shape a better world that is effectively, efficiently, and easily sustainable for the future of the planet [11]. Acknowledgement of the existing knowledge base could enhance co-creating a useful and viable IIPK that can change practices to more widely accepted and usable ones. The dissemination of IIPK through various platforms, which as encyclopedias and social media, also plays a vital role in efficient, effective, and engaging uses of it. These platforms engage and willingly undertake cooperative people participation, and they could lead to the effective completion of the changes in practice.

References

1. Kurup, P.M.; Li, X. Building Preservice Teachers' Confidence for Teaching and Learning STEM, Incorporating Innovative, Interdisciplinary, and Integrated (3I) Initiatives. In Encyclopedia of Teacher Education; Springer: Berlin/Heidelberg, Germany, 2021; pp. 1–5.
2. Young, M.; Muller, J. Three Educational Scenarios for the Future: Lessons from the sociology of knowledge. Eur. J. Educ. 2010, 45, 11–27.
3. Niemelä, M.A. Crossing curricular boundaries for powerful knowledge. Curric. J. 2020, 32, 359–375.
4. Kurup, P.M.; Levinson, R.; Li, X. Informed-Decision Regarding Global Warming and Climate Change Among High School Students in the United Kingdom. Can. J. Sci. Math. Technol. Educ. 2021, 21, 166–185.
5. Pawson, R. The Science of Evaluation; Sage: London, UK, 2013.
6. Pountney, R.; McPhail, G. Crossing boundaries: Exploring the theory, practice and possibility of a 'Future 3' curriculum. Br. Educ. Res. J. 2019, 45, 483–501.
7. Siskin, L.S. Restructuring knowledge: Mapping (Inter)disciplinary change. In Interdisciplinary Curriculum: Challenges to Implementation; Wineburg, S., Grossman, P.L., Eds.; Teachers College Press: New York, NY, USA, 2000; pp. 171–190.
8. Young, M. Curriculum theory and the question of knowledge: A response to the six papers. J. Curric. Stud. 2015, 47, 820–837.
9. Fensham, P.J. The Future Curriculum for School Science: What Can Be Learnt from the Past? Res. Sci. Educ. 2022, 52, 81–102.
10. Bybee, R.W. The Case for STEM Education: Challenges and Opportunities; National Science Teachers Association: Arlington, VA, USA, 2013.
11. Drake, S.; Reid, J. Integrated Curriculum as an Effective Way to Teach 21st Century Capabilities. Asia Pac. J. Educ. Res. 2018, 1, 31–50.