

BRIDGING DISCIPLINES

INTERDISCIPLINARY APPROACHES
FOR TRANSFORMING EDUCATION

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Tahmeena Khan
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Bridging Disciplines: Interdisciplinary Approaches for Transforming Education

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FOREWORD

I take this opportunity to write a foreword to the book titled “Bridging Disciplines: Interdisciplinary Approaches for Transforming Education”, edited by Dr. Tahmeena Khan, Dr. Manisha Singh, and Dr. Saman Raza, with whom I have been academically associated for the last 15 years. The book is a wonderful amalgamation of research and academics in the field of Science, Technology, Engineering, and Mathematics. This work is a masterpiece in emphasising the relevance of STEM in tackling global challenges across various areas of development and in sustaining human civilisation. It addresses the challenges of various life arenas, including science, Commerce, Technology, and achieving Developmental goals, as well as managing eco-balance and work-life balance, thereby covering the intersection of science and technology with sociology, economics, culture, and politics of a particular nation. The values imparted by research across different aspects of STEM shall provide a holistic learning approach for future generations. This has the potential to bridge the gap between education, rationalism, social norms, economics and foreign relations.

The study of STEM has imbued the application of Artificial Intelligence and its role in teaching and learning. The book contains contributions on diverse topics ranging from interdisciplinary aspects, integration of diverse fields, analytical creativity, environmental, cultural, social, and economic impacts, and an education system imparting knowledge in STEM. This book highlights an interdisciplinary approach to the field of education and emphasises the existence of a multi-faceted education and social system of our nation.

I appreciate the efforts of all the contributing authors, especially young minds who have conceptualised and written the chapters, throwing light on newer aspects of STEM. The growing need for interdisciplinary research has created a requirement for such an education system. The editors should be applauded for bringing out a collection that breaks all the traditional boundaries and sets up a new and deeper meaning towards understanding life. I wish this brainchild of the editors would ignite more minds towards the role of STEM in overall societal development.

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PREFACE

In a world that is ever-changing and increasingly complex, a field such as education, which encompasses various disciplines, must work to prepare students to understand the connections between this complex world and to meet the uncertain demands of the future, as well as the pressing issues of the present. There is no doubt that traditional discipline-specific teaching methods are the foundation of the education system, but they are unable to meet the changing demands of today's education. There is a need for an approach that fosters connections between various disciplines and equips students with adaptable abilities, integrative thinking, and a collaborative mindset, essential for addressing today's world and its complexities. One such approach that may fulfil this need is addressed in this book titled " Bridging Disciplines: Interdisciplinary Approaches for Transforming Education." The book is a compilation of 14 chapters from contributions by different experts in their respective areas and therefore offers a rich account of insights, new frontiers, and interdisciplinarity across disciplines. Each chapter is constructed to be self-contained, allowing readers to dive in and out as their understanding permits.

The book begins with an introduction to interdisciplinarity in education, where the chapter presents various related concepts, including interdisciplinary, multidisciplinary, and bridging disciplines, to enable readers to achieve a clear conceptual understanding upon completing this chapter. The second chapter, Bridging the Barrier Between Science and Arts, aims to reduce the gap between the two major categories of disciplines, *viz.*, science and arts. The third chapter discusses various pedagogical strategies for Interdisciplinary Learning in a general domain. The subsequent chapters cover a broad spectrum of topics, written in a way that each chapter draws upon insights from various fields, including the STEAM paradigm, Commerce, Social Studies, Languages, Biological Science, Chemical Science, Mathematics, Environmental Science, and Architectural Studies. The last two chapters provide insight into creativity and AI tools in interdisciplinary research.

The revolutionary potential of interdisciplinary approaches in education is explored in this book, which advocates for instructional models that break down silos, foster holistic understanding, and stimulate creativity by integrating multiple fields of knowledge. All the chapters are presented herein with the objective of rethinking curriculum, pedagogy, and learning methodologies.

We aim to provide a comprehensive account of insights to the major stakeholders in the field of education, including educators, researchers, policymakers, and students, while promoting interdisciplinarity. Our vision for this book is to empower stakeholders with an education that is both meaningful and skilful, capable of standing up to global competition. This book would be helpful for students, teachers, researchers, and academicians who seek to integrate across different disciplines.

We anticipate that educators, researchers, policymakers, and students will find inspiration and practical guidance within these pages. As we go towards more inclusive, adaptable, and future-oriented educational settings, may this book function as both a resource and a stimulus for continuous experimentation and discourse.

As the editors of this book, we would like to thank the contributing authors for their time and expertise. We also want to thank the readers whose curiosity and commitment to advancing education through technology drive our ongoing investigation of this fascinating intersection.

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Creative Teaching Tools for Enhanced Learning: Promoting Student Engagement through Blended Learning in Higher Education

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Abstract: The continuously evolving landscape of higher education necessitates the adoption of innovative pedagogical strategies that address the multifaceted needs of diverse learners as well as the dynamic nature of the digital environment. This chapter critically investigates the incorporation of inventive teaching tools aimed at augmenting learning outcomes within the realm of higher education. It scrutinizes the emerging technologies and methodologies that have surfaced in recent years, which include immersive technologies such as Virtual and Augmented Reality, generative Artificial Intelligence, microlearning, gamification, wearable technologies, blockchain applications for credentialing, and collaborative learning platforms. These educational tools not only enhance the instructional experience but also foster heightened levels of student engagement, motivation, and individualized learning opportunities. Through rigorous analysis and the presentation of contemporary case studies, the chapter elucidates how these innovative tools can effectively reconcile the disparities between conventional academic delivery methods and the expectations of modern learners. The results underscore the critical significance of faculty development, digital literacy, and institutional support as prerequisites for the successful implementation of these pioneering innovations. The chapter concludes by offering recommendations for future research endeavours and best practices for the effective integration of creative teaching tools, aimed at cultivating inclusive, adaptable, and efficient learning environments within higher education.

Keywords: Creative teaching tools, Enhanced learning, Game components, Higher education, Interactive learning, Learning based on games, Learning based on simulation.

INTRODUCTION

The incorporation of inventive pedagogical instruments within tertiary education has evolved as a remarkable emphasis for teachers aspiring to augment student

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participation, retention rates, and academic achievement. Conventional teaching approaches frequently inadequately address the multifaceted requirements of contemporary learners who necessitate engaging, interactive, and tailored educational experiences. This discourse examines an array of groundbreaking instructional tools and their influence on student outcomes, utilizing insights derived from pertinent scholarly articles.

Higher education currently finds itself at a pivotal crossroads, confronted with the dual imperative of equipping students with enduring knowledge and state-of-the-art competencies necessary for navigating an increasingly intricate and swiftly evolving global landscape. The conventional lecture-based pedagogical model, although instrumental in imparting fundamental concepts, frequently proves inadequate in fostering the dynamic skill sets requisite for modern societal demands. Such skill sets encompass critical analysis, intricate problem-solving, proficient collaboration, and the agility for lifelong learning. In light of this exigency, a significant paradigm shift is occurring, characterized by an escalating focus on the development and application of innovative educational tools. These tools are intended not solely to improve learning outcomes but also to cultivate a deeper and more meaningful engagement with the educational experience. The article highlights the value of student-centred learning and the application of knowledge in real-world contexts. By implementing these strategies, educators can create dynamic learning environments that cater to diverse student needs, fostering deeper understanding and essential skills for success in academia and future careers. The article advocates for a shift from traditional teaching methods to more interactive and application-based learning experiences in order to better prepare students for the demands of the professional world. The article examines a number of innovative teaching and learning approaches in higher education, including gamification, flipped learning, project-based learning, and technology-enhanced learning.

TEACHING METHODOLOGIES FOR ACTIVE LEARNING

To engage students as well as to improve learning outcomes, active learning methodologies have evolved as a powerful approach. These methodologies focus on the participation of students, collaboration, and hands-on experiences, so as to make learning more meaningful and effective (Konopka *et al.*, 2015).

The goal of active learning approaches is to teach with emotion as well as to evoke feelings. To this degree, learning is reinforced and solidified through the employment of various teaching approaches that enhance one another. Several active learning approaches, such as (i) flipped teaching, (ii) game-based learning, (iii) Game-based learning (iv) learning based on projects, (v) interactive storyte-