

THE TRANSFORMATIVE INFLUENCE OF SCIENCE ON EDUCATION: EMPOWERING MINDS, EXPANDING HORIZONS

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Science is known as the systematic approach to understanding the world, as well as its different nature. Over the years, it has been expanding through different aspects including physical, life, and social sciences. Another aspect is formal science, which talks mainly about mathematics and logic, encompassing students' learning. Science is perceived to have an indisputable impact on liberating education. Its transformative influence is far-reaching and has become a catalyst for educational progress. It plays a profound role in shaping curriculum development, enhancing critical thinking skills or inquiry-based learning, and integrating technological advancement through innovations. These all intend and endeavor to achieve a single goal- to empower every learner with pioneering and progressive knowledge.

Science helped the world develop into modernity, changing the ever-growing technology and education. Gregersen (2023) states that there are different branches of Science based on the subject of study. The physical sciences, which include the subjects of astronomy, physics, chemistry, and the earth sciences, are one of them. They investigate the inorganic world. There is also the subject of biological sciences, such as biology and medicine, which study the organic world of life and its processes. Lastly, the social sciences, such as anthropology and economics, are the study of social and cultural aspects of human behavior. Science provides abundant knowledge to discover and solve problems and has a significant impact on the education system. With the application of Science, there were numerous studies about medicine, biology, chemistry, and physics.

The results of these studies are applied in the current curriculum of students, which adds more to the existing knowledge and improves education once again.

The development of technology throughout the past few decades transformed the lives of people and helped the world evolve. Efficiency, decision-making, cost, time-saving, innovation, enhanced teaching and learning, globalization, and no geographical limitations are a few of the benefits of technological advancement. According to Raja and Nagasubramani (2018), technology is the mother of arts, civilizations, and sciences. With technology, the onset of gadgets in education made it easier for teachers to provide wisdom and for the students to develop it. Education is now leaning towards building inquisitiveness in the minds of learners. The application of technology in education makes the students more excited to learn, have the freedom to work at home on their own time, decrease paper and photocopying costs, and promote the concept of a “green revolution.” Every positive equates to a negative, however, the study (Raja & Nagasubramani, 2018) states that taking advantage of the positive side eliminates the drawbacks of using technology in education to achieve academic excellence.

Liberation in education through the help of science and technology has led to significant advancements in teaching and learning methodologies. According to Means, Bakia, and Murphy (2014), online learning studies reveal the effectiveness of blended and virtual laboratories in improving student outcomes and management. By integrating science and technology, personalized learning, collaborative problem-solving, and access to diverse educational resources have become possible. Learning Online has implications for state and institutional policies that would support the wise usage of online learning and efficient implementation strategies. Massive Open Online Courses (MOOCs), multi-player games, learning analytics, and adaptive online practice environments are all explained in terms of design concepts, implementation, and contexts of use. Student outcomes are not a result of technology alone, but rather of implementation, context, and learner characteristics working together. Successful technology integration in education

necessitates a careful evaluation of how it fits with the learning objectives, instructional methodologies, and the particular needs and characteristics of the learners.

Inquiry-based understanding of the learning process serves as the foundation for the inquiry-based learning methodology (Abdi, 2014). Scientists utilize children's participation in various activities and their thought processes to generate new knowledge in inquiry-based scientific education. Science educators encourage teachers to substitute inquiry-based approaches that engage student interest in science, give students opportunities to use appropriate laboratory techniques to collect evidence, require students to solve problems using logic and evidence, and encourage students to conduct additional research to develop their knowledge with traditional teacher-centered instructional practices that emphasize textbooks, lectures, and scientific facts. Science encourages inquiry-based learning, which emphasizes curiosity, exploration, and experimentation. Students are encouraged to ask questions, seek answers through research and experimentation, and develop hypotheses to test their understanding. Inquiry-based learning also promotes active student engagement. Instead of passively receiving information, students actively participate in the learning process, conducting experiments, analyzing data, and drawing conclusions. This hands-on approach enhances their understanding, retention, and application of knowledge, paving the way for a more profound educational experience.

Science plays a vital role in liberating education through innovation, particularly in fostering critical thinking and inquiry-based learning. By encouraging students to question, analyze, and explore the world around them, science education promotes a deeper understanding of concepts and cultivates essential skills for lifelong learning. According to Gholam (2019), inquiry-based learning in science allows students to actively engage in the process of scientific discovery, which empowers them to develop critical thinking skills and apply scientific methods to real-world problems. This approach enhances students' scientific knowledge and nurtures their ability to think critically, make

informed decisions, and seek evidence-based solutions. By incorporating hands-on experiments, collaborative discussions, and open-ended investigations, science education provides a platform for students to explore and challenge existing ideas. These activities foster curiosity and intellectual independence in the active participants. Therefore, through its emphasis on critical thinking and inquiry-based learning, science catalyzes liberating education and empowering students to become active participants in their learning journey.

The influence of science on education is undeniable. Substantial advancements happened through the immense application of this. It pervades every aspect of teaching and students' learning. Moreover, it has transformed education into a dynamic and engaging process. This became possible by driving curriculum development, promoting inquiry-based learning, and fostering technological advancements. As the world continues to unlock new scientific discoveries and innovations, the power to further enhance education is crucially harnessed. It raised the quality of education, equipping students with the skills and knowledge they need to thrive in an ever-changing society.

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