



INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

A STUDY ON EFFECTIVENESS OF EDUCATION 4.0 IN TEACHING AND LEARNING PROCESS WITH REFERENCE TO HIGHER EDUCATIONAL LIMITATIONS

¹Dr.V.S.D Himabindu

¹Assistant Professor, Department of Basic Sciences & HSS, Andhra University College of Engineering for Women, Visakhapatnam, Andhra Pradesh, India

Abstract: The Rapid advancement of digital technologies and the emergence of the fourth industrial revolution have significantly transformed many sectors including education. This transformation has led to the development of education 4.0, a new educational paradigm that integrated advanced technologies and innovative learning methodologies to meet the demands of the modern work force. Higher educational institutions (HEI)S are increasingly adopting education 4.0 to enhance teaching, learning, research and student engagement. This paper examines the concept of education 4.0 its key technologies, its impact on higher education and challenges faced by institutions in implementing it. The study concludes that education 4.0 has the potential to revolutionize higher education by promoting personalized learning, digital literacy and industry relevant skills.

Index Terms - Education 4.0, Higher Education, Digital Learning, Technology in Education, Industry 4.0

I. INTRODUCTION

Education has continuously evolved along side technological and societal changes. The modern era is characterized by rapid technological innovation associated with the fourth industrial revolution, which integrates digital, physical and biological technologies. This revolution has reshaped industries, economies and educational system worldwide.

In response to these changes, the concept of education 4.0 has emerged. Education 4.0 represents the integration of advanced digital technologies into teaching and learning processes to prepare students for the skills and competes in required in the modern work force. Emphasis personalized learning, digital collaboration and real-world problem solving.

Higher Educational Institutions (HEI)S play a crucial role in implementing education 4.0 by transforming traditional learning models and adopting innovative teaching practices. It requires a form a critical thinking, creativity, collaboration and complex problem solving to prepare students for technology driven world essential skills which include digital literacy, adaptability, emotional intelligence and global citizenship to navigate the rapid changes of the fourth industrial revolution. Nearly 50% of the HEI's are using generative AI to develop learning materials while 60% are permitting students use of AI tools according to report based on a survey of 30 leading HEI's unlocking the power of AI in Higher Education formed that 50% of HEI's have already implemented AI related policies with 40% in AI powered tutoring systems & chatbots the importance of AI adaptations across core academic and operational functions examining usage pallins, governance, rediness, curriculum innovation and faculty development. It introduces a diagnostic maturity model and an actionable roadmap to accelerate system wide adopting AI.

AI has impact on curriculum design, assessment models and clars room engagement strategies.

Today AI across teaching and learning landscape in being deployed for diverse application including adaptive tutoring automated grading plaganism detecting, curriculum design and career guidance.

- Generative AI Tools for creating teaching materials, AI powered tutoring or chatbots and personalized adaptive learning systems are emerging on the top use cases.
- In Telangana to introduce AI in schools, studies Bangalore, Kerala models.

OBJECTIVES OF THE STUDY:

- To study education 4.0 Technologies in bridging learning gaps in engineering courses at HEI's.
- To Evaluate the benefits and challenges of implementing education 4.0 tech tools for learning outcomes.
- To analyze how education 4.0 in transforming higher education as they bridge up learner needs and industry demands at HEI's

METHODOLOGY OF THE STUDY:

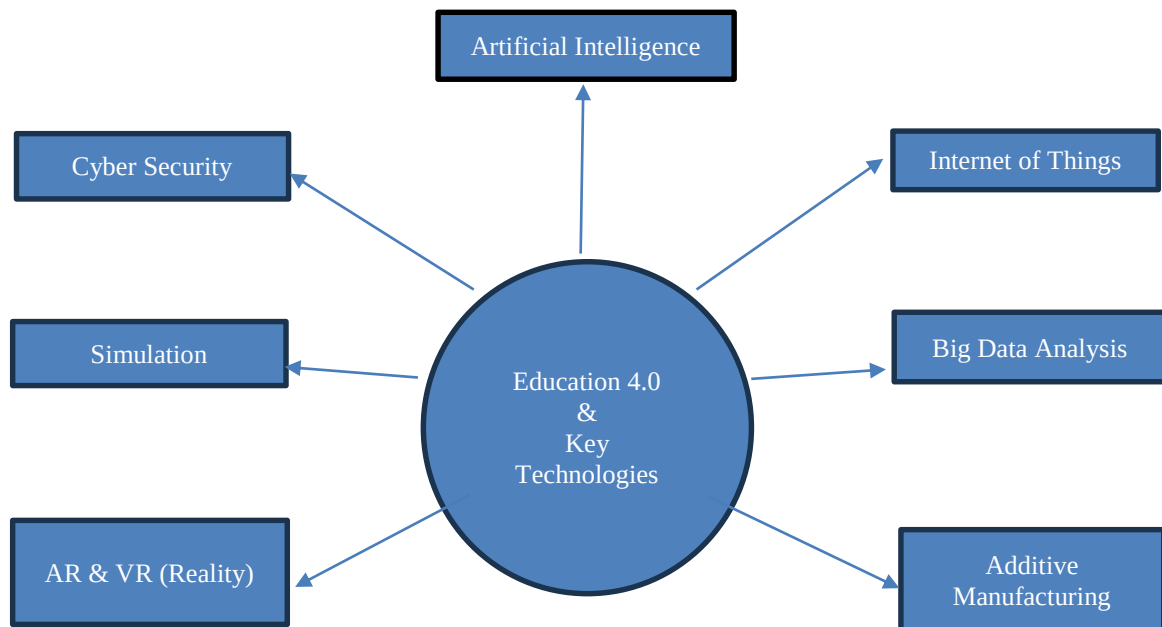
The study adopts a mixed method a research design combining both qualitative and quantitative approaches. Primary data is collected through structured questionnaire administered to students to evaluate on efficiency of technology tools which play an appropriate role in learning outcomes which also provided deeper insight into the adapting education 4.0 tools. An eminent sampling technique is used to select respondents. Data is analyzed using statistical tools such as percentage analysis and thematic analysis for responses this methodology enables a comprehensive evaluation of the impact of education 4.0 tech tools for learning experience at HEI's.

LITERATURE REVIEW:

- Education 4.0 emphasis personalized and technology driven learning systems (Hussains,2018).
- Higher Education is shifting toward digital and student-centered models (Bonfield Etal, 2020).
- AI enhances personalized learning and adaptive systems (Popenici skevr, 2017)
- IOT enables smart classrooms and connected learning environments (Javaid Etal, 2022)
- VR and AR improves refermental and immersive learning (Miranda Etal,2021)
- Block Chain ensures secure and transparent academic credentialing(Salinar Navarro Etal,2020)
- Big Data and learning Analytics learning analytics help monitor and improve student performance (Kipper Etal, 2021)
- Cloud Computing is digital platform cloud based platforms support flexible and accessible learning (castro,2019)
- Education 4.0 promotes skill based and completely-driven education(Aoun, 2017)
- It aligns education with industry requirements and future skills(Kipper Etal, 2021)

Areas of Addictive manufacturing in Education:

3D printer encourage the intelligent guideline in specialized ideas and frame works reliable with growing changes in Technology education. A clan of students can learn by taking print extensions and test the differential load beaming characteristics of various basic outcomes. A 3D printer can make an extensive variety of machines like pulleys and screws. Use of 3D printer can improve classes that are based around 3D displaying programming mostly 3D demonstrating are instructed in pelabs and seldom result in production of physical models. A 3D printer can creator exceptionally artlined parts that an under study can physically investigate learner will have the capacity to see their slipings in the part make modification in their advanced models and premitant another part to check that the adjustments they made to the model are adequate according to Martin Etal, 2014. 3D printing can reform innovation and designing institution the idea of "Think Globally" module locally has never been more obtain 3D printing innovation has made huge headways in the course and recent years and new and more remarkable than any other time in recent memory the flexibility of this machine gives innovation and designing instructors with the capacity to draw in their students in various stem based exercises that assistance to meet instructive guidelines (Martin Etal, 2014)



EDUCATION 4.0 TECH TOOLS AT HIGHER EDUCATIONAL INSTITUTIONS:

Education 4.0 is basically the industry 4.0 version of learning applied to management education. It is a shift from time based a size fits all teaching to personalised, tech enabled, completely driven learning that explains how modern organisation actually work technology on infrastructure.

- AI and analytics predictive analytics for student performance, AI tutor, chatbots for case discussion.
- AR/VR immersive simulation (eg. managing a factory floor in VR, crisis management scenarios)
- Bigdata and cloud real time dashboards for decision making in management games.
- IOT/Blockchains transparent credentialing, smart campuses.

According to a systematic review, the most used in higher education management are

1. Augmented Reality
2. Simulation
3. Internet of Things (IOT)
4. Viral Reality they are used to increase immersions, engagement, reduce risk cost and simulate real world scenarios

KEY TECHNOLOGIES IN EDUCATION 4.0:

Artificial Intelligence: Artificial intelligence plays a crucial role in education 4.0 y enabling personalised learning experiences, AI based system can analyse students learning pattens and provide customized educational content.

Internet of Things: Internet of Things connects devices and educational resources through the internet enabling smart classrooms and informative learning environment.

Big Data Analysis: This keeps institution analyse large amount of student data to improve teaching strategies and monitor academic performance.

Additive Manufacturing: It allows companies to produce more parts in-house, reducing their dependence on external suppliers. This, in addition to reducing the costs and lead times associated with outsourcing, gives companies greater control over the quality of the final product.

Simulation: Simulation technology is a comprehensive method for predicting possible outcomes or evaluating decision-making effects by establishing computer models of complex systems and simulating their behaviour and evolution processes.

Cyber Security: Emerging cybersecurity technologies are improving digital defence in 2026 and beyond. This article ranks the top 10 innovations improving how businesses secure data, networks, and systems.

Virtual and Augmented: It provide a immersive learning that allow students to interact with computer concepts in simulated enhancement.

These technologies enhance interactive learning improve student engagement and supports innovative teaching methods in higher educational institutions.

The need for institutionalizing Education 4.0 in higher Education Institution:

The changing Institutional work culture the higher learning centre. HEI stand as primary drivers of education 4.0 implementation higher educational institution must adapt new educational mode to meet the changing demands of the economy. In terms of curriculum design and redesign must include digital skills, learning gaps and practical applications one of the key advantages is identified by using LMS and digital sources in order to enable flexible and remote learning industries collaborating with institution can impart practical training, internships, hackathon, projects etc. Education 4.0 tools enable universities to form research innovations and entrepreneurship.

REFERENCES:

1. Lindgren R & Jhonson- Genberg M(2013) emboldened by embodiment: Six percepts for research an embodied learning and mixed reality, educational researcher, 42(8) 445-452.
2. Moon. J (2010) using story in higher educations and professional development London routledge.
3. Universities UK (2013) massive open online course: Higher education digital moment [content]
4. Gamification in education: A systematic mapping study educational technology and society 18(3) 2015 in press <http://ralloongroup.com/blog/gamification-Education-and-its-examples>.
5. Barrows H A Taxonomy of problem based learning methods medical education 1986, 20(64) 481-6.
6. Javed Wasim Etal, (IJCSIT) International Journal Of Computer science and information technologies vol 5(1) 2014,446,449.
7. Lee V (2012) What is inquiry guided learning? New direction for learning [129:5-14]
8. Schmidt H Assumption underlying self directed learning may be false med education c 2000, 34(4) 243-5
9. Kamp A, Engineering Education in the rapidly changing world: Rethinking the vision for higher Engineering Education 2nd Rev. ed TU Delft 2016, Delft University of Technology.
10. National Research Council, exploring the intersection of science education and 21st Century skills. A workshop summary, National Academics press Washington DC, 2010.
11. The future of work: The rise of a big economy NACO's 2017 Annual Conference and exposition available <https://www.ync.edc/sites/default/files/about/depts/servies/planningassessment/the%20chronicle%202026%20the%20decode%20ahead.pdf> December 25,2019
12. World Development Report 2019 the changing nature of work available <http://documents.worldbank.org/curated/en/816281518818814423/pdf/2019-WDR-REPORT.PDF> December 25,2019
13. World Economic Forum, the future of jobs report global challenges insight Report 2018 Available <https://www.weforum.org/reports/the-future-of-jobs-report2018> December.2019
14. World Economic Forum, the future of jobs employment skills and work force strategy for the fourth Industrial Revolution global challenge insight report 2016, Available http://www3.weforum.org/docs/WEF_future_of_jobs.pdf December 25,2019.
15. Aoun J E (2017) Robot-proof higher education in the age of artificial intelligence MIT press.
16. Chaka R (2020) Higher educations institutions and the use of online instruction and online tools and resources during the covid-19 outbreak international journal of educational technologies higher education, 17(1) 1-14.
17. Hussain A A(2018) Education 4.0 made simple ideas for teaching international journal of education and literacy studies, 6(3) 92-98
18. Javaid M, Haleem A, Singh R P, Suman R, Squonzalez E S (2022) understanding the adoption of industry 4.0 technologies improving education system sustainable operation and computers 3, 275-285.
19. Miranda J, Navarrete C, Noguez J, Molina Espinoza J M, Ramirez Montoya M S, Navarro-Tuch S A, Molina A (2021) the core components of education 4.0 in higher education three case studies in engineering education computers and electrical engineering 93, 1072 78.
20. Schwab K (2016) The fourth industrial revolution, world economic forum.
21. Sharma R C, kawachi P (2021) Digital transformation in education a review of literature, Asian journal of distance education, 16(1) 1-14.
22. Zawacki-Richter O, Martin V I Bond M, Squoverneuer F (2019) Systematic review of research on artificial Intelligence application in higher education, International journal of Educational Technology in Higher Education 16(1) 1-27.