Research Paper

Concept and Future of Education in the Era of Advanced Technology

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Abstract: *Education is enhancing our horizons, and giving a better vision of life. Martin Luther King Jr has said, 'Intelligence plus character that is the goal of true education.' John Adams has said, 'There are two educations. One should teach us how to make a living and the other how to live.' Actually, ninety percent of education is encouragement. Education is the basic need for self and social development. Civilization is the result of both format and informal education. Leonardo da Vinci said, 'Learning never exhausts the mind.' Education is the key that can unlocks the golden door to knowledge, intelligent, wisdom and freedom. Marc Cuban has said, 'Life is an open book test. Learning how to learn is your most valuable skill in the online world.' The idea of education is built on both old and new ideas and philosophies. Every part of life has changed because of how far technology has come, and schooling is no exception. Today, it is hard to take classes that meet at a certain time when students come from all over the country or even the world, or if there is a disease. Now that you can learn online or on your phone, asynchronous learning is a real choice. Now, apps for smartphones and tablets make it possible for people who work to study when they have a few minutes to spare at lunch or on a break. So, young people, students, and teachers can't avoid technology during their learning and kill developing period. It's an analytical paper that looks to the idea of education in light of advance technology and evaluates the concept for future education system.*
Key words: *Digital, 4IR, AI, smart, knowledge, skill, robots*

I. Introduction

Education is the transmission and spreading of knowledge,[1] skills,[2] and character traits[3]. It may refer to the mental states, wisdom, intelligence and qualities of educated people. Additionally, it also can mean the academic field studying education. Again, the role of critical thinking is to distinguish education from indoctrination.[4] Education is primarily a process that takes place during educational events and activities such as schooling, teaching, learning, and skill development. Some other schools of thought viewed it as a product rather than a process, emphasizing the mental states and dispositions of educated people.[5] The term education is derived from the Latin words 'educare', which meaning 'bring up, rear, educate', mainly related to the mind, and 'educere', which meaning 'bring out, lead forth', and refers to the bodily level.[6] "I can only say that I view education as the most important subject which we as a people may be engaged in," remarked the great democratic leader Abraham Lincoln. Because cultivating the mind is just as important for health as eating is for the body, we must grow as individuals. You will always be free once you learn to read. The Holy Book of the Quran began with the word "Read," coming from the Almighty and descended from God. Therefore, reading is the main driver of education. Modern society is fundamentally dependent on formal education.[7] But in primitive cultures, most of the education happened on the informal level.[8]

Confucius has said, 'Learning without thought is a labor lost, thought without learning is perilous.' Today, there is almost no aspect of life that has not been influenced by improvements in computer technology and smart technologies such as AI, ML, or big data. Nowadays, computer, communications, and artificial intelligence (AI) have altered the way people live. Previously, if someone wanted to learn something, they would go to a school and study directly under an instructor. It is now feasible to take classes and even get degrees without ever entering a school building. Furthermore, non-degree learning, such as continuing education, test prep, or professional education, is now more accessible than ever thanks to innovative e-Learning and m-Learning technologies. Print test study guides, textbooks, and other tangible learning resources are expensive to produce, and the expenses are passed on to students. The same may be said for traditional

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classroom instruction. While traditional books and classes have their place, modern technologies have made it less expensive for students to obtain the education or exam preparation they require. This not only makes learning opportunities more accessible, but it also levels the playing field for learners from various economic backgrounds.

John Dewey has said, 'The goal of education is to enable individuals to continue their education.' There are at least a few ways in which technology has facilitated learning. Firstly, learning opportunities are no longer limited to those who can attend in-person classes. Technology, such as laptops, smartphones, and tablets, enables users to attend classes and engage in exam preparation whenever and wherever they choose. Moreover, mobile media options enable learners to select the medium (video, eBooks, and interactive quizzes) that best suits their learning approach. In fact, online and mobile learning options provide numerous opportunities for collaboration. As they develop their academic and professional competencies, students have the opportunity to interact with individuals from around the globe. When it comes to conducting business, national borders are no longer as significant as they once were; therefore, collaborative learning is crucial. Pocket Prep's mobile learning applications provide immediate feedback on what the user has learned.[9] The learner can monitor their progress as they gain competency and keep motivated. Students are held responsible thanks to the same characteristic. The user cannot avoid the fact that their work is being automatically graded and recorded; this is the harsh reality. For someone who would need to concentrate more on studying in order to receive greater assistance, this can act as a reality check. In fact, computer programs and mobile applications are quite effective at identifying the areas where a learner is struggling and requires help. The goal of education, according to William Burroughs, is to gain understanding of values rather than facts. Before the internet became widely used, publishing educational content required a time-consuming process.

After the invention of printing technology or book publication, revisions would necessitate a substantial amount of work because the material would need to be republished. The republication procedure was both time and money consuming. Newer technologies enable content providers to readily update web content, apps, and eBooks to ensure that the information is accurate and up to date. This helps to ensure that learners receive the most up-to-date, exact information and training accessible. Mastery of industry knowledge corresponds with exam achievement and on-the-job performance. The only thing that could limit how technology influences learning is a lack of understanding about these new learning possibilities and how they work. It is critical for educators and administrators to learn more about available options in order to include them into educational programs while also guiding students and potential pupils. Similarly, HR departments and professional development personnel must keep up with technological advancements in order to adapt existing goods into workplace culture. The education concept is based on classical and modern ideas and philosophy. Every element of life, including education, has been altered by advances in technology, notably the learning and teaching processes. With the development of mobile learning and internet choices, asynchronous learning is now a real possibility. It is an analytical work that evaluates the notion of education in light of sophisticated technology and serves as a guidance for the next generation in developing purposeful education policies and people resources to meet future problems. This is an analytical paper to evaluate the concept and future of education system in the era of advanced technology. It encompasses the historical context, the notion of education based on great philosophers, scientists, leaders, and other world famous educationists, the classification of education, the impact of the internet and AI on education, the future job market, and other modern challenges.

Historical Background of Education

The earliest ancient civilizations developed in the period from 3000 to 1500 BCE in Egypt, Mesopotamia, and North China.[10] Ancient education was characterized by the invention of writing and the development of formal education.[11] The invention of writing had a big impact on the history of schooling as a whole. Formal schooling was the most important part of education in the past. This was needed because as societies grew, so did the amount of knowledge they had, and informal education wasn't enough to pass on all of that knowledge from one generation to the next. Teachers would teach as if they were experts, and education became more cerebral and less connected to everyday life.[12] Formal education was still quite rare in ancient societies and was restricted to the intellectual elites. It happened in the form of training scribes and priests and covered various subjects besides reading and writing, including the humanities, science, medicine, mathematics, law, and astrology. [13] Plato's Academy in Ancient Greece is often mentioned as one of the noteworthy achievements of ancient education.[14,15] During the Middle Ages, religious authorities exerted considerable influence over formal education. This was especially true of the Catholic Church's influence in Europe. However, it is also observed in the Muslim world. 241 Johann Gutenberg's creation and popularization of the

printing press in the middle of the 15th century had a tremendous impact on public education. The growing availability of written media considerably impacted the population's general literacy.

Initiatives to promote public education and universal access to education made significant progress in the 20th and the 21st centuries and were promoted by intergovernmental organizations like the UN.[16] Examples include the Universal Declaration of Human Rights,[17] the Convention on the Rights of the Child,[18] the Education for All initiative, the Millennium Development Goals,[19] and the Sustainable Development Goals. When public education was made available to everyone, it led to the creation of standardized courses and tests to measure how well students were learning. It also had an effect on teachers because it set up organizations and rules to guide and oversee teacher training. For example, it set standards for getting certified to teach in public schools.[20] A further influence on contemporary education was the emergence of new educational technologies. For example, the widespread availability of computers and the internet dramatically increased access to educational resources and made new types of education possible, such as online education. This was of particular relevance during the COVID-19 pandemic.[21] A further contemporary factor is the increased globalization and internationalization of education.[22,23]

Concept of Education in the Eyes of Great People

Aristotle said, 'learning' and 'inferring', that the end is built into the concepts. Again, education like teaching can be used as both a task and an achievement verb.[24] The teacher's responsibilities include the use of numerous ways to keep learning processes going. These learning processes, in turn, cannot be defined without reference to the outcomes that they produce. Again, learning something means meeting some norm, succeeding in some way. As a result, the final achievement must be that of the student. Teachers can continue to teach without success, yet there is a sense in which teaching someone something implies success. In reality, education is a purposeful and goal-oriented activity that aims to achieve certain goals such as the transmission of knowledge, skills, and character qualities.[25] In pre-history, education happened informally through oral communication and replication. With the rise of ancient civilizations, writing was invented, and the amount of knowledge grew.[26] This is the caused to shift from informal to formal education. Initially, formal education was mainly available to privileged and religious groups.[27] The invention of the printing press in the 15th century made books more widely and available to human.[28] Such innovation and book production increased general literacy.

However, at the beginning in the 18th and 19th centuries, public education became more important.[29] It sparked the global movement to make elementary education available to large numbers of students and people, free of charge, and required up to a particular age. Education then turns into a procedure that aids in leading a good life or the life they desire. In order to distinguish education from indoctrination or instruction, various scholars emphasize genuine thought.[30] For them, mere indoctrination is only interested in instilling beliefs in the student, independent of whether they are rational. On the other hand, education should also foster the rational ability to critically reflect on those beliefs and question them.[31] Again, some intellectuals wonder if some forms of indoctrination are required in the early stages of education. It may be required until the child's mind has fully formed. Education can be defined from either the teacher's or the student's perspective. Teacher-centered definitions emphasize the teacher's point of view and role. They may assert, for example, that education is the ethically appropriate transmission of information, experience, and skills.[32] On the other hand, student-centered definitions focus on education from the student's experience in the learning process.[33] For example, they may define it as a process that transforms and enriches their succeeding knowledge, skill and experience.[34]

The great scientist on earth Albert Einstein[35] has said, 'Imagination is more important than knowledge and education is not the learning of facts, but the training of the mind to think.' The only thing that prevents me from learning is my education, he continued. After one has forgotten what he learnt in school, education is what is left. After responding to a journalist, he stated, "I don't have any exceptional talent. I'm just incredibly intrigued. When you stop learning, you begin to expire. Life should never stop educating us; thus, we should never stop learning. Chinese proverb: "If you are planning for a year, sow rice; if you are planning for ten years, plant trees; if you are planning for a lifetime, educate people." Untrained children are like birds without wings. One thing that no one can take away from you is your education.[36] The great leader in modern time Nelson Mandela[37] has said, 'Education is the most powerful weapon which you can use to change the world. Your children will never be able to meet the obstacles they encounter unless they receive an education. As a result, it is critical to educate children and explain why they should be involved in their country.' Mahatma Gandhi, the Father of the Indian Nation, once stated, "Live as if you were going to die tomorrow." Learn as if you were going to live indefinitely. I mean an all-around drawing of the finest in child and man in body, mind, and soul when I say education.' Education, on the other hand, breeds confidence, which breeds hope, which breeds peace.

'The purpose of education is the expansion of knowledge and the transmission of truth,' declared American technology enthusiast John F. Kennedy.

For any endeavor to yield results, we must commit ourselves fully. Zig Ziglar's best piece of advice is, "If you don't want to learn, no one can help you." No one can stop you from learning if you want to. In fact, we do our best work when we know more. "Give a man a fish, and you feed him for a day. Teach a man to fish, and you feed him for a lifetime," says Maimonides. Isaac Asimov, a famous science fiction author, once said, "Education is not something you can finish." Education is the key to making the world a better place. Rabindranath Tagore, a famous poet, once said, "The highest education is not just getting information, but living in harmony with everything." We have to respect the student, because that's the key to teaching. Our schooling is like a dress rehearsal for the life we will live. A good and useful school system is the key to a brighter future.[38] The great philosopher Aristotle usually has said, 'The roots of education is bitter, but the fruit is education is sweeter. Educating the mind without educating the heart is no education at all. Education is an ornament in prosperity and a refuge in adversity.'[39]

Types or Classification of Education

There are many types or classifications of education. Actually, on the basis of institutional framework, education may be formal, non-formal, or informal. Formal education[40] happens in a complex institutional framework, usually in public schools. Non-formal education[41] is also structured but happens outside the formal schooling system. Informal education refers to a mode of learning that is characterized by its lack of structure, wherein individuals acquire knowledge and skills via their day-to-day experiences. The categorization of education into formal and non-formal sectors is commonly organized into distinct levels, including early childhood education, primary education, secondary education, and postsecondary education.[42,43] Forms of education may be divided by subject, like science education,[44] language education,[45] and physical education.[46] Education usually socializes children into society by teaching cultural values, norms and ethics. It furnishes them with the knowledge and skills needed to become productive members of society or community or city. Finally, it stimulates economic growth and raises awareness of local and global problems.[47] Many aspects of education are influenced by organized institutions, such as the fact that governments determine education policies. Today, UNESCO is influential in promoting primary education for all students.[48]

➢ Formal education is conducted within a multifaceted institutional structure. These frameworks exhibit a sequential and hierarchical structure. For example, the contemporary educational system organizes classes according to students' age and academic advancement, spanning from elementary school through higher education institutions. The administration and direction of formal education is often overseen by governmental authorities. Typically, there exists a mandatory requirement until a specified age.[49] Formal education takes place in school. Formal education is mainly driven by extrinsic motivation for external rewards.

➢ Non-formal and informal education occurs outside of the formal school system. Non-formal education is a happy medium. It is planned, systematic, and carried out with a specific goal in mind, just like formal education. Tutoring, fitness programs, and the Scouting movement are among examples. Non-formal education takes place in settings that are only visited on occasion.[50] Non-formal and informal education are closely linked to intrinsic motivation because the learning itself is enjoyed.

➢ In contrast, informal education occurs in a non-structured manner, primarily through daily encounters and interactions with the surrounding environment. In contrast to formal and non-formal education, the absence of a defined authority figure accountable for instruction is typically observed.[51] Informal learning can happen in many places. It happens all the time, most of the time on its own. This is how children learn their native language from their parents or how people learn to make a dish by cooking together.[52] Informal education occurs in places of everyday routines.

Types of education are often divided into levels or stages. The most influential framework is the International Standard Classification of Education.[53] The UNESCO is in charge of keeping it. Both official and informal education are included. It makes distinctions between levels based on the age of the pupil, how long they have been learning, and how difficult the subject matter is. Additional criteria include prerequisites for enrollment, teaching credentials, and the intended result of successful completion. The levels are grouped together[54] into following levels.[55]

➢ Early childhood education (level 0): Early childhood education is usually known as preschool education or nursery education.[56] It is such stage of education that begins with birth and lasts until the start of primary school.[57] It is important for socialization, early grooming, and personality development. It covers a wide

range of fundamental skills such as mingling, friendship, communication, learning, feeling, believing, and problem-solving.

➢ Primary education (level 1): Primary education, also known as primary education, typically begins between the ages of five and seven and lasts four to seven years. There are no additional entrance criteria. Its primary purpose is to teach fundamental abilities in reading, writing, science, and mathematics. However, it also covers fundamental information in other subjects such as history, geography, music, and art. It also aids in personal development.[58] Over 90% of all primary-school-age children worldwide attend primary school.[59]

➢ Secondary education (levels 2-3): Secondary education is the stage or level of education following primary education. It typically covers the ages of 12 to 18 years.[60] Lower secondary education, also known as middle school or junior high school, and upper secondary education, sometimes known as high school, senior high school, or college, depending on the country, are the two main categories. Primary school graduation is typically required for admittance into lower secondary education. It seeks to broaden and enhance the learning objectives. It has a stronger emphasis on subject-specific curricula and teachers who are experts in just one or two areas. Its goal is to introduce pupils to the fundamental theories behind these particular fields. As a result, a solid foundation for lifelong learning is created. It frequently also incorporates vocational education.[61] In most foreign the countries, it is the last stage of compulsory education.[62]

➢ Post-secondary non-tertiary education (level 4): Upper secondary education, as we know, strives to give students with the skills and knowledge required for work or tertiary study. It usually requires completion of lower secondary schooling. Its topics are more diverse and sophisticated.[63] Students are frequently given the option of selecting from a number of subjects. Its successful completion is frequently linked to a formal qualification, such as a high school diploma. It focuses on vocational training to prepare students for the labor market.[64]

➢ Tertiary education (levels 5-8): Tertiary education is also referred to as higher education. It expands upon the foundations of secondary education but has a more narrow and in-depth focus on a specific field or subject. Its completion leads to an academic degree.[65] The educational system can be categorized into four distinct categories, including short-cycle tertiary education, Bachelor's degree, Master's degree, and doctoral-level education. Frequently, a hierarchical structure is established, wherein subsequent levels are contingent upon the successful completion of preceding levels. Short-cycle tertiary education places emphasis on practical aspects. The program encompasses comprehensive vocational and professional instruction aimed at equipping students with the necessary skills and knowledge to effectively enter the job market within specific specialized fields.[66] Bachelor's level education is also referred to as undergraduate education. It tends to be longer than short-cycle tertiary education. It is usually offered by universities and results in an intermediary academic certification in the form of a Bachelor's degree.[67] Master's level education is more specialized than undergraduate education.[68] In many programs, you have to do your own study and write a Master's thesis as part of the requirements to graduate. When you go to school at the doctoral level, you get an advanced study qualification, which is usually a doctor's degree. It usually needs a big academic paper, like a dissertation, to be turned in.[69]

Education may be divided on the basis on receiver of education. Categories by the age of the learner may be divided as; childhood education, adolescent education, adult education, and elderly education.[70,71] On the other hand, Special education is education that is specifically adapted to meet the unique needs of students with disabilities.[72] This encompasses a range of deficits across intellectual, social, linguistic, and physical domains. The objective is to address the difficulties presented by these disabilities. Education can be categorized based on the instructional approach employed. In an education system that is teacher-centered, the primary role of the instructor is to assume a central position in imparting knowledge to the students. Conversely, under the context of student-centered education, students assume a more proactive and accountable position in influencing classroom activities.[73] However, education can be categorized based on levels of awareness or consciousness. In the context of conscious education, the process of learning and teaching is undertaken with a distinct and deliberate objective. Unconscious schooling, in contrast, transpires spontaneously and without deliberate planning or guidance.[74] Again, many different and unusual types of education has discussed in many academic literatures. Such as: traditional and alternative education.

➢ Traditional education concerns long-established and mainstream schooling practices. It uses teacher-centered education and takes place in a well-regulated school environment. Regulations cover many aspects of education, such as the curriculum and the timeframe when classes start and end.[75]

➢ Alternative education is an umbrella term for forms of schooling that differ from the mainstream traditional approach. For example, they might use a different place to learn, teach different subjects, or try

to build a different bond between teacher and student. Alternative schools have students who sign up on their own, have small classes and school sizes, and give individual lessons. This usually makes the place feel friendlier and mentally safe.[76] It encompasses many types like charter schools and special programs for problematic or gifted children. It also includes homeschooling and un-schooling.

Education can be categorized into two main types: compulsory education and voluntary education. Compulsory education refers to the legally mandated education that individuals are obliged to receive. This primarily pertains to youngsters who are required to attend school until reaching a specific age. Conversely, voluntary education refers to the pursuit of education by individuals based on personal preference rather than a legal obligation.[77,78] Again, education may be divided on the basis on the type of funding. Those are as follows.[79]

➤ Public education is also known as state education. The government funds and controls this type of schooling. It is open to the entire public. It usually does not require tuition payments and is thus a sort of free education. Actually, compulsory education is usually public education, which students/people are forced by law to receive.[80] It concerns mainly children who need to visit school up to a certain age.

➤ Private education is typically financed and administered by non-governmental organizations. Private schools typically employ a more discerning and proprietary admissions procedure. Numerous educational institutions provide the opportunity for individuals to acquire knowledge and skills through the provision of paid instruction, which is facilitated by the collection of tuition fees. A more comprehensive categorization centers on the societal establishment accountable for the provision of education. The aforementioned categories encompass several institutions, such as family, school, civic society, state, mosque, temple, and church.[81] In voluntary education, student/people pursue by personal choice without a legal requirement.[82]

Impact of AI in the Era of 4th Industrial Revolution (4IR)

AI techniques that can simplify this endeavor include machine learning and deep learning, among others. Training AI systems involves supplying appropriate training data to the algorithms. AI systems are tremendously effective replacements for any process requiring intelligent decision-making because they can acquire expertise and perform the task much faster than humans.[83] This makes AI as an exceptionally powerful and enormously valuable technology, since it essentially allows computers to think and behave just like humans; and that should be much faster and much more processing power than the human brain can produce.[84] Today, AI can solve many problems by intelligently searching through much possible solution.[85] While AI is an interdisciplinary science with multiple approaches, advancements in machine learning (ML) and deep learning, in particular, are creating a paradigm shift in virtually every sector of the tech industry.[86] Actually, AI is the backbone of innovation in modern computing and unlocking value for individuals and businesses.[87] Machine Learning (ML) is the science of accomplishment machines to interpret process and analyzed at in order to solve real-world and real-time problems instantly.[88] Deep Learning is an advanced field of ML that can be used to solve more advanced problems.[89] Robotics is a branch of AI which focuses on different branches/sectors and application of robots.[90]

In today's world, upon observation, it becomes evident that our societal landscape is undergoing transformation through the integration of AI and the Internet of Things (IoT) in various routine endeavors. When individuals visit a healthcare facility, they may encounter an AI enabled device that monitors their pulse. Similarly, when individuals use an online retail platform, they may come across a personalized list of recommendations generated by an AI algorithm. In fact, the aforementioned instances represent a limited subset of the benefits that artificial intelligence confers upon our routine engagements. In the future, AI is expected to provide a multitude of additional capabilities and benefits. Over time, an increasing number of industries, service sectors, and organizations will adopt this transformative technology to enhance the efficiency of various human operations. AI has the potential to enhance and expedite various processes at the community, societal, national, and global levels by augmenting workplace efficiency, enhancing decision-making capabilities, and providing direct assistance. AI possesses the capability to detect and address challenges that may elude human perception or resolution through human agency alone. Nevertheless, there exists a subset of individuals who fail to recognize the advantages associated with AI due to their apprehension that it would result in unemployment and a deterioration of human capabilities. Indeed, the paramount advantages derived from AI encompass rapidity, precision, efficacy, and scalability.

The 4IR will drastically transform industries, services, and other sectors, such that much of the job that exists today will no longer exist in the next 25 years. It is critical that we comprehend the implications of these developments for all aspects of our lives, including academic and learning institutions. Currently, all graduates face a technologically altered world in which AI, IoT, ML, Big Data, Cloud and Edge Computing, and social media present a variety of opportunities and problems for traditional education systems. As students explore

their post-diploma or post-graduation lives, formal academic and learning institutions face questions concerning their future, particularly employment. Almost all modern AI-powered technologies are revolutionizing the world to such an extent that social ideas such as 'post-work' are increasingly characterizing the current era. This time necessitates abilities that are not identical to those necessary during the Third IR, when information technology (IT) was the primary driver.[91] It has been estimated that, within next 7 years the AI will be US$15 trillion industry. Millions of unskilled or traditional skilled people will lose their job. On the other hand, millions of job related to modern and hi-tech skilled will be created in the next few years.

AI and Future Education

Frequently, the relationship between education and society is unclear and unidirectional, with education and skill expected to conform to social, economic, political, and global trends. It should not contradict them or represent something dissimilar. Consequently, the relationship between education and socioeconomic structures, human resource development, and education position helps us form a projection of future secondary and postsecondary education associated with the Fourth Industrial Revolution (4IR). Education is mapped onto the emergence and development of the Internet and the so-called 'Industrial' revolutions of the past two centuries. 'Education 4.0' then employs some foresight with a focus on graduates' employment prospects and future contributions.[92] The primary objective of mid-level and higher education in the context of the 4IR is to ensure the provision of high-quality learning experiences through effective teaching methods and practical applications. This is aimed at equipping learners with valuable and enduring knowledge and skills, which can be acquired through hands-on practice and exploratory research. Additionally, the sustained development of societies is fostered through the provision of service-oriented initiatives. In the era of the 4IR, it is imperative for mid-level and higher learning institutions to prioritize innovation, both in its evolutionary and revolutionary forms. This entails placing a heightened emphasis on innovation within their programs and undertaking comprehensive restructuring of their technology systems. It is crucial for these institutions to dismantle any barriers that impede innovation and hinder the process of modernization.[93]

Education and skill in the 4IR are numerous and difficult issues, but they also present exciting prospects that have the potential to alter society and the entire nation into a healthier and superior state. The 4IR is powered by AI and will shift the workplace away from task-based uniqueness and toward human-centered uniqueness. 4IR ensures the reunion of man and machine, reducing the subject distance between humanities and social sciences, as well as science and technology. The necessity for a mid-level and higher learning institution to respond is critical, as the capacity of 4IR technologies to either have great social consequences or cause massive environmental devastation is upon us.[94] This will necessarily require much more interdisciplinary teaching, on ground practice, research and innovation. So along with 4IR, education 4.0 is a focused, purposeful and viable approach to learning and is transforming the future of education using advanced technology and automation.[95] To keep up with the changes, traditional education models need to be looked at again from a futuristic point of view. Teachers and students/learners should have the skills needed by a global society and technology that change very quickly. So, now students and workers should be led, not told, and given access to information, not feed it to them. But there should be responsible use of the internet and the best use of technology to help people. The goal of both general education and vocational education should be to give students and workers the information and skills they need to be able to compete in the global workforce.[96]

Our education should be meaningful, long-term, and result-oriented. As a result, we must build an outcome-based education module to meet the accrediting demands of students, as well as a competency-based education module to foster effective knowledge and skill-based learning. We need to construct and improve the system so that it can minimize operational costs, be easily accessible, and automate all mid-level and higher education activities. Every educational institute and system should have project management, reporting, and analytics tools so that we can ensure future/modern education process and procedure where issues such as students/learners scheduling efforts, virtual classroom enablement, accreditation, strategic planning, modern learning, skill development practice, and so on can be addressed.[97] We should adopt a strategy and formulate such useful plan and that can ensure preferable future for today's students/learners.[98] In order to keep up with how the world is changing and how super technology is being used in every part of life, the education curriculum has to be planned and developed with the utmost care and give technology, IT, AI, IoT, ML, big data, cloud and edge computing, social media, and other knowledge and skills a lot of weight.

We may contribute to develop a more adaptable, multifaceted, and purposeful community and nation by providing the proper tools for today's workforce, contributing to a self-sustaining model of education. We must recognize the transformative power of digital technology in education and be conscious of end-to-end mid-level and higher education digitization and automation to make our education smart and future-ready.[99] Our

educational institutions and curricula should be designed with intelligent tools to facilitate 24/7 virtual learning,'made-to-order' learning, and interpersonal connection with department/faculty. Because students/learners should be able to choose, admit, enroll, discuss, administer assessments, and even test online effortlessly and spontaneously today. Education 4.0 encompasses and assures a limited number of significant learning and skill development concerns. We can assure their safety through a number of specific means.[100] Those important learning and skill developing aspects and means and ways have been described below in brief:

Ensure more individual/personalized learning: In the age of 4IR and Education 4.0, it's important that each student or learner is unique and that they learn at their own pace. Students will be able to reach their goals more easily and quickly if they are taught in a way that is tailored to them.[101] The integration of AI, IoT, and cloud computing has resulted in a wide array of tools that can cater to the unique demands and learning speeds of individual learners, hence enhancing the teaching and skill development process. Simultaneously, the Department/Faculty will possess the capability to readily identify and address the strengths and shortcomings, as well as the opportunities and threats, pertaining to specific students. This will enable them to provide immediate personalized input.[102]

Ensure more remote learning opportunities: With the growing use of technologies in educational interventions, approaches to learning and teaching have evolved to take place in different environments with a variety of strategies and techniques.[103] The core of Education 4.0 is to make learning and skill development programs available anywhere, at any time, using a set of e-learning tools, ensuring remote and self-paced learning for any learner. As we all know, blended learning is often (though perhaps overly simplistically) defined as a combination of face-to-face and online components. Active learning, on the other hand, is frequently described as an educational strategy that involves students in higher-order thinking tasks that typically need collaboration with others. So, the Active Blended Learning (ABL) concept is a blend of both, and it is particularly effective in the present age of 4IR.The ABL concept, in which learners are actively involved in learning outside of classrooms, is gaining traction.[104] This way, learners end up mastering both practical and experiential learning and nowadays it become popular.

Ensure optimum active learning system: Comparative studies often try to find ways to teach the same way in online, mixed, and face-to-face settings. But the real benefits seem to come from the way educational materials, pedagogy, and learning time work together. The best blended studies let students learn in ways that aren't possible in other types of classes. Active learning is one of the best ways to have a good and satisfying school experience. It can mean that fewer students fail, that they do better on tests, that they are better at handling problems and thinking critically, that they come to school more often, and that they are happier with school.[105] It may also help to narrow the achievement gap between disadvantaged and non-disadvantaged students. The shift to active learning transforms classrooms into real-world work and social situations that encourage cross-disciplinary connections. Students believe that dynamic learning environments foster creativity and innovation.[106] When learners participate in active learning environments, they tend to outperform their peers in more traditional classroom settings.[107]

Ensure availability of education tools: Education 4.0 gives students and learners a clear path by giving them tools and techniques that they can use in their learning setting. In fact, students and other learners will be able to pick the tools and methods they want to use to learn. As an example, tools for working together and getting people interested, flipped or mixed learning, etc.[108] However, it is imperative to provide suitable collaborative learning assistance for group-based learning inside a flipped classroom environment, particularly during the phase of learning that occurs outside of the traditional classroom setting. The use of the flipped classroom model has the potential to serve as a means of addressing the limitations associated with the one-shot approach and other obstacles to effective cooperation within educational settings.[109]

Ensure project-based learning: In project-based learning (PBL), students work in groups to solve challenging problems that are authentic, curriculum-based, and often interdisciplinary.[110] Learners make decisions about how to approach a topic and which activities to pursue. They collect data from various sources and synthesize, analyze, and generate knowledge from it. PBL is made possible by technology. Students use word processors, spreadsheets, and databases to complete tasks such as outlining, composing essays, evaluating numerical data, and keeping track of material gathered. E-mail, electronic mailing lists, forums, and other online applications make it easier to communicate and collaborate with people beyond the classroom.[111] For study, the Web gives people access to museums, libraries, and other places that are far away. Education 4.0 supports a project-based way of learning that helps students learn in a fun and interesting way. It doesn't care about theoretical information and instead pushes students to learn how to manage their time, organize their work, work with others, and manage their time, which are all skills they will need for their jobs in the future.[112]

Ensure easy and accurate assessment: Nowadays, predicting students' performance is one of the most specific topics for learning environments, such as universities and schools, since it leads to the development of effective mechanisms that can enhance academic outcomes and avoid destruction. In education 4.0, AI can play a key role in identifying new factors in the performance of students and implementing personalized learning, answering routine student questions, using learning analytics, and predictive modeling. [113] A more practical way of assessment comes into place with Education 4.0. [114] There are both online and offline assessments and students get assessed on projects, assignments, and fieldwork. Again, to find the available vulnerabilities against any system, it is mandatory to conduct vulnerability assessments as scheduled tasks in a regular manner.

Ensure information/ Data at the fingertips: There are greater insights into the students learning journey with data analytics and reporting in Education 4.0. [115] The statistical analysis enables teaching personnel to determine where pupils stand and guide them appropriately. The causal graph of the organization's/institution's social ties is based on the framework of a balanced scorecard. The structural unit of the university/institute is used as an example. Acquiring quantitative measurement data has been a challenge in secondary and higher education, particularly in technical education, because the necessary gear and tools are sometimes too outdated, error-prone, complicated to operate, or just too expensive. [116] It creates hindrance of those educations.

Remodeling of education curriculum: We need to come up with the right plans so that our schools can prepare kids in a way that fits with Education 4.0. That needs to be in line with what the industry needs. The future should be given a lot of attention and stress. With digitization and robotics, it's more important than ever to teach skills-based lessons. Employers need more skilled workers, but there aren't enough of them. They hope that universities and schools will help the workers they already have become more skilled. [117] Engineers need to have broadened design abilities that span interoperability, virtualization, decentralization, real-time capability, service orientation, modularity, and so on in order to effectively execute Industry 4.0. So, Engineering Education 4.0 (EE 4.0), which produces engineers for Industry 4.0, should be modified to suit the expectations of Industry 4.0, which emphasizes the integration of all engineering disciplines. [118]

Building digital skills: One of the main goals of Education 4.0 is to teach students about new technologies like Machine Learning (ML) and give them the skills they need to use what they learn to solve problems in the real world. So, both students and teachers need tools for teaching and learning that make it easier to start talking about these kinds of things. Educational institutions should have up-to-date skills for the workplace and train their teachers in digital skills so that their students are fully prepared for the workplace. Mixing problem-solving, social skills, and process skills should make soft skills essential.

Opt for digital tools for virtual learning environments (VLEs): This is becoming more popular around the world as students and staff receive remote access for instruction via LMS. Learning and teaching, course content access, online chat, discussions, collaborations, peer teaching, and blended learning all take place throughout flexible hours. Artificial intelligence (AI), robotics, cloud computing, the internet of things (IoT), cyber-physical systems, big data, and other innovations are driving the 4IR. Thus, industries have leveraged these technologies to deliver solutions to humanity's expanding requirements; yet, for them to continue adapting their ecosystems to the digital world, competent personnel with knowledge and abilities in those areas are required. [119]

Fine-tuning of course delivery: The faculty and the courses they teach should be in sync with each other. The faculty should be open to the idea of using technology to help students learn more effectively. They should use personalized, adaptive learning methods for a smarter way to learn and to make the whole process fun and interesting. There should be a strong professional framework with career planning across fields. This will make Indian schooling more up-to-date and help build a workforce for enterprise 4.0. But to get skilled workers, Education 4.0 is being proposed as a new framework so that schools can train professionals who can create knowledge through scientific research and experience, share this knowledge with society, and use it to solve technological, social, political, and economic problems. [120]

Prepare technology built classrooms: Technology-built classrooms are being implemented across universities, colleges, and higher education institutions in order to produce effective graduates for the cyber-physical systems that are ubiquitous across all industries. This entails developing a technology-rich curriculum and modifying the learning style in order to improve the student experience. This education industrial revolution 4.0 focuses on current and smart technology, artificial intelligence, and robots, all of which have an impact on our daily life. It is a new challenge to redefine education 4.0 in order to recognize creative and innovative clever pupils, and determining students' outcomes is tough. [121] The acquisition of technical education and technological skills is of utmost importance in the development of human resources at the national level. Education of this nature yields a proficient labor force, enhances productivity, and contributes to the enhancement of

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overall societal well-being. The production of competent and skilled human resources in the 21st century, characterized by advancements in science and technology, is of utmost importance. Indeed, a strong correlation exists between the technical or vocational education system and the socio-economic development of a nation.[122] It's no surprise that technology can be blamed for many of the problems we face as a society. We are frequently cautious or terrified of technology since it moves so quickly and can feel so foreign due to the speed of advancement and invention. It is normal to be afraid of the unknown and uncomfortable with new things, and technology facilitates new experiences. Technology has forced us to adapt to new and unexpected realms, from radios and televisions to the internet and social media. [123]

Advantages and Challenges of Technology in Education

Today learners exhibit notable distinctions compared to their predecessors in light of the advent of the digital revolution. The learning environment exhibits a higher degree of dynamism. As technology continues to evolve, classrooms are undergoing reform and reinvention to cater to the evolving needs of contemporary digital learners. The internet has undergone significant development and has become as an indispensable medium for accessing information. Numerous online children's books can facilitate the cognitive development of young readers by enhancing their knowledge acquisition. The process aids individuals in developing self-reliance as learners and cultivating a sense of self-assurance. One additional benefit of the internet is that it provides youngsters with an abundance of material that has the potential to stimulate their interest in reading. This skill is commonly utilized in our everyday activities. It is imperative that children and adolescents acquire this skill from a young age in order to effectively navigate the various hurdles they may encounter in their educational pursuits and other domains throughout their lifetimes. There are numerous advantages associated with instructing youngsters in the skill of problem-solving. The curriculum instructs individuals on strategies for mitigating conflicts both inside educational settings and in their everyday experiences. Engaging in this activity has the potential to enhance individuals' empathy skills and cultivate various other desirable traits. The acquisition of these skills is crucial for the preparation for formal education and achievement in academic endeavors. The advent of social media platforms and applications has precipitated substantial transformations in the contemporary era. Social networking sites and applications enhance individuals' capacity to interact and connect with people within their social network. The utilization of social media platforms has the potential to enhance individuals' self-assurance and equip them with valuable skills for forthcoming social marketing prospects.[124]

Through social networking sites, children and teens can undertake a variety of important tasks. They can communicate with friends and family, meet new people, post photos, and share ideas. Social media also improves learning opportunities for middle and high school students by allowing them to collaborate on homework and group projects. We can't keep children's imaginations in check. Kids nowadays have laptops, iPads, and other technology to help them turn their ideas into reality. Instead of drawing an image, students can now create a 3D animation. They aspire to create more with their ideas and to experiment with new things. It increases their ability to learn, helping them to do better in the future. The internet's information resources make early schooling far more accessible than in previous generations. They can do research projects without visiting a library because there are so many internet resources. That is not to say that we no longer require books. In reality, the internet is a resource that increases the availability of books and high-quality knowledge. Because of technology breakthroughs, children and youths can now complete the process. They are capable of communicating in ways that words cannot. Children are more willing to conduct additional research and develop new lines of reasoning when they can answer their queries. Advanced technology can assist children and adolescents in developing independence, academic confidence, and an interest in new fields. On the other hand, children may have an overwhelming desire to imitate their heroes or peers. When they can't meet up or do what they observe on TV, it can cause worry or a sense of inadequacy and inferiority. As we know, Fear of Missing Out emerges (FOMO), a toxic combination of worry and inadequacy.[125] The online world can be a breeding ground for hate. The internet provides an opportunity for children to be emotionally tormented. Children and teenagers can use technology and social media to persecute other kids without even meeting them. This behavior is commonly referred to as cyberbullying. It is common even with younger students. This is the most alarming effect of Kids and youths' unsupervised technology use. The amount of explicit information available on the internet is surprising. So, Kids and youths with unsupervised access to technology will as a result have much easier access. Most sites that display this sort of content do not have any age restrictions. So Kids and youths might readily view them. Furthermore, dangerous individuals online can easily lure minors into sending inappropriate photographs, or financial and security information, especially if we haven't properly introduced our child to basic online safety. Education nowadays has relied heavily on the internet, especially during the pandemic. To cope with the restrictions brought by lockdowns,

schools developed online programs so that the education of millions of students nationwide wouldn't be disrupted. Many schools require their students, including young children, to get online and attend classes via video conferencing. Many of these apps require sign-ups, where kids give their personal information as a requirement for registration. If left unsupervised, children may unwittingly share sensitive information online, making them vulnerable to dangers that loiter in cyberspace.

Due to the proliferation of portable electronic devices such as smartphones and tablets, children increasingly possess unrestricted access to media content throughout the entirety of the day. This suggests that individuals may allocate their entire night to responding to text messages and other forms of electronic communication, rather than engaging in sleep. Sleep has a crucial role in maintaining both physical and mental well-being, with children requiring a substantial amount of sleep to support their overall health. Obtaining sufficient sleep during the night contributes to their overall development, enhances cardiovascular well-being, influences body weight, extends their capacity for sustained focus, and even facilitates academic performance. It is imperative to exercise parental oversight over children's utilization of technology and impose restrictions on their access. The excessive utilization of technology among children can give rise to significant health implications. Engaging in prolonged periods of inactivity on electronic devices, such as smartphones, video games, or television, is associated with a reduction in overall physical activity levels. The increased prevalence of technology usage contributes to the adoption of a less healthy lifestyle. The potential consequences encompass a range of health-related concerns, such as obesity, coronary heart disease, and type 2 diabetes. The amount of time children allocate to screen usage is inversely related to the time they dedicate to outside activities or engaging in physical exercise. Additionally, individuals may partake in increased instances of mindless consumption while engaging in activities such as watching television or playing video games. The contemporary youth cohort actively engages in online gaming, utilizes various websites, and communicates through the popular social media platform, Facebook. The persistent utilization of electronic devices may impede the advancement of fundamental interpersonal abilities. Social skills encompass the ability to appropriately engage in conversational exchanges by demonstrating turn-taking behavior, interpreting and utilizing facial expressions, and establishing effective eye contact. The utilization of technology can yield favorable outcomes for children, while excessive exposure may result in adverse consequences. The occurrence of these events is less probable when individuals limit their exposure to screens. It is advisable to adhere to the guidance provided by your pediatrician and exercise your own discernment in establishing a well-rounded routine for your child. It is imperative to oversee and regulate individuals' social interactions, usage of electronic devices, and engagement in physical exercises. Achieving effective parenting entails the cultivation of equilibrium, judiciousness, and vigilant oversight. It is imperative to ascertain the potential hazards and vulnerabilities associated with the disclosure of personal information, particularly in the context of accessing online classrooms, digital modules, and study materials. It is imperative to ascertain the available resources that may be utilized to enhance the internet security of our children and students, thereby safeguarding their personal information from any cyber dangers.[126]

Necessary to Teach Technical Subjects

Technology and job education subjects are now taught in primary schools, with the goal of providing students with technical knowledge and skills. These are the topics that allow teachers to provide students with abilities in a creative school setting. The subjects have distinct personalities. Teachers, via good instruction, help students realise the connection between theoretical subjects and technological products seen in real life. These studies are distinguished by strong interdisciplinary connections to history, science, biology, physics, mathematics, technology, and other fields. The technical subjects' material is focused towards the practical side of the outside world, which has a considerable educational impact. It enables kids and their parents to accurately identify their career direction. Children, on the other hand, can achieve a harmonic and holistic development of their personalities, ensuring that their abilities and talents are best applied in real life as well as in the job market. The technical subjects aid in the development of constructive and creative thinking. Information, communication, AI, IoT, and smart technologies can be used and deployed to the greatest extent possible in the teaching of these disciplines.

As a big part of human society, technology has always had a close relationship with the work of creative people. Humans were, are, and always will be the main source of all technological innovations, creations, and changes. These things are becoming more and more important in both adults' and children's professional and personal lives, and they will always have an effect on people's attitudes, values, moral, mental, and physical health, as well as their way of life. Technological growth has a big effect on evolution because it makes people more skilled and educated in technology. For a society or even a country to be successful, technical knowledge must be put to use. People need to be taught how to be creative, and technology is a way to do that. The idea behind technical education is that technology is the key to both the present and the future of

human life. Every day, students come to school with a lot of new knowledge, problems, practical activities, and tasks that they need to talk about in an integrated way. Teaching experience shows that practical creative activity is important for the healthy and natural development of children. It gives them a good feeling and the self-confidence, self-awareness, ethical support, and new attitudes and values they need in relation to people, work, technology, and the environment.

Primary school technical education is children's first opportunity to pursue a career. It is an opportunity to become acquainted with the most common instruments, basic techniques for working with various materials, common difficulties in everyday life, and viable solutions. Technology lessons allow youngsters to choose whatever activities are most attractive to them so that they can focus on them in their future studies and professional employment. Handling activities with various types of toys have a major impact on the development of thinking in preschoolers. At beginning, there are a variety of simple puzzles. A baby will eventually seek out more sophisticated toys. He/she discovers technical toys based on composing or decomposing activities, such as a game of building blocks in which a youngster creates real-world items and models. Working with technological toys and playing games helps youngsters develop their senses, intellectual abilities, and ability to express themselves. It entails developing a work strategy and objective, thinking first, and then acting. Today, all of the conditions for a child's personality development in all areas must be set in kindergartens. Neglect of technical education for children's growth, such as imagination and spatial orientation development, in the early years cannot be totally restored at a later time. Subjects with a technical focus are the best for developing autonomous and creative thinking not only in primary school, but also in lower secondary school, therefore it is critical to protect and promote the integrity of education at all levels of education. Technical education, in fact, ensures the following structure.

- Technical spatial imagination.
- Technical, constructional, technological and creative thinking.
- Understanding of the applications of scientific knowledge in the operation of technical equipment.
- User friendly and commercial thinking as people often use in purchasing technical equipment and using them, like, in households.
- Information and habits of safe and hygienic use of technology in general.
- Manual habits and skills for the processing of commercially available engineering materials including skills to safely use tools and technical aids. [127]
- The ability to implement cooperative and team-working teaching with an emphasis on experimental activities and implementation of projects in the field of technical products. [128]
- Effective thinking and effective work with technical materials and equipment.

II. Conclusion

Numerous research studies have been conducted to investigate the determinants of school climate and school environment. The field of neuroscience and neurodidactics in education emphasizes the importance of establishing an environment that fosters safety, emotional well-being, social acceptability, and high-quality engagement. The conditions that shape the field of education are influenced by a diverse range of external and internal influences. The educational conditions encompass various factors, such as the physical setting of the school and classrooms, the overall ambiance within the school and classrooms, and the prevailing temperature in the educational environment. From a temporal perspective, the school climate can be characterized as a phenomenon that extends over an extended period of time. Various factors have a significant impact on the dynamics of interaction inside educational institutions, the outward expression of students' behavior, their motivation levels, and ultimately, the outcomes they obtain. In the present setting, the establishment of a conducive school climate necessitates a concentrated effort towards ensuring a secure environment and enhancing the overall quality of the school climate. The composition of a secure educational setting includes emotional, social, and physical elements, as well as norms and regulations, their implementation and adherence, and the caliber of reciprocal engagement. Currently, there is a growing recognition of the significance of establishing a secure educational environment, particularly in light of the prevalence of students' inappropriate behavior such as bullying and aggression. These behaviors have a substantial influence on the overall quality of school life.

According to Peter Drucker, "We now accept that learning is a lifelong process of keeping up with change." The most essential responsibility, however, is to teach people how to learn.' According to Johann Wolfgang Von Goethe, 'in the end, we retain from our studies only that which we practically apply.' As a result, children and students must learn in accordance with the needs of society and the nation, as well as future work opportunities. Today, millions of future employments in the online economy will require significantly more

advanced technical or, more particularly, digital capabilities around the world. As such skills grow more crucial for employment, significant 'talent gaps' may emerge between people skilled in information and communication technologies (ICTs) and other High-tech subjects and others who lack ICT abilities or familiarity. Qualification gaps are compounded for many people by socioeconomic disadvantages such as a lack of Internet access at home, limited training options, outmoded views, and unequal financial situations. The digital divide is a skills disparity as well. The Internet user gap, or the divergence in the number of people who have access to and utilize the Internet, can be explained mostly by education and abilities. One of the primary challenges to Internet adoption in underdeveloped nations is people's lack of capacity and abilities to take full use of online platforms and services. Although young people and students have been dubbed "digital natives," the majority of them still lack the necessary digital skills to fill job openings. To create a more inclusive digital society, governments, the corporate sector, academia, and other important players must act quickly to provide citizens and employees with the digital skills and competencies required for the labour market and civil society. The epidemic of COVID-19 has accelerated digitization. However, it has shown significant obstacles in connecting families and people.

According to Denis Waitley, individuals who consistently achieve high levels of success are characterized by their commitment to continuous learning, as they actively seek out opportunities to acquire new abilities, get fresh insights, and explore novel ideas. If individuals are not engaged in the process of acquiring knowledge and skill, they are impeding their personal development and hindering their progress towards achieving a high level of proficiency. Stephen Hawking once stated that intelligence might be defined as the capacity to adjust and respond to alterations in one's environment. In order to secure a more promising future, it is imperative for the younger generation and students to undergo a transformative process that involves acquiring new information and skills. The International Labor Organization (ILO) reported that industries associated to information and communication technology (ICT) experienced the most substantial increase in employment amidst the pandemic. The increasing digitalization and proliferation of smart technologies in many industry and service sectors will result in a further rise in the demand for individuals with expertise in digital technologies, as well as Internet of Things (IoT), Artificial Intelligence (AI), and Machine Learning (ML). The advent of digitalization, automation, and economic disruptions has the potential to render numerous existing jobs obsolete. However, it is important to note that this transformative process will also give rise to novel employment opportunities within the realm of digital and smart technology. In the coming years, employment opportunities will increasingly necessitate proficiency in digital and smart skills, spanning a spectrum from fundamental to advanced levels of proficiency. The proliferation of novel tools, solutions, platforms, and services that emerged since the onset of 2020 will continue to be integrated into the prevailing paradigm in the aftermath of the pandemic. The domains, industries, and professions in which digitalization and smart technology foster employment opportunities will necessitate a growing demand for enhanced digital and smart competencies, expertise, and proficiencies. Once more, this change is generating significant investment prospects in the realm of training and skill development. In order to meet the future demand, it is imperative for the education, training, and learning sectors to reform accordingly and undergo development.

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[1] Klein, Peter D. (1998), "Knowledge, concept of", In Craig, Edward (ed.). Routledge Encyclopedia of Philosophy, London; New York: Routledge. doi:10.4324/9780415249126-P031-1

[2] Sommerville, Kerry (2007). Hospitality Employee Management and Supervision: Concepts and Practical Applications. Hoboken, NJ: John Wiley & Sons, Inc. p. 328. ISBN 9780471745228

[3] Allport, Gordon W. (1961). Pattern and growth in personality (14 print. ed.). New York: Holt, Rinehart and Winston. ISBN 978-0030108105

[4] Edward M. Glaser. "Defining Critical Thinking". The International Center for the Assessment of Higher Order Thinking (ICAT, US)/Critical Thinking Community,

[5] HarperCollins staff (2023). "The American Heritage Dictionary entry: education". www.ahdictionary.com. HarperCollins. Archived from the original on 12 May 2022,

[6] Etymology Online staff. "educate | Origin and meaning of educate by Online Etymology Dictionary". www.etymonline.com. Archived from the original on 9 August 2021,

[7] Bowen, James; Gelpi, Ettore; Anweiler, Oskar (2023). "Education". www.britannica.com. Archived from the original on 12 December 2007,

[8] Scribner, Sylvia; Cole, Michael (9 November 1973). "Cognitive Consequences of Formal and Informal Education: New accommodations are needed between school-based learning and learning experiences of everyday life". Science. 182 (4112): 553–559. doi:10.1126/science

[9] https://www.pocketprep.com/,

[10] Wright, Ronald (2004). A Short History anthropological. ISBN 978-0887847066

[11] Bowen, James; Gelpi, Ettore; Anweiler, Oskar (2023). "Education". www.britannica.com. Archived from the original on 12 December 2007

[12] ohnson, Mark S.; Stearns, Peter N. (2022). Education in World History.Taylor & Francis. pp. 23–26. ISBN 978-1-317-81337-8. Archived from the original on 2 May 2023,

[13] Sampath, K. (1981). Introduction To Educational Technology. Sterling Publishers Pvt. Ltd. pp. 30–32. ISBN 978-81-207-3139-4. Archived from the original on 13 May 2023

[14] Hughes, Claretha; Gosney, Matthew W. (2016). The History of Human Resource Development: Understanding the Unexplored Philosophies, Theories, and Methodologies. Springer.p. 43. ISBN 978-1-137-52698-4. Archived from the original on 13 May 2023,

[15] Murphy, Madonna M. (25 April 2015). "Plato's Philosophy of Education and the Common Core Debate". Association for the Development of Philosophy Teaching - Spring Conference: 4. Archived from the original on 3 May 2023,

[16] artlett, Steve; Burton, Diana (2007). Introduction to education studies (2nd ed.). Los Angeles: Sage Publications. ISBN 978-1-4129-2193-0

[17] "Universal Declaration of Human Rights". Amnesty International,

[18] United Nations (2020). "Chapter IV. Human Rights. 11) Convention on the Rights of the Child" in: United Nations Treaty Collection. Depositary.Status of Treaties. Archived 8 September 2020 at the Wayback Machine,

[19] United Nations Millennium Development Goals website,

[20] Haleem, Abid; Javaid, Mohd; Qadri, MohdAsim; Suman, Rajiv (2022). "Understanding the role of digital technologies in education: A review". Sustainable Operations and Computers. 3: 275–277,

[21] St. George, Donna; Strauss, Valerie; Meckler, Laura; Heim, Joe; Natanson, Hannah. "How the pandemic is reshaping education". Washington Post. Archived from the original on 31 March 2023,

[22] Bartlett, Steve; Burton, Diana, eds. (2003). Education studies: essential issues. London: Sage. ISBN 0761940499,

[23] Ge (Rochelle), Yun (19 May 2022). "Internationalisation of higher education: new players in a changing scene". Educational Research and Evaluation. 27 (3–4): 229–231,

[24] The Principles of Psychology (New York, 1890),

[25] Chazan, Barry (2022). "What Is "Education"?". Principles and Pedagogies in Jewish Education.Springer International Publishing. pp. 13–21. doi:10.1007/978-3-030-83925-3_3. ISBN 978-3-030-83925-3,

[26] Adams, Robert McCormick (1966). The Evolution of Urban Society.Transaction Publishers.p. 13. ISBN 978-0202365947. Archived from the original on 30 December 2016,

[27] Asadi, Muhammed (22 January 2007). "A Critique of Huntington's "Clash of Civilizations"".Selves and Others. Archived from the original on 26 April 2009,

[28] McGee, B. W. (1 December 2007). "Archaeology and Planetary Science: Entering a New Era of Interdisciplinary Research". AGU Fall Meeting Abstracts. 2007

[29] Fernández-Armesto, Felipe (2001). Civilizations: Culture, Ambition, and the Transformation of Nature. Simon & Schuster. ISBN 978-0743216500. Archived from the original on 1 April 2021,

[30] Curtis, Will; Ward, Stephen; Sharp, John; Hankin, Les (6 December 2013). "1. What is education?". Education Studies: An Issue Based Approach. Learning Matters. ISBN 978-1-4462-9693-6

[31] Haack, Robin (1981). "Education and the Good Life". Philosophy. 56 (217): 289–302. doi:10.1017/S0031819100050282. ISSN 0031-8191

[32] Jackson, Philip W. (2011). "1. Dewey's parting words". What Is Education?.University of Chicago Press. ISBN 978-0-226-38939-4

[33]33 AbdelRahim, Layla (2015). Children's literature, domestication and social foundation: narratives of civilization and wilderness. New York. p. 8. ISBN 978-0415661102

[34] Kennett, Douglas J.; Winterhalder, Bruce (2006). Behavioral Ecology and the Transition to Agriculture. University of California Press.pp. 121–. ISBN 978-0-520-24647-8,

[35] https://www.britannica.com/biography/Albert-Einstein,

[36] Siegel, Harvey et al, (2018), Philosophy of Education, The Stanford Encyclopedia of Philosophy, Metaphysics Research Lab, Stanford University. Archived from the original on 28 March 2019

[37] https://www.nelsonmandela.org/,

[38] Tarnas Richard, (1993), The Passion of the Western Mind: Understanding the Ideas that Have Shaped Our World View (Ballantine Books)

[39] Peter J Heather, (2005), The Fall of The Roman Empire: A New History Of Rome And The Barbarians. Oxford University Press. ISBN 978-0-19-515954-7

[40] Recognition of Non-formal and Informal Learning - Home". OECD

[41] Eaton, Sarah Elaine (22 May 2011). "Formal, Non-Formal and Informal Learning". Archived from the original on 30 January 2017,

[42] "Best Accredited Online Early Childhood Education Degrees of 2018". Teacher Certification Degrees. Archived from the original on 8 January 2019,

[43] Tertiary Education". World Bank. Archived from the original on 10 December 2017,

[44] Layton, D. (1981). "The schooling of science in England, 1854–1939". In MacLeod, R.M.; Collins, P.D.B. (eds.). The parliament of science. Northwood, England: Science Reviews. pp. 188–210. ISBN 978-0905927664

[45] Phillips, J. K. (2007). Foreign Language Education: Whose Definition?. The Modern Language Journal, 91(2), 266–268. ISSN 0026-7902^ Scoville, Priscila. "Amarna Letters". World History Encyclopedia,

[46] Mitchell, Stephen (2016). The Essential of Teaching Physical Education. Shape America - Society of Health and Physical Educators. pp. 1 page cited (4 page). ISBN 978-1-4925-0916-5.

[47] https://en.wikipedia.org/wiki/List_of_global_issues,

[48] "List of UNESCO members and associates".UNESCO. Archived from the original on 15 August 2022,

[49] Tudor, Sofia Loredana (April 2013). "Formal – Non-formal – Informal in Education". Procedia - Social and Behavioral Sciences. 76: 821–826. doi:10.1016/j.sbspro.2013.04.213

[50] La Belle, Thomas J. (1 June 1982). "Formal, nonformal and informal education: A holistic perspective on lifelong learning". International Review of Education. 28 (2): 159–175. doi:10.1007/BF00598444. ISSN 1573-0638

[51] Eshach, Haim (1 April 2007). "Bridging In-school and Out-of-school Learning: Formal, Non-Formal, and Informal Education". Journal of Science Education and Technology. 16 (2): 171–190.

[52] Curtis, Will; Ward, Stephen; Sharp, John; Hankin, Les (6 December 2013). "1. What is education?". Education Studies: An Issue Based Approach. Learning Matters. ISBN 978-1-4462-9693-6. Archived from the original on 12 May 2022,

[53] "Revision of the International Standard Classification of Education (ISCED)" (PDF). 2013-01-24. Archived from the original (PDF) on 2013-01-24,

[54] Salganik, Laura Hersh; Matheson, Nancy; Phelps, Richard P. (April 1997). Education Indicators: An International Perspective. DIANE Publishing. ISBN 978-0-7881-4267-3. Archived from the original on 6 May 2023,

[55]UNESCO (2012). "International Standard Classification of Education ISCED 2011" (PDF). uis.unesco.org. Archived (PDF) from the original on 6 January 2017,

[56]"College of Early Childhood Educators". College of Early Childhood Educators. Archived from the original on 8 May 2019,

[57]Larry Prochner, "A History of Early Education and Child Care in Canada, 1820–1966" in Early Childhood Care and Education in Canada (eds. Larry Prochner and Nina Howe), Vancouver: UBC Press, 2000,

[58]OECD (20 March 2015). ISCED 2011 Operational Manual Guidelines for Classifying National Education Programmes and Related Qualifications: Guidelines for Classifying National Education Programmes and Related Qualifications. OECD Publishing. ISBN 978-92-64-22836-8. Archived from the original on 13 May 2023,

[59]Roser, Max; Ortiz-Ospina, Esteban (17 July 2013). "Primary and Secondary Education". Our World in Data. Archived from the original on 18 May 2023,

[60]Gillard, Derek. "The History of Education in England – History". www.educationengland.org.uk. Retrieved 11 March 2017,

[61]Claire, Shewbridge; Marian, Hulshof; Deborah, Nusche; Louise, Stoll (7 December 2011). OECD Reviews of Evaluation and Assessment in Education: School Evaluation in the Flemish Community of Belgium 2011. OECD Publishing. p. 137. ISBN 978-92-64-11672-6. Archived from the original on 5 May 2023,

[62]Dufour, Barry; Will, Curtis, eds. (2011). Studying education: an introduction to the key disciplines in education studies. Maidenhead: Open University Press. ISBN 978-0335241071

[63]rieved 12 October 2018.^ Jump up to:a b c d #CommitToEducation. UNESCO. 2019. ISBN 978-92-3-100336-3. Archived from the original on 11 February 2020

[64] Coombs, Jerrold R. (December 1998). "Educational Ethics: Are we on the right track?". Educational Theory. 48 (4): 555–569. doi:10.1111/j.1741-5446.1998.00555.x

[65] Gunn, Andrew; Kapade, Priya (25 May 2018), The university grade inflation debate is going global, University World News, archived from the original on 26 May 2018,

[66]White Paper: Education and Training for the 21st century (1991)". Archived from the original on 2 October 2021,

[67] UNESCO (2012). "International Standard Classification of Education ISCED 2011" (PDF). uis.unesco.org. Archived (PDF) from the original on 6 January 2017 OP Cit

[68]Coates, Ken; Morrison, Bill (2016), Dream Factories: Why Universities Won't Solve the Youth Jobs Crisis, Toronto: Dundurn Books, p. 232, ISBN 9781459733770, archived from the original on 1 June 2016

[69] Warren, Sue, ed. (2009). An Introduction to Education Studies: The Student Guide to Themes and Contexts. Bloomsbury Academic. ISBN 978-0-8264-9920-2. Archived from the original on 16 April 2023,

[70]Bullard, Julie; Hitz, Randy (1 January 1997). "Early Childhood Education and Adult Education: Bridging the Cultures". Journal of Early Childhood Teacher Education. 18 (1): 15–22. doi:10.1080/10901029708549133,

[71] DeVitis, Joseph L.; Irwin-DeVitis, Linda (2010)."Preface". Adolescent Education: A Reader. Peter Lang. ISBN 978-1-4331-0504-3. Archived from the original on 15 May 2022,

[72]Mazurek, Kas; Winzer, Margret A. (1994). Comparative Studies in Special Education.Gallaudet University Press.p. xvii. ISBN 978-1-56368-027-4,

[73] Emaliana, Ive (30 November 2017). "Teacher-Centered or Student-Centered Learning Approach to Promote Learning?". JurnalSosialHumaniora. 10 (2): 59–70. doi:10.12962/j24433527,

[74]Jackson, Philip W. (2011a). "6. In Pursuit of Perfection". What Is Education?.University of Chicago Press. ISBN 978-0-226-38939-4. Archived from the original on 12 May 2022,

[75]Neufeld, Andrew (2015). "Successful Alternatives to Traditional School Structure: A Literature Review". BU Journal of Graduate Studies in Education. 7 (2): 85–93. Archived from the original on 7 May 2023,

[76]Aron, Laudan Y. (2006). An Overview of Alternative Education.Urban Institute. pp. 3–4. Archived from the original on 7 May 2023,

[77]Ali-Coleman, Khadijah; Fields-Smith, Cheryl (1 January 2022). Homeschooling Black Children in the U.S.: Theory, Practice, and Popular Culture. IAP. ISBN 978-1-64802-784-0. Archived from the original on 9 May 2023,

[78] National Education League (1875). "Compulsory Education". New England Journal of Education. 1 (5): 52. ISSN 2578-4145. JSTOR 44763565. Archived from the original on 21 February 2023,

[79] Humphreys, John; Quinn, Francis M. (11 November 2013). Health Care Education: The Challenge of the Market. Springer.p. 27. ISBN 978-1-4899-3232-7. Archived from the original on 13 May 2023,

[80]Rosenkranz, Karl; Brackett, Anna Callender (1872). The Science of Education: A Paraphrase of Dr. Karl Rosenkranz'sPaedagogikAls System. G.I. Jones. p. 95. Archived from the original on 30 July 2022,

[81]Harris, William T. (1881). "The Church, the State, and the School". The North American Review. 133 (298): 215–227. ISSN 0029-2397,

[82]Wagner, Michael; Deindl, Philipp; Schmölzer, Georg (1 March 2023). Future medical education in pediatrics and neonatology. Frontiers Media SA. p. 99. ISBN 978-2-8325-1317-0. Archived from the original on 9 May 2023,

83 Luger,George;Stubblefield,William(2004).ArtificialIntelligence:StructuresandStrategiesforComplexProblemSolving(5thed.).Benjamin/Cummings.ISBN978-0-8053-4780-7

84 Dreyfus,Hubert;Dreyfus,Stuart(1986).MindoverMachine:ThePowerofHumanIntuitionandExpertiseintheEraoftheComputer.Oxford,UK:Blackwell.ISBN978-0-02-908060-3

85 Poole,David;Mackworth,Alan;Goebel,Randy(1998).ComputationalIntelligence:ALogicalApproach.NewYork:OxfordUniversityPress.ISBN978-0-19-510270-3

86https://builtin.com/artificial-intelligence,accessed on 17June 2023

87 https://cloud.google.com/learn/what-is-artificial-intelligence, accessed on 17 June 2023

88 https://www.edureka.co/blog/top-machine-learning-tools/, accessed on 17 June 2023

89 https://www.sciencedirect.com/science/article/abs/pii/S138650561730446X, accessed on 17 June 2023

90 https://www.tandfonline.com/doi/10.1080/20479700.2018.1498220, accessed on 17 June 2023

91 https://businesspostbd.com/opinion-todays-paper/education-fourth-industrial-revolution-and-our-expectations-41467,

92https://eric.ed.gov/?id=EJ1222907,

93Ornellas, O., Falkner, K., &Stalbrandt, E. (2019).Enhancing graduates' employability skills through authentic learning approaches. Higher Education, Skills and Work-Based Learning, 9(1)

94Dua, D.; Graff, C. UCI Machine Learning Repository; University of California: Irvine, CA, USA, 2017

95Dao L.T. (2023), Abibliometric analysis of Research on Education 4.0 during the 2017–2021 period. Education and Information Technologies, 28(3)

[96]López-Pérez, M. V., Pérez-López, M. C., & Rodríguez-Ariza, L. (2011). Blended learning in higher education: Students' perceptions and their relation to outcomes. Computers & Education, 56(3)

[97]Maguire, M., & Delahunt, B. (2017).Doing a thematic analysis: A practical, step-by-step guide for learning and teaching scholars. AISHE-J, 8(3)

[98]Adams Becker, S., Cummins, M., Davis, A., Freeman, A., Hall Giesinger, C., &Ananthanarayanan, V. (2017). NMC horizon report: 2017 higher Education Edition. Austin, Texas: The New Media Consortium

[99]Zhang, X.D. A Matrix Algebra Approach to Artificial Intelligence; Springer: Berlin/Heidelberg, Germany, 202

[100]McBeath, M., Drysdale, M. T. B., & Bohn, N. (2018).Work-integrated learning and the importance of peer support and sense of belonging. Education + Training, 60(1), 39–53

[101]Geier R., Blumenfeld P. C., Marx R. W., Krajcik J. S., Fishman B., Soloway E., Clay-Chambers J. (2008). Standardized test outcomes for students engaged in inquiry-based science curricula in the context of urban reform. Journal of Research in Science Teaching, 45

[102]Masika, R., & Jones, J. (2016). Building student belonging and engagement: Insights into higher education students' experiences of participating and learning together. Teaching in Higher Education, 21(2)

[103]McGee, P., & Reis, A. (2012). Blended course design: A synthesis of best practices. Journal of Asynchronous Learning Networks, 16(4)

[104]University of Northampton - Institute of Learning and Teaching in Higher Education (2020). Defining Active Blended Learning

[105] Shin, H., Sok, S., Hyun, K. S., & Kim, M. J. (2014). Competency and an active learning program in undergraduate nursing education. Journal of Advanced Nursing (JAN), 71(3)

[106]Mikalayeva, L. (2016). Motivation, ownership, and the role of the instructor in active learning. International Studies Perspectives, 17(2)

[107] https://www.igi-global.com/chapter/active-blended-learning/275671,

[108] https://link.springer.com/article/10.1007/s11423-020-09868-0,

[109] https://www.tandfonline.com/doi/abs/10.1080/13614533.2015.1073162,

[110] file:///C:/Users/csd/Desktop/PBL_Article.pdf,

[111] https://free.openeclass.org/modules/document/file.php/ENG155/Projects%20online/PBL-Primer-www_techlearning_com.pdf,

[112]Cuevas P., Lee O., Hart J., Deaktor R. (2005). Improving science inquiry with elementary students of diverse backgrounds. Journal of Research in Science Teaching, 42

[113] http://www.journal.iberamia.org/index.php/intartif/article/view/580,

[114]Karacay, G. Talent development for Industry 4.0. In Industry 4.0: Managing the Digital Transformation; Springer: Berlin/Heidelberg, Germany, 2018

[115]Liang X. (2022), Recommendation Algorithm for Equilibrium of Teaching Resources in Physical Education Network Based on Trust Relationship. Journal of Internet Technology, 23(1)

[116] https://pubs.acs.org/doi/abs/10.1021/acs.jchemed.1c01139,

[117]Ramirez-Mendoza, R.A.; Morales-Menendez, R.; Iqbal, H.; Parra-Saldivar, R. Engineering Education 4.0: Proposal for a new Curricula. In Proceedings of the 2018 IEEE Global Engineering Education Conference (EDUCON), Santa Cruz de Tenerife, Spain, 17–20 April 2018

[118]https://ieeexplore.ieee.org/abstract/document/8629704,

[119]Xu, L.D.; Xu, E.L.; Li, L. Industry 4.0: State of the art and future trends. Int. J. Prod. Res. 2018

[120]Rodríguez-Abitia, G.; Bribiesca-Correa, G. Assessing Digital Transformation in Universities. Future Internet 2021

[121]Nabila Sghir, AminaAdadi, Mohammed Lahmer (2022), Recent advances in Predictive Learning Analytics: A decade systematic review (2012–2022). Education and Information Technologies

[122]https://thefinancialexpress.com.bd/views/why-technical-education-is-imperative-1580483097#

[123]https://www.cyberwise.org/post/from-social-media-to-smartphones-how-technology-affects-our-mental-health, accessed on 26 May 2023

[124] https://www.cyberwise.org/post/3-ways-social-media-can-influence-your-teen-s-confidence,

[125]Przybylski, Andrew K.; Murayama, Kou; DeHaan, Cody R.; Gladwell, Valerie (July 2013). "Motivational, emotional, and behavioral correlates of fear of missing out". Computers in Human Behavior. **29** (4): 1841–1848.

[126]https://www.cyberwise.org/post/social-media-safety-tips-for-students-protecting-personal-information-online, accessed on 27 May 2023

[127] COHEN, J., and THAPA, A. A review of School Climate. Review of Educational Research. [online]. 83, September 2013, pp. 357-385. [viewed 3February 2015

[128] COHEN, J. Measuring and improving school climate: Creating a climate forlearning. Independent School (A publication of the National Association ofIndependent Schools). 67, 1, 2007,,