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EVALUATION OF TECHNOLOGICAL BREAKTHROUGH IN GLOBAL EDUCATION AND FUTURE EMPLOYMENT OPPORTUNITY

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Abstract:

Technologies guide our younger generation to become digital and smart citizens. With the abundance of social media sites, most of our teenagers are already digital citizens. However, through the integration of technology into the classroom, students can acquire the skills necessary for responsible conduct in the digital realm and with their digital activities. Thus classroom transforms into a microcosm of the broader digital landscape, allowing students to sharpen up their abilities in communication, information retrieval, and interaction with fellow digital citizens.Technology offers numerous advantages to students and the new generation.The internet and digital tools allow students to explore various subjects, conduct research, and access educational materials that may not be available in traditional textbooks. There are many concrete examples of how students can use technology to enhance their learning. Digital libraries and online databases provide students with access to a wide range of academic and research materials, encompassing e-books, scholarly articles, journals, and multimedia resources that can augment their learning. Digital libraries or online databases allow students to access various academic and research materials, including e-books, scholarly articles, journals, and multimedia content that can support their learning. Educational platforms and learning management systems (LMS) provide a centralized location for teachers to share resources and for students to access information. These platforms can host digital textbooks, multimedia content, interactive modules, and assignments. Again, students who enroll in technical schools or institutes will be ornamented with specialized education that aimed at enlightening the specific skill set necessary for their future employment. This technical curriculum will also encompass substantial practical training prior to certification attainment. In contrast to their counterparts pursuing four-year degrees, trade schools do not require general education coursework and instead emphasize on the skills essential for a particular profession. On the other hand, in universities, students at timesface frustration and experience delays when they engage in general education courses such as history, political science, botany, foreign languages, or English. Therefore, it is an analytical study to evaluate the outcome of technological breakthrough in global education and future employment opportunities for young generation.

Key words: Digital, smart, AI, ML, AR, VR, Career choice

Introduction

Astechnical education is usually termed as the knowledge and skills which provide or assure sustainable income of human.These jobs provide individuals with a comfortable enough income to live in society.Now a day's many students are interested about their own companies or small scale businesses on the basis of technical education. In addition they have also managed to offer job opportunities to other educated hands as well. Technical education schemes offer excellent opportunities for education, employment, and internships, catering to newcomers or those simply looking to explore the field.It is the important tools to create small/medium entrepreneur.Technical education also fosters lifelong learning, a crucial aspect of staying updated with the latest technologies and industry advancements.[1]It helps any individuals to stay up to date and remain relevant in their careers, and also adapt to newly emergingtechnologies.Additionally, technical education can create a route for social mobility, enabling individuals to ascend the socioeconomic ladder and attain an improved standard of living.These days, artificial intelligence (AI) is significantly more advanced then virtual reality in the field of technological development. Elon Musk's comments about implanting chips in people's heads to produce superhuman have truly opened our eyes to the potential of AI technology. Youth and students can explore how AI and Machine Learning (ML) technologies are advancing Earth monitoring.[2]However,the main goal of AI is not the development of a new human generation. Rathertwo possible goals of AI are making useful robots and improving corporate procedures.[3]Demands for these kinds of employment aren't going to be reduced soon, because the advancement of AI's potential is practically endless and that continue.

Yet the commonquestions that arise in our mind like, will more human workers lose their jobs as AI advances and becomes more common? In contrast, the larger and richer economy made possible by these new technologies would certainly result in more jobs being generated in the long term, according to PwC's study on AI.[4] The exciting dominion of robotics and AI in healthcare[5] is a promising opportunityfor youth and students those who want to learn more about human-robot interaction. Next generation can discover the importance of Natural Language Processing in generative AI and comprehend its fundamental issues. Young people and students can learn more about this topicbyenrolling themselves in a few worthwhile courses, such as those on creative AI[6], medical robotics, natural language processing, etc.

Education is the only thing that cannot be taken away. It is the key to fulfilling human dreams. But, **1.6 billion** children have experienced school closures and their learning disrupted due to the COVID-19 pandemic 0.**72 million** estimated primary school children will experience learning poverty which means that those children will be unable to read and understand a simple text by the age of 10, as learning losses continue to grow 0.**24 million**children are at risk of dropping out of school forever 0.**10 million** more girls will be at risk of becoming child brides as a result of the pandemic over the next decade. A UN policy brief on the impact of COVID-19 on women says, 'Evidence from past epidemics shows that adolescent girls are at particular risk of drop out and not returning to school even after the crisis is over.' In this context,online teaching and learning is the best solution. Alternately we need todesign new methods to facilitate distance learning, including radio and TV education broadcasting in areas without internet.[7]Computer technology is the best possible technology. There is virtually no area of life that has not somehow been touched by advances of computer science. Computer and communications technology have changed the way human beings live. In the past, if someone wished to learn something, they went to a school and studied directly under an instructor. These days, it is possible to take courses, and even earn degrees without ever physical stepping in a school building. In addition, non-degree learning, in the forms of continuing education, exam prep, or professional education, has become more accessible than ever through new e-Learning and m-Learning technologies.

Technical education and skills are vital for the development of human resources in any nation. This type of education generates a proficient workforce, boosts productivity, and contributes to the overall improvement in the quality of life for the population.Developinghuman resources in to purposeful, qualified and capable resources in this modern era of age of science and technology is obligatory. In fact, there is a close relationship between the technical or vocational education system and socio-economic development of a nation. Insufficient number of young generation and students of poor, LDC and developing countries receive technical and vocational education. This is very low and alarming compared to many developed and strong economic nations. The mindset of parents and students in those nations needs to shift towards prioritizing technical education over general education.Because millions and billions of general educated people remain unemployed around the world. Those jobless people are a massive burden for the nation and society. Unemployed youths often feel distressed and may, at times, become involved in criminal activities and engage in drug abuse.[8] The demand for a skilled workforce will see a significant rise worldwide, including in Middle Eastern countries where the majority of the current workforce comprises unskilled or semi-skilled laborers from poorer, least developed, and developing nations.It's an analytical research based on both primary and secondary information to assess the benefits and limitations of technology on education including necessity of technical education. It also covers a diagnostic case study to depict the necessities of technical education for new generation.

Modern digital and smart skills are enhancing our daily lifestyle and career prospects. Fundamental digital skills serve as a foundation for acquiring a variety of new abilities. They boost our confidence in using technology for work, education, and daily life, which is increasingly important in many job roles, including those that don't require extensive qualifications or experience. As example, if anybody works in a warehouse or a shop he/she may keep digital records of stock. We also need digital skills every day for shopping, banking, and keeping in touch with family and friends. Today, few essential digital skills of daily life for every individual may be: to use devices like a computer, tablet or mobile phone for simple, personal and work tasks; to find and use information on the internet; to understand how to be safe and responsible online; to communicate socially and professionally using email; messaging and social media, shop, bank, access services or apply for a job online; etc. Internet and technical knowledge can boost up our confidence.Using internet and online communication may help us in many ways like: maintaining connections with family and friends, simplify daily tasks, enhance employment prospects, broaden access to information, guidance and services, and facilitate opportunities for learning, training and career advancement opportunities etc.

As technology advances, most jobs will be required some level of digital and smart skill. Nowadays technology is creating opportunity for lots of exciting new jobs. These jobs will require employees who possess the confidence and skills to utilize the internet on various devices such as mobile phones, tablets, laptops or PCs, communicate effectively through email and social media, and work remotely, including the use of online tools like Zoom, Skype, Teams, and FaceTime. Additionally, they should be able to create online accounts for information access, conduct reliable online searches, and practice safe and lawful online behavior etc.**It is a diagnostic study to evaluate the technological breakthrough in global education and depict the future employment opportunity for young generation. There will be detail discussion on importance of technical education, requirement of technology in education and suggestion for future job pattern and new professions.**

Importance of Technical Education for Human Resource Development

Technical education is becoming increasingly important in today's economy as technology continues to advance and industries become more complex. Technical education provides individuals with the skills and knowledge needed to work in specific fields and industries, which can lead to immediate employment opportunities and higher earning potential. It also plays a vital role in driving economic growth and development, bridging the skills gap in the workforce, and empowering individuals from disadvantaged backgrounds. One of the most important aspects of technical education is that it focuses on providing students with the hands-on skills and knowledge needed to perform specific tasks or functions in a particular field of industry. These skills and knowledge are in high demand and essential for individuals looking to secure a successful career. With the rapid advancement of technology, it is important that individuals are able to adapt and update their skills to remain competitive in their working fields. Technical education programs are constantly updated to include the latest technologies and industry developments, which allows individuals to stay current and relevant in their careers.[9] It can help to bridge the skills gap in the workforce. As technology continues to evolve, new skills are required to meet the demands of different fields and industries. Technical education provides individuals with the necessary skills and knowledge to meet these demands, which can lead to increased productivity and economic growth. The ability of technical education is to empower individuals from disadvantaged backgrounds. Technical education can provide individuals from low-income families or underprivileged communities with the skills and knowledge needed to secure better-paying jobs and improve their standard of living. It is a powerful tool for personal and professional development and it allows individuals to grow and improve their skills over time. Such education can also play a vital role in driving economic growth and development. Technically skilled individuals can contribute to the growth of industries and companies, leading to the creation of jobs and increased productivity. This can help to revitalize communities and create a more sustainable and self-sufficient local economy. Moreover, it can also provide a job seeker with the skills and knowledge needed to start their own businesses, which can lead to economic development and job creation. Entrepreneurial opportunities can help to create jobs and promote economic growth, while also providing a sense of ownership and control over one's own life.

Again, technical education is knowledge about finer skills in life, which give an added advantage to students besides mainstream education. Skills like audio editing, video editing, voice modulation, recording coddling small programming, etc are interesting sets of skills that require a finer and more nuanced understanding.[10] These skills are usually found in students who are artistically inclined or have a softer side to their academic persona, allowing them to experiment and explore rather than follow the rules and stay within the lines. Students are breaking free of traditional career options like that of a general school/college teacher, manager, accountant, banker, business executive, doctor, lawyer, and instead of trying to make a break for jobs that require far more technical knowledge in different trade like electrician, mechanics, welder, fridge/AC mechanics, mobile/TV mechanics, digital marketing, e-banker, mason-man, digital sound or video editing, etc.[11] About one-third of students in bachelor's degree programs change their college major at least once, with 1 out of every 10 student changing majors multiple times. A key reason for this is a lack of hands-on career exploration opportunities during high school. Without career-focused education, students don't have a clear picture of what a future job might actually be like.[12] Making choices with limited information increases the likelihood of needing to do course-corrections down the line. Career and technical education, however, is built around the idea of giving students those hands-on opportunities with the end goal of getting a job firmly in sight. They get to learn about the industry associated with that course, learn the basics and try out the work for themselves. Almost 85% of families with students in Career and technical education (CTE) programs are satisfied with their school's career exploration experience, compared to only 54% of prospective families being satisfied.[13] Technical education encourages self-learning and independence.

Technical education offers employment opportunities that are skill-based and distinction. It encompasses a wide range of study levels and offers numerous degrees and certificates as well. There are diploma levels, graduate degree levels, postgraduate degree levels, research levels, and even special industrial training institutes for technical education in the world. It offers specialized courses in different events in various technical fields. This is to adjust to the different sides of technological development and the following economic progress. The standard of technical education is maintained around the world with the help of international level councils and universities. They generally deal with forming standards and norms and keeping them consistent. Today, young student and children know their talents and strengths by that point in time. Many students/children of technical education opt for jobs. All major industries in the modern world rely heavily on some form of data consumption or smart technology. This data could be about the clients, products, services or organizations. Being good at understanding multiple programs is a set of strong skills that won't go wrong at all. Many jobs require written communication. These often require people to explain things that are hard to understand.[14] Good careers can be made out of technical education. An individual can also earn a respectable amount of money and status from a career in technical work or skill. A large chunk of this can be attributed to the modern world which is gaga over technology and the extremely rapid advancements that are made to it.[15] Normally, technical schools/institutes have a curriculum tailored to a particular job assignment, while conventional universities involve more extended coursework before acquiring a certain profession's skills. Technical schools/institutes are known to have short courses with programs that can be finished within the year. Since there is less time to stay in college, vocational graduates can immediately join the workforce. In traditional colleges/universities where their programs can last for two or more years, their cost of attendance is undoubtedly expensive, and may even have huge loans by the time they graduate.[16]

Nowadays, students who choose a trade school are almost certain of getting jobs they wish to pursue. These learners are determined to develop their skills and knowledge in particular areas. One of the main reasons students prefer to enroll in a trade school is its financial benefits. It is a lot cheaper than earning a degree from a university. Students can make huge savings since they have a shorter time in college and pay less for textbooks and miscellaneous expenses. Technical and vocational institutions concentrate more on job-focused, hands-on education in a specific trade or skill. Students can maximize the high-tech facilities in the classroom, which usually are close enough to their future job site. The curriculum of technical schools develops the abilities utilized in the job site and not the lecture room. The objective of trade schoolis plain and simple–teach skills and provide the experience needed to succeed in the student's chosen job after graduation.[17] As students go through their technical education in an actual environment, they become involved in resources and concepts. Such methods intensively prepare them for possible scenarios and problems they will encounter while working. Also, their hands-on training will teach them to work with their tools in an actual simulated environment. Students will learn practical safety from this administered but realistic learning environment.

As we know that, throughout the last century, formal education witnessed a significant expansion in both its importance and scope with more and more students opting for higher education in the fields of medicine, engineering and mathematics. Manystudentsoptedforbachelors and master's degrees, and acquire high paying white-collar jobs. But now, as the world sentiment moves towards equity, more and more students are inclined towards technical education that imparts knowledge of practical and important jobs while promoting independent workers and entrepreneurs. Many international schools are now offering technical skills right from the primary level to encourage students to hone their skills and develop inherent talents. Now, students of an international school in New York, Moscow, Boston, Sydney, London, Delhi, Beijing, Abu Dhabi, Singapore, Malaysia, Hong Kong, Thailand and other big cities around the world have to make decisions about their careers by the end of their final year of high school (HSC or A level). This seems lke a very young age but usually, children know their talents and strengths by that point in time interestingly, Many students of technical education opt for jobs while others opt to attend international technical colleges like Caltech, MIT, etc. Local technical school degree courses or diploma courses are not as expensive as regular four-year courses at colleges. This is mainly due to the shorter length of the technical courses. They also give students the added benefit of joining a workforce directly in their stream of choice. So, such education benefits the youth mass students. High schools focusing on technical education often have more career advice to offer to their students than schools that focus on their regular subjects in academics. This generally tends to include a larger amount of career advice sessions, skill development workshops, and their teachers being able to offer more advice to the students.

Many high-end technical institutions have connections with higher education institutions and companies that perpetually require fresh faces working in their technical divisions. It is also worth noting that a nation's development relies on the efficient utilization of its human and physical resources, which in turn hinges on the training and skill development of its workforce. Take, for instance, a country like Bangladesh, which, despite being the world's eighth most populous nation, faces a shortage of significant technical manpower relative to its population. Actually Technical education is all about skills developments. Skilled workers definitely increase productivity.[18]

Technical education and technological skills are crucial components in the development of a nation's human resources. This form of education contributes to the creation of a skilled workforce, enhances productivity, and contributes to an overall improvement in the quality century at the age of science and technology is indispensable. Actually, there is a close relationship between the technical or vocational education system and socio-economic development of a nation. Country like Bangladesh, an estimated 30% of students receive technical vocational education, which is very low compared to many developed and even some developing nations. The mind-set of the parents and students need to be changed to give priority to technical instead of general education. There are millions of educated unemployed youths in the country. Those jobless people are a massive burden on the nation and society. Those unemployed youths remain upset and sometime get engaged in criminal activities and involve in drug abuse. The demand for skilled workforce will dramatically increase all over the world including Middle Eastern countries where currently the majority Bangladeshi workers are unskilled.[19]

Technical education not only empowers individuals with essential skills and knowledge but also contributes significantly to the advancement of both society and industry.Japan's remarkable journey of industrialization can be traced back to its strong commitment to education, especially the training of technical professionals, and the concurrent development of technical skills and knowledge. Technical education not only improves analytical, functional abilities but also enhances efficiency, skills, knowledge and profitability which are very much essential for economic development of any country. Now we live in a century of technologies, where we find the application of technologies in every aspects of life. A technology makes our daily life so easy that without it we feel discomfort. In Bangladesh many people get higher education but they are failing to getting job anywhere because of lack of employable skills and technical know-how. The technical education trained a person in a particular field so that he can start his/her own business and makes him/her self-employed. Technical education helps to reduce unemployment through skill manpower and helps in economic development of any country. The progress and economic development of any country depends upon the industrialization. The technical education produces a person’s with necessary skills to run and establish the industries. The countries can save lots of its foreign exchange if she has expertise in technical know-how and required skill. For the development of a country, it must offer diversified courses in order to balance distribution of manpower for all professional so that large population of country can contribute to economic growth through different profession. The main objectives of technical education are usually included; to provide education for employment and occupation of work force, to help in nation's sustainable development, to help people to acquire skills for earnings, to promote small business and entrepreneurship, to provide necessary scientific and useful knowledge to the persons for improvement and solutions of an environmental problems, to provide and trained a people who can understand advance or new technologies, and to enhance economic growth of nation through trained human resources.[20]

Technical education fosters human resource development and imparts skills that empower individuals to initiate, advance, and establish industries within the nation. It also promotes competition among manufacturer of goods and services which results in better technologies. Better technologies results in reduction in cost of production and increases profit for entrepreneur. So that entrepreneur can invest this money in establishment of new company or expanding existing plant or business. As a result, they generate more employment and produce more goods and services which again increase profit of entrepreneur. Investing such profit again will increase employment as well as production of goods and services. This cycle repeat again and again. Thus a person helps to improve their economic condition and hence helps in economic growth of country. Again Technical education also helps in reduction of poverty and economic inequality in the society. The crime rate, riots, violence, robbery, increases in the society with economic inequality. Every country should ensure justice in society. The persons with high skills earn more while persons with little or no skill earn less. Technical education imparts skills to the persons which in turn help in reduction in economic inequality among people. Therefore to reduce poverty and economic inequality government need to pay more attention on technical education.

Technical education makes persons experts in particular field and so that they can start their own business or become self-employed. Becoming self-reliant person's makes society self-reliant and entrepreneur and finally country become self-reliant.

Technical education not only enhances productivity by imparting skills, training, and improved technologies but also results in reduced resource wastage, the efficient utilization of the nation's natural resources, and ultimately higher profits. Consequently, it provides money into society, fostering both societal and national growth and prosperity. Moreover, technical education plays a crucial role in conserving a country's foreign exchange reserves by optimizing the utilization of its natural resources and harnessing its human resources effectively and efficiently.Technical education also helps in reduction of dependent population. It also helps self-employment of mass people. It Increase working population in the family, society and whole nation. Finally it results in uplifting in living standards of people by more earning and hence leads to economic development of a nation. Technical education plays important role in social development of nation through required abilities, capabilities, attitude, knowledge, and way of thinking know-how of citizens of a country. Lack of technical education means unemployment and which, leads to frustration ultimate results is increasing crime rate or drug addiction in the society, and hinders social developments of the society. Actually, technical education makes persons employable or self-reliant by imparting skill to the persons. Today labour market is continuously changing.Sometimes the employed persons are thrown out of market because of skill demandpattern is continuously changing. To cop up with these changes every person continuously required to update his knowledge and know how through new skill acquirements and training. So, technical education is very useful to maintain healthy environment in the society. Sustainable development is the development that can continue for a several generation and useful for a very long period. Sustainable development means satisfaction of needs and meet of people, better quality of life without compromising the quality of life with batter future. There are three main aspects of sustainable developments. Such as: Social sustainable development means it must maintain adequate health, education and other services. It must maintain equality of gender, equal opportunity and distribution, participation and accountability in politics. An environmentally sustainable system must maintain bio-diversity, avoids over exploitation of conventional resources, maintain and protect environment, maintain stability of natural resources and atmosphere. Finally, an economically sustainable system must produce goods and services continuously, maintain external and government debts to manageable extents, and avoid things that disturb balance in sector which can leads to damage in agricultural and industrial production.

Technical education equips individuals with the skills and knowledge needed to work in specific fields and industries, many of which are in high demand. Technical education helps individuals to stay updated with the latest technology and industry developments, allowing them to remain competitive in their fields. Technically skilled individuals can contribute to the growth of industries and companies, leading to the creation of jobs and increased productivity. Technical education can provide individuals from low-income families or underprivileged communities with the skills and knowledge needed to secure better-paying jobs and improve their standard of living.[21] Technical education programs should be tailored to the specific needs of disadvantaged communities, including offering programs that are relevant to the industries that are prevalent in the community and providing training and support for individuals who may lack basic education or have limited English proficiency. In addition to providing technical education, it is also important to focus on the overall development of disadvantaged communities by providing access to healthcare, housing, and other forms of support, which can help to create a stable and supportive environment in which individuals can thrive.[22]In fact, technical education can also help to mitigate the effects of automation by providing individuals with the new skills and knowledge that will be in high demand in the future. As technology continues to advance and automate many tasks, it is becoming increasingly important for individuals to have a diverse set of skills that are not limited to a specific field or industry. Technical education programs that focus on providing skills are transferable across different industries and can help individuals to be more resilient to change job in the job market.

Requirement of Incorporating Technology in Education

Technology can enable virtual guest speaker sessions, enabling students to engage with experts and professionals from various fields via video conferencing, broadening their access to information and real-world insights. Beyond the educational setting, students incorporate technology into every facet of their daily lives. Inside the classroom, technology has the potential to infuse learning with greater enjoyment and excitement.Hereis some exciting ways to incorporate technology into classroom activities.

Technology helps students to utilize educational game websites or apps that offer interactive quizzes, puzzles, and challenges related to the subject matter in 21st century. This engages students in a fun and competitive environment while reinforcing their learning.[23] Technology can prepare students for the modern workplace. To thrive in the 21st century workplace, students need more than a working knowledge of current technological tools. Students must gain exposure to the tools and skills they will likely encounter in the modern workplace. By integrating these technologies into the regular curriculum and ongoing activities, institutions ensure that their students are ready to become efficient workforce in more than oneways.[24] Digital literacy skills are in high demand in the workplace.[25]By integrating technology in the classroom, students learn to navigate digital platforms, use productivity tools, collaborate online, and effectively communicate using digital mediums. Technology enables students to access, organize, and analyze large amounts of data. Employees often need to gather data and conduct research to make informed decisions. Classroom technology familiarizes students with information management tools and techniques, preparing them for these tasks. Technology integration exposes students to various digital tools and platforms. This experience helps students become adaptable and flexible in using different technologies, as workplaces often require employees to learn and adapt to new technologies and software in 21st century.

Technology**encourages collaboration, communication, creativity and Innovation**. Students can use technology to create multimedia presentations, design projects, develop prototypes, and express their ideas innovatively. These skills are having high demand in many industries where creative problem-solving and innovative thinking are essential. Many educational tools offer a variety of functionalities that promote collaboration. For example, video conferencing tools such as Zoom, Microsoft Teams, Slack, and Skype allow students to hold virtual meetings with classmates from anywhere in the world. With free online storage solutions like Google Drive, students can easily share and edit projects with each other, helping to foster better overall collaboration in both the academic sphere and the world of work.[26] This mirrors the teamwork and communication skills required in any workplace in 21st century. Technology allows g**lobal awareness and cultural exchange.**Technology allows students to connect with peers and experts from around the world. Through video conferencing, online collaborations, and virtual exchange programs, students can gain global awareness, learn about different cultures, and develop a broader perspective on various issues.[27]While it's true that no two students learn in identical ways, educators can effectively accommodate the diversity in learning styles and experiences by utilizing the appropriate tools. A Student Insight Solution platform like Explorance Blue can help identify student needs based on real-time feedback in 21st century. Explorance Blue supports student learning by allowing instructors to connect and engage with every student, no matter where they are or what they do or what are their culture/believe or what are their challenges.[28]

Technology help student to use online polling tools or survey platforms to gather student feedback, conduct class surveys, or facilitate class discussions.[29] This encourages active participation and allows students to express their thoughts. It also helps students to introduce coding and programming activities by using educational coding platforms or apps.[30] Students can learn the basics of coding through game-based tutorials and then apply their skills to create simple programs or animations in 21stcentury.Open Educational Resources (OER) refers to freely available educational materials accessed online in 21st century. Instructors can utilize OER platforms to find textbooks, lesson plans, videos, and other resources that align with the curriculum and provide students with additional information sources. As we know that, for any research project student need to visit in the library so that they could pull few books to read, and have access to an encyclopedia, and even microfilm to view so that student had enough resources to finish their assignment. Technology connects the classroom experience to the real world.Technology allows educators to remove the physical barriers of the classroom, offering students a way to connect the curriculum with the real world and those areas of academic focus that can genuinely enrich the student experience.[31] For example, a geology professor leads her students on a virtual tour of Grand Canyon National Park, while a history teacher guides his students through the rich history and corridors of the White House.

Technology **helps students to become smart citizen.** Effective instructors harness the potential of technology to enhance their instruction and engage students more efficiently. However, it's essential to ensure that students are guided on effectively searching for information, critically evaluating sources, and using technology responsibly. Instructors are crucial in helping students to navigate the digital landscape and develop information literacy skills.[32]**It helps student to be oriented and learn smart technology like Artificial Intelligent (AI), Machine Learning (ML), Big Data, Reality (AR), Virtual Reality (VR),** etc. Now student can explore AI, ML, AR and VR technologies to create immersive and interactive learning experiences.

Students can use AR/VR tools to explore historical sites, dissect virtual organisms, or visualize complex concepts in a three-dimensional space. Students can use AI/ML tools or apps to learn and gather knowledge by sitting from any corner of the world in 21st century.

Teaching is a complex job that includes a number of rote but time consuming tasks. Tools that facilitate the memorization of basic facts free up teachers to help students who need personalized interventions. Every extra minute spent teaching makes a difference over the course of the school year.[33] Recent advances in assessment technology have the potential to help teachers and students. Without feedback on performance, teachers can't know if students have grasped the lesson and policymakers won't know whether their reforms work. Assessment technology has advanced very little if at all since the invention of the optical scan answer sheet a half-century ago. New assessment technologies can help cut the costs of testing while others allow for reliable assessment in real time. Advances in testing can assess students in a low stakes environment. In recent years, it has been suggested that social robots have potential as tutors and educators for both children and adults. While robots have been shown to be effective in teaching knowledge and skill-based topics, we wish to explore how social robots can be used to tutor a second language to young children. As language learning relies on situated, grounded and social learning, in which interaction and repeated practice are central, social robots hold promises as educational tools for supporting second language learning (L2).[34] Nowadays, a huge problem that teachers face is cheating on exams, and not having an insight into student knowledge of a lesson. This is also the biggest problem with online tests, because teachers often don't know if students have access to another device while taking the test. This problem could have long-term consequences, primarily due to the inability of educational institutions to guarantee that the student actually possesses the knowledge needed for higher levels of education, or to do their job. On the other hand, with the introduction of technology in the curriculum, the role of the teacher as an authority figure and mediator is slowly fading. It should be noted that automation in education and the introduction of certain applications has led to a decrease in the number of teachers in modern schools.

However, the remaining teachers have even more responsibilities than before, and their income is not increasing in proportion with their responsibilities, so many have had to give up their job. Again, describing the advantages of technology in education, children have the opportunity to access a wide spectrum of information that makes lessons more engaging, but the question is, how long does it take to prepare and integrate that content into a meaningful whole? So, increased responsibilities mostly refer to the preparations for class, the importance and complication of which are underestimated by many, primarily because it is not visible to parents. The problem that needs to be addressed is that educational institutions should stop approaching teachers as manual laborers, and the first step toward that goal is increasing their salary and treating them with the respect they deserve, otherwise, we will have unmotivated teachers who don't care about transferring knowledge to their students, and the consequence is a generation of individuals incapable of becoming useful members of society. Different people have different opinions on the introduction of these changes in the education system, especially if it's done so suddenly and in such a short time. However, one should be realistic, because the advantages still far outweigh the disadvantages. So, a continuous insistence on disadvantages should not be seen as a desire to return to traditional education, but as a reason for caution and the possibility to better see the holes in the technologies and methods used in education. It is up to educational institutions and teachers to analyze the disadvantages in the next revision, and improve the quality of teaching both in their digital and physical classrooms.

The presence of informational resources on the internet has significantly increased the accessibility of early education compared to previous generations. With the abundance of online resources available, students can conduct research tasks without the need to physically visit a traditional library.[35] The internet is a resource that makes books and high-quality information more accessible. It's not just the act of making and doing but also the sense of independence and power.[36] They have the ability to communicate in ways that words cannot. When children can answer their questions, they are more likely to conduct more research and pursue new lines of reasoning. It helps kids develop independence, academic confidence, and interest in new areas.[37]Technology develops skill to use modern technology to study for children and student and they use this skill frequently in their daily lives. In 21st century they should learn it at an early age to deal with challenges in education and other areas throughout their lives.[38] It teaches them how to avoid conflicts in school and in their daily lives.[39] It can strengthen their empathy skills and develop other positive attributes.[40]Social media can boost learners' confidence and prepare them for future social marketing opportunities. Kids and children can do many essential things online through social networking platforms. They can stay in touch with friends and family, make new acquaintances, share images, and exchange ideas.[41]

One significant benefit of technology in education is the vast amount of information readily available to students with just a few clicks. This allows them to swiftly access information from a wide array of sources, such as websites, Google, tutorial sites, YouTube, videos, eBooks, PDFs, and more, making it possible for students to gather valuable information for assignments, projects, or homework without the need to visit libraries and search through piles of books.[42] This is the first ever effect of technology on education that students experience with the advent of the World Wide Web (www). Students can get unlimited information and data in just a few clicks on their laptops, tablets, or smart-phones. This enables any student to prepare a lesson or write a paper without anyone's help. Thus, technology enriches students' knowledge base and makes them a self-sufficient learner and smart citizen of time.[43] Students can access a huge variety of learning materials on the internet. They include scientific articles, journals, research papers, educational videos, tutorials/guidebooks, informational websites, online databases, and blogs of educators/authors.[44] A great benefit of the internet for students is the opportunity for distance learning. Online classes became a reality with the power of the internet. Students can learn in the same effective way through a virtual screen or chat room. They can share documents, important resource links, and media files during the online session with others students.[45]

Today's students have never known a world without advanced technology. They didn't need to wait 45 minutes for a new website to load over a slow dial-up modem. Teachers who embrace technology bring a level of credibility to their knowledge for this generation that allows for educational applications in numerous subjects.[46] Even just a single technological tool can make a major impact on the modern student. It wasn't that long ago when students were forced to drag heavy textbooks to class with them every day. Now most of those textbooks are available online and can be accessed through a computer. Organizational platforms complement the e-books and other tools that are available through technology so that the learning process is streamlined and effective.[47] For teachers, technology in the classroom is important as well. There are engagement tools available today that can begin to automate the grading process. Software platforms make it easier to track the performance of individual students, identifying learning gaps with greater speed. By automating more of the tedious work that teachers do every day, there is more time for actual teaching and less time spent at home reviewing work.[48] When students of any age are in a learning environment that is based on a lecture format, the amount of information they retain can be as low as 5%. Students who learn in a collaborative environment can retain up to 80% of the information they study.[49] And, if interactive practice is included in the classroom environment, information retention levels can reach 95% for some students.

Technology provides various platforms and apps that allow teachers to combine and use all information about their students that may be useful. It can also help teachers' group together with students who may be benefited more from learning together than learning apart.[50] Technology allows students to work at a pace that is comfortable for them. Curriculum demands or programs can be adjusted easier to meet individualized needs to enhance the learning process.[51] Students have more control over the learning process when technology is used in the classroom. It is a chance for students to embrace their natural curiosity to see what their interests, talents, and skills happen to be. Technology also provides an opportunity for students to try different things that may not have been possible in the past. That allows them to discover, on their own, which strategies work best to help them effectively learn new materials.[52] Now, students learn how to research new subjects and how to properly source the data they find with the help of technology. These are all vital skills for the modern workplace and today's students have the opportunity to master them before they even start looking for a job.[53]Students should be able to look to the future when they enter into their classroom every day. Stepping back into the past might provide some joy in the nostalgia of it, but it will not prepare students for the challenges of a society that is rooted in technology. We can certainly learn from the lessons of the past, but we must also be ready for what the future may hold when its veil is lifted.[54]

One of the finest outcomes of technology integration in education is the homework planner software or task manager used by teachers. They are digital replacements for the school diary or paper planner. The teachers can feed in all assignments and projects for the day, week, or month. They can schedule them deadline-wise. They get real-time updates as the students start a task, pause it, and complete it.[55] They can also track the individual performance, achievements, and pitfalls of the students. It helps them to decide their syllabi accordingly in the next learning session.[56]Communication skills are crucial for students to do well in academics and the professional field in the future. It is difficult to make young children sit in one place and learn. They easily get distracted. Similarly, elder students find it tough to keep up their focus and complete large papers or assignments. All in all, education is not a pleasant experience for all students.

But, with technology, it is now an enjoyable experience for all.[57] The use of tablets, laptops, VR/AR devices, and touch screen boards makes classes exciting for students. Teachers could easily keep up the attention of kids.[58] Learners in higher grades develop better abilities to communicate with various technological tools and virtual courses. We know that, many students are reluctant to speak with the teachers in class or in front of others.[59] They can interact freely through chat, audio, or video call, during their independent screen time.[60] It will help student to use their additional knowledge to prepare academic lessons and surpass the scores of others. It also helps aspiring young talents to garner professional skills that will help them in the future to grow.[61]

The different uses of technology, such as audio-visual presentations, virtual classrooms, wide-screen projectors, and digital planners help teachers to improve their delivery of instructions. This consequently enhanced the understanding and comprehension level of the students.[62] Besides, technologies increase the productivity of teachers. The digital tools they use not only increase the engagement of students but also provide them with more learning opportunities.[63] Actually, educational technology helps teachers to increase their productivity, which benefitted both the students and schools.[64] New tools like digital task planners, virtual classrooms, and eLearning apps are gaining prominence in the market. If the students are aware of the trends of EdTech, they can use these tools to gain their maximum advantages and make progress academically.[65] It improves the physical and mental well-being of students. Various digital tools eased their tedious learning courses and made them interesting. In many ways, EdTech methods improve their cognitive skills.[66] Virtual learning sessions and the integration of AR are two prime contributors. They enhance the capabilities of their brain to read, interpret, learn, remember, think, and use logic. All these technology immensely impact their academic learning and performance in the long run.[67] As they can score good grades/marks due to the use of educational technology, it gives them confidence and a positive feeling. This boosts their mental health and helps them to concentrate better on their studies.[68]

One of the assured benefits of using technology in education is improved collaboration between students and teachers. Online learning system not just enables the teachers to interact with students during lessons. It also allows the students to engage in one-to-one interactions with the teachers.[69] By staying at the home, they can upload their projects or homework, which teachers can access and give necessary recommendations.[70] In the case of collaborative activities like group projects, compare the situation of a classroom with a virtual classroom setting. When the teacher assigns taskstofew groups of students, chaos or confusion is inevitable as some students will be loud, some will ask questions, some will be shy to ask, and some could not get the opportunity to be heard.[71] Contrary to this, such a situation does not happen in an online setting. Every student is connected in the virtual classroom. The teacher responds and resolves queries of each of them individually, on independent screens.[72] In 21st century, online learning also fostered interactions between students outside the school. They can share ideas and resources for difficult projects and support each other.

Now a day many schools and educators are replacing paper books with eReaders in the wake of rapid environmental damage.[73] The use of technology in education made students of this generation to understand the significance of environmental sustainability. Electronic and digital mediums of learning are not only saving the environment but also providing convenience to teachers and students.[74] It is helping them save up costs on different learning resources like books, notebooks, boards, paper planners, educational outings, etc. The benefits of using technology in learning today will prepare children and students for the future, which is going to be fully digitized. It also helps them to set priorities regarding the use of technology.[75] This will help them draw a line and use technology wisely. When students become familiar with different technologies from an early age, they can easily land a job in the desired company.[76] Their parents do not have to engage them anywhere for vocational training and to make them competent at using computers, software programs, and online communication tools. The competitive classroom environment and usual teaching methods are not suitable for special child or weak student as they could not catch up with the lessons. They need special attention to perform better academically.[77] There are digital apps that allow teachers to set individualized learning programs and schedules for them. It also assists teachers to teach students with ADHD (Attention-deficit/hyperactivity disorder) or such issues, independently.[78]

Now, with the digital transformation and the increasing influence of educational technology, teachers are implementing profound alterations in their instruction, assessments, and even the physical layout of their classrooms at a considerably accelerated pace, surpassing initial expectations.[79] These current trends are making headlines in education because of the ways in which they are impacting student learning.[80] Again, modern classrooms are outfitted all over the country with iPads and laptops for each student.[81]

Google Chromebooks account for over half of the devices in US classrooms. In 2014, more than three million Chromebooks were used in educational institutions.[82] And that number is growing continuously. Virtual reality has the capability of bringing the outside world into the classroom and vice versa.[83] Apps such as Unimersiv can transport students to ancient Greece, while Cospaces allows students to share their virtual creations with the world.[84] Wilkes University online adjunct professor and independent educational technologist Kathy Schrock concludes virtual reality has the potential to increase visual literacy, technology literacy, and attention to audience. The idea of combining **Augmented Reality, Virtual Reality, Mixed Reality** (AR/VR/MR) is highly anticipated. Take, for example, the privately owned company Magic Leap.[85] Even though it has yet to really sell anything, Magic Leap is already valued at four and a half billion dollars! This speaks to the projected endless possibilities of technology transforming classrooms.[86]

Classrooms in the 21st century feature SMARTboards in lieu of traditional chalkboards and clusters of SMARTdesks replacing individual seating arrangements.[87] Students are going on virtual field trips instead of merely reading from a text; they are creating media instead of just looking at it in 21st century. Colleges and universities are creating more informal campus learning spaces because they understand the importance of creating and collaborating 24/7, not just when class is in session. It's nothing new but IoT has to be the first choice in our list because of the advancements in technology. In the past, the discussion surrounding IoT primarily centered on energy-efficient infrastructure for schools and colleges. However, with the invaluable data it provides, teachers can now gain deeper insights into the effectiveness of their teaching methods, the difficulty level of assignments, and even whether students are working late into the night to complete their tasks.[88] This is a valuable insight as it would enhance future digital transformation trends in education. Also, it can help students gain momentum for homework time at home.[89] The use of AI in higher education has already proven useful. Australia's Deaken University used IBM Watson to create a virtual student advisory service that was available 24-hours a day, seven days a week.[90] Use for AI includes chatbots, Siri, personalizing learning, evaluating the quality of curriculum and content, and facilitating one-on-one tutoring with the use of Intelligent Tutoring Systems. Actually, technology doesn't aim to replace teachers, only to complement them.[91] Adaptive learning technology collects information about student behavior as they're answering questions, and then subsequently uses that information to provide instant feedback in order to adjust the learning experience accordingly.[92] In adaptive learning where students make critical decisions such as the task to be completed in the timeframe and the path chosen.[93] Adaptive learning involves collecting data about students' behavior as they counter and overcome problems and later provide feedback.[94]

The integration of technology into education not only offers many advantages to eLearning, but also adds a twist to the eLearning definition.[95]Teaching is a multifaceted profession encompassing numerous time-consuming responsibilities. Tools that facilitate the memorization of basic facts free up teachers to help students who need personalized interventions. Every extra minute spent teaching makes a difference over the course of the school/college year. There are many distinct advantages of integrating technology in the classroom and those have been shown below.

- Technology in the classroom does have a cost, but these associated costs are relatively modest compare to its outcome benefits.Instead of investing in a set of textbooks, students can acquire a Google Chromebook for less, granting them access to all their required course materials.[96] Students could have access to the computer in the classroom – if not take it home every day as well.[97]
- **Students can study at their convenient time and from anywhere from the world. It makes education versatile.**[98]For example, aworking person can decide to take a course online and not worry about time to attend classes.[99] They just have to figure out how to balance work with school.[100]
- Technology in the classroom can boost learning motivation. Most kids and students enjoy using technology in some way.[101] It allows active learners to remain engaged with the lessons and encourages not-so-active learners to find something that they might classify as fun.[102] One of the best advantages that technology provides to the classroom is an increased level of motivation.
- **Students, business people and IT specialists can get their desired certificates online.** For example, a person seeking a real estate license can go online and take courses to get real estate license.[103]
- **Today, use of technology in education enhances competencies beyond knowledge and skills.** It results in improved understanding of concepts that are complex and will lead to connecting ideas, processes, and learning strategies in students and even teachers regarding problem-solving.[104]
- The incorporation of technology in education and the classroom not only enhances the enjoyment and engagement of learning but also provides a valuable option for remote learning when the traditional classroom environment becomes overwhelming for the students.[105]

- **Technology makes teaching easy.** Teachers may attend and take class from his suitable places. It also helps them to prepare class more effectively and professionally.[106]
- Technology offers a wider choice of materials that can be accessed easily. The vast array of educational technology that is available today offers students a wide range of options from which they can choose the best ones for their learning needs.[107]This aids in nurturing the requisite skills and knowledge, enabling them to excel as competent professionals in their chosen fields.
- Technology helps to improve learners' communication skills and performance in school and workplace settings. Students and earners who are able to communicate better through technological means will also perform better academically as well as in work settings because communication skills are very important when you want to get your point across effectively.
- Technology offers an enjoyable and captivating learning experience for students. In today's educational landscape, learners are not just expected to acquire knowledge but also to derive enjoyment from the learning process.[108] Educational technology offers students the opportunity to have fun while learning, which will also help them stay motivated and excited about their studies.
- Technology allows learners to access the internet from anywhere at any Time. The internet has become such an integral part of our lives that we hardly find people who do not use it on a daily basis. In today's world, it is essential for students to be able to access the internet from anywhere at any time so that they can do their assignments and research without having to travel all over a place or wait for a particular time when they can do so.[109]Using educational technology helps learners in this regard because it allows them to connect with the internet even when they are in a classroom, school, or at home.
- Technology aids learners in acquiring new skills and expanding their knowledge base. Learning new skills and acquiring new knowledge are two very important aspects of life that learners should be able to enjoy. Educational technology offers a pathway for learners to acquire these skills and further enrich their knowledge through a wide array of online programs. These programs offer students the opportunity to learn about various topics that are interesting and useful for their respective fields of work or studies.[110] It helps students and learners stay up to date and well informed with new technological advancements.
- Technology allows students to improve themselves both mentally and physically. The benefits of using educational technology also include the improvement of learners' mental and physical health.[111]By using these tools, students are able to enhance their learning and their cognitive skills, which in turn help them, improve their academic performance as well as their physical health.[112]
- When classrooms incorporate gaming as an instructional tool, the realms of play and learning converge. Gaming technology injects excitement and interactivity into the process of learning complex subject matter.[113] Today, virtual game worlds provide a unique opportunity to apply new knowledge and make mission-critical decisions, while identifying obstacles, considering multiple perspectives and rehearsing various responses.'[114]
- Now, teachers can tutor the students from distance or communicate easily outside the classroom. This enhances their ability to give instructions, improve the learning of students, and help them get better academic scores.[115] Moreover, technology integration in education resulted in mobile/desktop applications that are helpful as digital attention coaches for students. They help teachers to organize the homework or tasks of students. They can easily know whose grades are lower or who is slow in completing lessons. They can provide the necessary guidelines to them and help to gradually improve their academic performance.

Outline of Future Works and Diversification of Professions

Digital cameras and mobile phones changed photography and the way we click photos. To stay resourceful, photographers had no option but to embrace the new technology.[116] At one point, nobody could have thought that these interesting jobs would not make it to a list of top future jobs and would be redundant in the future.[117] However, we have come a long way since then and learned from our experiences. Our past has taught us that there could be a world in future where the human resources function vanishes and gets replaced by automation, outsourcing, and self-organizing teams.[118] A world in which top talent is fought over so fiercely that the most skillful workers hire personal agents to manage their careers isn't hard to imagine. The idea is to stay prepared for that future.[119] Let's look forward about what the future of work will look like in next era. PwC sees four alternative worlds of work, all named after different colors. One world could move away from big companies as new technology allows small businesses to gain more strength. In another, companies might work together for the betterment of society as a whole. The future world will be as follows.

- **The Red World.** In future, technology will allow tiny businesses to tap into the vast reservoirs of information, skills, and financing. HR will no longer exist as a separate function, and entrepreneurs will rely

on outsourced services for people processes. There would be fierce competition for talent, and those with in-demand future skills will command the highest rewards.

- **The Blue World.** In fact, global corporations will become larger, powerful, and more influential than ever. Companies see their size and influence as the best way to protect their profit margins. Top talent is fiercely fought over.
- **The Green World.** As a reaction to strong public opinion, scarce natural resources, and strict international regulations, companies will push a strong ethical and ecological agenda.
- **The Yellow World.** In future, workers and companies will seek out greater meaning and relevance. Workers will find autonomy, flexibility, and fulfillment while working for organizations with strong ethical and social standards. The concept of fair pay will predominate in the future of work.

Again according to independent studies published by CBRE and Genesis, and a report in WSJ, the workplace in 2030 will be very different from the one seen today.[120] Future trend of job will be as follows.[121]

There will be 'Places to Work'. The best workplaces will have different quiet areas so that workers have choices to where they want to work, eliminating assigned seating altogether.

Smaller Individual Organizations. There will be smaller corporations. With so much opportunity for collaborations, there will be no need to build a costly big business.

Less Hierarchy. Everyone will be a leader. Work will thrive in teams, not with dictators.

Big Emphasis on Wellness. Offices will have much healthier environmentslike, good lighting, relaxation areas, sleeping rooms, music, pets at work, etc.

Need for a 'Chief of Work' Role. The Chief of Work will set the culture in the organization. This role could also feature amongst the best jobs for the future.[122]

Flexible Floor Plans. When workers arrive at their office building, wearable devices will let them know what floor to go to, that can be changed based on sensor data.

Goodbye Desk. There won't be any physical desks; employees will just park themselves anywhere and have a simulated office before their eyes.

Your Robot Assistant. All workers at all levels will be using robotic helpers in the future like Siri or Alexa, to sort through incoming email, schedule meetings, create spreadsheets, etc.

Smarter Brainstorming. Most meetings will take place between different groups of workers in multiple locations, allowing seamless sharing of ideas and brainstorming across time zones.

The Virtual Water Cooler. Informal get-togethers will take place via virtual and augmented reality headsets.

McKinsey Global Institute's research report has highlighted the top three skill sets workers will need to secure the best careers for the future.[123] These most in-demand skills for the future are as follows.

- **Higher cognitive.** These include advanced literacy and writing, critical thinking, and quantitative analysis and statistical skills. Doctors, accountants, research analysts, and writers use these.
- **Social and emotional.** These include advanced communication, empathy, to be adaptable, and the ability to learn continuously. Business development, programming, and counseling require these skills. These jobs are also amongst the best careers for the next ten years.
- **Technological.** This includes everything from basic to advanced IT skills, data analysis, and engineering. These future skills are likely to be the most highly paid.

There are two divided opinions and two groups on whether technological advances[124] will reduce human jobs, or technology advances will produce as many jobs as they displace.[125] An article by WSJ says that automation is expected to impact work in a series of three waves.[126] Such as:

- 1st Wave (in early 2030). Known as Algorithmic. There are 3% of jobs are expected to be displaced in the first wave.
- 2nd Wave (till late 2030). Known as Augmentation. This number can rise considerably in the next two waves as 30% of jobs might get automated, with more and more workplaces starting to embrace the advancement in technology. Due to their greater presence in administrative and clerical jobs, women might face a larger risk of automation during the first two waves. Later, many manual tasks performed by men are likely to be replaced by automated vehicles and machines.
- 3rd Wave (from 2030). Known as Autonomy. The most sought after jobs and skills of 2030**.** It is disruption to human life that anoints moments as a turning point in history. Previously wars and now with the corona-virus pandemic affecting not the stability of our healthcare systems and the global economy, other issues are front and centre such as partisan leaders at the helm of the most influential countries in the world, the climate crisis closing in, etc. There are a lot of factors that we must take into consideration as we look ahead to making predictions about the future.

There will be a substantial transformation in the job landscape as experts analyze the most promising career paths for the next decade. The Oxford Martin School and Nesta have worked in conjunction to cast projections as to which skills and jobs will be in the highest demand throughout the next decade. They have looked at what the world will need, and what people will want, and produced a thorough report of their findings. Is there a gap or niche in any industry that jobseekers feel they might be able to fill? Is there some upskilling work that they could do, in order to be better prepared for the demands of the future? These are all things to consider in reading the following summation of the Oxford Martin School &Nesta, 'Most Sought After Jobs and Skills of 2030' report.[127] Utilizing extremely large job trend datasets and analyzing this data through seven different lenses that represent how our world will change throughout the next decade. This survey uses western countries to collect data and not exclusive to Australia. There will be few distinct changes within and after 2030. Such as: globalization, demographic change, environmental sustainability, urbanization, increasing inequality, political uncertainty, technological change and automation. The most sought after jobs for 2030 includes as: engineers; preschool, primary, secondary and special education school teachers; food preparation and hospitality trades; animal care and service workers; sports and fitness occupations; lawyers, judges and related workers; natural and social science professionals; teaching and education professionals; managers and proprietors in hospitality and leisure services; personal appearance workers; health and social services managers and directors; counselors, social workers, and other community and social service specialists; therapy professionals; librarians, curators and archivists; artistic, literary and media occupations; public services and other associate professionals; entertainers and performers, and related workers, etc. Ultimately, these projects reflect the fundamental needs of our society; care, service, education, health and entertainment.[128] Therefore, we can find comfort in that these fundamental factors will not change, and the landscape of the work force will not become unrecognizable any time soon.

There are few skills and abilities will be in more demand in 2030. Such as: complex problem solving; system analysis; monitoring; learning strategies; judgment and decision making; psychology; fluency of ideas; instructing; active learning; social perceptiveness; sociology and anthropology; originality; education and training; system evaluation; coordination; deductive reasoning, etc. Education systems will need to alter their approaches to favour the growth of these skills. At the moment, educational systems across the western world tend to prioritize the teaching of information, facts and processes, rather than exercise that encourage more abstract skill learning. If we take an example of Engineers in 2020, and apply one of the lenses that will cause a shift in the nature of the skills required for this job in 2030, we can see significant differences begin to emerge. For instance, when considering the perspective of urbanization, our growing population necessitates ongoing innovation in how we maximize the utilization of our living spaces. Here in WA it is much less of an issue than say, Shanghai. Engineers will have to grasp not just the mechanics of infrastructure but also those of human interaction and mobility to ensure the sustainability of large cities. This will become increasingly crucial as urban farming takes precedence in response to food shortages caused by the climate crisis. Buildings will need to serve dual functions, as both centres for living and for production. A certain level of engagement with societal structures is therefore needed. As a result of all of these factors, engineers of 2030 will be required to have a different set of skills than what would normally be associated with the role. These may include: social perceptiveness; service orientation, knowledge of sociology and anthropology.[129] So, with these skills becoming potentially crucial for engineers in 2030, educational institutions need to ensure that their programs are broadening beyond mechanical knowledge. Also, people with the engineering career pathway in mind, need to take it upon them to gain the education and knowledge that may be needed to achieve this kind of lateral thinking, and new social approach to engineering.

Technology will Change the World within Next Decade

Three cutting-edge technologies—artificial intelligence (AI), blockchain, and synthetic biology—have recently reached commercial viability and are poised to reshape the fundamentals of business and society by 2035. These technologies predict behavior and increasingly create behavior. They learn and improve persistently. These technologies make better decisions than humans in an increasing number of contexts. These technologies are unconstrained by moral boundaries. In November 2022, the introduction of ChatGPT brought the potential and power of Generative AI into public consciousness. It was downloaded by over 100 million people globally within next 6 weeks. Business leaders, regulators, and professionals wonder how this magical technology would affect their business models. Workers in both creative and other professional career wonder how it will affect their livelihoods. Governments around the world are waking up to the power of the technology to disrupt the established order.[130] Venture Capitalists have lined up to fund over 500 startups that use Generative AI.

CEO's of some of the leading AI companies have gone on record to say that this generation of AI could destroy human society. Others have said that it could create a global utopia by solving intractable problems like climate change, ending the need for humans to work for a living and bringing the cost of energy to zero.[131] At about the same time that ChatGPT was growing explosively the Web 3 and crypto markets and that were limping through a crypto winter. Companies that had been slated to restructure financial market declared bankruptcy. Leaders like Sam Bankman-Fried who declared the birth of a new distributed era where our notions of 'value' and money itself would be redefined and were under house arrest for fraud.[132] Further in the background, a quiet revolution has been taking place in reengineering life itself. Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR) is a technology that can be used to edit genes and, as such, will likely change the world.[133]The discovery of CRISPR as a precise genome editing tool has resulted in the establishment of several CRISPR-based companies. Several companies have been using CRISPR-based technologies to reprogram living organisms, promising a new, unimaginable future where humans' capabilities could be enhanced and aging could be reversed, new forms of life created, and new custom designed materials could be grown rather than manufactured.[134] Companies like Verve Therapeutics announced the first human trials of a single shot cure for all heart attacks through a one-time change in a single gene. In most of these cases, business choices like market selection, financing strategy and pricing are critical determinants of the value of the technology to humanity. CRISPR genome editing allows scientists to quickly create cell and animal models, which researchers can use to accelerate research into diseases such as cancer and mental illness. In addition, CRISPR is now being developed as a rapid diagnostic. To help encourage this type of research worldwide,Feng Zhang and his team have trained thousands of researchers in the use of CRISPR genome editing technology through direct education and by sharing more than 40,000 CRISPR components with academic laboratories around the world.[135]

There are many ways technology could change the world within next decade. The World Economic Forum's Technology Pioneer community is composed of early to growth-stage companies from around the world involved in the design, development and deployment of new technologies and innovations. Innovation is critical to the future well-being of society and to driving economic growth, both of which are key priority areas for the World Economic Forum. To support these two pillars, the Forum launched its Technology Pioneer community in the year 2000. The community is composed of early- to growth-stage companies from around the world that are involved in the design, development and deployment of new technologies and innovations, and poised to have a significant impact on business and society. The program aims to give next-generation innovators a voice in solving global issues and the opportunity to contribute to the exploration of future trends. Each year, the Forum recognizes a new cohort of Technology Pioneers[136] and incorporates them into its initiatives, activities, and events. Technology will change the world in the next five years expressed by 2022 cohort.[137] From maturing of advanced technologies such as Web3 and quantum, to managing flexible grids and on-demand manufacturing, here are their predictions for our near-term future.[138] From quantum computers and 5G are in action to managing cancer chronically in now and near future.[139]

In the future, credit will become attainable for individuals who have been overlooked by conventional financial institutions. As global internet access continues to expand, coupled with the widespread growth of digital labor marketplaces and platforms, "gig work" is poised to emerge as the dominant form of employment.[140] This shift has larger ramifications for low-skilled/blue-collar workers who usually comprise more than 80% of the workforce in developing countries. Internet platforms in e-commerce, food delivery, ride-sharing, logistics, etc. have low barriers to entry and are creating a wealth of earning opportunities in countries where there aren't enough jobs for low-skilled populations. Workers can engage with many platforms in parallel and maximize their earnings.[141] In future, digital labour marketplaces will embed financial services into their products which will make credit accessible for many people who are ignored by traditional financial institutions. Indeed, technology will empower financial stability and discipline without individuals needing to acquire specialized knowledge. AI and ML advisors will become commonplace, continuously offering recommendations on the next gig, investment, or online course, thereby democratizing access to growth and financial well-being.

Web3 technologies will revolutionize the world of commerce. Web 3.0 is also called the Semantic Web. As we know that, Web 1.0, also known as the "static web," was the early stage of the web when web pages were primarily static and read-only. Websites were generally simple and consisted of basic HTML pages with limited interactivity. Content was created and published by webmasters, and users could only consume it. The mid-2000s saw the emergence of Web 2.0, a significant development characterized by the rise of user-generated content, social networking, and interactive web applications.

This transformative era introduced platforms like Facebook, Twitter, YouTube, and Wikipedia, which revolutionized online communication, collaboration, and information sharing. Web 2.0 has aimed to create a more dynamic and engaging web environment by placing a strong emphasis on user participation and interaction. Web 3.0 represents 3rd generation web as aiming to enhance its intelligence and intuitiveness. This evolution entails enabling the web to comprehend content meaning and deliver tailored information to users. Advanced technologies like AI, ML, blockchain, and the Internet of Things will be harnessed by Web 3.0 platforms to foster a more interconnected, smart, and user-centric web experience.[142] The ultimate objective of Web 3.0 is to establish a web that is not only smarter and more secure but also decentralized. This is due to its use of ML and AI to create a more useful experience for users. These technologies will show users content that is more relevant to them. This will also allow e-commerce sellers to show their content to the right audience and fill their pipelines with their ideal customers.[143]

E-commerce sellers will soon be able to take ownership of the assets that are important to their business. These assets include photos, videos, reviews, and other types of content. Currently, these may belong to the e-commerce platform that is being used, such as Shopify. But with Web 3.0, sellers will take ownership of these assets and their digital storefront will truly belong to them. Web 3.0 Will Integrate Voice Assistants And AR/VR Technologies. Web 3.0 is bringing a lot of changes to the e-commerce industry. Through the use of blockchain and other technologies, customers will find their shopping experience to be easier, as well as being more personalized, secure, and transparent. E-commerce sellers will also see greater transparency with their vendors and other professionals that they work with. They will also actually own their media and other assets, rather than platforms owning them. Blockchain offers a lot of benefits for customers, sellers, and suppliers. To take advantage of these perks, e-commerce brands should learn about new technologies and how to use them then include their team in the process before adding the new technologies to their existing channels and techniques.[144] By 2025, Web3 technologies will have revolutionized the world of commerce, in much the same way that Web2 transformed access to information. Physical and digital combine new term like phygital! In future ‘things’ will be listed and traded on an open, liquid, digital market. In the early days of the internet, information was mostly siloed within proprietary online networks.[145] However, the zero marginal cost of distribution, combined with consumer demand, led to the single, searchable, open internet of information we enjoy today. Understandably, commerce has taken longer to make the leap. With the exchange of physical assets, the need to manage counterparties’ risk, mediate disputes and ensure settlement, requires trust. This trust is vested in either trusted intermediaries or trusted sellers. Consequently, e-commerce transactions are mostly siloed within one of many, closed, proprietary systems. The advent of Web3 technology enables the automation of settlement by smart contracts and the tokenisation of physical asset commerce transactions into a universal standard such as NFTs.[146] Just as decentralized finance’s ‘money lego’ applications have begun to unbundle traditional finance, an ecosystem of decentralized ‘commerce lego’ protocols and applications will evolve to create an open marketplace for things, where everyone can share in the value they create.

The data industry will become more inclusive and affordable. Christine Qi, Chief Executive Officer, Databento has expressed that, ‘The amount of information or data about our universe and about ourselves, has grown exponentially over the past decade. But with enormous growth comes an array of issues: data privacy, management, access, and affordability are some of the biggest areas of debate amongst citizens and leaders alike.[147] Who owns my data? Is my phone spying on me? How much money are companies making from it? These questions are becoming increasingly pertinent as companies continue to collect our data, whether we pay them or not, and with or without our permission. Issues also persist in industries like finance.[148] Why am I paying a fortune for market data? In the next few years, so long as governments allow it, we'll see technology in the data industry become more inclusive and affordable as startups enter the space. The metaverse promises benefits that could impact economic innovation, social interaction, productivity enhancement, consumption and entertainment when executed right. Thus, enriching the development of both real and virtual societies requires the close integration of various technologies to provide technical support. The participation of users in the metaverse cannot be achieved without communication technology (ICT), rendering technology, interaction technology and teamwork technology.[149] By 2027, metaverse will look back at our current digital interactions the same way we see our carbon emissions today. Social media has exposed the perils of technology designed without humans at the centre, and its harmful effects on our mental health and emotional wellness. We're missing what we removed from our interactions a decade ago: humanity, intimacy, depth, and empathy. Interactions that make us feel closer to each other. In the future, our focus will be on the human experience. The transition to the metaverse will be not a technological but a sociological paradigm shift.

The metaverse will be shaped by the communication of our emotions, enabled by technologies such as virtual and augmented reality, and brain-computer interfaces. Emerging hardware, platforms, disciplines, and sensory experiences will enter the scene, and the metaverse will redefine the social dynamics within the virtual realm. Emotion, trust, and safety will emerge as the paramount currencies, leading to a decentralization of the platform experience in favor of prioritizing human engagement.

While contemporary technology enables us to communicate through voice and visual means across vast distances, there remains a notable absence of a dependable method for transmitting the sense of touch over long distances. However, engineers at the City University of Hong Kong have developed a wireless soft e-skin, raising the possibility of someday making virtual hugs over the internet a tangible reality.[150] The e-skin is studded with flexible actuators that sense the wearer's movements and convert them into electrical signals.[151] These signals can then be sent to another e-skin system via Bluetooth, where the actuators convert them into mechanical vibrations that mimic the initial movements. The system could be used to allow friends and family to 'feel' each other over long distances, the researchers say. Researchers at the City University of Hong Kong recently invented what they're calling a 'novel, wireless, skin-interfaced olfactory feedback system'. In other words, VR attachments that let you smell stuff.[152] The smells are generated by the devices heating and melting odorous wax that releases adjustable concentrations of stink. There are two versions of this tech. One is 'mounted' on your upper lip for easy access to your nostrils, and the other is a facemask-like design with hundreds of different odour combinations. The university said their new tech has a broad range of applications that includes online teaching and 4D movie watching. That's right, in the future, we'll not only be able to watch our favourite movies in VR, and we'll also be able to smell them.

In 2016, it was reported that scientists at the National Institutes of Health (NIH) in the United States had successfully maintained the heartbeat of a genetically engineered pig's heart inside a baboon for duration of three years.[153] Though it was undoubtedly a headline-grabbing story, there are serious implications for the research. Every year, several million people die worldwide because of transplant shortages. There just aren't enough human organs from tragedies like road accidents to go around. But some scientists are working on a radical solution – to use organs from animals. Now, Xenotransplantation is the procedure of transplanting, implementing or infusing a human with cells, tissues or organs from an animal source - has the potential to revolutionize surgery.[154] Again, as artificial intelligence continues to perform jobs just as well as humans, there is a new industry to add to the list – the world of art. Researchers at the company OpenAI have created software that is able to create images from just worded prompts. If anybody, type in 'a dog wearing a cowboy hat singing in the rain' and he/she'll get a host of completely original images that fit that description. He/she can even choose what style of art their request will come back in. However, the technology isn't perfected and still has issues, like when we gave it poor prompts on designing cartoon characters. This technology known as Dall-E is now its second iteration and the team behind it plans to continue developing it further. Now, OpenAI'sDall-E 2 program can create images just from worded prompts.Now, we are able to get high-quality images based on our worded prompts, offering highly detailed images in a matter of seconds.[155]In the future, we could see this technology used to create art exhibitions, for companies to get quick, original illustrations or of course, to revolutionise the way we create memes on the internet. Additionally, there is a technology called Midjourney, an AI image generator capable of producing intricate gothic masterpieces based on straightforward text prompts. We are truly living in the future.[156]

Battery powered construction will underpin sustainability efforts. Brandon Ng, Co-Founder and Chief Executive Officer, Ampd Energy has declared, 'The construction industry accounts for almost 40% of global CO2 emissions and much of this is driven by the urbanisation of humanity. Fossil fuels continue to power construction projects, resulting in around half a billion tonnes of CO2 emitted each year. Noise and exhaust fumes from fossil fuel use also negatively affect worker health and local air quality.'[157] This is rapidly changing. The industry is adopting battery energy storage systems (ESSs) tailored for construction sites that reduce carbon emissions by 80% and the remaining 20% is the carbon of electricity used to recharge the ESSs. The electrification of mobile construction machinery is also making giant strides towards commercialization. All of this is driven by advances in lithium-ion battery technology. Looking into the future, long-duration ESSs–which only need recharging weekly, monthly or longer–make off-site recharging from solar or wind farms a real possibility. The world is still figuring out the right technology base for long-duration ESSs. But, there are multiple options: flow batteries, non-lithium-ion non-flow batteries, gravity-based ESSs, heat-based ESSs and hydrogen and a winner, or winners are sure to emerge. In short, the future for how we build cities is charged with potential.

The 3D printing industry holds the potential for a wide range of applications, from cost-effective house construction to the creation of affordable durable armor. However, one of the most intriguing uses of this technology is the fabrication of 3D printed bones. The company Ossiform specialises in medical 3D printing, creating patient-specific replacements of different bones from tricalcium phosphate – a material with similar properties to human bones.[158] Using these 3D printed bones is surprisingly easy. A hospital can perform an MRI which is then sent to Ossiform who create a 3D model of the patient-specific implant that is needed. The surgeon accepts the design and then once it is printed, it can be used in surgery. To achieve the best integration possible, the implants are of a porous structure and feature large pores and canals for cells to attach to and reform bone. Researchers at Columbia University School of Engineering have created a device that can construct a seven-ingredient cheesecake using food inks and then cook it to perfection using a laser.[159] Their creation contained banana, jam, peanut butter and Nutella. The technology could one day be used to create personalized meals for everyone from professional athletes to patients with dietary conditions, or could be useful for those who are simply short on time.

Star Trek, a source of inspiration for many futuristic technological concepts, portrays a world where individuals can simply step into the medbay to undergo a comprehensive digital scan of their entire body for any indications of illness or injury.[160] Doing that in real life would, say the makers of Q Bio, improve health outcomes and alleviate the load on doctors at the same time. Q Bio CEO Jeff Kaditz hopes it will lead to a new era of preventative, personalized medicine in which the vast amounts of data collected not only help doctorstoprioritise which patients need to be seen most urgently, but also to develop more sophisticated ways of diagnosing illness.[161]The US-based company has developed a cutting-edge scanner capable of analyzing hundreds of biomarkers in approximately one hour, encompassing everything from hormone levels and liver fat accumulation to indicators of inflammation and various cancer markers. It intends to use this data to produce a 3D digital avatar of a patient's body and that known as a digital twin and which can be tracked over time and updated with each new scan.[162] In the realm of technology, the digital twin concept is a beacon that has been casting its light across a wide array of industries on a global scale. Coined in the world of virtual reality and artificial intelligence, a digital twin represents a dynamic digital replica of physical systems and processes. It integrates real-time data, predictive analytics, and machine learning to generate a digital avatar that parallels the physical counterpart in intricate detail. Digital twin technology entered mainstream adoption around 2022, marking a watershed moment in our ability to simulate, compute, and interact with physical systems, from complex industrial machinery to entire cities. This shift has brought about an exponential acceleration in digitalization, remapping the technological landscape and propelling us into a next-generation digital era.[163] The advent of digital twin technology is a game-changing development, redefining our understanding of simulation, prediction, and interaction with the physical world. The convergence of various technologies, including AI, machine learning, XR, and blockchain, has fueled the growth and utility of digital twins, fostering a new paradigm of digital-physical interaction. Actually, digital twins serve not just as replicas, but as dynamic tools, facilitating in-depth, real-time understanding, and optimization of systems and processes.[164] Digital twin technology, with its potential to transform industries and sectors worldwide, is poised to be one of the most significant technological advancements of our time. The journey is just beginning, and the world eagerly waits what's to come.[165]

Building will dynamically respond and adjust to support human wellness and comfort. Francois Amman, Co-President and Co-Founder, Akila, '90% of life is spent indoors and 50% of carbon emissions are created by buildings. Their impact is simply massive; so is the volume of building data that could be harnessed for better outcomes on people and planet. Today, we see buildings becoming smart and automated through increasingly cost-effective sensors and control points. Properly connected smart buildings can react to dynamics like equipment status, space occupancy, weather and more, using AI to optimize for best impact.'[166] Most building systems are still manually controlled, but in coming years, we'll see this status quo totally upended. Building will dynamically respond and adjust to support human wellness and comfort; minimize carbon emissions; and include building-to-building interoperability enabling true metaverse applications for the built environment. Driving this change will be a fundamental transformation in the construction industry. The emergence of digital twin and 5G/6G technology as key tools enabling new ways of assessing and optimizing value over the building lifecycle from design to construction into operations; and growing understanding of energy as a not just a direct cost to portfolio holders, but also a liability for those who cannot keep up with new regulatory and ESG frameworks. Again, Grid flexibility will phase out fossil fuels and jumpstart the clean energy transition. Thomas Folker, Co-Founder and Chief Executive Officer, Leap has said, 'one pressing challenge that lies on the road to a clean-energy future is grid flexibility, and the need for more dynamic interaction between energy supply and demand.

As we incorporate more intermittent renewable energy sources such as wind and solar into the power mix, flexible load will be crucial to ensure that the grid can always meet demand.'[167]By 2025, achieving a notably more digitized, decarbonized, and resource-efficient future will hinge on the utilization of market-driven software solutions. These solutions enable smart energy technologies, like EV chargers and heat pumps, to swiftly adapt to real-time grid demands in specific regions. This optimization not only enhances the earnings of asset owners but also provides crucial support to the electric grid during peak demand periods. When combined, these distributed energy resources collectively furnish the flexibility required to phase out environmentally harmful fossil fuel-driven peaker plants and accelerate the shift towards a clean energy future.

A crucial concern revolves around ensuring universal internet access. Despite the indispensability of the internet in our lives, approximately half of the global population remains unconnected. Various factors contribute to this disparity, encompassing economic and social barriers. However, for a portion of the population, the internet remains inaccessible simply due to a lack of connectivity. Google is slowly trying to solve the problem using helium balloons to beam the internet to inaccessible areas,[168] while Facebook has abandoned plans to do the same using drones,[169] which means companies like Hiber are stealing a march.[170] They have taken a different approach by launching their own network of shoebox-sized microsatellites into low Earth orbit, which wake up a modem plugged into your computer or device when it flies over and delivers your data. Their satellites orbit the Earth 16 times a day and are already being used by organizations like The British Antarctic Survey to provide internet access to very extreme of our planet. Very recently, Chemical engineers from Switzerland's ÉcolePolytechniqueFédérale de Lausanne have created a prototype device that can produce hydrogen fuel from the water found in air.[171] Inspired by leaves, the device is made from semiconducting materials that harvest energy from sunlight and use it to produce hydrogen gas from water molecules found in the atmosphere. The gas could then, potentially, be converted for use as liquid fuels. Chemical engineers in Switzerland have invented a solar-powered artificial leaf. Their solar-powered, transparent and porous electrode turns water from its gaseous state in the air into hydrogen fuel.[172]

People will eat more nourishing food. Edwin O. Rogers, Chief Executive Officer and Co-Founder, Bonumose, 'though nourishing, tasty food should be available to wealthy and poor alike, too often there is a great gulf between 'the is' and 'the should'. But there is nothing inherent in capitalism or the profit motive that demands the divergence. Good news is in the wind: thanks in part to new processing methods for healthy sugar or salt alternatives, good food will become an accessible, ubiquitous option for all consumers.'[173] People will eat more nourishing food even if in some cases they do not realize it; because cost and taste will be at par with less healthy, legacy foods. In the best of cases, production assets for questionable food ingredients like high-fructose corn syrup will be redeployed for healthy counterparts. Finally, in a virtuous circle, global reductions in diet-related healthcare costs will have a deflationary effect on food prices, and global alleviation of health-related suffering will free individuals for inspired innovations that benefit humankind and the earth. Again, Central bank digital currency will revolutionize the financial system. Inga Mullins, Founder and Chief Executive Officer, Fluency has expressed, 'a new digital form of a country's fiat currency issued directly by a nation's monetary authority or central bank is predicted to have one of the biggest disruptive impacts over the next 3-5 years.'[174] This form is referred to as a central bank digital currency (CBDC). When underpinned with blockchain technology, a CBDC has the potential to revolutionize the financial system and pave the way to increasing financial inclusion and improving the lives of billions of people globally by providing access to cheap and affordable financial services. Due primarily to its architecture, a well-constructed CBDC can support offline payments, shielded transfers, automation throughout the programmability layer, and possess cash-like properties. All these features when taken together will foster financial inclusion of the user by providing them with a digital alternative to physical cash, enhancing access to their money even in remote areas, and providing options for those that are currently unbanked. Innovative payment platforms will provide an on-ramp for building CBDC and bridging them together to existing payment networks, including both traditional banking and alternative finance. For banks and issuers, they'll be able to integrate their existing infrastructure and be able to provide a broad spectrum of CBDC-linked payment-related services and exercise cross-chain interoperability protocols for universal payment access to digital national currencies, stablecoins, NFTs, the Metaverse and much more.

Supply chain intelligence will solve the food crisis. Julie Gerdeman, Chief Executive Officer, Everstream has said, 'several decades of accelerating climate change, a global pandemic, conflict, and fragmented supply chains impacted food production and distribution, driving the global food crisis to catastrophic levels.'[175]

By 2027, major food, beverage, and consumer packaged goods manufacturers will use AI-driven supply chain technology to see future disruption and act before weather, labour issues, and other incidents that can harm the global food supply. Contingency plans will be needed far less often because companies will have advanced insights exposing how future weather events will impact their suppliers, giving them ample time to find alternatives. They will predict spikes in commodity availability, change their purchasing habits and reformulate their products so shelves remain stocked. The issue of food spoilage and waste during transportation will become obsolete as manufacturers and shippers gain the ability to anticipate unusual weather events, labor disruptions, and other delays well in advance. Delays in delivering food to remote areas, where it's critically needed, will no longer be caused by port and road closures. Predictive supply chain technology will empower companies to transition from reactive responses to proactive measures, ensuring constant availability of food on store shelves and a smooth flow of food supplies globally.

AI will reinvent how we think about education. AsudeAltintas, Co-Founder and Chief Executive Officer, Twin Science has expressed, 'the traditional education system was invented nearly 200 years ago to meet the needs of the industrial revolution and it is not functional today. Today, the needs of our world have been gathered under the United Nation's Sustainable Development Goals. On the other hand, 21st century skills that will serve these needs are listed by the World Economic Forum.'[176] The younger generation already has the desire to co-create solutions to the world's biggest problems and create a more compassionate world. Technological progress is a great chance to help every child develop skills and competencies to solve these problems and build a better future. AI will be used to understand children's own interests to suggest the next step in their learning journey. AI will also generate insights for their parents and teachers and will turn them into mentors. The internet is already connecting children with the best experts, improving the quality of education and reducing inequalities. Every child will be able to ideate, prototype, test and iterate in a cost-effective way. In this way, they will innovate and improve the well-being of the world.

Advanced manufacturing and fashion technology could digitally transform the apparel industry. Matthew Wallace, Chief Executive Officer, DXM has said, 'transforming the apparel industry with localized, on-demand manufacturing. The apparel industry is riddled with excessive waste and supply chain challenges. Today, most brands and retailers are forced to mass-produce goods with limited consumer input, resulting in high merchandise return rates, waste from overproduction, and lower profit margins due to deep discounts of unwanted merchandise. And while on-demand apparel and footwear are believed to be a solution, traditional manufacturing models still require months of lead time and hundreds of miles of travel between order and delivery is a problem which has only been exacerbated by global supply chain instability.'[177] Advanced manufacturing and fashion technology can digitally transform the apparel industry by bridging the gap between creators, consumers, and local manufacturers. It can play an important role in producing custom goods locally, resulting in dramatically reduced turnaround times; days, not months. This innovative model has the potential to not only reduce the environmental footprint of the fashion industry but also improve supply chain security on a global scale. It's a promising solution that can be achieved with an open platform that unites best-in-class partners for the greater good of the apparel industry, and the world.

The quantum internet is coming. Jim Ricotta, Chief Executive Officer and Chairman, AliroQuantum has told, 'the quantum internet is coming, and it will revolutionize the world just as the classical internet has. And just as classical networks enabled today's internet, quantum networks are required to build the quantum internet of tomorrow. The quantum internet is expected to have a profound impact on how we live our lives by enabling breakthroughs in energy, medicine, material sciences and more. In the next five years, we will see quantum networks emerge from local area networks and clusters into continent-scale area networks using quantum repeaters, which are the foundations of the quantum internet. As a result, we'll see more and more use cases emerge for quantum networks.'[178]AliroNet™ is available in three modes: **Emulation Mode,** for emulating, designing, and validating quantum networks; **Pilot Mode** for implementing a small-scale quantum network testbed; and **Deployment Mode** for scaling quantum networks and integrating end-to-end applications. Each mode of AliroNet™ corresponds directly to one of the three necessary phases of building a quantum network with a deliverable of Deployment Mode being the user's deployed full-scale entanglement-based secure network. For example, quantum secure communications leverage the power of physics to enable unhackable security. Distributed quantum sensing will enable ultra-high-resolution telescopes, as well as ultra-precise clocks and GPS. And to make the power of quantum computing useful, clustered quantum computing and ultimately distributed quantum computing will enable the quantum internet.

Researchers at the National Eye Institute in the US have produced retinal tissue using stem cells and 3D bioprinting. The new technique may help scientists model the human eye to better understand and develop treatments for diseases and conditions that affect people's vision, such as age-related macular degeneration (AMD).[179] The researchers created tissue found in the outer blood-retina barrier, which is the area AMD is known to start in, by printing stem cells taken from patients into a gel and allowing them to grow over several weeks. They are currently using the tissue to study the progression of AMD and are experimenting with adding additional cell types to model more of the human eye.[180] The speed at which current lithium-ion batteries can be charged is limited by a phenomenon known as lithium plating. Nowadays, Fast-charging of electric vehicles is seen as key to their take-up, so motorists can stop at a service station and fully charge their car in the time it takes to get a coffee and use the toilet and taking no longer than a conventional break. Researchers at Penn State University in the US have said, 'But rapid charging of lithium-ion batteries can degrade the batteries.' This is because the flow of lithium particles known as ions from oneelectrode to another to charge the unit and hold the energy ready for use does not happen smoothly with rapid charging at lower temperatures. However, they have now found that if the batteries could heat to 60°C for just 10 minutes and then rapidly cool again to ambient temperatures, lithium spikes would not form and heat damage would be avoided.[181]

AI will power clinical decision making in fertility clinics around the globe. Paxton Maeder York, Chief Executive Officer and Founder, Alife Health has said, 'between now and 2030, over one billion people will suffer from infertility. As global population growth slows and drops below the replacement rate, utilizing AI-enhanced fertility treatments will help support the creation of new families and future generations.'[182] The most common infertility treatment today, in-vitro fertilization (IVF), is expensive, often requires multiple attempts, and is both physically and emotionally onerous. Successful pregnancies from IVF rely on a complex set of clinical decisions made by physicians to deliver the optimal care for each patient. During IVF, doctors make many decisions that will affect a cycle's outcomes including medication doses and timing for procedures. Alife's AI software helps doctors review what has worked for patients similar to you. With this information, your doctor can make the best decisions for your care.[183]The use of technology and advanced analytics to support this decision making will lead to improvements in care efficiency, clinical success rates, and personalization of treatment methods.[184]By 2027, AI will drive clinical decision-making in fertility clinics worldwide, allowing healthcare professionals to provide an enhanced level of precision medicine. This advancement will result in improved outcomes and increased accessibility for patients.

Human potential will be re-directed towards more meaningful objectives. Gabriel Safar, Co-Founder and Chief Executive Officer, Lease Pilot has said, 'Documents as technology have served businesses well for centuries. In modern times, email may have replaced the need for a courier and documents may be stored electronically, but the underlying technology itself hasn't changed. That's a problem since documents are fundamentally an analogue technology and today's world is digital. Computers aren't very good at manipulating natural language (analogue), but they are great at manipulating information in a database (digital).'[185] So, taking a data-first approach to constructing agreements opens the door to hyper-efficient transactions facilitated by computers. By converting agreements into structured digital information, software can assemble, manipulate, store, share, and understand these agreements in ways that weren't previously impossible. When done successfully, the end-user sees a document written in natural language and is able to edit the text of the agreement in the same way that they would in a traditional word processor. But behind the scenes, the agreement is still a collection of database values which are updated to reflect the user's interactions with that document. Ultimately, the impact will be a future with radically more efficient markets that free up massive amounts of wasted human potential to be re-directed toward more meaningful objectives.

In future remote sensing data streams will accurately monitor natural ecosystems. Kevin Lang, Chief Executive Officer and President, Agerpoint has said, 'to achieve the United Nations goal to reach carbon neutrality by 2050 and keep global warming below +1.5 °C, nature-based solutions to restore, conserve or enhance forests or agricultural lands are a valuable contributor to removing carbon dioxide from the atmosphere and capturing it into the soil.'[186] However, to determine the impact of these solutions, measurements such as tree height, trunk diameter and biomass are required to accurately quantify the carbon stock potential in plants. These measurements are traditionally assessed through labour intensive and subjective manual methods. With the increased demand for credible carbon credits along with a heightened need for transparency, remote sensing data streams from high-resolution cameras and lasers (or LiDAR) are enabling new scalable and efficient digital measurement techniques.[187] Satellite imagery is increasing in resolution and frequency as more constellations enter into orbit.

Rapid advances in smart-phone optical sensors and positional systems provide extensive access for growers and conservationists to affordably capture rich datasets. These data sources, combined with cloud data processing, AI and data fusion will empower accurate measurement and monitoring of plant health and carbon sequestration potential for natural ecosystems.

Technology will bring the best opportunities to the best talent. ProjjalGhatak, Chief Executive Officer and Founder, Onloop has expressed that. 'the one sector that has gone through breakneck change in the last two years is the workplace. Office work has been the default for knowledge workers for decades and did not warrant a full re-think until the pandemic.'[188] The pandemic tested it to its fullest but although we saw flat to increased productivity, the loss in cultural connectivity and an increase in anxiety, fatigue, apathy and burnout are all also some of the effects being felt. In a pace of rapid change, it is hard to parse out each piece independently. The pandemic also lasted long enough to truly change the talent landscape for many companies to a permanent global and hybrid one. This means that companies can seize the day in thinking about a global talent market to tap into in a realistic fashion. He added, so, if I had to be provocative, I would say that technology is going to be a true leveller. It will bring the best opportunities to the best talent irrespective of where they live thereby truly unlocking the full potential of a billion knowledge workers.

Researchers have discovered a method for affixing artificial neurons onto silicon chips, replicating the characteristics and electrical properties of neurons within our nervous system. Professor Alain Nogaret, from the University of Bath, has said, 'Until now neurons have been like black boxes, but we have managed to open the black box and peer inside.'[189] He also added, 'our work is paradigm-changing because it provides a robust method to reproduce the electrical properties of real neurons in minute detail. But it's wider than that, because our neurons only need 140 nanowatts of power. That's a billionth the power requirement of a microprocessor, which other attempts to make synthetic neurons has used.' Researchers hope their work could be used in medical implants to treat conditions such as heart failure and Alzheimer's as it requires so little power. One of the biggest buzzwords of the last decade will continue to impact the next. The cloud has the potential to host almost all IT services and web applications, and an increasing number of enterprises are embracing public cloud solutions due to enhanced cybersecurity measures. Progress in AI, machine vision, sensors, motors, hydraulics, and materials will revolutionize the delivery of products and services, while there will also be a notable increase in the demand for tech talent to develop, manage, and maintain advanced robotics systems. A recent survey of security professionals revealed that 72% of companies are planning to drop traditional passwords by 2025. This will give rise to new authorization services for face, voice, eye, hand and signature identification.[190]

Analysis of Present and Future Job Market

As per Future of Jobs Survey 2023 done by World Economic Forum (WEF), tight labour markets are widespread in high-income countries, low and lower middle income countries continue to see higher unemployment than before the COVID-19 pandemic. On an individual level, labour-market outcomes are also diverging, as workers with only basic education and women face lower employment levels. At the same time, real wages are declining as a result of an ongoing cost-of living crisis, and changing worker expectations and concerns about the quality of work are becoming more prominent issues globally.[191]The Future of Jobs Survey 2023 compiles the viewpoints of 803 companies, employing a combined workforce of over 11.3 million individuals spanning 27 industry clusters and 45 economies across all global regions. Within its scope, the Survey addresses technology trends, their influence on employment, their effects on skills, and the strategies that businesses intend to implement for workforce transformation throughout the 2023-2027 periods.[192] Within technology adoption, big data, cloud computing and AI feature highly on likelihood of adoption. More than 75% of companies are looking to adopt these technologies in the next five years. The data also shows the impact of the digitalization of commerce and trade. Digital platforms and apps are the technologies most likely to be adopted by the organizations surveyed, with 86% of companies expecting to incorporate them into their operations in the next five years. E-commerce and digital trade are expected to be adopted by 75% of businesses. The second-ranked technology encompasses education and workforce technologies, with 81% of companies looking to adopt these technologies by 2027. The adoption of robots, power storage technology and distributed ledger technologies rank lower on the list.

Big data analytics, climate change and environmental management technologies, as well as encryption and cybersecurity, are anticipated to serve as the primary catalysts for job growth. On the other hand, agriculture technologies, digital platforms and apps, e-commerce and digital trade, and AI are all projected to bring about significant disruptions in the labor market, with a notable number of companies expecting job displacement within their organizations.

However, this displacement is expected to be offset by job growth in other areas, resulting in an overall positive net impact.[193] All but two technologies are expected to be net job creators in the next five years: humanoid robots and non-humanoid robots.Employers anticipate a structural labour market churn of 23% of jobs in the next five years.[194]This can be interpreted as an aggregate measure of disruption, constituting a mixture of emerging jobs added and declining jobs eliminated. Respondents to this year's Future of Jobs Survey expect a higher-than-average churn in the Supply Chain and Transportation and Media, Entertainment and Sports industries, and lower-than-average churn in Manufacturing as well as Retail and Wholesale of Consumer Goods. Of the 673 million jobs reflected in the dataset in this report, respondents expect structural job growth of 69 million jobs and a decline of 83 million jobs. This corresponds to a net decrease of 14 million jobs, or 2% of current employment.[195]

Employers project that within the next five years, 44% of workers' skills will face disruption. Among these skills, cognitive abilities are seen as gaining importance at the fastest rate, highlighting the increasing significance of complex problem-solving in the workplace. Surveyed businesses also note that creative thinking is growing in importance slightly faster than analytical thinking. Technology literacy is the third-fastest growing core skill. Self-efficacy skills rank above working with others, in the rate of increase in importance of skills reported by businesses.[196] The socio-emotional attitudes which businesses consider to be growing in importance most quickly are curiosity and lifelong learning; resilience, flexibility and agility; and motivation and self-awareness. Systems thinking, AI and big data, talent management, and service orientation and customer service complete the top 10 growing skills. While respondents judged no skills to be in net decline, sizable minorities of companies judge reading, writing and mathematics; global citizenship; sensory-processing abilities; and manual dexterity, endurance and precision to be of declining importance for their workers.[197]Six out of 10 workers will require training before 2027, but only half of workers are seen to have access to adequate training opportunities today. The highest priority for skills training from 2023-2027 is analytical thinking, which is set to account for 10% of training initiatives, on average. The second priority for workforce development is to promote creative thinking, which will be the subject of 8% of upskilling initiatives. Training workers to utilize AI and big data ranks third among company skills-training priorities in the next five years and will be prioritized by 42% of surveyed companies. Employers also plan to focus on developing worker's skills in leadership and social influence (40% of companies); resilience, flexibility and agility (32%); and curiosity and lifelong learning (30%). Two-thirds of companies expect to see a return on investment on skills training within a year of the investment, whether in the form of enhanced cross-role mobility, increased worker satisfaction or enhanced worker productivity.[198]The most common labour shortages by occupations in 2022 in Europe have been shown in figure 1 below.

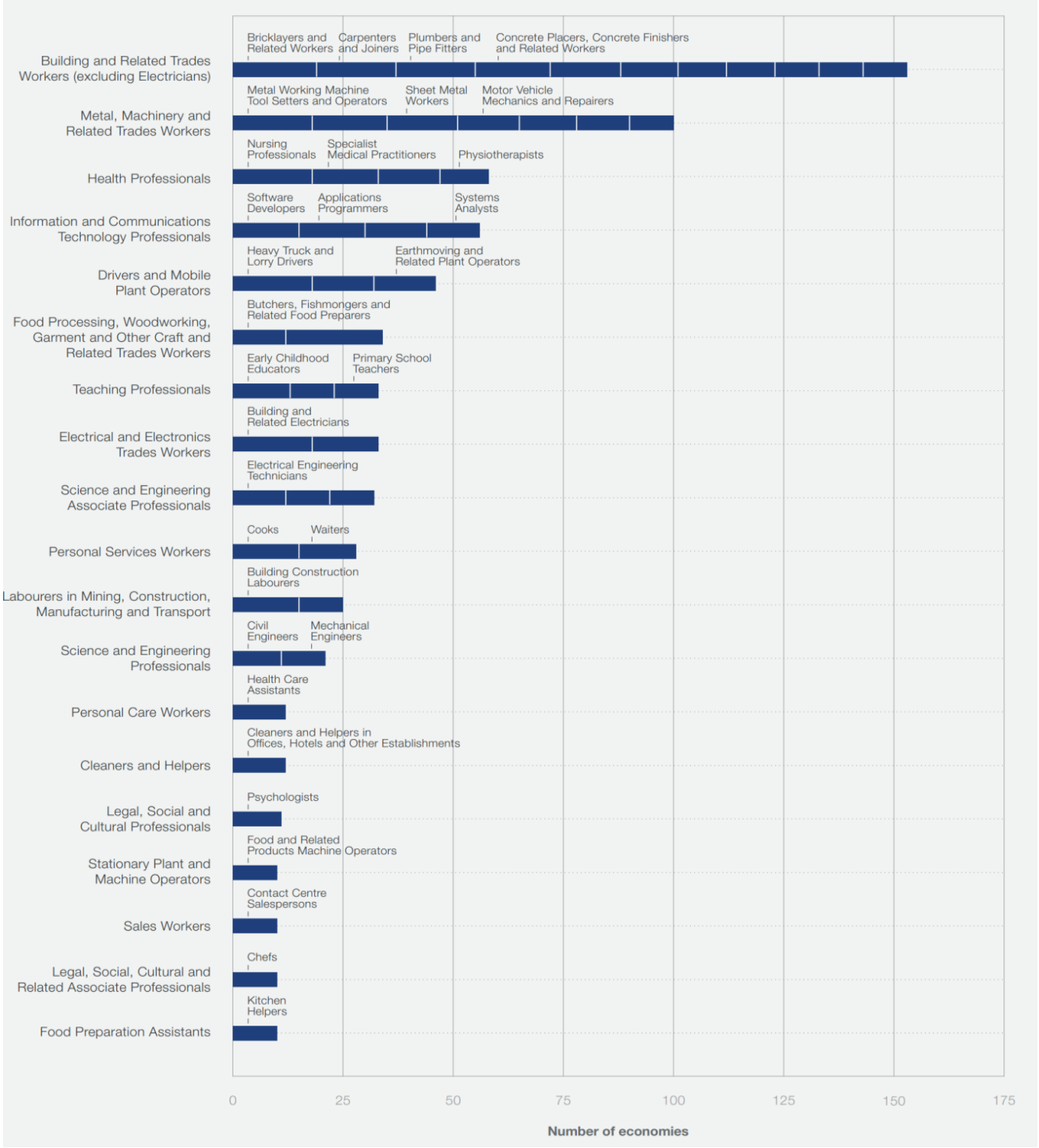

Figure 1: Most common labour shortages by occupations in 2022 in Europe (Source: Labour shortages report 2022, European Labour Authority)

According to the International Labour Organization (ILO), labour income in many developing countries remains below pre-pandemic levels.[199] In 2020, the global economy started experiencing inflation levels not seen in almost 40 years.[200] With high inflation, the global cost-of-living crisis has hit the most vulnerable hardest.[201] According to the ILO, for the first time over the last 15 years, workers' real wages have declined – by 0.9% in the first half of 2022.Across regions, real wage growth was most affected in Northern, Southern and Western Europe; Latin America; Asia Pacific; and North America.[202] In Africa, real wages saw a 10.5% drop in 2020 due to the global pandemic. However, real wages have continued to increase in 2022 across Asia Pacific, Central and Western Asia and Arab states.In line with rising inflation, purchasing power has declined for the most vulnerable, given the higher weight of energy and food in expenditures of the lowest-income households.[203]

According to recent research by the United Nations Development Programme (UNDP), rising food and energy prices could push up to 71 million people into poverty, with hot spots in Sub-Saharan Africa, the Balkans and the Caspian Basin.[204] This cost-of-living crisis highlights the importance of designing permanent models of social protection for non-standard employment and the informal economy that provide security and support resilience.[205]

Figure 2 summarizes the upskilling and reskilling strategies of companies responding to the Future of Jobs Survey for 2023 to 2027. For a representative sample of 100 employees, businesses estimate that 39 will not require training before 2027; 12 will need training that will not become accessible to them until 2027; 15 will require training which will not be accessible for the forseeable future, likely leaving their skills gaps unclosed beyond 2027; and 18 will be upskilled in their post by 2027. Companies expect that 16 of the representative 100 employees will be reskilled and successfully redeployed to growing roles within their organization by 2027.

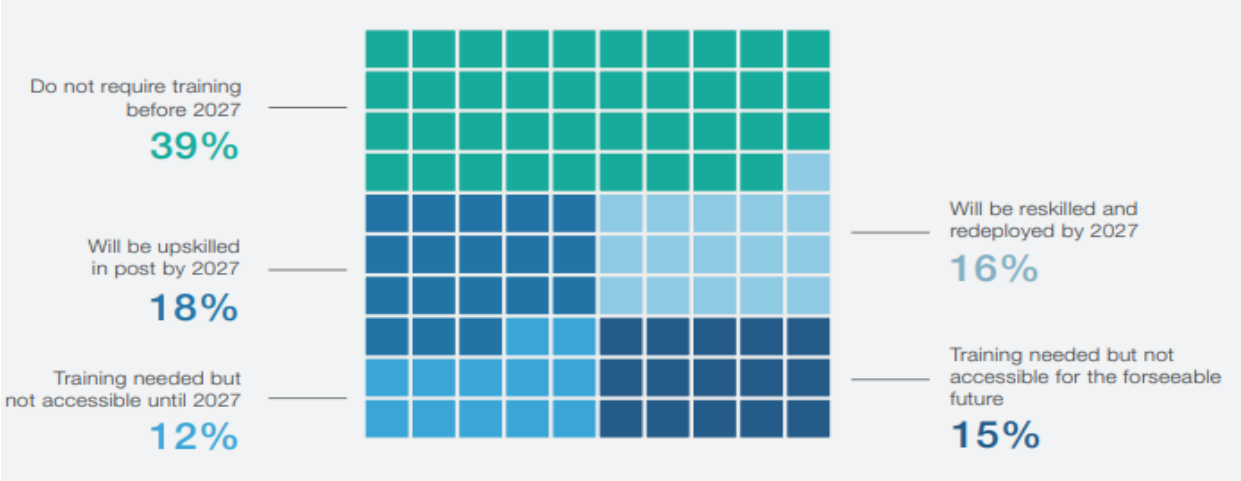

Figure 2: Upskilling and reskilling outlook, 2023-2027, by workforce fraction(Source:WEF, Future of Jobs Survey 2023)

Research conducted by LinkedIn for the Future of Jobs Report 2023 describes the 100 roles that have grown fastest, consistently and globally, over the last four years – known as the "Jobs on the Rise". While ILO and OECD data show which sectors are employing more people, Jobs on the Rise data identifies the specific job types that have experienced significant growth. In line with ILO and OECD data on the growth of roles in the Information Technology and Digital Communication sector, Technology and IT related roles make up 16 of the top 100 Jobs on the Rise, the third-highest of all job groupings. Jobs related to Sales Growth and Customer Engagement top the list, with 22 of the 100 roles. With roles such as Sales Development Representatives, Director of Growth, and Customer Success Engineer featuring in this group, this may suggest an increasing focus on broadening customer groups and growth models in a world with increasing digital access and rapid technological advancement.[206] Human Resources and Talent Acquisition roles are the second-most popular roles, and most of these relate to Talent Acquisition and Recruitment, including a specific role for Information Technology Recruitment; perhaps illustrating the increasing difficulty and importance of accessing talent in a generally strong labourmarket.LinkedIn jobs on the rise (asgrowing roles by job type)in2018-2022have been shown in figure 3. Andfastest growing job postings on LinkedIn 2018-2022 has been shown in figure 4.

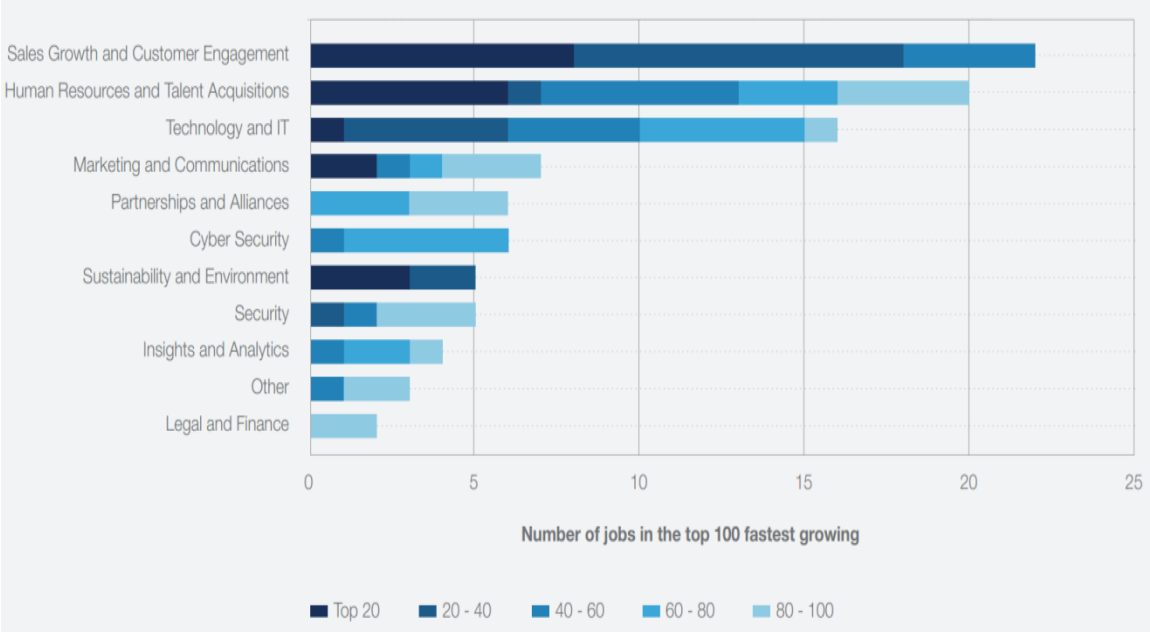

Figure 3:LinkedIn jobs on the rise, asgrowing roles by job type in 2018-2022 (Source:LinkedIn)

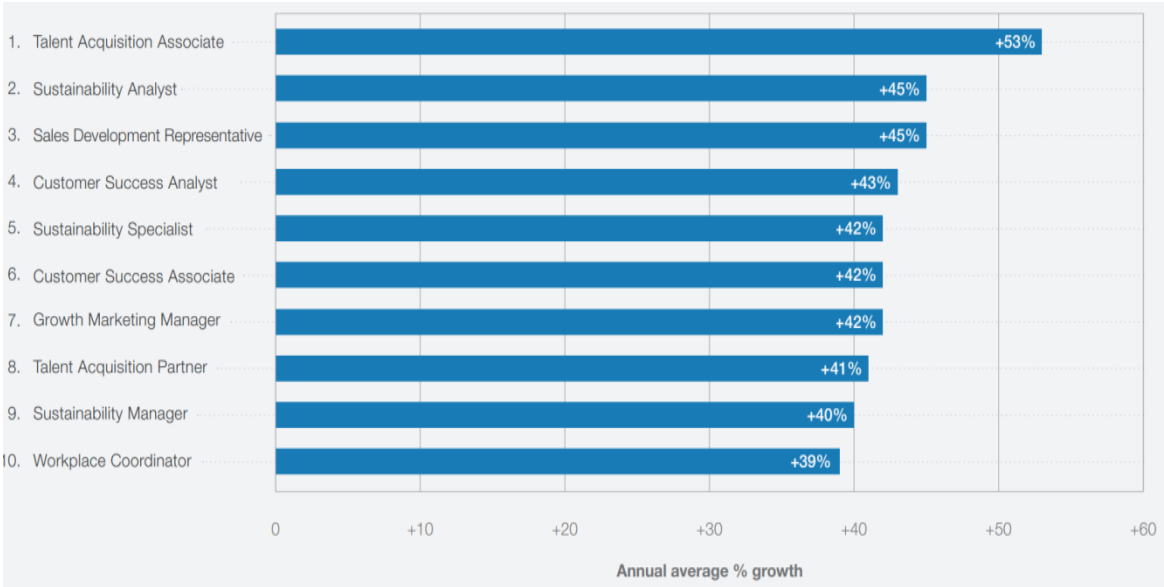

Figure 4:Fastest growing job postings on LinkedIn 2018-2022(Source:LinkedIn)

The skills that companies report to be increasing in importance the fastest are not always reflected in corporate upskilling strategies. Beyond the top-ranked cognitive skills are two skills which companies prioritize much more highly than would appear according to their current importance to their workforce: AI and big data as well as leadership and social influence.[207] Companies rank AI and big data 12 places higher in their skills strategies than in their evaluation of core skills, and report that they will invest an estimated 9% of their reskilling efforts in it – a greater proportion than the more highly-ranked creative thinking, indicating that though AI and big data is part of fewer strategies, it tends to be a more important element when it is included.[208] Leadership and social influence ranks five places higher than suggested by its current importance and is the highest ranked attitude. Other skills which are strategically emphasized by business are design and user experience (nine places higher), environmental stewardship (10 places higher), marketing and media (six places higher) and networks and cybersecurity (five places higher).[209] Respondents express confidence in developing their existing workforcehowever, they are less optimistic regarding the outlook for talent availability in the next five years. Accordingly, organizations identify skills gaps and an inability to attract talent as the key barriers preventing industry transformation. In response 48% of companies identify improving talent progression and promotion processes as a key business practice that can increase the availability of talent to their organization, ahead of offering higher wages (36%) and offering effective reskilling and upskilling (34%).45% of businesses see funding for skills training as an effective intervention available to governments seeking to connect talent to employment.[210]

Funding for skills training ranks ahead of flexibility on hiring and firing practices (33%), tax and other incentives for companies to improve wages (33%), improvements to school systems (31%) and changes to immigration laws on foreign talent (28%).[211]

Future of Jobs Survey results highlight expected future trends in technology adoption across industries. Figure 5 presents the technologies according to companies' likelihood to adopt them by 2027. As in previous years, big data, cloud computing and AI feature near the top of this list, with approximately 75% of companies looking to adopt these technologies in the next five years. The data also shows the impact of the digitalization of commerce and trade, with platforms and apps likely to be adopted by 86% of companies and e-commerce and digital trade likely to be adopted by 75% of businesses. The secondranked technology is education and workforce technologies, with 81% of companies looking to adopt this technology by 2027.Technology adoption in future within 2023-2027 has been shown in figure 5 below. The Future of Jobs Survey also probes the expected impact of technology adoption on employment. Figure 6 shows that all but two technologies are expected to be net job creators in the next five years. Big data analytics, climate change and environmental management technologies, and encryption and cybersecurity are expected to be the biggest drivers of job growth. Agriculture technologies, digital platforms and apps, e-commerce and digital trade, and AI are all expected to result in significant labourmarket disruption, with substantial proportions of companies forecasting job displacement in their organizations, offset by job growth elsewhere to result in a net positive. Generative AI has received particular attention recently, with claims that 19% of the workforce could have over 50% of their tasks automated by AI and job losses making headlines, while others expect the technology to Share of organizations surveyed that expect each technology to create or displace jobs, ordered by the job creation net effect.[212] The shares of organizations which expect the impact of adopting these technologies to be neutral are not plotted enhance jobs.[213] Only robots, whether humanoid or non-humanoid, are forecast to have a net negative overall impact on employment in our data, with roughly equal cohorts of companies expecting growth, displacement and neutral impact.

The shares of organizations surveyed which forecast a neutral impact are not plotted. While respondents operating in different industries show differing preferences for technologies, there are a few industries that show much higher overall expectations to adopt new technologies while some are more cautious.[214] The Electronics and Chemical and Advanced Materials industries are planning to adopt more technologies than average, while the Employment Services, Insurance and Pension Management, and Real Estate industries are the least inclined to adopt new technologies. Environmental management technology is one of the technologies with the most differentiated uptake across industries, with 93% of Oil and Gas employers expected to adopt the technology, followed by Chemical and Advanced Materials (88%) and Production of Consumer Goods (86%). In contrast, just 26% of Employment Services employers expect to adopt this technology, followed by Education and Training (36%) and Insurance and Pension Management (42%). Similarly, augmented and virtual reality is likely to be heavily adopted by organizations in Electronics (80%); Research, Design and Business Management services (77%); and Energy Technology and Utilities (75%) industries, compared to Mining and Metals (46%); Accommodation, Food and Leisure services (42%); and Agriculture, Forestry and Fishing (30%) industries. Looking specifically at robots, Future of Jobs Survey data highlights the Electronics (83%), Energy Technology and Utilities (72%), and Consumer Goods (71%) industries as likely top adopters. Data from the International Federation of Robotics shows that the number of industrial robots per 10,000 workers has continued to rapidly increase over the last five years across countries.47 Industrial robot density has nearly doubled over the last five years, reaching 126 robots per 10,000 workers on average. Regarding robots' impact on employment, the strongest sectoral picture emerges for the adoption of non-humanoid robots, wherein 60% of companies operating in the Production of Consumer Goods and the Oil and Gas industry foresee job displacement, and 60% of companies operating in Information and Technology services foresee job creation in the next five years.

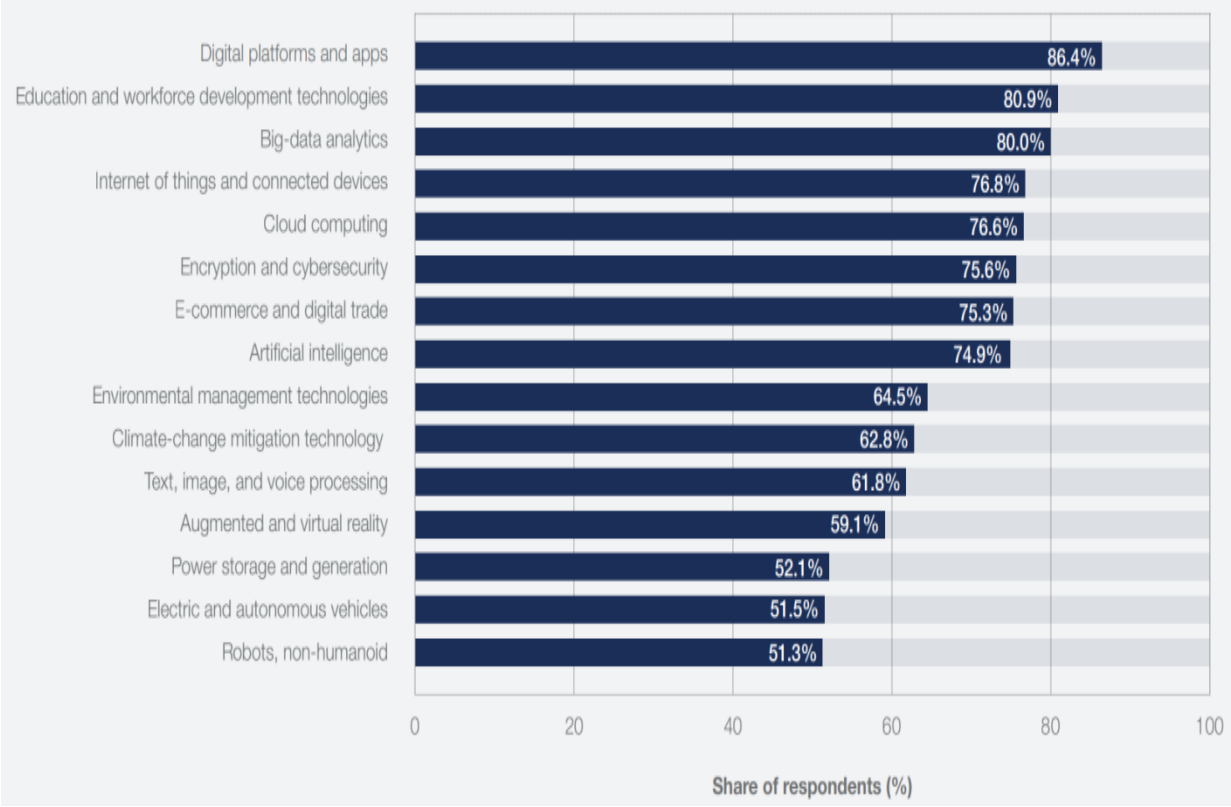

Figure 5: Technology adoption in future within 2023-2027 (Source:WEF, Future of Jobs Survey 2023)

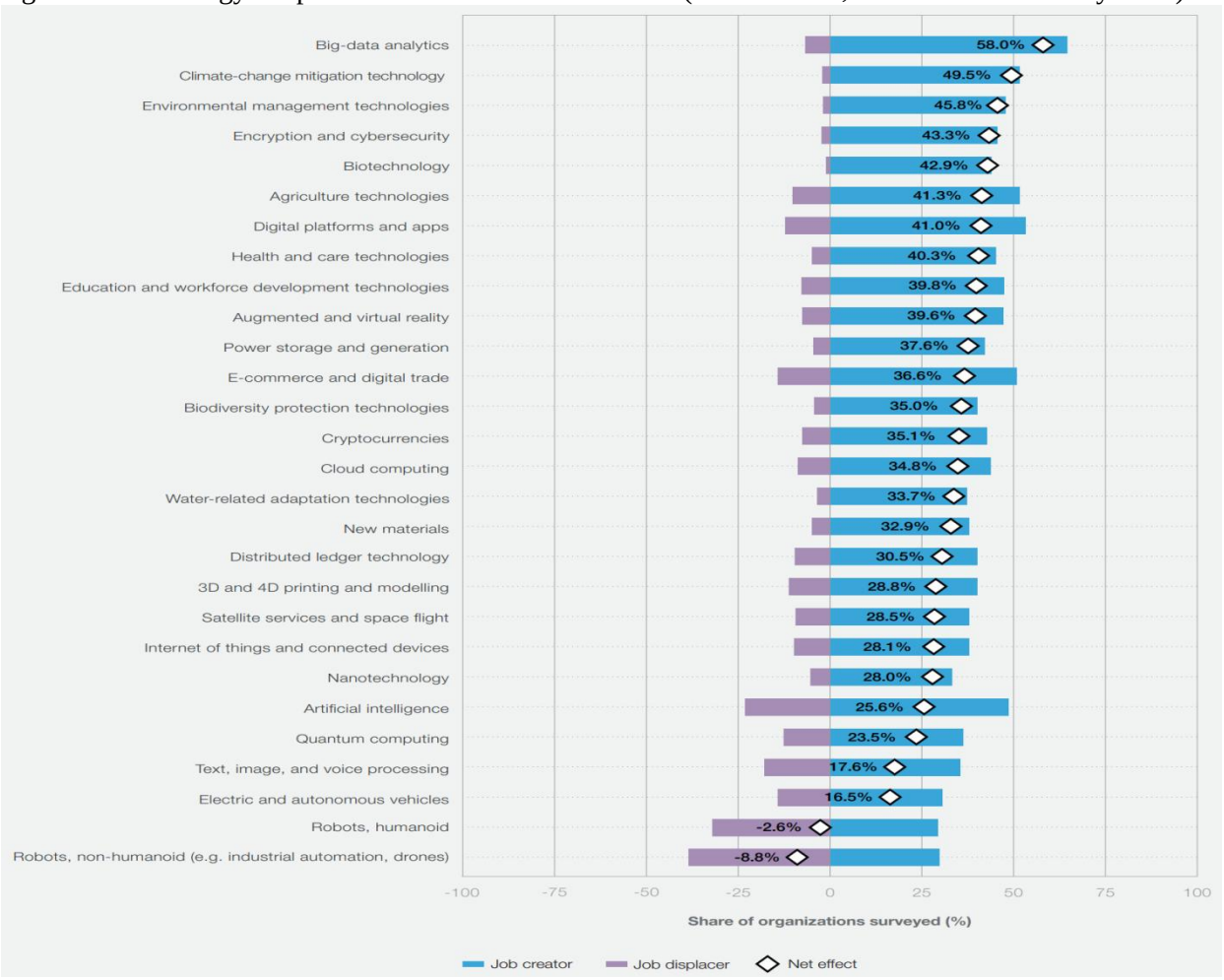

Figure 6: Expected impact of technology adoption on jobs, 2023–2027 (Source:WEF, Future of Jobs Survey 2023)

Labour-market churn refers to the pace of reallocation of workers and jobs. The survey provides insight into structural labour-market churn; namely, the number of expected new jobs, plus the number of roles expected to be displaced during the period, divided by the size of the labour force in question. Structural churn does not include the natural churn of workers moving between jobs for personal reasons.[215] Five-year structural churn is estimated for each job by summing the absolute magnitudes of its reported workforce fraction changes from now to 2027, reported by the respondents in the Future of Jobs Survey, and dividing by the summed workforce fractions today, reported by the respondents in the Future of Jobs Survey. It can be interpreted as an overall measure of disruption, both growth and decline. Overall, estimated structural labour-market churn of 23% for surveyed companies across sectors and countries over the next five years and has been shown in figure 7. This indicates that total expected job movement, including both new roles being created and existing ones being destroyed, represents 23% of the current workforce.[216] This finding helps to illustrate situations whereby relatively modest changes in net job numbers across a country or industry can partly mask major underlying reconfigurations within a churning labour market. In the next five years, 83 million jobs are projected to be lost and 69 million are projected to be created, constituting a structural labour-market churn of 152 million jobs, or 23% of the 673 million employees in the data set being studied. This constitutes a reduction in employment of 14 million jobs, or 2%. Future churn expectations for the next 5 years are likely to continue the ongoing structural reconfiguration of labour markets. According to WEF Future of Jobs Survey 2023 report's churn analysis suggests a higher than average churn from 2023 to 2027 in the Supply Chain and Transportation and Media, Entertainment and Sports industries, where respondents estimate structural five-year churn to be 29% and 32% respectively, but lower than average churn in Accommodation, Food and Leisure; Manufacturing and Retail; and Wholesale of Consumer Goods and has been shown in figure 8 below. Relatively high churn is also forecast in the Telecommunications and Media, Entertainment and Sports, Financial Services and Capital Markets, and Information and Technology Services industries, in part reflecting technology-driven job changes.

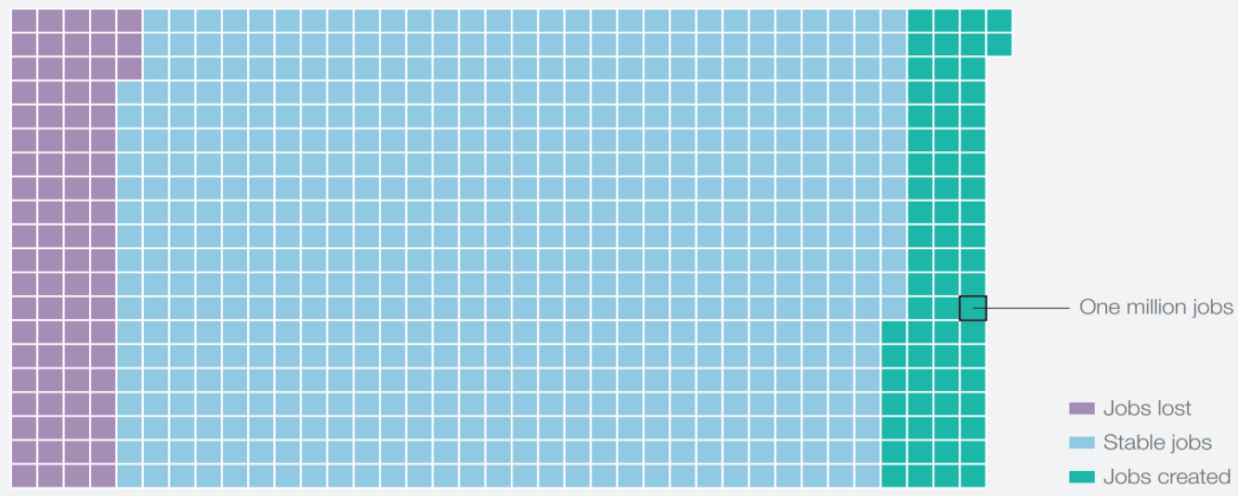

Figure 7: Projected job creation and displacement, 2023-2027(WEF, Future of Jobs Survey 2023; International Labour Organization, ILOSTAT)

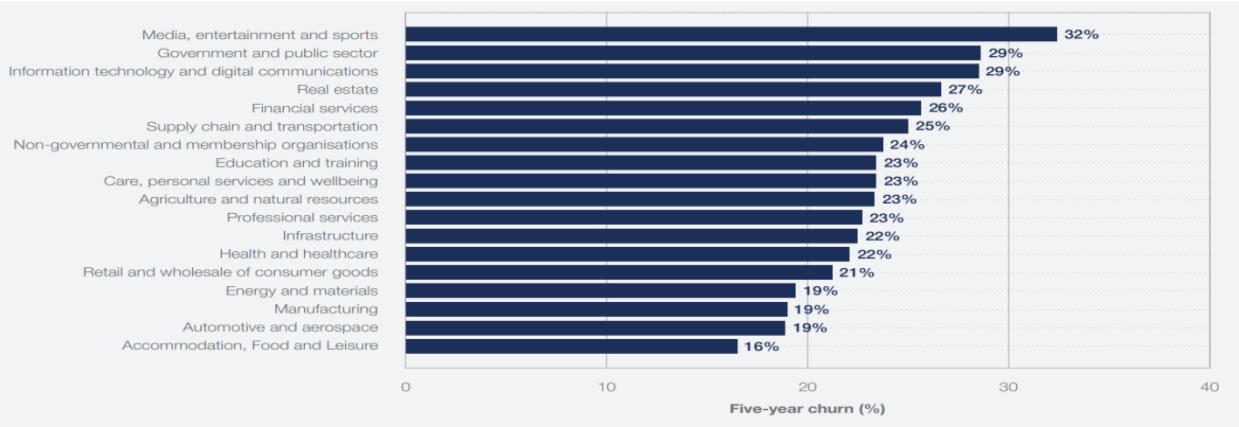

Figure 8:Labour market churn, by industry(WEF, Future of Jobs Survey 2023)

Projected job creation (blue) and displacement (purple) between 2023 and 2027, as a fraction of current employment, for the global employee data set studied in this report. The projected net growth or decline for each occupation in the next five years (diamonds) calculated by subtracting the two fractions.[217] The projected structural labour-market churn for each occupation in the next five years is the sum of the two fractions, and is indicated by the full width of the bars. Averaged across occupations, structural labour-market churn represents 23% of current employment. Top roles ordered by the largest net jobs reduction, calculated based on ILO occupation Employment statistics and growth reported by organizations surveyed or informal employment. The conclusions derived for this subset of data should thus not be treated as comprehensive, but provide useful insights on selected segments of the workforce. Figures 9 and 10 present data on jobs that are expected to see the most absolute growth and decline, and survey results suggest that the highest growth from 2023–2027 will be for Agricultural Equipment Operators, Heavy Truck and Bus Drivers, and Vocational Education Teachers. Data Entry Clerks; Administrative and Executive Secretaries; and Accounting, Bookkeeping, and Payroll Clerks are expected to suffer the greatest reduction in employment. Combined, these three roles make up over half of the total expected job destruction. Overall, our analysis suggests that 69 million jobs will be created and 83 million jobs destroyed, leading to a contraction of global labour markets of 14 million jobs in the next five years at the present rate of change, though this figure is subject to a high degree of uncertainty as it is not holistic.[218] The sum of these changes yields the estimated overall structural labour-market churn of 23% of the current global workforce the data is able to cover.[219]Top roles ordered by largest net job growth and reduction, calculated based on ILO Occupation Employment statistics and growth reported by organizations surveyed has shown in figure 9 and 10 respectively below:

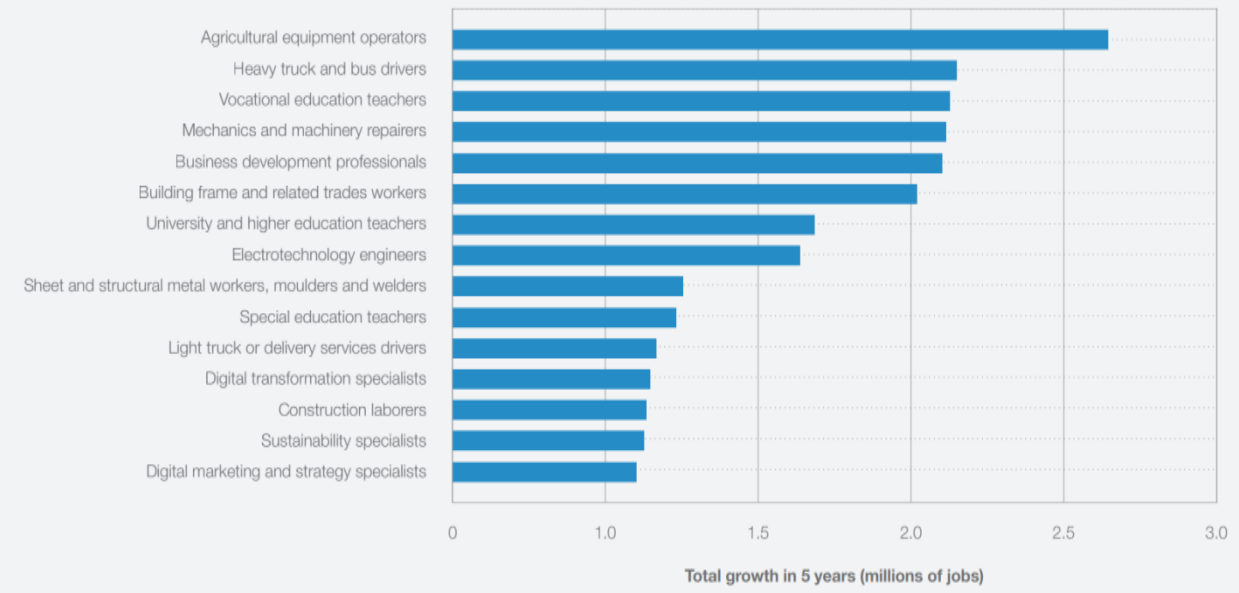

Figure 9:Largest job growth, millions (WEF, Future of Jobs Survey 2023)

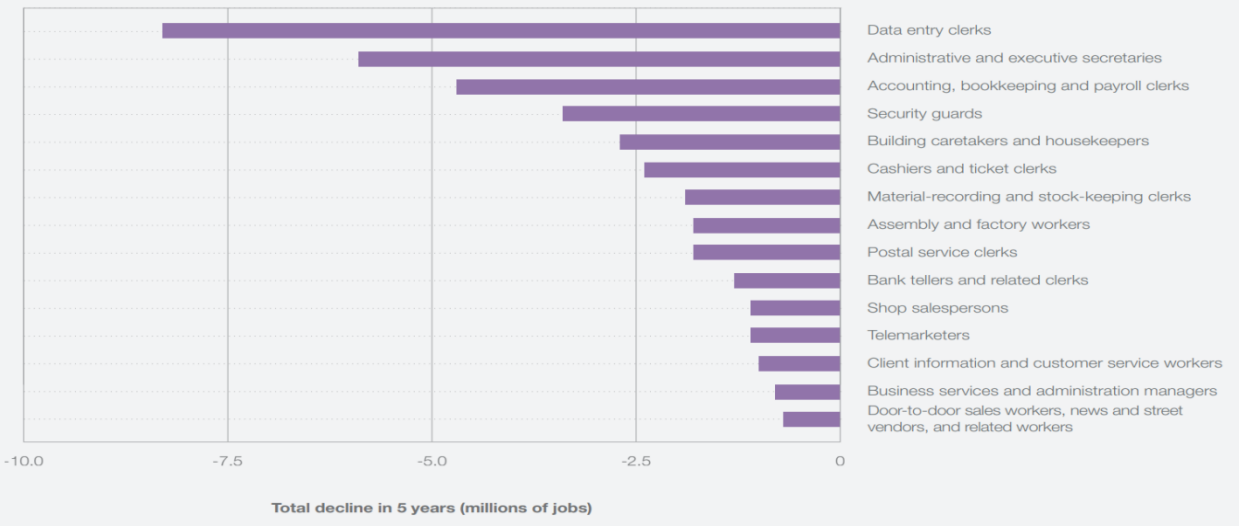

Figure 10: Largest job decline, millions (WEF, Future of Jobs Survey 2023)

Importance of Digital and Smart Skills and Best Employable Skill for Young Generation

Businesses in all sectors that want to build their brands, provide excellent social customer care, generate leads, and boost sales need to have employees with strong digital capabilities. 'A range of abilities to use digital devices, communication applications, and networks to access and manage information', is how UNESCO defines digital skills. To facilitate productive and creative self-fulfillment in life, study, employment, and social interactions, they empower individuals to generate and exchange digital information, communicate and cooperate, and address challenges. Students who acquire digital skills not only increase their employability but also future-proof their careers by becoming familiar with important digital platforms.[220]Modern students and professionals have the opportunity to enrich their daily lives and careers by developing their digital skills. Acquiring a foundational understanding of technology serves as the initial gateway to mastering various other competencies. These skills can instill confidence in students when it comes to using technology effectively in their work, education, and everyday activities. In today's world, a multitude of professions necessitate proficiency in digital skills, and even in occupations with lower skill requirements, students and employees still find them beneficial.[221] For instance, if students or employees operate in a store or warehouse, you might preserve digital stock records. Every day, students and workers alike require digital skills for tasks like banking, shopping, and staying in touch with loved ones. It can help students and employees succeed by assisting with interview preparation. Most jobs are now posted online. They can submit a CV by email or an online application form. Online tests or a video interview are now included in the manual job selection procedure. If students or employees feel comfortable utilizing the most fundamental digital tools, they may continue to study more specialized skills like website coding, social media marketing, cyber security, and producing digital goods and services. As a result, individuals could discover new employment prospects and improve their performance in their existing position.[222]

Young individuals or students commencing their professional voyage frequently contend with a multitude of unanswered queries, acknowledging the possibility of substantial shifts in traditional employment dynamics as time progresses. The younger generation may have apprehensions about pursuing higher education or venturing into an alternative, more satisfying career trajectory. Alternatively, those who are already established in their careers might be keen on understanding the fluctuations in the labor market. There are many alternatives, but it's important to keep an eye on the occupations that will have demand in the future. The elements that need to start taking into account for the ideal jobs in the future are flexibility, demand, security, and growth potential. It doesn't imply that young generation should disregard their hobbies, objectives, and experience (both professional and academic) when choosing the finest future vocations.[223] The fact that pupils are learning about the conceivably finest employment prospects in the future is fantastic. They will be better able to choose a profession. Students should think about the most in-demand careers for stability and security, or they risk being at a disadvantage later in life. We are aware that the logic of the job market will always be in line with advances in science, technology, and global demand. The current discoveries, inventions, and improvements in the field of technology are referred to as trends. [224]These trends frequently influence the course of enterprises, industries, and society at large, affecting how we communicate, function, and live.One can embrace new tools, enhance procedures, and take advantage of growth prospects by being knowledgeable about evolving technology.[225]In 2023, the most prominent technological trends include AI, ML, Blockchain, 5G, IoT, quantum computing, VR/AR, and cybersecurity. Here are some of the leading career paths and industries for the future that are accessible to anyone. Many of these roles are already available today and are anticipated to remain relevant for several more years.

Our professional life is currently undergoing significant change as a result of megatrends like globalization, digitization, and others. The OECD intends to support stakeholders and governments in creating a more inclusive workplace. By doing this, we encourage advancement in the direction of SDGs 4 and 8, which deal with universal access to high-quality education, opportunities for lifelong learning, and good jobs. We offer knowledgeable counsel to decision-makers, work to elevate many viewpoints and ideas in the public discourse, and establish forums for cross-sector dialogue and cooperation. We can create a better workplace together. Some abilities are becoming outdated as technology develops while the demand for others is growing. Although such changes result in the creation of new jobs, automation also eliminates the necessity for human input in some lower-skilled occupations. As a result, some people run the risk of falling behind, especially low- and semi-skilled workers who carry out repetitive duties that can be automated. In the OECD, about 1 in 2 workers will probably be impacted in some manner, with close to 14% of employment falling into this category and another 32% having a high probability of being at least partially automated. Over the past decade, jobs and the way people perform them have undergone significant changes.

It's interesting to note that numerous industries have adopted robot suits, and employees have had to learn how to use them. It may surprise you to learn that 60% of workers in OECD nations lack the rudiments of computer literacy, with 40% of their jobs being in highly digitalized industries. Again, at the same time, workers in the business are utilizing new technologies to complete their tasks more quickly, locating employment through online job boards, and working in novel ways with coworkers around the world.[226] The situation in LDCs and emerging nations, on the other hand, is more difficult and aggravating. It is a fact that we might work more flexibly to better balance our job and personal lives or change careers later in life. We must make sure that individuals can adapt to these technological changes successfully and that they receive the full benefits that new technologies provide. Therefore, we should assist the general public, or people everywhere, in acquiring the necessary skills for new jobs, as well as learning how to use advanced technologies.

We will need to adjust not only what we study in primary school but also what and how we learn in secondary school if we want to keep up. More students than ever before in the OECD hold a higher degree today: 45% in 2018 compared to 35% in 2008. Even so, persons with degrees are more likely to be employed than those without. However, many firms claim they are unable to locate personnel with the necessary abilities. In order to appropriately prepare pupils for the job market, further education is also required. Is higher education displacing other routes to skills provided by professional and vocational programs? What is effective? What should be done? What else needs to be done to make sure that skill acquisition and labor market needs are well matched? We must be ready to keep learning throughout our life as the needs change. Building programs to train individuals for the future of employment is well underway in several nations. For instance, France provides employees with the ability to take portable and transferrable paid training leave between firms. Finland based its predicted regional labor market needs on which training programs are most in-demand. Spain is leading an effort for SMEs to create apprenticeship programs and link existing vocational credentials with companies' skill requirements. Sector Skills Councils play a significant coordination role in Canada and the Czech Republic, while autonomous organizations like national skills advisory committees assist in improving coordination in Denmark, Finland, and Germany. Only 2 out of every 5 persons overall high skilled workers participate in education and training each year. [227]To guarantee that everyone's skill needs are identified and satisfied, however, there is still much work to be done. Significant investment is required to retrain workers at danger of being displaced by automation. School systems must provide kids with the tools they need to study throughout their lives and must improve the resources and training available to teachers. To overcome inequities, training should be directed at those who need it the most.

The Bureau of Labor Statistics' Occupational Outlook Handbook (OOH) is a useful resource for identifying the top career options. It offers thorough details on hundreds of professions, outlining both the work itself and typical workplaces.[228] The best employment of the past may not be the best jobs of the present. For instance, American industry reached its peak 50 to 75 years ago. The middle class[229] was accessible to employees with less education thanks to high-paying factory positions. Outside of a few high-tech areas, however, most of those employments have already disappeared. More job vacancies in industries like high tech, engineering, AI, ML, data science, health care, personal care, food service, and advanced technology are expected in the 2020s. While the economy as a whole is expected to increase by 7% between 2023 and 2033, the OOH forecasts that the vast majority of these fields will expand by more than 10% during that time. However, knowing more about each industry and its objectives may aid students or employees in figuring out where they'd fit in well. Consider which objectives appeal to them the most.[230] Once again, a typical career coach is equipped to assist clients with their resumes, interviews, and job searches. They lack the training to assist them in choosing the ideal career.

The future development of industrial systems will be grounded in sustainability. Current technology is advancing rapidly, facilitating swifter progress and innovation, thereby accelerating the pace of change. Technology trends and new technologies are developing, but a lot more has changed this year as a result of the COVID-19 epidemic, which made engineers in general and IT professionals in particular recognize that their roles would alter in the contactless world of the future. With improvements in machine learning and natural language processing, artificial intelligence will be more common in 2023. Using this technique, artificial intelligence will be able to comprehend us better and carry out more difficult tasks. According to predictions, 5G and smart technologies will change how we live and work in the future. Therefore, students, teachers, and employees should keep up with the newest technological advances. They should keep an eye on the future to understand what abilities they will need in the future to get a secure job or career and even learn how to get there.[231]

Computing Power, Smarter Devices, Datafication or codding, Artificial Intelligence (AI) and Machine Learning (ML), Augmented Reality, Virtual Reality (VR), Extended Reality (ER), Digital Trust, 3D Printing, Genomics, New Energy Solutions, Robotic Process Automation (RPA), Edge Computing, Quantum Computing, Blockchain, Internet of Things (IoT), 5G, Cyber Security, etc. are new technology trends that will emerge in the near future.[232]As we know that, the future is uncertain, and students will never be able to predict its course. However, students can prepare for it and avoid choosing a professional path that won't be competitive in the job market in the future. Making the appropriate job choice is always crucial. Today's shifting industry trends render certain employment outdated while increasing the value of others. The factors that new generation or young people and students need to start taking into account for the best professions for the future for them are flexibility, demand, security, and growth potential. When choosing the best future career or profession, it does not imply that people give up their interests, ambitions, experience, talent, and educational and professional potential.

Social Media. According to a recent research, today there are 4.2 billion active social media users globally. Out of them 4.15 billion of them use mobile devices actively. According to this data, the number of social media users worldwide increased by 13.2% in just one year and is showing no signs of slowing down. So, it will be more lucrative profession in future. Every professional should be able to comprehend and use social media successfully because it is a fundamental and valuable skill. The goal of social media marketing is to comprehend the dynamic relationship between businesses, influencers, and customers rather than just tweeting or updating Facebook. Due to the prevalence of consumers using social media to post questions or comments, it now also plays a crucial part in providing excellent customer service. For graduates to gain meaningful and practical skills, social media influencers should be aware of the nuances of each platform, from YouTube to TikTok marketing, and how to enhance community participation.

Search Engine Marketing (SEM). Today one of the most important disciplines on which marketers have come to rely is search engine marketing (SEM). For example, let's consider that todays' global 81% of internet users conduct an online search before making a purchase, with 70% of that traffic coming from Google. Students with SEM knowledge can primarily use paid advertising to boost a company's website's visibility on a search engine like as Google or Bing. By doing this, the company will get beneficial search engine traffic to its website. Students and employees will be able to seize priceless organic search traffic outcomes by applying SEM.To achieve the highest possible conversion rates, marketers, content managers, and webmasters devote a lot of work to optimizing websites, especially for mobile and ad campaigns. The majority of businesses compete online to attract customers by overtaking their rivals in the sales of goods and services. The amount of clients making purchases online during the COVID 19 outbreak caused an increase in e-commerce transactions. Statista reports that about 22 billion people visited retail websites in June 2020. Interesting Plus, this online activity doesn't seem to be slowing down after Covid.[233] As a result, employers will value job searchers with search marketing experience highly.

Content Marketing. Content is available to us in a variety of formats these days, including blog posts, videos, podcasts, infographics, eBooks, case studies, newsletters, free tools, and even social media status updates.[234] Although marketers usually have spent their time refining their keyword strategies; but ad campaigns, content is still remain as ruler. Because content is what drives a website or social media page, without it, clients have no means of knowing the advantages of a good or service. Content is essential for increasing brand recognition and can position influencers or brands as thought leaders. As a result, prospective hires must comprehend the significance of producing material that is not only related to keyword research but also optimized for it. Those students who possess expertise and knowledge in content marketing acquire a valuable skillset that equips them for success in any professional field.

Email Marketing. Nowadays email is a tried-and-true strategy that is one of the finest ways to get and keep leads. Global business leader like Elon Musk believes and uses email as command, communication and controlling tools. One of the earliest types of direct marketing, email is still remain effective in attracting new clients and keeping existing ones. A strong email marketing strategy is essential for the launch of successful campaigns, whether for small businesses or large enterprises. A seasoned digital marketer is aware that every step of the funnel needs to be properly thought out.Every stage must be optimized to draw users in and foster engagement, from the signup page and its placement on a website to the welcome email. It's intriguing to note that while people may occasionally change their home addresses or social media accounts, they tend to keep their email addresses consistent.

This pattern has created a substantial demand for individuals who possess the expertise to effectively engage with customers through email marketing strategies. Therefore,teachers should encourage new generation and students to rethink how they may use email in their current and future careers rather than viewing it as a dated tool.

Mobile Marketing. According to the Digital 2021 research by We Are Social and Hootsuite, mobile connectivity is continuing to increase, with 97% of people in the world owning mobile phones and 96% of all active connections coming from smartphones. Google currently crawls pages and prioritizes content using mobile-first indexing since smartphone traffic has surpassed desktop traffic (64%), which is why. We only need to look at Google, who developed a mobile-friendly web app to evaluate the usability and speed of mobile websites, to understand the effects of this transformation. When we use mobile-friendly material, we may improve our online visibility with customers who don't have access to desktop computers. Job searchers can leverage this information by customizing their campaigns to take advantage of the most recent advancements in user experience and mobile search.

Strategy and Planning. Over the course of time, one is more likely to witness measurable outcomes from digital marketing campaign strategies. Digital marketers should focus on creating and executing campaigns rooted in analytics and quantitative SEO data, rather than relying on haphazard planning. To put things in perspective, according to DMI's study paper, "Perpetual Evolution," 79% of senior marketers said that strategy and planning were "very important" for an organization's performance. Despite its significance, marketers found it to be one of the most difficult skill sets to fill. By instructing students on how to create and carry out a digital strategy, educators should take advantage of this skills gap.

Social Selling. Sales professionals must enhance their online proficiency to effectively connect with and influence clients. Social selling is proving to be a valuable strategy, with 65% of sellers relying on it to populate their pipelines, and it contributing to 50% of sales in 14 major industries. Businesses are beginning to invest in new'sales stack' technologies, such as email tracking tools, productivity apps, and sales intelligence software, as they begin to recognize the value of social selling. Above all, social selling techniques are seen to be particularly successful in reaching out to contemporary buyers who rely on social media for recommendations and reviews.Any student interested in a sales career and successful social selling will bebenefitedfrom training that is industry aligned because social selling is still a relatively new field for organizations.

Pay-Per-Click Marketing (PPC). The average landing page conversion rate, according to Larry Kim, is 2.35%, but the top 25% convert at 5.21% or higher, which is double that number. Additionally, just US$1 is used to convert a customer for every US$ 92 spent on customer acquisition. PPC is thus a well-liked strategy for brands to generate visitors swiftly. For significant traffic, businesses with large expenditures can pay to have their search result show up on Google's top page. Google's Ad-Words program is a well-known PPC advertising model, and for the digitally savvy jobseeker, using a PPC for e-Commerce tracker is a wonderful way to monitor spends and comprehends impressions, reach, cost per click, etc.

Video Developer. Video has changed from being merely an entertainment medium to a key source of social media material in today's intelligent society. Nowadays, few networks like TikTok and Instagram have turned video on its head to produce wealthy influencers. Today, TikTok and Instagram have made video a strong and influential medium as well as become very popular to all type of social media user. With the average age of smart-phone users rising, social media apps like WhatsApp, Weibo, and WeChat are quickly taking over as the standard methods for sending instant messages. In actuality, WhatsApp has more than 2 billion users worldwide, with American users constituting the majority of downloads. Compared to other content types like blog posts, video is simpler to absorb. Markets may access a rising market of engaged consumers by fusing the emotional impact of social media video with the reach and scope of digital advertising.

Data Scientist and Analyst. One of the most popular industries right now is data science, and it will continue further due to many good reasons. The amount of data used by businesses and their clients has grown tremendously. To use that data efficiently, organizations need very urgently the assistance of data scientists. Acquiring this proficiency would, therefore, empower the younger generation to effortlessly become highly sought-after professionals in the future. Nearly every industry, including e-commerce, startups, research institutions, marketing firms, etc., employs data scientists. The task of finding the best data analytics solutions for an organization falls to data scientists.[235]To fulfill their tasks, they must make use of deep learning, machine learning, and associated technologies.

Jobseekers should enroll in a data science course and gain the necessary knowledge if they want to work in this industry. Data scientists[236] are a new breed of analytical data specialists that possess the technical know-how to address complicated issues as well as the curiosity to discover what issues are worth addressing. [237]According to LightcastTM, the average compensation for a data scientist in the United States is US$ 108,659 per year.[238] Data scientists use data to examine the data and provide solutions. An analyst is a specialist who has the knowledge to explain the facts to anyone. The responsibility of a data analyst is to make complex data and its insights comprehensible to a broader audience. If a kid excels in math and statistics, this is a great field for them. In addition to those disciplines, this position necessitates knowledge of several programming languages. Data science, a relatively new field, is presently one of the most demandable industries, offering a future-proof career path. He will need to use data as a data analyst to find solutions to challenging business issues. The statement that data drives contemporary civilization is not exaggerated. Now, two and a half quintillion bytes of data are produced by humanity every day, a staggering amount that doesn't appear to be decreasing anytime soon.[239] International Data Corporation (IDC) recently released a report claiming that the market for big data and business analytics has been growing rapidly over the past few years, increasing from US$ 122 billion in global revenue in 2015 to US$189 billion in 2019 and on its way to a predicted US$ 274 billion for 2022.[240]

Software Developer. One of the most common industries in all over the world has been software development. The need for software engineers is increasing in pushbike with businesses' shift to digital platforms and reliance on digital goods. The coding and production of a software product are within the purview of software developers. To address any issues that may arise during software development, individuals in this field must collaborate in teams and demonstrate strong problem-solving skills. Additionally, they must continually update their skills to align with the evolving landscape of the software industry in order to meet market demands. A software developer should have excellent teamwork and communication abilities in addition to their technical expertise. They ought to understand how to communicate and exchange ideas with other team members. By enrolling in a software development course and gaining the essential knowledge, students and employees can become software developers. To create new software and upgrade old programs, software developers employ their programming expertise. A career as a software developer is well-suited for any student with a creative mindset who derives satisfaction from problem-solving.[241] The future world will be AI and ML driven and software developer as profession will be more lucrative then before.

Big Data Engineer. The person in charge of creating, maintaining, testing, analyzing, and assessing a company's data is known as a big data engineer. Extremely massive data sets are referred to as big data. Large amounts of data are frequently gathered by businesses in the modern economy as they carry out their daily activities. Big data is always helpful for businesses to increase productivity, profitability, and scalability when used properly. Big data engineering is a well-known profession with great demand. Today, we are producing a huge amount of data during our usual work. Experts predicted that the digital world will contain 44 zettabytes, or forty times as many bytes as there are stars in our observable universe by 2020. We have already crossed the limit before. Prominent data engineers can help with that. Today, of any organization's big data needs are handled by big data engineers. The infrastructure and technologies used by the organization or company for handling data are built by big data engineers. They are in charge of gathering, processing, storing, and studying data as well as data systems. For such position, an employee or student should be skilled in arithmetic, statistics, and problem-solving techniques. In addition to these abilities, employee or students should have good deductive and communication abilities so they can readily convey their findings to non-technical audiences. To pursue a position in those industries, employees or students can earn degrees in computer science, statistics, or mathematics. Since certification guarantees that a person has all relevant skills, businesses opt for certified specialists. To enter this field, it would be ideal to attend a big data course or relevant degree or skill development program. But without a big data engineer to create systems for data collection, maintenance, and extraction, a company's big data is useless. Therefore, big data engineers are ultimately responsible for assisting businesses in managing their huge data and it's a lucrative profession in deed.[242]

Cyber Security Expert. The number of cybercrime incidents has surged worldwide by 60% in a single year 2019 alone. The threat postured by cybercriminals and organizations is increasing due to our society becoming more digital and internet connected. Now, companies and organizations from all over the world have relied on cybersecurity specialists to assist them in overcoming these challenging circumstances and situations. Student consults businesses as a cybersecurity expert to help them comprehend the potential cyber risks they might encounter. In order to defend against hackers and malware, students can also help them strengthen their cybersecurity implementations.

Experts in cybersecurity assist organizations in training their workforce to adhere to best security standards. The need for cybersecurity experts is consistently growing, and if you enjoy helping people, this is unquestionably a great career for you. Students need have a degree in computer science or a related field to become cybersecurity experts. To obtain all the necessary skills in addition to earning a degree, it would be preferable if interested new generation or students enrolled in a cybersecurity course. It would make it simpler for them to land well-paying jobs in the cybersecurity industry. As a lucrative profession it will keep its demand on in future days ahead. One might select PG level cybersecurity courses to obtain the necessary understanding in the subject. The future is uncertain, and students will never be able to predict its course. However, students can prepare for it and avoid choosing a professional path that won't be competitive in the job market in the future. Making the appropriate job choice is important. Today's shifting industry trends render certain employment outdated while increasing the value of others. The Cyber Security Expert Master's Program from Simplilearn equips cybersecurity experts with fundamental, intermediate, and advanced skills that lead to industry-recognized certifications including CompTIA Security+, CEH, CISM, CISSP, and CCSP. The program starts with basic technology instruction before moving on to intermediate hacking skills like reverse engineering and network penetration testing.[243]

Artificial Intelligence (AI) and Machine Learning (ML) Expert. Experts in AI and ML are in high demand, and that need is only growing. Numerous industries, including finance, health, medicine, education, manufacturing, and production, use AI and ML. Roles in AI and machine learning are among the top rising careers in south Asia, according to a LinkedIn survey. Despite the rising demand for these professions, there is a severe lack of qualified and talented AI and ML specialists. The best employment opportunities for the next ten years include AI and ML. Although the AI industry is still young, competition will increase with time.[244] Student will need to acquire adept in programming, logic, and several computer science principles in order to become an AI or ML expert. To increase their chances of landing this position, students can enroll in a postgraduate study in artificial intelligence and machine learning. Implementations of the Digital Twin (DT) can advance smart manufacturing by fusing the physical and digital worlds. Applications of AI based on ML are widely regarded as innovative manufacturing technologies. [245]

Virtual Reality (VR) Developer. A variety of businesses are using virtual reality more and more to enable users to manipulate an object even when they are physically unable to do so. It has been discovered that highly competent workers may investigate objects they otherwise wouldn't be able to thanks to the use of VR by professionals as diverse as surgeons, instructors, and architects. Virtual reality (VR) feels like a fairly good wage if we were to pick a business that will be expanding for the next few decades. According to the most recent figures, the global market for AR and VR is expected to grow to US$296.9 billion in 2024 from US$30.7 billion in 2021. That represents a rise of almost tenfold. In 2021, Meta (formerly Facebook[246]) predicts that VR and AR will have a significant impact both now and in the future. Virtual reality is going to be a turning point for the employment market and the entire society, from marketing departments to video game makers.[247] If young people and students are interested in learning more about this topic, they can enroll in a few introductory courses like Introduction to VR Programming, Design, and Unity.[248] They can take an advanced course like "Construct a Virtual Reality Experience" if they already have some VR expertise. [249]

Augmented Reality (AR) Developer. As of 2022, the popular Pokémon Go game is an AR-related game[250] and has generated over six billion dollars in total revenue. It was completely novel for the mobile game industry and achieved success. It was a stroke of genius to combine an iconic franchise with augmented reality. Although AR revolutionized gaming and raised the standard, it is also succeeding in other sectors, like fashion, where AR closets let you try on things at home. As AR's applications expand, there is a rising need for developers skilled in this specialized area of technology.[251] Students and young people can learn more about immersive creative technology like AR by enrolling in courses offered by NFTS, Royal Holloway and other many firms, like Introduction to Virtual, Augmented, and Mixed Reality.[252] Nowadays there are also many job related to mixed reality (MR).

Biomedical Engineering. As a field of study, biomedical engineering is one of the best. This is in especially for individuals who are interested in finding out how modern engineering and life on Earth relate to one another. The work of biomedical engineers focuses on the integration of technology and medicine to improve human health. Artificial organs and other life-saving devices are being developed at the forefront by biomedical engineers. An excellent illustration of this is the artificial kidney. Since its inception, this has enhanced the lives of more than 2 million people. [253] After earning a bachelor's degree in this subject, it will be simple to acquire a full-time employment because there is a significant need for biomedical engineers.

According to the BLS, this industry will grow at a pace that is 6% greater than the national average until 2030.[254]

Biometrics. Biometrics is a leading career in the twenty-first century. The field of biometrics educates people on how to design tools that can identify living things. The facial recognition system is a prime illustration of this. In the coming years, biometrics and biometric readers will phase out current identifying methods. Many of the passwords that people use for their electronic gadgets will also be replaced. Smart-phones, smart devices, and laptops that let users log in using their fingerprint as a password rather than manually entering one are examples of this. Grand View Research estimates that by 2025, the biometrics industry would experience job growth of around 20%. [255]Organizations of all sizes working in the life sciences field place a high priority on maintaining the privacy and security of information. Touchstone Medical Imaging, a Tennessee-based company, was fined $3 million in 2019 for exposing over 300,000 patients' protected health information online via an unprotected FTP server; this could have been prevented with the use of biometric technology. [256]A Business Insider research claims that by implementing biometric authentication technology on computers and tablets, [257]25% of firms are avoiding scenarios like this. Biometrics graduates might work in the creation of the many biometric systems used by security services or serve as security intelligence analysts. They have access to some of the modern jobs that are increasing the fastest.

Digital Marketer. Today, one of the global industries with the quickest growth is digital marketing. Country like Bangladesh is expanding with a rate of 25% annually. Bangladesh now has 100 million internet users. Once more, as more people purchase smartphones, this figure will increase. Therefore, it's indisputably among the top employment alternatives in the coming days ahead. The fact that this sector doesn't require students to be tech-savvy is another significant benefit. Technical expertise and creativity are both required for digital marketing because it incorporates both of these elements. Digital Marketer assists students in learning marketing from actual marketers rather than academics and industry experts. Anyone may find out how to market like network with industry leaders, and obtain the tools and techniques they require to expand and take their business to new heights.[258] It will be more easy and lucrative profession in future further.

Cloud Computing Expert Career. In the technology industry, cloud computing is expanding. Presently, the platforms of three large corporations offer cloud computing capacity. Those three leaders in service delivery are Amazon, Microsoft, and Google. And they are using the platforms Amazon Web Server, Azure, and Google Cloud Platform. Growth in the industry is inevitable as more businesses come to understand the advantages of transferring their resources to the cloud. Today's cloud computing has increased security and provided businesses operational efficiency at a lower cost. Jobseekers could focus on cloud architecture, administration, development, big data, networking, or security as a cloud computing expert. Jobseekers must assess their aptitude and select a specialization in line with it. All of the roles are in high demand right now and will continue to be so in the future. Jobseekers can explore high demand positions in the USA, UK, Canada, Australia, China, India, Japan, Germany, France, and many other countries by preparing for the sector. A computer science degree will provide students a solid foundation, but certification programs that concentrate on each aspect of cloud computing will give him an edge.

Digital Manager. Every business needs more managers to handle its operations as it grows and expands. As a result, there is always a crying need for managers to operate any organization. Management would undoubtedly be the ideal field for new generation and student who have always been interested in pursuing leadership positions. Students must earn a Master of Business Administration (MBA) degree in order to pursue a career in management. It is a postgraduate degree that is earned in two years. Anybody can learn about both fundamental and sophisticated business principles, leadership, entrepreneurship, and many other related topics by enrolling in an MBA program. However, todays' perspective is executive MBA or EMBA (like EMarketing, EManagement, EFinance, EHR, etc.). In accordance with these feelings, it also enables them to specialize in particular fields. Therefore, management would be a great choice for anyone seeking for a future-proof position rather than a technical profession. After earning an MBA, students can work in a variety of areas, including banking, finance, investing, software, healthcare, etc. In the business world, a master's in MBA is a highly desired graduate-level degree, to be more precise. Many working adults who are dedicated to their professional and personal development are willing to invest in an MBA, and many organizations are ready and willing to invest in candidates with this degree for executive roles.[259]

Creators and Advisor to Creators. These experts are already well-liked and will continue to be so over the coming several years. They are the individuals who produce online content and are also referred to as digital influencers.[260] When it comes to social media, especially Instagram, a creator is an expert. The success

of these individuals can be attributed to the fact that modern consumers prefer to connect with actual people over brands.

However, brands are well aware of this and are looking into collaborations with internet influencers.[261] The careers of digital influencers are managed by a variety of companies and specialists, and as more new producers emerge, it is likely that this number will increase. In addition to assisting in securing business relationships, advisors to creators also direct and oversee career pathways.

Online Teaching and Coaching. Online teaching is a significant trend in future vocations. Teachers are now beginning to realize how the online classroom might help them reach more pupils.[262] This is a powerful tool for experts who wish to expand their knowledge-distribution business. The market for online courses is becoming more niche and widespread. [263] Anyone who wants to learn how to impart their special knowledge to people all around the world can consult the YouTube channel for assistance.[264]In contrast, a coach is a professional who supports others in moving forward in various aspects of their lives, but particularly in their professional careers. There are coaches available in a variety of fields, including business, love, emotional intelligence, weight reduction, and spirituality.[265] There are training programs, coaching methods, and client-assistance resources available to those who want to become coaches.[266]

Community and Talents Manager. This expert is responsible for engaging with consumers and the communities in which the company operates to enhance the business and improve the firm's reputation among these individuals.[267] This job is already filled by certain businesses, and it will undoubtedly grow over the coming few years. Being the ones who create brand advocates, they play a crucial role in firms since they are responsible for shaping the corporate culture.[268]Talent management goes a little beyond what modern human resources departments do. To help people advance professionally, it is vital to recognize and act more assertively on their strengths and deficiencies. A talent manager not only helps professionals develop their abilities but also plays a role in hiring new staff, preserving the company's culture, and lowering turnover.[269]

3D Architect and Engineer. Because it will be feasible to project locations in 3D in the engineering, architectural, and urbanism fields, experts should focus on these fields to give their clients a more realistic experience.[270]An engineer or architect who needs to enhance the visualization of his designs, it's important to have an awareness of 3D architecture models. These models can aid in each step of the design process, from the project's conceptualization to its presentation to investors. The use of 3D models has a number of benefits that architectural and engineering organizations will appreciate.The manner that 3D modeling offers precise descriptions of a project is one of its key benefits. A 3D model helps expedite the approval procedure because it is simpler for non-technical individuals to grasp. When clients don't understand why the original design can't be implemented, 3D models can assist them see the changes that must be made. [271] These are very promising careers with bright futures for students.

Hospital engineer. Hospital technology has advanced as well, and new tools are being developed for procedures, novel therapies, and the daily activities of medical workers. Because of this, hospital engineers will undoubtedly be in demand in the future.[272] Their major responsibility is to gather and use all technology thought to be necessary to address any issues that may arise in hospitals. The master's degree in medical engineering examines the benefits and drawbacks of the technology employed in clinical and preclinical applications, covering the broad and interdisciplinary topic of medical engineering. Students can further specialize in Biomechanics, Health Systems, or Imaging after selecting a concentration in Computer Science, Electronics, or Physics. Medical and technological professionals have a wide range of job options.[273] Again, the massive heating, cooling, refrigeration, and ventilation systems in hospitals are the responsibility of hospital maintenance engineers. Boilers, air conditioning units, diesel engines, turbines, pumps, condensers, generators, and compressors are just a few of the machines they operate. They activate, control, turn off, or fix this machinery.[274]

Environmental Engineer. Due to the significant changes in the environment, this occupation will be crucial among future jobs.[275] An area of professional engineering that is connected to environmental science is environmental engineering. This professional's primary duty is to deal with technology and the environment.It is obvious that new environmental management techniques and solutions are required to save the environment.[276] In reality, environmental engineering covers a wide range of scientific disciplines, including chemistry, biology, ecology, geology, hydraulics, hydrology, microbiology, and mathematics, in order to develop solutions that will safeguard living things' wellbeing while simultaneously enhancing the environment's quality.[277]

Walker/Talker. Walker/Talkers are independent contractors hired in the modern world to spend time with elderly clients using an online platform, allowing them to listen and converse with them.

Compared to traditional carers, who deal with medication and help with bathing and feeding, this is a distinct kind of occupation. By providing a variety of social media apps, Facebook, Instagram, Apple, and other companies are assisting the walkers and talkers of society.[278] Youth and students are misinformed if they believe that a Walker/Talker will never be a part of the future. Many elderly folks live far from their families and are socially isolated. They want and require someone to actually hear what they have to say and to listen to them. Virtual reality technology is used every day in many programs run by the Engineering and Technology Education Department.[279] Students are able to comprehend the foundational abilities required to execute various jobs by using the VR technology without worrying about being hurt or damaging their equipment. Additionally, the VR systems serve as a fantastic recruitment tool for Career and College Fest as well as our trips to elementary and middle schools.[280]

Specialist in Renewable or Alternative Energy. In order to produce energy from the wind, biomass crops, agricultural waste, municipal waste, or solar energy, experts must anticipate the arrival of new technologies and always stay up to date on pertinent local, state, and federal public legislation. Successful renewable energy experts interact with organizations from the public and private sectors. They communicate with engineers, representatives of the government, large and small enterprises, and the general public. Environmental anxiety is only going to increase over the next years. Instead of that! It is likely that thinking about alternate resources that won't harm our ecosystem will become more and more vital. In the current world, there is an urgent need for energy conservation and the creation of alternative energy sources. A large number of people are switching to renewable energy sources in order to protect the environment. [281] There is, still a ton of space for this industry to expand.[282] Specialists in renewable energy evaluate research on cutting-edge technology, comprehend the environmental effects of energy production, translate their knowledge into workable business plans, and communicate via a range of channels, including public presentations. Specialists in renewable energy frequently work for engineering design companies, utilities, universities, governments, or nonprofit groups. Nowadays, they also function as independent consultants and it isa lucrative profession. [283] Because of this, this type of expert is crucial to our future.

Financial Manager and e-Commerce Specialist. In order for small and large enterprises to manage their finances and stay in the black, this professional is now and will continue to be essential. Although there is artificial intelligence that can perform mathematical operations more accurately than humans, this role also entails making judgments that computers are unable to make yet. [284]Once more, e-commerce is a highly mainstream business model in people's daily lives. To get customers, though, a person will need to stand out in a sea of competing online virtual stores.[285]Future financial and commercial sectors will benefit greatly from AI. In people's daily lives, e-commerce is already a very popular business concept. Any young person or student who works in the e-commerce industry will be knowledgeable with online sales tactics and the many platforms available for conducting digital transactions or website conversions. Their duties will also include tracking daily site activity and overall performance to meet objectives including enhancing user experience, boosting website traffic and sales, and fostering brand loyalty. They'll run advertising campaigns on search engines and other websites, as well as learn about and put the newest social media marketing techniques into practice.[286]

Inside Sales Representative. Any sales professional who performs his/her sales over the phone or online is usually known as, inside sales agent. The job paradigm for an inside sales profession is fairly similar to that of outside sales.[287] The client now has many more options, thus businesses, particularly those in the B2B market, employ representatives who will only approach the customer after they have expressed interest in the product. Accordingly, sales will become increasingly forceful and tailored to the prospect.[288] Inside sales professionals can conduct business with clients in a retail setting such as a store or an office setting. They will interact mostly with walk-in clients in each setting or source sales via email, cold calling, and lead follow-up calls.[289] The standard educational requirement for becoming an inside sales representative is a high school diploma.[290] A bachelor's degree in business, sales, marketing, or another area connected to business may be required by some employers of suitable people. Although it might not be necessary, having experience in a commission-based or other sales function may assist jobseekers succeed in this profession depending on the company or industry. Knowledge of Customer Relationship Management (CRM) or CRM software like Sales-force, expertise in cold calling and completing sales, and proficiency with the Microsoft Office suite products could all be advantageous. [291] Although some on-the-job training might be offered, successful

candidates will already have the fundamental sales training and experience needed to begin working in the position.[292]

Product Manager along with Fintech Career. As we know that, a company's products and services determine its growth and profitability. Even the top corporations launch goods that don't succeed occasionally. It has been observed that new businesses introduce products that are very successful. Product managers have a direct impact and playing a pivoting role on the new products that businesses introduce. Based on facts, corporate objectives, and a clear vision, a product manager conceptualizes new products or makes changes to current ones. Nowadays, market rivalry is ferocious, and businesses are fighting for customers' attention. Product managers demand as a lucrative profession now and will continue to be so in the future. [293] As a product manager, a person would keep an eye on the market and be aware of the needs of their clients. [294]They will then draw out a blueprint for a good or service based on the analysis. A group of experts who are typically under the direction of a product manager handle all of this. Almost every industry need a product manager. Any student who wants to succeed in his or her future position as a product manager in fintech (financial technology) must study both finance and technology. [295] He or she may pursue product management coursework to better prepare for their next careers. A wonderful future job in the business sector will be in fintech.[296]

Paid Traffic Manager. In any firm, a hired traffic manager plays a crucial function. They are responsible for planning and overseeing paid marketing strategies, including Facebook and Google Ads.[297] They also do A/B tests to find areas where conversion could be improved. Paid traffic includes all of the advertising campaigns that a company funds in order to increase website traffic. There are many venues that allow a person to pay for traffic, including media networks, search engines, and social media sites like Facebook and Instagram. Pay Per Click (PPC) advertising, which makes use of Google Ads (formerly known as AdWords), is the most widely used type of paid traffic. Retargeting advertisements are also rising to prominence in the realm of bought traffic.[298] The demand for experts in this field is expanding significantly, largely because paid media is so crucial for generating leads and new customers. [299]Without an expert, businesses risk is suffering a great loss.

UX Design Specialist. A UX Designer (User Experience) is in charge of making sure that a website's or app's design provides cutting-edge and appealing solutions to fulfill the needs of the user. It is a very diverse field that incorporates ideas from business, psychology, market research, design, and technology.[300] UX design focuses on how actual human users interact with commonplace goods and services like websites, applications, and even coffee makers.[301] For marketing tactics to be effective, user experience must be taken into consideration. The user must be led through the website and encouraged to respond to the design in a way that encourages conversions.[302] Anyone who chooses to work in this field will find great demand in the market because of the high level of demand.

Coding Careers or special software developer. Coding is one of the most in-demand skills among research organizations and technology companies are quickly evolving and will increase further. Software developers are now the profession with the highest overall ranking in the poll. In a remote study of more than 500 IT workers and employers has found that ‘software developers were named by 37% of respondents as the most crucial tech profession in the future.’ A child coding genius can now teach coding at a school due to the rising relevance of programming, and that has led several nations to include coding in the primary school curriculum. Without a doubt, coding will open up new career opportunities in the future. However, there is an obvious gap that needs to be filled for the immediate coding market because it can take some time for those elementary school students to reach the employment market. Students with these skills can alter their careers and potentially see a 40% pay rise. Students and the younger generation must grab this chance and enter the software development industry. Try out their software development fundamentals, such as ExpertTrack,[303] to get started. They ought to be interested in learning and honing their Python, Java, Microsoft, and Django skills. They can do whatever they can think of or imagine with programming and their courses because there are so many various things they can do with them. Perhaps creating video games appeals to them, or perhaps developing software is more their style. Cloud computing enables businesses to cut expenses and boost productivity. Along with such advantages, it also promotes productivity and teamwork. Because of this, an increasing number of businesses are starting to use cloud computing. Professionals skilled in cloud computing are in high demand. It's among the top professions for the twenty-first century. The pandemic's effects, it was discovered, had raised demand for cloud software. Students that are interested in cloud computing can pursue an engineering degree. To become a professional in this field, individuals can instead enroll in an Advanced Certification in Cloud Computing program.[304]

Ethical Hacker (Job related to Cybersecurity). Nowadays many people are doing ethical hacking among who are working in the network security industry. However, this occupation is going to increase further. [305] The only scenario in which ethical hackers (sometime known as white hat hackers) would lose their jobs is if the present internet were to ended up and be replaced by something else. But, that doesn't seem to be a happen soon or ever. Therefore, moral hackers are not giving up. Therefore, if young people and students are interested in a job where there is no unemployment, this could be a good fit for them. By the end of 2023, ethical hacking profession is expected to have increased by 20% as compare to the previous year.[306] Youth and students can enroll in a variety of courses, such as online cybersecurity courses or Introduction to Ethical Hacking,[307] if they wish to try their hand at simulating website hacking to discover where changes can be made.[308]

Big data Analyst. Big data has grown significantly over the last few years, and this trend is not set to converse.[309] According to research by Statista, the global big data analytics market is anticipated to expand by 30% by 2025, and is going to bring more than US$ 68 billion.[310] The future leaders in the field of company development will be data analysts. Big data and the capacity to analyze vast volumes of data for the advantage of their employers have allowed them to take over the department already.[311] They can only accurately forecast the future and provide company leaders the information they need to make the best decisions by analyzing streams of data.[312] This is a career that is currently available and should provide financial security for the rest of one's life if youth and students enjoy math and translating complex information into practical judgments. If young people and students wish to get started in this field, they can take a few introductory courses like big data analytics[313], marketing analytics[314], and data analytics[315].

Content creator. Over the past few years, there has unquestionably been a significant increase in content producers. A content creator is someone who develops amusing or instructive information for expression through any channel or medium. Content production is especially pertinent to digital content, given that the majority of content is now consumed digitally and is where jobseekers can generate income from their efforts.[316] This is a rather all-encompassing phrase that includes anyone who produces content for digital platforms. However, social media influencers[317] are the category of content creators with the most renown. Global online content consumption increased in 2020 as a result of the pandemic, with more content being watched everyday than ever before, and the need for content providers is only expected to rise in the coming years.[318] The opportunities for this job path are essentially limitless, ranging from fashion bloggers to real crime vloggers. Youth and students might take a few introductory courses like Digital Marketing Content Creation[319], Instagram Marketing Essentials[320], and copywriting skills[321] if they wish to get started in this field.

Quantum Machine Learning Analyst. In order to improve the efficiency and effectiveness of system algorithms, a quantum machine learning analyst is tasked with doing cutting-edge research and inventing novel solutions. Machine learning could potentially benefit greatly from the quantum leap in processing capacity that quantum computing promises. Inside, kids and students can explore this amazing technology that has the potential to change the game. Quantum machine learning accelerates and improves machine learning carried out on the conventional computers that we use every day. A lot more information can be stored and processed on quantum computers than on the tablets, smartphones, and supercomputers that run a lot of today's technology.[322] Quantum computers are created using the frequently counterintuitive laws of quantum physics. This is due in large part to the quantum element, which will represent our next technical progress and will dramatically increase computer capabilities. It is one of the most significant careers of the future.[323]

Data Protection Jobs. The number of regulations governing data handling[324] and privacy [325]is increasing every ten years. Because it may be used by marketing teams to help them sell and by political departments to help them develop targeted campaigns, and personal data is always of great interest. But too frequently, those data is mishandled or illegally used after getting into the wrong hands. This will lead to the creation of new positions for data detectives, who are responsible for upholding data regulations, to track out how specific corporations are using data. These kinds of inquiries have already begun, as shown by the inquiry into Cambridge Analytica[326] and how it influenced the outcome of the 2016 US presidential election and even the Brexit vote, which can be understood by viewing the Netflix documentary[327] on Cambridge Analytica. The main lesson is that, there will soon be an increase in the number of data detective jobs available. If young people and students are interested in learning more about this field, they should enroll in a few high-quality courses like preserving patient privacy[328] and data science ethics.[329]

Gene Experts/Editors. According to the UK government, gene and cell therapy is going to create within 2030 more than 18,000 new employments in Britain alone.[330] Therefore, if young people and students are interested in genomic medicine, this is a field need to take into account. Because it lets us act almost like gods, gene editing is a hotly debated subject. There is a medical purpose for it, though aside from letting we select the eye color or height of our infant. We will be able to greatly improve the quality of life for many individuals and lower the chance of developing significant health disorders with the ability to change genes and apply genetic technologies.[331] But there are a lot of obstacles and traps that must be avoided, and this calls for regulation. To launch the industry, gene legislators will be required, as well as medical professionals to administer the system and modify the genes. It is undeniably a big milestone for mankind, despite the fact that the subject as a whole can be delicate.[332] If young people and students wish to learn more about this topic, they can take a few worthwhile courses, like those on the future of genetics in medicine[333], how DNA affects health[334], genetics courses[335], etc.

Innovation Manager. An individual with responsibility for the creation of novel goods, services, or procedures is known as an innovation manager. The IT sector's lifeblood is IT innovation. It is the motivation that pushes workers toward innovative discoveries, approaches, goods, and services. Innovation is really about original thought that adds value.[336]This person will be in charge of reevaluating a company's plans, whether they pertain to their core competencies or to a particular area, in order to enhance their business model. In the end, innovation and unconventional thinking are required for a business to be able to stand out in the market. The innovation manager's job is to come up with fresh ideas to stay one step ahead of the competition as more and more rivals emerge. Innovation plays an especially important role in the technology sector. Tech companies are constantly fighting against obsolescence due to the quickly evolving market. Every development, no matter how small or significant, is essential to preserving competitiveness, promoting growth, and opening up new possibilities.Global innovation rankings are frequently topped by tech behemoths like Apple[337], Google[338], and Amazon[339], showing their unwavering dedication to pushing the envelope and venturing into uncharted waters.[340] A truly interdisciplinary degree program in IT Innovation will combine elements of Computer Science and Engineering (CSE), Management Information Systems (MIS), and any other field of interest to the students.[341]

Mental Health Jobs. To make it easier for people to seek help and use professional mental health services[342], many members of society are working hard to lessen the stigma attached to mental health issues. But neither will these positions as mental health workers disappear. To help individuals get through difficult times, people will always need mental health professionals, just as they will always need doctors and nurses.[343] According to studies on the skills gap, there were 230% more unique job ads for mental health abilities in 2021 than there were in 2016[344]. The current pandemic, economic downturns, environmental concerns, and even an increase in remote work could increase demand for psychologists and mental health organizations[345]. There are classes available on a variety of mental health issues, such as depression, anxiety, CBT[346], and supporting adolescents with complex trauma[347], for youth and students who want to learn more about this subject.

Nurse Practitioner. A form of nurse with greater education and power than a registered nurse (RN) is a nurse practitioner (NP). NPs can carry out a lot of a doctor's duties without needing to be only an assistant. An NP can manage a patient's care, administer medications, and diagnose ailments, according to the American Association of Nurse Practitioners (AANP). NPs are employed in a variety of healthcare environments.[348] They may work in private practices, hospitals, urgent care facilities, nursing homes, and clinics. Some work for public health agencies, colleges, or institutions. A student or employee must already have their RN license in order to become an NP. That could entail obtaining an associate's or bachelor's degree in nursing.[349]Additionally, he or she must finish a graduate program and obtain their national certification. According to the OOH, NPs in the U.S. made a median salary of US$ 123,780 in 2021. The highest-paid NPs worked in hospitals, while the lowest-paid ones were employed in schools. In 2021, there were 300,000 NPs in the U.S., according to the BLS.[350] The AANP estimates that there are more than 325,000 NPs in the U.S., which is higher than that. According to the OOH, between 2021 and 2031, demand for NPs and other APRNs will be increased by 40% in the U.S. and globally, primarily in developed and emerging nations.

Data Broker. For instance, while current brokers facilitate the smooth flow of commodity transactions, the broker industry will soon be shaken by the emergence of a brand-new category of broker

known as the data broker. The concept is basic as data brokers will be in charge of arranging contracts between data firms and others looking to purchase data blocks.

They will guarantee that the buyer receives their data and that the selling business is paid. In order to safeguard the integrity of the new data market, they also make sure that the data is not shared further. The quantity of data created online is currently estimated to be 1.145 trillion MB[351] every day, and it is increasing exponentially every day. Therefore, it is confirmed and we are convinced that data brokers will have stable employment for a very long time. There are several top-notch courses, including those in data science[352], data visualization[353], and data analytics[354], etc., for young people and students who wish to learn more about dealing with data.

Drone Expert/Pilot. Nowadays, drones have become more popular and beneficial. In fact, according to the Association for Unmanned Vehicle Systems International (AUVSI),[355] at least 100,000 jobs for drone pilots will be created by the year 2025.[356] Drones can change delivery services, check building constructions and agricultural field easily, and safely carry medical supplies. Over the next ten years, drones will continue to permeate society and become increasingly commonplace. Now, drone specialists will be required to build these devices, maintain them, and possibly the most enjoyable job of all fly them.[357]Young people and students can pursue careers as drone engineers or pilots, which are in high demand. The construction, design, and flight operations of big UAVs (including multi-rotor and fixed-wing UAVs) are often handled by UAV systems engineers. In contrast, drone pilots fly remotely controlled aircraft for tasks like aerial photography[358], cinematography, and surveying. In the not-too-distant future, anticipate seeing more of these positions becoming broadly accessible across sectors. It is crucial to be aware of the difficulties and legal limitations associated with drone use. Important and challenging courses like ‘drone safety for managers’[359] and ‘using drones for security’[360] may be helpful to children and students.

Entrepreneur. An entrepreneur is a person who starts and invests in enterprises, taking on the most of the risks and reaping the majority of the benefits.[361] Entrepreneurship is the practice and innovative attempt of starting a business. The entrepreneur is usually considered as an innovator, a source of fresh concepts for products, services, technologies, businesses, and operational methods.[362]Once more, being an entrepreneur is the ability and willingness to create, plan, organize, and manage a business initiative, together with any associated risks, in order to turn a profit.[363] This is typically similar to running a small business.[364] Entrepreneurs are frequently used to describe the persons who start thesebusinesses. Actually, the term "entrepreneur" refers to a person or organization with the capacity to transform inventions or technology into goods and services.[365] We must not ignore the fact that today's society is more entrepreneurial than ever.[366] Nowadays an average person has a better chance to launch their own business or a tiny empire because of the internet and technical advancements.[367]These options to launch own firm will only increase if more technological milestones, like those mentioned above, are achieved. There has never been a better time to become an entrepreneur and give concept by young generation to flourish if they have a business idea or desire.[368] Young and students can enroll in entrepreneurship classes, which may motivate them and teach them everything from how to establish a business from scratch to how to be entrepreneurial in a variety of industries.

Blockchain Developer. A distributed database or ledger shared by the nodes of a computer network is known as a blockchain. However, they are not only used in crypto currency systems, where they play a vital function in keeping a secure and decentralized record of transactions. Any sector can use blockchains to make data immutable, which is the phrase used to describe the inability to be changed.[369] By 2030, more than 40 million employments would benefit from block chain technology worldwide, according to PwC's Time for Trust research, placing blockchain jobs in second place. Even those who are unfamiliar with blockchain technology are likely to have heard of it, typically in relation to crypto currencies like Bitcoin. Blockchains are utilized for more than just crypto currencies, though.[370] They are independent technologies that have applications in various fields. In order to prevent seller fraud, blockchain technology is already has utilized in the automobile industry to record the history of vehicles. When all of this data is securely stored on the blockchain, nobody will be able to fabricate information regarding the mileage or maintenance of the vehicle. In fact in todays’ perspective, blockchain has enormous potential, and in the future, nearly every business will be in desperate need of blockchain developers. Contrarily, with blockchains, data is digitally formatted and gathered into clusters or blocks. Each block has a finite amount of storage. When that limit is reached, the block shuts and uses cryptography to link to the one before it, forming a chain. When a block links to another via cryptography, a timestamp is created that cannot be changed. The accuracy of sensitive data, such as transactions, is

confirmed by this ongoing record.[371]Youth and students can learn blockchain technology and its uses in contemporary technology and those will be profitable profession in future.

AI Jobs. In comparison to virtual reality, AI and robot are more advanced in its development. Now, idea like implanting chips in people's heads to produce superhuman have opened our eyes to the prospective of AI technology. Researchers and students can investigate how AI and ML technologies are advancing Earth monitoring.[372] However, making useful robots and improving corporate procedures are two possible goals of AI. AI's potential for advancement is practically endless and that continue. As a rapidly evolving industry, growth opportunities in AI careers are diverse. AI jobs are plenty, hiring growing by 32% in the last couple of years (2021-22). AI careers are flexible—you could be a freelancer, consultant, researcher, practitioner, machine learning engineer, computer vision engineer, or even build your own AI products.[373]AI jobs are not only in hot demand, but a great opportunity to enter a number of fields and industries. You can apply the programming languages and ML techniques you pick up in a number of fields.[374]

Cloud Computing Professional. Cloud computing enables businesses to cut expenses and boost productivity. Along with such advantages, it also promotes productivity and teamwork. Because of this, an increasing number of businesses are starting to use cloud computing. Professionals skilled in cloud computing are in high demand. It's among the top professions for the twenty-first century. The pandemic's effects, it was discovered, had raised demand for cloud software. Students those who are interested in cloud computing can pursue an engineering degree. To become a professional in this field, individuals can enroll in an Advanced Certification in Cloud Computing program.[375]

Preparation to Career Option Choice and Further

Even individuals who are still students, young adults, or jobseekers well into adulthood may find themselves questioning their future career paths. Exploring various job opportunities, reviewing job descriptions, and engaging in career assessments and personality type quizzes can assist them in discovering their ideal profession. But in reality, the process of landing the right career is hard, and often ongoing.[376] Decision making about career takes time when it comes in front of students or jobseekers. This decision will impact the rest of their life. Although of course, changing careers is always an option. If anyone is feeling daunted by this task, take a look at this step-by-step strategy to help him to make a career choice. Finding a career that is the best fit for students/young skill and in line with their interests is a journey of trials and errors. According to the Bureau of Labor Statistics (BLS), an average person holds about dozen different jobs in their working lifespan of 18-52 years.If they have hit a career wall, it may be time to rethink their line of work.[377]If they're worried that shifting careers won't be possible for them, don't be. Between 2015 and 2016, over 6 million people changed occupations, according to the BLS. In addition, the COVID-19-induced lockdowns and changes in the job market have prompted many more people to explore new career choices. No matter the stage of their career, it's always possible to transition into a new role successfully.[378]Thousands of career options are waiting for young generation or jobseekers to pick them. Having lots of options is wonderful; but can also be overwhelming. That's why it helps to take it one piece at a time. With these eight steps, jobseekers may feel more organized and focused on what they can do to make an informed career choice. To make a career choice when young generation are undecided, they can consider following:

Think deeply about them. Discussing strengths and weaknesses can often make jobseekers feel uneasy, yet it's an essential step in shaping their future careers. To do this, they can carve out a peaceful moment to reflect, focusing on their values, interests, and soft skills.[379] Unlike hard skills or technical skills, these skills aren't straightforward to learn. Those skills are more difficult to quantify. Often, the way they show up may be related to someone's personality traits.[380] For example, proficiency in a foreign language is a hard skill; they have to know the vocabulary, grammar, and how to structure statements and questions in that language. Communication skills, on the other hand, are soft skill.[381]Jobseekers can take a moment to list out what they are good at.[382] They may imagine their future by themselves. What would be their preferred lifestyle and schedule? Jobseekers may look for careers that meet those preferences. They maytake one, or several, career aptitude tests to get an idea of what jobs are out there that match their desired lifestyle.

Create a broad list of careers. Jobseekers may gain insights from various career tests, and jot down those ideas in a particular order and thoroughly review them. They may take time to reflect on what they have discovered about themselves and align their characteristics with potential career options. It's also helpful to consider their personal values[383] and their work values.[384] They might scratch some

careers off the list immediately, but others may attract their interest. There could be careers that a jobseeker never considered or thought of on their list. Compiling their options is an excellent starting point when jobsekers start to explore specific careers in more detail.

Start investigating list. Actually, jobseekers have some options to explore, it's time for some basic research into the careers they have on their list right now. Jobseekers need to narrow things down a bit. For example, jobseekers may feel certain that they want to work in healthcare, but are less aware of which particular role is right for them. Here are some questions to keep in mind as they review the options on their list. Such as:

- Where are these job opportunities located?
- Would they force you to live somewhere specific? Is that something you want?
- What educational background is required to succeed in this field?
- Are hours long or short in this career? What kind of overall lifestyle is common?
- What are the salary expectations?

Shorten your list. In the previous step, jobseekers likely identified certain factors that acted as deal-breakers, leading them to eliminate specific career choices. This is a positive development, as narrowing down their options through research assists in honing their decision-making process. As a goal, they may aim to compile a list of five prospective careers. If they haven't reached that point yet, they can continue refining their list by removing roles that involve responsibilities they dislike or requirements they have no interest in meeting.

Talk to people in those fields of study. Connecting with individuals who have already selected their prospective career paths can offer jobseekers insights beyond what job descriptions can provide. The firsthand experiences and candid opinions shared by these individuals can play a pivotal role in guiding jobseekers toward the right direction. Networking allows them to ask questions about how they manage their time and have a healthy work-life balance.[385] If they've recently started working in that profession, jobseekers can ask how they've adjusted to their new role or how they earned the position.[386] Having support from someone while jobseekers make this career decision can help them to evaluate their options more clearly. A coach from Better Up can offer the impartial guidance that jobseekers require to attain clarity amidst the overwhelming decision-making process and remain on track in their career journey.[387]

Think of their life goals. When contemplating their goals, jobseekers should assess how these objectives influence both their professional and personal life. For instance, if they desire ample family time, a career requiring constant travel may not align with their aspirations. Identifying their life goals can aid in their self-understanding as a complete individual, not merely as someone with a job.[388]Jobseekers may write down the long- and short-term goals that they hope to achieve, and make sure that their career will let them to do it.[389]

Make their career choice. Ultimately, jobseekers must make their career choice. Nonetheless, if they feel unprepared, it's entirely acceptable to take additional time, conduct further research, or reflect on their decision. They should have confidence in the research and effort invested in this process and recognize that they are not making an irrevocable, lifelong commitment. People frequently make career changes, regardless of age, and opportunities for change are always available.[390] They shouldn't feel trapped with their decision.[391]

Write out a plan. Once jobseekers have reached a decision, the next question is how they will reach their future career. Career planning encompasses not only selecting a job but also outlining the path to get there. They should document the necessary accomplishments, whether it involves obtaining a GED, enrolling in training programs or online courses, or acquiring specific certifications. By charting out these steps, they can gain insights into the associated costs and the timeline for embarking on their chosen career.

Get more information. Resources from BLS can help jobseekerstodecide what type of work they want to do and what type of skills they need to do it. For example, the *Occupational Outlook Handbook* (*OOH*) provides information about nearly 600 occupations in 329 profiles[392] that describe job tasks, wages, outlook, and more.[393]

Figure out the reasons. In deciding to change careers, it's a good idea to consider what's driving their desire. 'Are they unhappy with their employer? Do they want to use different skill sets? What is it that needs to change?' They need to ask them these kinds of questions to know the type of change they should

make. They should think about their most recent job. What parts of it didn't they like? Perhaps more importantly, what parts *did* they like? Are they sure they want a different occupation or should they just look for a new job?

Make a list of the tasks they enjoy most. For example, may be they're a biological technician, and they really like working with people.[394] Some occupations might allow them to use their people skills while still applying their scientific knowledge. Would they like to be a biology teacher? Work toward a management position at their current company? Become a scientific product sales representative?[395] This type of reflection can help them identify occupations they may want to enter, or it might help them decide to stick with their current occupation and instead work in a different setting or job. 'People often think it will take a huge change to make them happy.' Anybody might want to start smaller with a change that doesn't uproot his/her whole life but will make him/her happier in his/her next career.

Analysis on the information and data. If jobseekers are thinking of changing occupations, he must remember he is not the only person who is thinking to change occupation. According to 2015 and 2016 data from the current population survey, about 6.2 million workers or 4% of the total workforce transferred from one occupational group to another.[396] These and other BLS data can offer guidance to explore suitable options. Career changers are likely to be interested in occupations that offer opportunity, and BLS data can help jobseekers to identify those. For example, jobseekers should also analyze occupations to determine education and training typically required for entry.[397] With these determinations, they can see whether they qualify for a particular occupation or, if not, what preparation they may need. Employment, wage, and transfer data may also point them toward career choices. For example, employment and wage data show how many jobs were in a particular occupation and how much money workers made.[398]

Match your skills. When jobseekers begin the process of applying for positions in a different field, it becomes essential for them to emphasize their skills that align with the specific requirements of each job. Utilizing a chronological résumé, which outlines their work history, provides an effective means to showcase their notable achievements.

Fit skills to jobs. When embarking on a career change, it becomes particularly crucial to customize every résumé and cover letter to align with the specific role that jobseekers are pursuing. Focus on skills they have that are directly relevant to the job tasks, and not the fact that they're transitioning. On paper and in person, they should be able to translate how their skills and experience match the position as they're applying for. They should look at the work they've done before, piece by piece. Also look at each segment and ask, 'How would that relate to the new work?' They should use the requirements from the job posting as a guide, or study online profiles of people currently in the job to see how they describe their qualifications. Switching careers may be easier between some types of occupations than others. This is particularly true when the occupations have skills in common, but it's still up to the jobseeker to make that connection. Those who get interviews are able to show that they've done the things the job requires, in a particular context, and that it provided value to the company when they did it.[399]

Be proactive. Jobseekers may encounter skills or knowledge gaps that require addressing, particularly when transitioning to a substantially different role from their current one. It's important to maintain a realistic perspective on the steps needed to align with employers' expectations. If they find themselves under qualified for their desired career, it's advisable to begin actively working towards acquiring the necessary qualifications. They should ask themselves like Do they need more work experience? Additional skills? Professional certification? etc. There are many opportunities for people to get up to date in a new field, often in a relatively short amount of time and that doesn't always mean earning a degree. Even if they do need additional training, though, assessing their existing qualifications can help them figure out exactly what else they need. The beauty of looking at the skills they have? Or is that they can build on them instead of starting over?

Connect with others. Reaching out to others, both to learn about their options and to help them find a job is important for all jobseekers. But it's even more crucial for people who want to switch to a new field. When jobseekers want to change careers, they may not look great on paper. Again, the bigger the change they're making, the truer that will be. Developing contacts, say experts, is essential and it's easier than most people realize. Experts say that networking works best when they start with the people already in their circle and ask specific questions. For example, a jobseeker might ask their family or friends what they think about a certain company, or if they know anyone who works there. It's not as scary if they start with the people they know best. Visit networking sites to find out how the people they know are connected. But make an effort personally too, such as with a phone call. For example, they might call their uncle and ask, 'How well do you

know this person? Might she be a good contact for me?'After they've identified people in an occupation that interests them, talk to other about their work.

What did they like most about their work today? Do their research ahead of time and assure the people they talk to that they're only looking to gain information and not asking for a job. They should note afterward and try to stay in touch, keeping them informed of their progress. They might also ask for advice on how to make their résumé stand out when they're ready to start applying for jobs. Knowing people who work somewhere they'd like to work is helpful, experts say. Not only do internal contacts give them an insider's perspective, but they also might increase their chances of being a 'referred candidate' and someone suggested for an interview by a worker within the company; when they apply for a job. Internal contacts also can let jobseekers to know about job openings as soon as, or sometimes before, vacancies are advertised.

Some other tips for making the right career choice. Jobseekers can adopt certain strategies to facilitate their decision-making process. Crafting a successful career choice involves more than merely following the preceding steps; it's also beneficial to bear these tips in mind when contemplating the path to the right career decision. When making decisions, people usually have the best intentions in mind. They want to take everything they know into consideration and make a decision that guarantees the best possible outcome.[400] But even when they want to be objective, it's difficult to do so. Their personal perception can skew their decision-making process and cloud their judgment. One of the causes of this is the availability heuristic.[401] Let's take a look at what the availability heuristic is and how it can mislead us. Jobseekers should look at ways to avoid the availability heuristic.[402] Be aware of how other factors influence Jobseekers. Such as:

- Jobseeker should never forget his/her strengths
- He/she should volunteer in his/her possible professions
- Consider how he/she want his/her career to support financially
- Take his/her time and don't feel like he/she have to rush the process
- Be patient, and keep in mind this is a challenging task
- Reflect on what subjects in high school he/she enjoyed
- Think about his/her dreams in life but try to understand **why** and what is it about these dreams that appeal?

Jobseekers next move will come when they're ready. Choosing their future career isn't a decision they can rush or that they'll make very well if they feel pressured. They shouldn't forget that this is the life they're thinking about. It's their passions and values that need to be front and center, so they should make sure and listen to them. In fact, when we're doing the talking, we're typically not doing a whole lot of listening, and often not a lot of learning either.If we become a good listener, we'll have better quality conversations.[403] Sometimes we need someone to remind us that we need to follow our passions and put our needs first.[404] At BetterUp, we can provide the perspective we need to make the career choice that lets us live a life full of happiness. There are many ideas about the future of jobs training.[405]Among them there are five major ideas are as follows:

- The training ecosystem will evolve, with a mix of innovation in all education formats.
- Learners must cultivate 21st century skills, capabilities and attributes.
- New credentialing systems will arise as self directed learning expands.
- Training and learning systems will not meet 21st century.
- Technological forces will fundamental change work and the economic.

Conclusion

Nowadays, numerous free courses are readily available to assist students and young individuals in enhancing their digital skills. They can conveniently find online courses on essential digital skills at their preferred time through resources like the 'Skills Toolkit,' 'Learn My Way,' or the 'Lloyds Bank Academy' to acquire digital skills for their everyday lives. Many courses are available for online banking, shopping and helping children with schoolwork. Young generation can use their local library. They may book time on a PC and use their learning resources. Students may sign up for a course at their local college or adult education service. Today, learning no longer requires confinement to a classroom setting. There exist numerous flexible avenues for young generation to acquire knowledge at their own pace, on their own schedule, and in environments that suit their comfort. Digital skills empower students to research their ideas and access career-related information online. Nowadays career websites are great sources of useful information and advice where students can chat online with advisers and talk to people in similar situations in online forums. They

can explore different types of jobs and find out which jobs are growing in demand. They can also compare their requirement with available opportunity.

Digital and smart skills are invaluable for job seekers, assisting them in locating and applying for relevant employment opportunities, preparing for interviews, and ultimately achieving success. In today's job market, the majority of positions are advertised online, enabling students and young individuals to submit applications either through online forms or by emailing their CVs. Moreover, the job selection process frequently involves online assessments or video interviews, highlighting the significance of digital skills in securing employment. If they are confident with basic digital skills, they may go on to learn something more specialist like, how to code a website, using social media as a marketing tool, cyber security or designing digital products and services. So, student/young could open up new career opportunities and it can help them to do their current job better. Roles requiring digital skills often pay more than those that do not.

The future workforce will require a combination of technical and non-technical skills, and individuals who have a mix of both will be in high demand. Technical education plays a crucial role in equipping individuals with the requisite technical proficiencies for the future job market, concurrently fostering problem-solving capabilities, soft skills, and other vital aptitudes. Technologists or engineers design and develop a product for welfare of society through innovation. The economic growth of a country depends on technological innovation, technological advancement, aeration, constructive thinking, skills and trained technical manpower. The innovation of new products generates employment opportunity. More working people and employment means people have more money to expenses on education and health which results in social, economic development of nation. People can understand easily, become civilized and advanced, as they are educated properly. Education brings skills and quality in life. When all individuals receive education, the country will naturally experience development. At the same time, for designing a product, designer must consider effective use of resources by maintaining environmental friendly technique and ensures satiability of resources. Technologists or engineers play an important role in sustainable development by overcoming worldwide challenges such as environmental degradation, rapid population growth, depletion of natural recourses, suitable technique etc. Today, technologists or engineers have changed their mindset by considering effects of engineering achievement on social, economic and environmental issues. To satisfy the needs of society, humans are altering natural resources at drastic rate. This causes serious issue of balancing between needs of society and preservation of global eco system. The role of technologists and engineers is pivotal in meeting society's needs for health and welfare while minimizing resource wastage and preserving the environment and resource sustainability. Ultimately, technical education plays a vital role in facilitating the industrial growth and sustainable development of any nation. It aids in alleviating unemployment, lowering the country's foreign exchange expenditures, reducing poverty, and addressing social inequality. It provides necessary skills which is crucial for responsible and good citizens of a country.

Global macro-trends and disruptions create an ever-more complex environment for policy-makers, employers and workers to navigate, and uncertainty and volatility remain high. However, the jobs impact of the green transition and generative AI dominate the media headlines.These areas have also been identified as some of the largest drivers of future job creation. In future, skills disruption will remain high and it has somewhat stabilized from the height of the COVID-19 pandemic. While companies persist in identifying access to skilled talent as the primary obstacle to business transformation, expectations regarding workforce strategies are evolving towards higher levels of sophistication, pragmatism, and proactive engagement. The future of work can be shaped for better outcomes and that it is the policy, business and investment decisions made by leaders today that will determine outcomes and the future space for action. The development of a country depends upon the how nation use its natural resources in best way. Productivity is an index of living condition and development of a nation. A country with high productivity index utilizes its natural resources effective and efficient way and can prosper more. A skill labour force is required to transform country's natural resources into useful product and for that technical education is paramount. Hence, any Least Developed Country (LDC) or developing nation can achieve sustainable prosperity by integrating a skilled technical workforce, both domestically and through collaboration with other countries. Additionally, remittances in foreign currency can contribute significantly to the nation's growth when these funds are sent by individuals with strong technical expertise, skills, and competitive capabilities.

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