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ROLE OF TECHNOLOGY IN ENHANCING THE EFFECTIVENESS OF TECHNICAL EDUCATION: AN EMPIRICAL STUDY WITH SPECIAL REFERENCE TO MECHANICAL ENGINEERING STUDENTS

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Abstract

One of the most important resource any country need is human resources. Humans are central to each and every other resource. Humans are the ones who are capable of creating and processing and other resources. Thus, it becomes crucial for any country to emphasize on its resource and divert a huge amount of its capital and time developing human resources. Education and more important skill education is one very important aspect for developing human resources at the prerequisite standard of industries. The paper makes an attemptto analyze the role of technology in advancing the field of vocational and skill training in the field of education. Technology in the last decade has grown in a far and wide manner and is been equipped in a wide spectrum to empower individuals in various fields including the vocational and skill-oriented fields. Sample of 226 mechanical engineering students were surveyed to know the Role of Technology in Enhancing the Effectiveness of Technical Education. The study concludes that there are different factors that determine the roles of Technology in Enhancing the Effectiveness of Technical Education like Access to information, Real time exposure, Concepts and doubts and Ready for field.

Keywords: Human Resource, Technology, Education, Vocational, Skill-oriented.

INTRODUCTION

The fast and rich developed countries today are in a future crisis as their population has started growing old with negative birth rate, the rate of replenishment of human resources is far slower compared to the under-developed and developing countries. Human resources are considered as a core resource because it has the capability to create and develop other resources. The developing countries when compared to developed nation are in abundance in terms of population but still lack in proper development its humans as resource. The basic method of developing human resource is through education. Education acts as an instrument through which one develops humans as resources with proper addition of knowledge and by acquiring relevant skill.

Education alone cannot develop resource there is also a requirement to acquire relevant in the same field as of their knowledge. The acquired skill-set along with proper knowledge will help humans work in the field and produce results (Wright, et.al, 2020).

Students now require ability that facilitate them to admittance and administer the expanding magnitude of information, pick the trustworthy information they require, read significantly and think autonomously as they create their own ideas, and then pertain that sophisticateddata for their academic careers. This method situates literacy of information instruction inside the subject, improving students' knowledge of the value of information literacy within their chosen disciplines. The student gains the ability to think about phrasing the research issue in the context of accessible resources, asks clarifying questions, and learns where to begin looking for information and a diverse variety of information sources (Vinogradov, & Plumb, 2008).

The growth of technology in the last two decades has been unprecedented. With the age of the internet, there has been an explosion of technology spreading across different fields. Today every field and sector has been developed with the help of technology and the internet.Many dimensions of society rely on technology, and its incorporation into the enlightening process holds considerable budding for the student knowledge. Learners and tutors should look forward toimprovedgood organization and helpfulness as a consequence of technology. Technology may also rally round to forceinstructive change and speak to challenges that influence knowledge, schooling, and social structure. As a result, expertise may be viewed as both a instrument and a catalyst for change. Students must accept technology in order to profit from it, and instructors must be willing to introduce the technology into the classroom in order to progress and innovate their educationprocedures (Agarwal, et.al, 2000).

In the midst of the introduction of a free economy, India has seen a lot of improvements in the education sector in recent years. These developments, on the other hand, have had acollision on supply and demand as well as educational quality. Higher quality, cheaper manufacturing costs, and better service are the increasing requirements of today's customers. It is a key source of concern for today's educational institutions because the products (students) do not match the first requirement criteria of companies. As a result, it is critical that students graduating from engineering institutions be immediately beneficial to industry(Sharma, & Pandher, 2018).

To achieve the institution's prime mission, namely to make available high-quality technological education, it is critical to maximize the institution's effectiveness. Many aspects of society rely on technology, and its incorporation into the learning process holds considerable impending for the learning of students. Both the teachers and students should anticipate enhanced effectiveness and helpfulness as a product of technology. Technology may also help to force pedagogically to modify and address challenges that influence the process of knowledge transmission in a conductive manner. As a result, technology may be from a point ofview as both a instrument and a channel for change. In order to learn students must acknowledge technology which in turn will help them profit from it, and instructors must be enthusiastic to introduce know-howof modern tech into the classroom to perk up and innovate their teaching methods (Uziak, et.al, 2018).

And, with the intention ofmaking an increase in the competence of any organization, the plentiful elements influencing it should be recognized and their value in maximizing effectiveness assessed. The proper examination both in terms of quality and quantity of these distinctiveness will support in the formulation of coherent, appropriate policies and deliberate planning for technical institutions. Therefore, there is need to assess the necessity for the different concept in technical education and to identify several elements influencing the efficacy of technical institutions. Using differentmodels studies and critically assesses the influence of each element and improves the condition of these factors so that they have a positive effect in enhancing the effectiveness of technical education (Kirkwood, & Price, 2014).

Literature Review

It is traditionally non-academic and job focused. It is frequently the manual or practical actions associated with a given profession or occupation. Vocational education is also known as career education or technical education. Today, technology is one of the most important building elements in education, and vocational education is no exception. The incorporation of technology in this field has resulted in some identifiable output, and hence the relevance of the same is appreciated globally. Integration of technology in vocational education, as in other academic disciplines, is extremely beneficial and produces nearly identical results in terms of efficiency(Eze, et.al, 2020).

The importance of technical education especially the knowledge of various computer software and programming languages has become today’s common need in every subject out there.From the field of education and training to branches of engineering such as mechanical, software, etc. The acquisition of intellectual skills and knowledge is one factor that will enable graduates to make a positive contribution to society through productive and fulfilling engineering careers as innovators, decision-makers, and global leaders.In order to do that there is a need to improve the quality of education as well as an educational system in order to produce well-rounded individuals who are properly equipped and industrially ready (Abellán-Nebot, 2020).

The value of programming in the current mechanical and automotive industries is enormous, and it is only increasing. You can develop and progress in any domain if you have a decent command of programming, regardless of your area of specialization. Programming allows you to work much more quickly and come up with more inventive ideas than people who do not know how to code. With new instruments of choice, many mechanical and car engineers are extending their talents beyond broad study. If you're strong at programming or want to make it your profession, you should start using Matlab, Python, etc(Kustono, et.al, 2018).

With the economy moving towards a need trend such as globalization which is brought on by the new age internet with an attempt to make the world as we know today into a global village and people as an international villager. There is thus a shift from conventional and traditional methods to new-age methods brought on by the information technology revolution. The IT revolution which has led to a decrease in the price of computing with the help of outsourcing, also decreasing the cost of data processing,

interpretation and its storage (Rufai, 2014). There is thus a growing need and expectance from the industry for students from different fields to have basic knowledge especially in the field of computer science and data analytics especially from mechanical engineers (Feisel& Rosa, 2005).

The task and orientation of the field of mechanical engineers have changed drastically as the field have transformed with growing emphasis on the environment with sustainable methods of producing output. As there has been growing importance as well as pressure put by governments of the world to make a sustainable and environmental-friendly effort to make world a better place to live, the sector of mechanical engineering has been put in a corner to innovate and come up with better methods of producing outputs.The tasks of physical laborhave been transferred offices now with the age of IT, even the mechanical sector has been making a shift towards office(Tinnirello, & Gago, 2017).Because of the changes in the workplace, we can observe that there is a huge need for vocational education all around the world. Since then, Technical and Vocational Education has focused on preparing students for work by providing them with the information, skills, and attitudes that employers need. It is natural to conclude that vocational education must incorporate technology profoundly because the working world is currently governed by ICT, and hence should include training in ICT applications as part of vocational education (Ramirez-Mendoza, et.al. 2018).

The role of technology has become a crucial part in uplifting the center of education in field of technical and proper knowledge. Technology itself is helping in developing the educational sector in terms of their administration, to run the institute in a smooth and resourceful manner. The management of any institution promoting technical learning and acting a critical role in its function, with tasks that include: 1. establishing the center operational objectives. 2. Formulatingpolicy and strategy to help one get there. 3. Organizationof all function that have an impact on efficiency, whether they are directly or indirectly.Engines, power generator, mechanic elevators, and even air conditioning would not cease to exist without the power ofthe field called mechanical engineering. Every day utilities and equipments has been mechanically produced, even if we aren't aware of it. Mechanical engineering is of use in a broadvariety of products, from automobile sector to aviation sector to cooling and refrigeration sector. It helps you to fulfill a assortment of daily tasks with ease, as it introduces us toconstructivemachinery to our current civilization. It is one of the most indispensable branches of engineering(Bessinger, & Mammen, 2010).

Technology also helps a teacher impart knowledge in a better way by equipping him with modern tools of learning.Teachers are aggravated to build upknowledge objectives and adjustlessons depending on the requirements of their pupil, merit to the extensiveaccessibility of learner databases that can follow individual improvement. Teachers must be able to exploit the uprising technologies that are constantly altering how people live, work, and study in order to guarantee that technical and vocational program are relevant to society (Rugarcia, et.al, 2000).

As a result, educators must stay up with evolving technologies in order to ensure that their responsibilities remain relevant in the production of tomorrow's workforce. Because they must be proficient in ICT in order to be effective instructional leaders, since they will be passing this knowledge on to their pupils. The caliber of learners who come out of from different universities and colleges is first and foremostis judged by the teaching personnel hired in that institute. The role of research and technology are increasing by leaps and bounds, and it is critical for faculty to continue with them and struggle to improvethemselves by steadily increasing their qualifications. It is the institution's obligation to offer an appropriate and conducive environment for the instructor to attend various value improvement program such as in various workshops and seminars and so on (Soni, et.al, 2016).Technology also helps students gain unaccounted access to the various resourcesaroundthe world with the help which helps students develop themselves in a holistic manner. The contribution of the whole system is fabricatedon the basis of their pupils. The processof thesuccess of transferring information is heavily influenced by the surroundings in which the pupils are positioned, as well as their desire to learn and achieve. The student's individualconsciousness and craving in learning, in addition to his innate ability to comprehend, on top of his genuineness, timekeeping, and truthfulness, are critical to his effective achievement of his course(Gao, et.al, 2022).

It is also very important to inspire pupils to develop their morale. factors, When these factors are carefully applied and nourish, outcome in a complete transformation in educational quality. Mechanical engineering encompasses more than just machinery and automobiles. In today's world, mechanical engineering expertise is required in fields such as biomimetics, geophysics, material research, and many more. So, one should not be intimidated by machines. Genetic engineering may be one lucrative field with a huge role for computer software. As a result, the multidisciplinary approach to engineering should always be embraced, because every big project needs the participation of a diverse range of brains, as well as a leader to guide them through the process (Khosrana, & Haruna, et.al, 2015).

There is also a need for interaction between students and industries. This kind of interaction helps students get a reality check on the situation in which they have to work. Technology helps in the process of overcoming their fears and helps them learn the necessary industrial skills. Engineers studying in vocational learning institutions ought to be prearrangedbusiness training to get the horse's mouth experience. Aextensive recasting of learningcurriculum is requisite, with industry-oriented syllabus and a well-built association between the enlightening program and different community demands (Kabouridis, et.al, 2014).

OBJECTIVE OF THE STUDY

1. To know the factors that determines the Role of Technology in Enhancing the Effectiveness of Technical Education.

RESEARCH METHODOLOGY

Sample of 226 mechanical engineering students were surveyed to know the Role of Technology in Enhancing the Effectiveness of Technical Education. The study is empirical in nature and the primary data of the study is collected with the help of a

questionnaire particularly designed for this study through random sampling method. The statistical tool exploratory factor analysis was used to analyze the data and get the appropriate result.

FINDINGS OF THE STUDY

Table 1 is demonstrating general profile of the respondents. It is found from the table that in total 226 respondents 58.0% are boys and 42.0% are girls. Among them 35.0% are from the age group 19-21 years, 41.1% belongs to age group 21-23 age group and rest 23.9% are above 23 years of age. All of them are pursuing their mechanical engineering and 27.9% are in mechanics, 30.15 are in aerospace, 25.2% in automation branch and rest 16.8% are there in automotive branch of mechanical engineering.

Table 1 General profile

Variables	**Respondents**	**%age**
Gender		
Boys	131	58.0
Girls	95	42.0
Total	**226**	**100**
Age		
19-21 years	79	35.0
21-23 years	93	41.1
Above 23 years	54	23.9
Total	**226**	**100**
Course		
Mechanical Engineering	226	100
Total	**226**	**100**
Branches		
Mechanics	63	27.9
Aerospace	68	30.1
Automation	57	25.2
Automotive	38	16.8
Others	**226**	**100**

Table 2 KMO and Bartlett's Test

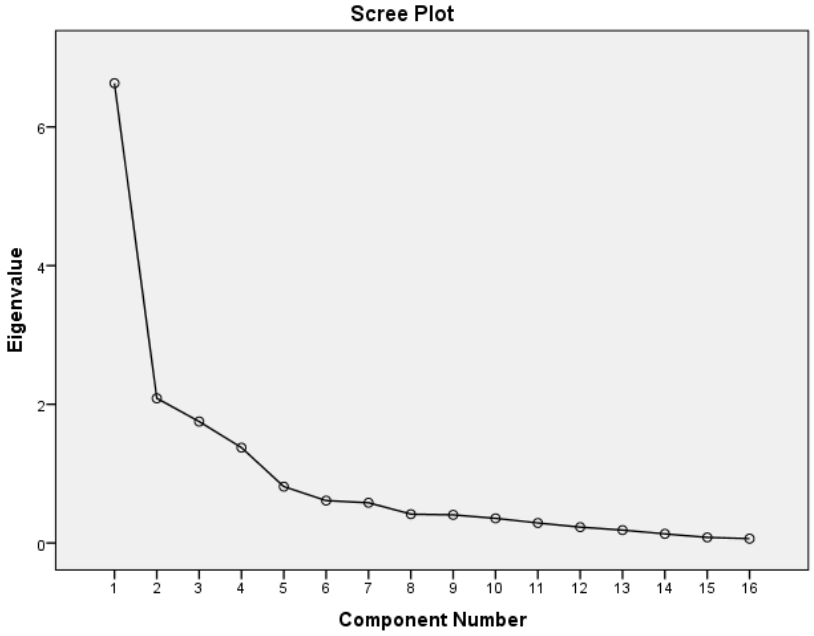
Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.854
Bartlett's Test of Sphericity	Approx. Chi-Square	2687.950
	df	120
	Sig.	.000

"KMO and Bartlett's Test" was applied in which KMO value found is .854 which is more than the 0.6 hence it confirms the validity of the factor analysis.

Table 3 Total Variance Explained

Component	**Initial Eigen values**			**Rotation Sums of Squared Loadings**		
	Total	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
1	6.630	41.439	41.439	4.120	**25.753**	25.753
2	2.087	13.041	54.480	3.076	**19.223**	44.975
3	1.752	10.947	65.427	2.396	**14.972**	59.947
4	1.375	8.596	74.023	2.252	**14.076**	**74.023**
5	.812	5.078	79.102			
6	.611	3.817	82.919			
7	.580	3.626	86.545			
8	.415	2.597	89.142			
9	.405	2.534	91.676			
10	.355	2.220	93.896			
11	.289	1.805	95.701			
12	.228	1.426	97.127			
13	.185	1.159	98.286			
14	.131	.821	99.107			
15	.080	.503	99.610			
16	.062	.390	100.000			

It is found from the table 3 that the 4 factors explain total 74% of the variance. The 1st Factor explains 25.753% of the variance followed by the 2nd Factor with 19.223%, 3rd Factor having 14.972% and 4th factor explains 14.076% of variance.



Figure…Scree Plot

Table 4 Rotated Component Matrix[a]

S. No.	Role of Technology in Enhancing the Effectiveness of Technical Education	Factor Loading	Factor Reliability
	Access to information		**.952**
1.	Technology provides easy to access information to students and teachers	.885	
2.	Learning is accelerated with the help of technology	.869	
3.	Technology enable an individual to explore new things	.861	
4.	Technology facilitate student to admittance and administer the expanding magnitude of information	.848	
5.	Improving students' knowledge of the value of information literacy within their chosen disciplines.	.817	
	Real time exposure		**.893**
1.	Technology helps to practice the things which is learned	.893	
2.	Technology help students to deal with sophisticated data	.889	
3.	Technology uplifts the center of education in field of technical and proper knowledge	.764	
4.	Technology helps the student to implement their ideas	.716	
	Concepts and doubts		**.848**
1.	Technology helps to understanding difficult concepts	.862	
2.	Students are able to clear their doubts through real time examples	.827	
3.	Teachers are motivated to build up knowledge level and prepare lessons as per requirement	.821	
	Ready for field		**.729**
1.	Technology makes students properly equipped and industrially ready	.813	
2.	Technology prepares student to work much more quickly and come up with more inventive ideas	.755	
3.	Technology prepares students for work by providing them with the information, skills, and attitudes that employers need	.703	
4.	Technology helps in the process of overcoming their fears and helps them learn the necessary industrial skills.	.669	

Development of the factors

Access to information is the first factor that includes the variables like Technology provides easy to access information to students and teachers, Learning is accelerated with the help of technology, Technology enable an individual to explore new things, Technology facilitate student to admittance and administer the expanding magnitude of information and Improving students' knowledge of the value of information literacy within their chosen disciplines. The second factor namely Real time exposure consists of variables like Technology helps to practice the things which is learned, Technology help students to deal with sophisticated data, Technology uplifts the center of education in field of technical and proper knowledge and Technology helps the student to implement their ideas. The third factor is Concepts and doubts which includes the variables like Technology helps to understanding difficult concepts, Students are able to clear their doubts through real time examples and Teachers are motivated to build up knowledge level and prepare lessons as per requirement. The last and fourth factor is Ready for field which include the variables like Technology makes students properly equipped and industrially ready, Technology prepares student to work much more quickly and come up with more inventive ideas, Technology prepares students for work by providing them with the information, skills, and attitudes that employers need and Technology helps in the process of overcoming their fears and helps them learn the necessary industrial skills.

Construct wise reliability of all the factors

The reliability of different factors is observed as that the factor reliability of access to information is 0.952, real time exposure has 0.893, Concepts and doubts is 0.848 and Ready for field has 0.729 factor reliability.

Table 5 Reliability Statistics

Cronbach"s Alpha	N of Items
.885	16

It is found from table 5 that there is total 16 numbers of items that includes all the variables related to role of technology and total reliability found is 0.885**.**

CONCLUSION

The process of different manufacturing industries is changing into new and sustainable for which technology becomes very important. Mechanical engineering is the mother of all subjects as not different computer software is being utilized in order to improve efficiency. The different branches of mechanical engineering such as automobile, robotics now depend on the knowledge from computer science. Mechanical Engineering today is not just limited to human labor rather is focusing on improving and now creating ways and methods to develop the subject more holistically.Technology plays the leading role to pass on the skills to the students and develop them as per industry standards.Technology helps students get familiar with different kinds of soft skills demanded in the market. It also has improved the method adopted but the teachers and led to an increase in the efficiency of learning. In totality with the government focusing on helping people acquire skill-based knowledge by promoting free educational and training servicesacross villages and districts (Upadhayay, &Vrat, 2016).

The study concludes that there are different factors that determines the roles of Technology in Enhancing the Effectiveness of Technical Education like Access to information, Real time exposure, Concepts and doubts and Ready for field.

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