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Emerging Trends in Science & Technology

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ABSTRACT

Technology has been reshaping the world around us continuously and with every new technology trend we are seeing wave of innovation and disruption across industries. Now that we come to the close of 2017, the time looks apt to speculate on what will be the top emerging technology trends in 2018. The world is changing faster than most business establishments can comprehend. With technological innovations being born every day, the future is being created in the present tense.

21st century has been defined by application of and advancement in information technology. Information technology has become an integral part of our daily life. According to Information Technology Association of America, information technology is defined as "the study, design, development, application, implementation, support or management of computer-based information systems."

Information technology has served as a big change agent in different aspect of business and society. It has proven game changer in resolving economic and social issues.

***Educational technology** is "the study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources". Educational technology is the use of both physical hardware and educational theoretic. It encompasses several domains, including learning theory, computer-based training, online learning, and, where mobile technologies are used, m-learning. Accordingly, there are several discrete aspects to describing the intellectual and technical development of educational technology.*

Introduction :-

The existing knowledge base, accumulated over time, reminds us of our unique heritage, which favored the purity of mind and soul over worldly and materialistic achievements. Knowledge creation, absorption and dissemination, which were considered to be the prime concern of our thinkers, have become secondary and the prime slot is being occupied by finance and technology. Before globalization, which started in early nineties in real sense, the importance of science was reflected in technological and socio-economic development but now we notice that the roles are interchanged. Even though the choice between science and technology was always a subject of debate in the last century but still science education was pursued with vigour. As emerging patterns of education and manpower growth are indicating a paradigm shift, an analysis of this trend will be appropriate for shaping the future of tomorrow and for taking the desired course of action. In the present study the emerging trend in higher education is analyzed with the help of mathematical models. Scenario presented here may be useful in policy reviews and can provide a base for S&T planning and policymaking. A quantitative analysis of this kind suggests that academics and knowledge seekers are disappearing from academic field and are being replaced by so called knowledge workers, who are more interested in money matters. Growing interest in the fields of engineering and medicine and saturation in basic science research only suggests a shift from science to technology. Growing trend in the number of Ph. D. degrees awarded in Mathematics is the only exception in basic sciences and may be indicative of the importance of the subject in the present ICT revolution.

Globalization and liberalization has not only changed the economic structure of the whole world in the form of new economic order but also the human resource development and education pattern. Globalization

resulted a boom in more qualified manpower in managerial and technical skill and science education in particular has witnessed structural changes, which is reflected in the form of S&T workers. Human resource potential in general and S&T personnel in particular is a measure of a country's competitiveness in the emerging knowledge society. Science and engineering degree holders may be recognized as an important indicator of a nation's S&T effort.

Past trend in science education may be used to gain some insight and, also, to project the future demand and supply of human resources. Every year thousands of thousands of post-graduates and Ph.D. holders are coming out from our academic institutions and contributing in the growth and developmental activities on the national as well as international level. Suitable deployment of this work force can bring in changes in all walks of life. The effectiveness lies in planning the manpower requirement in the desired areas to create a base for scientific and industrial research. The progress in scientific and industrial research in the past has been impressive and now is the time to look around and assess the overall prospects in this direction. It is essential for policy formulation and programme development.

Human resource potential is a measure of a country's competitiveness in the emerging knowledge society. Science and engineering degree holders may be recognized as an important indicator of a nation's S&T effort. Such indicators are useful in policy formulations and development of plans for the future. A trend forecast in science education will be helpful in decision-making. Trend analysis of the outturn of highly qualified S&T manpower in India is presented along with future projections. The subject areas include Natural Sciences, Engineering and Technology, Medical Sciences, Agricultural Sciences, and Veterinary Sciences. As regards basic sciences, a trend analysis of Ph. Ds. awarded in Physics, Mathematics and Chemistry is presented here. An important aspect of this study being that the highly qualified manpower in due course of time can become a powerful tool of the nation and thereby can create an effective influence at the national and international level for advancement of knowledge.

Accumulated scientific knowledge should percolate down over time in the society via technological root in the form of economic growth and social welfare. However, in practice it is noticed that a reverse route is being followed in many developing countries. Skilled scientific workers / R&D personnel are seen moving away from science to commerce and other business oriented activities in search of a greener pasture. Further the lack of incentives and assistance in basic science research is also one of the main causes of this transition from science education to commerce and engineering. Potential scientists of the future are moving to other areas, where financial gains are apparently better. This will hinder scientific growth, which in turn will affect developmental activities. For sustaining development we need high science, as it is an integral part of development itself. Basic research has to be complimented with financial rewards.

Working environment also plays an important role in career development. Miserable conditions, mediocrity, non-stimulating environment, hierarchy, bureaucracy, and the like factors are some of the major bottlenecks in the present surroundings and causes of repulsion from S&T research. Further, in some cases our talented scientists succumb to mediocrity and are not able to present their views forcefully. In this process they are eliminated or suppressed and mediocrity further gets a boost.

Decreasing popularity of science among students coupled with poor understanding of scientific concepts may prove to be a major deterrent in preparing future citizens for the post information society. Growing dissatisfaction with research and education among scientists and researchers requires immediate attention of the concerned authorities and policy makers. Empowering research scientists to take decisions in S&T affairs, enhancing the status of scientific research as a profession and central funding for basic research may be helpful in this direction. In fact basic sciences need a policy push where the government has to play a major role. Development of centres of excellence for scientific research along with incentives and better career opportunities may save the society from turning to a conglomerate of techno-baboos. Encouraging post Ph. D. research is also important as most of the research scholars and university professors are engaged in non-academic activities after receiving Ph. D. degree and being promoted as professors respectively.

Educational technology as "the study and ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources". The Association for

Educational Communications and Technology (AECT) denoted instructional technology as "the theory and practice of design, development, utilization, management, and evaluation of processes and resources for learning". As such, educational technology refers to all valid and reliable applied education sciences, such as equipment, as well as processes and procedures that are derived from scientific research, and in a given context may refer to theoretical, algorithmic or heuristic processes: it does not necessarily imply physical technology. Educational technology is the process of integrating technology into education in a positive manner that promotes a more diverse learning environment and a way for students to learn how to use technology as well as their common assignments.

Helping people learn in ways that are easier, faster, surer, or less expensive can be traced back to the emergence of very early tools, such as paintings on cave walls. Various types of abacus have been used. Writing slates and blackboards have been used for at least a millennium. From their introduction, books and pamphlets have held a prominent role in education. From the early twentieth century, duplicating machines such as the mimeograph and Gestetner stencil devices were used to produce short copy runs (typically 10–50 copies) for classroom or home use. The use of media for instructional purposes is generally traced back to the first decade of the 20th century[26] with the introduction of educational films (1900s) and Sidney Presser's mechanical teaching machines (1920s).

Students growing up in this digital age have extensive exposure to a variety of media. Major high-tech companies such as Google, Verizon and Microsoft have funded schools to provide them the ability to teach their students through technology, in the hope that this would lead to improved student performance.

Educational media and tools can be used for:

- task structuring support: help with how to do a task (procedures and processes),
- access to knowledge bases (help user find information needed)
- alternate forms of knowledge representation (multiple representations of knowledge, e.g. video, audio, text, image, data)

Numerous types of physical technology are currently used: digital cameras, video cameras, interactive whiteboard tools, document cameras, electronic media, and LCD projectors. Combinations of these techniques include blogs, collaborative software, e-Portfolios, and virtual classrooms.

The current design of this type of applications includes the evaluation through tools of cognitive analysis that allow to identify which elements optimize the use of these platforms

Electronic performance support system

An electronic performance support system (EPSS) is, according to Barry Raybould, "a computer-based system that improves worker productivity by providing on-the-job access to integrated information, advice, and learning experiences

Effective technology use deploys multiple evidence-based strategies concurrently (e.g. adaptive content, frequent testing, immediate feedback, etc.), as do effective teachers. Using computers or other forms of technology can give students practice on core content and skills while the teacher can work with others, conduct assessments, or perform other tasks. Through the use of educational technology, education is able to be individualized for each student allowing for better differentiation and allowing students to work for mastery at their own pace.

The use of educational apps generally has positive effect on learning. Pre- and post- tests reveal that the use of apps on mobile devices reduces the achievement gap between struggling and average students. Some educational apps improve group work by allowing students to receive feedback on answers and promoting collaboration in solving problems, examples of these apps can be found in the third paragraph. The benefits of app-assisted learning have been exhibited in all age groups. Kindergarten students that use iPads show much higher rates of literacy than non-users. Medical students at University of California Irvine that utilized iPad academically have been reported to score 23% higher on national exams than previous classes that did not.

With the Internet and social media, using educational apps makes the students highly susceptible to distraction and sidetracking. Even though proper use has shown to increase student performances, being distracted would be detrimental. Another disadvantage is increased potential for cheating. Smart phones can be very easy to hide and use inconspicuously, especially if their use is normalized in the classroom. These disadvantages can be managed with strict rules and regulations on mobile phone use.

Educational assessment with technology may be either formative assessment or summative assessment. Instructors use both types of assessment to understand student progress and learning in the classroom. Technology has helped teachers create better assessments to help understand where students who are having trouble with the material are having issues.

Formative assessment is more difficult, as the perfect form is ongoing and allows the students to show their learning in different ways depending on their learning styles. Technology has helped some teachers make their formative assessments better, particularly through the use of classroom response systems (CRS). A CRS is a tool in which the students each have a handheld device that partners up with the teacher's computer. The instructor then asks multiple choice or true or false questions and the students answer on their device. Depending on the software used, the answers may then be shown on a graph so students and teacher can see the percentage of students who gave each answer and the teacher can focus on what went wrong. The concept of the digital divide is a gap between those who have access to digital technologies and those who do not. Access may be associated with age, gender, socio-economic status, education, income, ethnicity, and geography.

Conclusion :-

The outturn information regarding doctorates in India is a glaring example of a change of the mind set in researchers, where we notice the preference for technology in place of basic sciences. This diversion may retard the process of contribution to fundamental knowledge, from where technological developments evolve. India's S&T work force, which is ranked as the third largest in the world, may loose its position because of this paradigm shift and quality may also deteriorate. We know that engineers and technologists play a vital role in enhancing the industrial production. However, one should not forget that "science is the mother of technology". All technological developments depend to a large extent on scientific inputs. We can't sustain technological progress without proper scientific backing. Immediate action by S&T planners and decision makers is required to ensure technological progress itself otherwise mediocrity in basic sciences will create a vicious cycle in the field of research and development.

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