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## Chapter 9

# An Analysis on E-Learning and Its Recommendations

**Lalitha T. B.**

*Hindustan Institute of Technology and Science, Chennai, India*

**Sreeja P. S.**

 <https://orcid.org/0000-0002-2995-3580>

*Hindustan Institute of Technology and Science, Chennai, India*

### ABSTRACT

*Education provides a predominant source of worldly knowledge around us and changes the perspective of the living society as a global village. However, education has revealed fragmentary remains in the professional competence and personal growth of the learners without the involvement of online learning. E-learning brings out a broader vision of sources to the learners available over the web with the holistic approach to learning from anywhere without cost and minimal effort. The proposed theoretical framework analyses the long-term evolution of e-learning and its effect on mankind. The various methods, technologies, and approaches of e-learning that exist in various forms were discussed exponentially according to the range of necessities among the learners. The recommendation system plays a pivotal role in referring contents and enhancing the learning environment. The education promoted to the learners through the recommendations system over their personal preferences were explored here in detail.*

### INTRODUCTION

In the modern era, each person is obliged to learn but just the learning differs from one to one. Based on few factors the education can be categorized into three types, mainly, Formal education: which is the basic and traditional type of learning acquired in the school premises. Informal education: which is a natural type of learning from worldly knowledge through parent-child teaching or by self-learning through experience or personal interest. Non-Formal Education: which involves open-ended adult education, a very long process of learning with the flexibility of age, time, and syllabus without interrupting the learner's workflow. Learning defines the sense of abstracting the meaning with the transformative

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process of behaviour and knowledge in the person permanently based on the long- or short-term experiences or changes. The process of learning involves two categories like traditional learning and online learning. Traditional learning is also known as face-to-face learning or classroom learning where the learning is teacher-centric. Whereas, online learning or web-based learning also known as E-Learning is learner-centric (Swan, 2003) where the student can take part in learning using technology by virtually connecting with or without teachers. The main differentiating aspects are given in Figure 1 below.

*Figure 1. Traditional vs online learning*

TRADITIONAL LEARNING		ONLINE LEARNING
Acquisition of knowledge	GOAL	Application of knowledge
Teacher Centric	LEARNING APPROACH	Student Dependent
Institution prescribed study material.	CONTENT CHOICE	Vast web-based learning resource
Assessment Based on peer performance	COMPETENCY	High impact on self-upgradation
Instant Feedback, social advantage	MOTIVATION	Self motivated and lacks timely feedback
Complete within stipulated time	TIME LIMIT	Self-paced / deadline
Expensive	EXPENSE	Cost Effective

## **BACKGROUND**

The history of new technologies and pioneers in online learning tells, in 1728 the world's first and foremost distance learning course was started through the post in Boston to the learner. In 1840, Great Britain offered a correspondence course for shorthand. In 1922, the courses were offered through the radio in Penn state. In 1924, Ohio University professor Sidney Pressey invented the first e-learning device "testing machine" called "automatic teacher" which was a failed project. In 1927 - Thomas Edison quoted "The motion picture will replace textbooks in schools". In the 1930s during World War II, the first e-learning took place using film to train the soldiers (Chen, 2008). Then in 1945, the "teaching machines" (Skinner, 1961) were developed by B.F. Skinner for school use. In the 1960s the teaching gradually flourished were PLATO- Programmed Logic for Automated Teaching Operations a computer-based-training program was developed and made machines/computers inevitably skilled, more reliable, and easier to access. In 1965, the University of Wisconsin offered the first state-wide telephone-based education program. In 1966, Stanford University professors Petrick Suppes and Richard C. Atkinson offered reading and teaching math to young elementary school students using computer-aided instructions (CAI). In 1968,

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Stanford University accessed television networks for part-time instructions. In 1969, the US department of defence authorized ARPANET Heralds in establishing the internet for communication and training soldiers. In 1970, modern computing was defined through the invention of the Computer mouse and the GUI which enhanced computer-based training. In 1976, adult online education was offered by the University of Phoenix. In the 1980s the personal computer came into existence with Macintosh where information sharing within online communities raised the path for e-Learning, thereby leveraging the initiatives to expand e-learning to schools, organizations, and self-development (Harasim, 2006). In 1981, the learning leaped into new trends through audio recordings, radio, and television broadcasting [64] as taped classes. In 1982, a computer-based learning center (CALC) was found for adult learning. In the 1990s virtual learning through email communication started with the era of “digital natives”. In 1992, the first Ph.D. program was offered through American online by the Electronic University Network. In the 2000s business began to adopt e-learning courses to train employees. In the 2010s a new way of e-learning (Thai-Nghe, et al., 2010) brought to light through social media like YouTube, MOOC, Twitter, Skype, etc., to connect and share information for learning from each other. In 2012, 90% of universities started offering online courses. The persistent change in potential interaction and experience with the web around the globe resulted in the vast growth of performance by the learners in various aspects.

This paper represents the various aspect of e-learning, its methods, and enhanced approaches prevailing along with the recommendation techniques and the emerging latest trends in e-learning globally.

## **E-LEARNING**

Online Learning is also called electronic learning which uses electronic devices to communicate and learn. E-learning can make screen time purposeful from kids to elders by facilitating various knowledge providers who offer books, videos, learning audio materials, and quizzes to the wholesome growth of everyone. E-learning increases the abilities of the individuals to gain proficient information and frame the mind to attain essential innovative skills to tackle the issues and the capacity to do inventiveness.

E-learning can be classified into fundamental two categories: Synchronous e-learning and Asynchronous e-learning (Hrastinski, 2008). The synchronous e-learning can be called virtual classroom or distance online education where the conventional method of learning happens at the same time or in real-time with the virtual presence of tutor and learner at a stipulated time. Whereas, asynchronous e-learning is an unconventional method of learning that occurs through the online platform without the virtual presence and real-time interaction. The six various types of e-learning were classified based on students with/without presence and e-communications (Negash & Wilcox, 2008) which involves face-to-face, synchronous, asynchronous, self-learning, hybrid synchronous, and hybrid asynchronous. Below figure 2 shows the main difference in learning styles (Shahabadi & Uplane, 2015) between the synchronous and asynchronous in varied aspects.

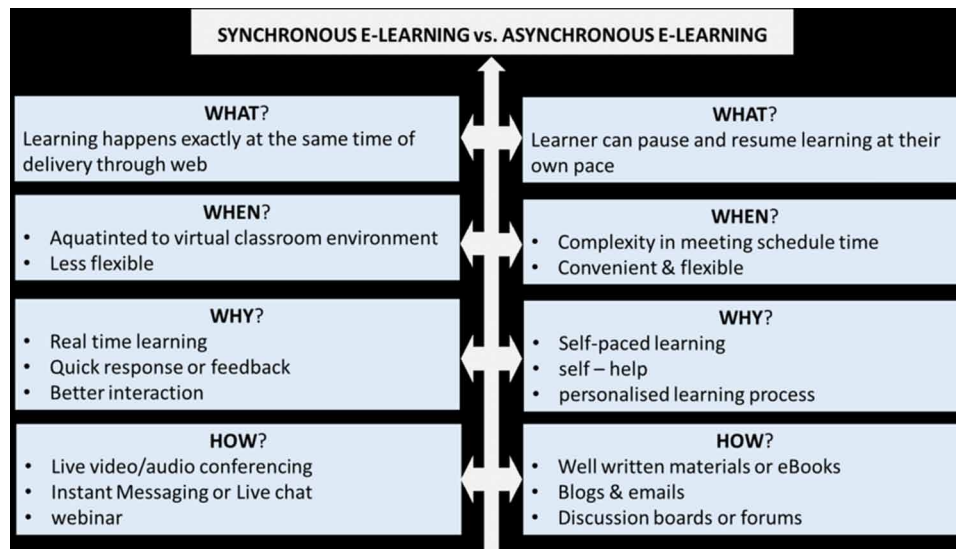
The pros and cons of learning exist in both synchronous and asynchronous e-learning. The advantages of e-learning are effective and performance yielding than traditional classroom learning (Peat & Helland, 2004).

Some of the main perspectives of e-learning include:

- Convenience: e-learning gives immense flexibility and convenience to learn regardless of time and place.

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Figure 2. Synchronous vs. Asynchronous E-Learning



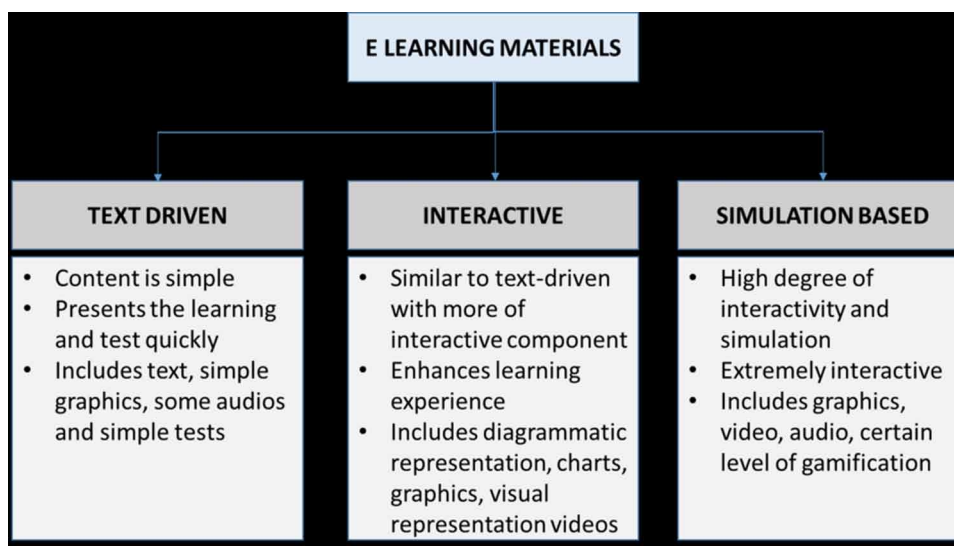
- Cost-effective: It is cheaper when compared to traditional learning.
- Provides continuous up-gradation of skills and knowledge.
- Higher opportunity to access the contents from worldwide.
- Updating the contents to access is easy and materials are permanently available.

In the same way, e-learning possesses certain challenges:

- Interaction: It lacks face-to-face or peer-to-peer communication.
- Self-Dependent: The learning will be taken on the individual's exertion and preferences.
- Self-Motivation: The learners should take up and complete this learning with their strength without encouragement from others.
- Misconception: Learners may misunderstand the content and conclude the context in the wrong way.
- Periodical Growth: The learner must determine which concepts to know and necessary to learn further.
- Evaluating the process growth of the individual and getting feedback will be harder or even negligible.

E-Learning materials and courses over the web are categorized into three types (see Figure 3).

The perspectives of eLearning materials are, the learner acquires a greater degree of flexibility, convenience, cost-effective, immersive, and amusing learning experiences (Littlejohn, et al., 2008). Whereas the challenges of eLearning materials are more relevantly based on a qualitative check of the content such as the poor instructional design of course materials, the relevancy of subject, placing the textbook content and lectures notes over online in the same format, repetitive or similarity of content and lacking new course design or learning contents in-depth with new technologies or contents.

**An Analysis on E-Learning and Its Recommendations***Figure 3. Types of eLearning materials*

The current and future trend in the enhanced e-learning involves different types of methods and technologies that promote and leverage the user's needs which facilitates active participation in learning activities. Now will see various learning methods that are making the head away with technological growth.

## Hybrid Learning

Recently the usage of eLearning concepts emphasized in the Hybrid learning technique that clubs online learning and traditional learning together (Wang, et al., 2010). In the current scenario, incorporating the teacher-centric and online resources in the learning styles for the enhanced academic performance of the students, explicitly getting acknowledged throughout the world. Hybrid learning is a recent deployment in the epidemic trend with different strategies such as Blended Learning and Flipped learning.

## Blended Learning

Blended Learning is the merging of e-learning and classroom learning. It provides learners with tremendous potential and the most logical way of learning (Poon, 2013). Thus, the approach overcomes the challenges of one-to-one contact of instructors by integrating with the technological benefits of online learning. This learning strategy has placed a strong step in the broader context of educational institutes and business organization developments. Hence made a huge change in the learning process (Brookfield, 2009) and unfolded efficient opportunities for every individual who desires to learn something new in an appropriate field. But it has a negative impact on learners who are trying to sync up to the pace of the course and peers, creating cognitive load by over-delivering of materials and learning activities from the instructor.

Advantages of blended learning:

- Flexibility

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- Increases interaction
- Technical skills improvement
- Asynchronous Interactions

Disadvantages of Blended learning:

- Time Constraints
- Technical Support
- Student and faculty perception over learning technics and relationship between them

**Flipped Learning**

In the field of education, we are witnessing a major transformation in the style of teaching and learning environments. Here comes the emerging theory of Flipped learning which was developed in the late '90s as a "peer instruction model" by Harvard Professor Eric Mazur in the name of "just in time teaching" (Crouch & Mazur, 2001) and then in 2012, it got popularized by the chemistry teachers Jon Bergman and Aaron Sams of Woodland park high school, Colorado. Flipped learning is also known as Reverse learning. This uses the typical concept of combining online and offline learning (O'Flaherty & Philips, 2015). The students learn through the eLearning materials before attending the class and after that, the instructor guides the students to implement the concepts via assignments and engaging them actively in the subject matters practically (Jordan, et al, 2020).

Advantages of Flipped learning:

- Helps in developing prior knowledge
- Enhanced applications of learning
- Adequate time for learning and implementing

Disadvantages of Flipped learning:

- Motivation
- Timing to cope with peers

**Adaptive Learning**

The eLearning concept indulges also in adaptive learning. Depending on the upraising tendencies of growth in the industrial or business organization, explicitly opting for individualized adaptive learning by replacing traditional web-based learning that is delivered to the employees for the competitive advancement of their organizations. In this adaptive learning, the information producers customize the presentation of eLearning materials according to the learner's performance level in real-time. Adaptive learning methodology carries the data-driven approach to provide customized learning paths (Paramythis, & Loidl-Reisinger, 2004). This learning strategy determines the e-learning activities dynamically, which can be delivered to a learner based on their data that are gathered before and an ongoing e-learning process using some sort of data mining technique (Yarandi, et al., 2013). The learner experiences the shifting of presentation or course flow to accommodate the performance level and by not repeating the materials

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they've known already thus, by completing the course at their own pace and path. The adaptive learning path will be approached non-linearly and helps in an enormous procreative learning environment for the learners. The learning objective involves creating, evaluating, analyzing, applying the skillsets that offer a personalised content learning experience for the learners. The main issue relies on the material developer who faces few challenges on how to analyse course content, generate the adaptive learning data, and pattern recognition of the learner.

Advantages of Adaptive learning:

- Flexible and adjustable for learners
- Individualised and effective content learning path
- great time and competence for completion

Disadvantages of Adaptive learning:

- Numerous Tests and assessments to find the path
- The path could lead to over jumping of important materials and contents that need to be learned
- Accuracy problem arises with the complexity of adaptive content creation

### **Self-Directed Learning (SDL)**

Self-Directed Learning is subjectively called adult learning (Knowles, 1975; Knowles, et al., 1998) or life-long learning which has a specific capacity for critical self-reflection with continuous modelling of new knowledge for increasing access to information for necessary skill acquisitions to change their learning experiences positively (Merriam, 2001). Learning in a solitary state can be a strenuous job even for impelled learners as this method is an instruction based on design, conceptualization, performance, and assessment over the learning materials handled by the learners themselves (Brookfield, 2009). Learners can prefer any one of the strategies to get resourced learning.

- Deep mode – includes the transformation of learners by understanding, implementing knowledge and ideas to new circumstances which are more than what is required
- Surface mode – includes reproduction, where learners go for what is required to accomplish a task with a good understanding
- Strategic mode – includes organization, where learners prefer what is required to get the highest grades with minimal effort.

This creates a cooperative learning environment and the utmost flexibility where the learners self-motivate by engaging in self-evaluation and accepting constructive feedback from their past experiences to achieve their goals productively with no age barriers (Lalitha & Sreeja, 2020).

Advantages of SDL:

- Learning at one's own pace
- Access to feedbacks
- Continuous Surplus materials and sites
- Increases the involvement by owing the learning process



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- Appropriate for Employees without disturbing the workforce

Disadvantages of SDL:

- Self-motivation
- Sometimes misleading in learning things will occur due to learning on their own.

**Mobile Learning**

Based on the upcoming new Learning methods in the field of eLearning are prominently focusing on the growth of digital technologies and devices like cell phones (Sarrab, et al., 2012). This Mobile learning is applied in many distinct scenarios with the help of a Personal digital assistant (PDA), where the happenings of live lectures or conference talk presenting by the instructor are broadcasted directly to the learners over their mobile devices (Ozdamil & Cavus, 2011) and simultaneously can generate the digital video library through the procured video clips that are accessed by the learners or created by their own to view subsequently either by web-based or by mobile devices.

Advantages of Mobile Learning:

- Accessing contents easily
- The Flexibility of involving time and place for the learning process
- Engaging and provides feedbacks instantly.

Disadvantages of Mobile Learning:

- Resolution size and accessing with a small device
- Distractions during the learning process
- Speed and connectivity issues
- Doesn't seem appropriate for children's usage for long hours.

The various approaches incorporated in using e-learning which facilitates the learners and instructors in transferring of knowledge and skills mainly focus on

- Paragogy (Peergogy) (Corneli & Danoff, 2011) – involves instructor-led learning where learners dependent on peers.
- Andragogy (Merriam, 2001) – involves self-directed learning where learners are independent.
- Heutagogy (Hase & Kenyon 2013)– involves self-determined learning where learners are problem-finders
- Cybergogy (Wang & Kang, 2006)– involves engaged online learning where learners are influenced by emotional, behavioural, and intellectual in learning tasks.

*An Analysis on E-Learning and Its Recommendations***E-LEARNING RECOMMENDATION SYSTEM AND RELATED WORKS**

The recommendation System (RS) is a distinct model of intelligent systems that plays a critical role in the personalisation of user's requests and needs. This information filtering system first and foremost used in online commercial applications. Recently recommendation systems were substantially used in various domains to customize applications through prediction and recommendations according to the user's needs. Similarly, the recommendation system has put its Bigfoot in the e-learning domain and becoming a significant part in recommending the items to the users based on their interests and requirements. The recommendation system can be categorized as constraint-based recommenders (Felfernig, et al., 2015), knowledge-based recommender (Tarus, et al., 2018), and context-aware recommendation systems (Verbert, et al., 2012). It helps the learners to find out the most relevant topics and materials by scrutinizing the large data available over the web. E-learning recommendation system gathers information on the preferences and interest of the learners based on the list of user-items like basic profile (age, qualification, occupation, etc.), prior knowledge, learner's performance (Nguyen, et al., 2010), user's behaviour, user's ratings, weblogs, nearest neighbour navigation list (Salehi & Kamalabadi, 2012), opinion mining from social platforms (Ortigosa, et al., 2014), demographic data (Goga, et al., 2015), etc., were used in generating a personalised recommendation that assists the learners in collecting the appropriate learning materials, learning patterns and paths (Zhang, et al., 2020; Nabizadeh, et al., 2020) for their career growth. The system uses Machine learning techniques like social filtering (Madani, et al., 2019), user-based & memory-based collaborative filtering (Rabahallah, et al., 2018), content-based filtering (Jordan, et al., 2020), hybrid filtering, K-means algorithm (Salehi & Kamalabadi, 2013), web mining techniques (Herath & Jayaratne, 2017), ontologies (Agbonifo & Akinsete, 2020; Rabahallah, et al., 2018), fuzzy logic techniques (Nilashi, et al., 2014), association rule (Wu & Gu, 2015), ensemble classifiers techniques (Kausar, et al., 2020), etc., to generate the e-learning recommendation model for extract the preference and valued learning objects. Some detailed views of methods and datasets usage in a certain paper on e-learning recommendation systems are given in the table.1 below.

Some latest works presented in the field of e-learning recommendation systems were discussed below.

Jordan, et al., (2020) proposed a hybrid learning recommending model using the content-based filtering techniques to extract and recommend the learning videos for both students and instructors from the central repository of the university. Daher, et al., (2018) proposed a new data mining algorithm to search complex multi-data items called multi-source data mining algorithm for a Metal project that includes primary and secondary school students in the e-learning domain. Goga, et al., (2015) proposed a framework of intelligent recommender based on students' academic performance and their family background using techniques like decision tree, and multilayer perceptron to take corrective measures and improve the students' performance. Rabahallah, et al., (2018) proposed a recommendation engine that focuses on the prediction of top online courses to the learners using ontologies and memory-based collaborative filtering techniques. Demertzi, et al., (2020) proposed a hybrid personalised eLearning system using ontology, machine learning classification techniques, collaborative and content-based filtering based on data extracting from learning material repositories and curriculum courses to generate recommendations that match learner's needs and skills. Wu, et al., (2015) proposed a novel framework for filtering and predicting educational metadata using the cloud model to generate the personalised recommendation model for online learning. Chen, et al., (2020) proposed a new learning style model to generate personalised recommendation feature sets for online learners by clustering them based on online behaviour styles and extracting preferences and patterns using association rule and collaborative filtering resulting

**An Analysis on E-Learning and Its Recommendations***Table 1. ML Methods with Datasets*

YEAR	ML METHODS	DATASET	REF.
2010	collaborative filtering, Matrix Factorization, linear regression, logistic regression	log files of interactions between students and computer-aided-tutoring systems	Nguyen, et al., 2010
2012	content-based and collaborative based filtering tools	frequently visited materials, most similarly visited materials to target learners	Salehi & Kmalabadi, 2012
2013	K-means algorithm, association rules, collaborative filtering, content-based filtering	rating of learners, multidimensional attributes of the material, sequential patterns of learner's accessed material	Salehi & kamalabadi, 2013
2014	Adaptive Neuro-Fuzzy Interference systems (ANFIS) and self-organizing map (SOM) clustering, fuzzy-based algorithms	Real-world datasets to improve the accuracy	Nilashi, et al., 2014
2017	Web-mining techniques, Collaborative Filtering, content filtering tool	navigation behaviours, web contents, performances, profiles	Herath & Jayaratne, 2017
2018	Collaborative Filtering, Matrix Factorization	Similar user's preference, contents of the document	Lai, et al., 2018
2019	social filtering, collaborative filtering, K-nearest neighbours' algorithm	social network profiles (Facebook, Twitter)	Madani, et al., 2019
2020	Naïve Bayes classifier, fuzzy c-means clustering algorithm, Semantic Ontologies technique, Collaborative filtering	Educative content repositories: ADRIADNE & MERLOT, student's info & grades	Demertzi & Demertzis, 2020

in an adaptive recommendation of online learning styles model. Rivero-Albarrán, et al., (2018) proposed a framework for a teaching agent system to obtain appropriate teaching and learning content as per the needs of the student using a multi-agent system design to provide an intelligent classroom environment to each student. Apoki, et al., (2020) proposed an adaptive eLearning model to provide specialized courses that merges the text, video, audio learning resources for common curriculum generation correlating with learners' preferences and needs. Azzi, et al., (2020) proposed the architecture for personalised course design based on artificial neural networks using learner's historic data and prior knowledge to produce the appropriate learning materials for the learners. Mondal, et al., (2020) proposed a framework to study in a personalised environment using machine learning techniques like collaborative filtering and k-mean clustering algorithm based on learner's historic data and prior performance to form clusters that can be utilized for recommending suitable courses. Shi, et al., (2020) proposed a model for learning path recommendation using a multidimensional knowledge graph framework to fulfill the learning needs by targeting learner's interests that help in generating the personalised learning path recommendation model. Krauss (2018) proposed a new time-weighted knowledge-based filtering algorithm to analyze the accuracy of top N item recommendations at different time instances when the users access it and by using multi contextual activity data to provide explicit recommendations to the learners. Ali Ahmed, et al., (2020) proposed the architecture for e-tutoring to design and update course contents based on learner's abilities and to resolve certain problems by using an isolated database. Monsalve-Pulido, et al., (2020) proposed an architecture of a hybrid recommendation model using content-based, collaborative, and knowledge filtering based on the demographic data, online content, students learning style, student's

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historic data, etc., to produce the precise academic course for the students. Rani, et al., (2015) proposed an ontology-driven adaptive personalised e-learning system using cloud storage, ontologies for query creation, and the Felder-Silverman model for determining learning style which assists in semantic web education learning. Ismail, et al., (2019) proposed a framework for personalised content recommendation and evaluation model for generating appropriate adaptive recommendations with the changes in learner's interest and then analyze the impact of learning objects recommendation from wikis. Klasnja Milicevic, et al., (2018) proposed an online tutoring system to utilize collaborative tagging and using social tagging, sequential pattern mining to generate a hybrid recommendation model by comparing the most popular tags to give out suitable learning objects to the learners.

## **LATEST TRENDS AND FUTURE SCOPE OF E-LEARNING**

Education is the road to advancement and brings betterment to one's life through natural and everlasting positive behavioural changes to achieve their goals. The emerging generation centralizes over goal-oriented learning. The current pandemic involuntarily made us take a remarkable transformation in education and further changed everyone's day-to-day lives including toddlers by fast-tracking digitalization worldwide (Livari, et al., 2020). Charles Darwin quotes "It is not the strongest of the species survives, nor the most intelligent that survives, it is the most adaptable to change". The unleashing technological transformation with the impact of the COVID-19 pandemic has reshaped the education sector adversely creating unprecedented challenges in the learning system (Dwivedi, et al., 2020) as more goal-oriented. It forced us to experience a new digital revolution by changing the conventional teaching and learning practices globally by pushing it to switch to eLearning. With the high growth and demand of eLearning system, the recent study on the e-learning market has estimated \$144 billion in 2019 and forecasted \$374.3 billion gain by 2026, thus even the government has initiated R&D projects and funding the prevailing works to become mainstream with an expected growth of USD 14.6% compound annual growth rate (CAGR) from 2019 to 2026. The persistent change in potential interaction and experience with the web around the globe resulted in the vast growth of performance by the learners in various aspects, 90% of universities started offering online courses.

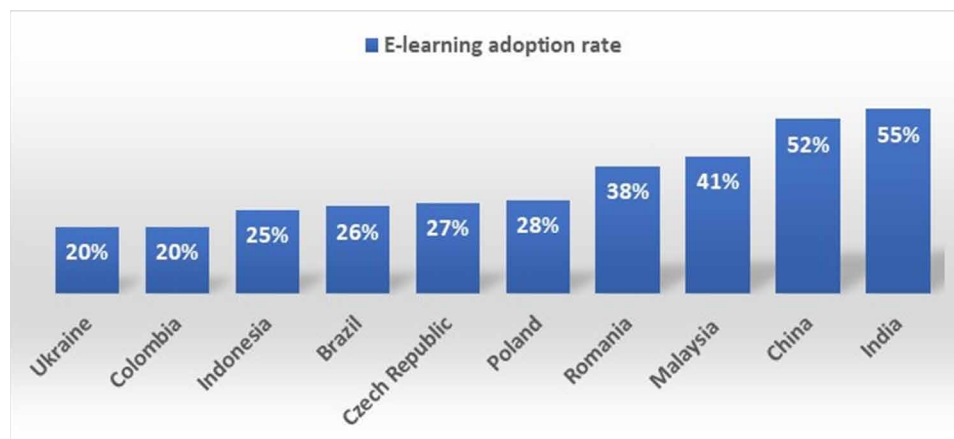
This COVID-19 pandemic put us in a challenging position by forcing us to move towards digitalization from the physical world by migrating students learning to undergo 100% online learning programs. India is gearing up to pedagogical evolution and digital revolution with rapid speed and the e-learning industry is dominating the overall education system by permanently incorporating computerized technology by infusing online classes and courses for the learners. The future of India's education system drastically changed by introducing e-learning in every step of the learner's life making them convenient, interesting, and engaging while learning. This pandemic situation with more than 1.2 billion children's needs for education, has tweaked the e-learning adoption rates in many countries to reach the desired success in teaching and learning for the students. In the recent study done by BINUS University, the statistical growth of major countries with the highest growth in e-learning adoption rate is given in below figure 4.

In this 'New Normal' condition, the whole education system has been obligatory in offering solutions to the study-from-home state and social distancing issues by incorporating necessary online tools into the academic environment. Prior to the Covid-19 situation, technology-supported education was not mandatory for students, where the medium of instruction is mainly concentrated on physical teaching and learning environment and students get additional blended learning benefits from online technology

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*Figure 4. Countries with the high e-learning adoption rate*

Source: BINUS University, 2019



(Aggarwal, 2009). But now due to the lockdown situation, the compulsory implementation of new on-line medium is widely spreading not only to the urban landscape but even reaching the rural sectors in India (Anusudha, et al., 2021) by offering ample variety of learning facilities ranging to more than 500 million internet users regardless of their age, location and status. The digital transformation is providing online courses through MOOC (Pant, et al., 2021; Bordoloi, et al., 2020) platform some of them like Udemmy, Coursera, edX, Udacity, Swayam (initiated by the Govt. Of India), etc., allowing unlimited learning to students and employees. In recent times in India, several ed-tech companies like Byju's, Edukart, Vedantu, Toppscholars, Cuemath are some of the learning apps actively encouraging eLearning ranging from elementary school students to high school students, in that Byju's attained a 150% surge in this business. Thus, E-Learning has been an accelerated transformation in learning strategies with varied trends (Zain, 2020) and recommendation system at all the levels in the best way possible for the learners to focus and carry on with their learning activities virtually and more spontaneously without major hindrance. Adult education is highly engrossed with the technological evolution in eLearning recommendations that paved the way to the individual-centered and personalized learning experiences for the learners to enhance their strategic abilities and goals without disrupting the workforce (Bariso, 2010). Corporate e-learning (Arnquist, 2020) entails learning and training over the web by engaging the employees to learn efficiently, enhancing their skills, increasing benefits to the organization, and maximizing the results with 40% to 60% less time duration to complete the course contrast to conventional learning. According to current market statistics (Source: Businesswire, 2020), the corporate e-learning market has predicted a growth of 11% compound annual growth rate (CAGR) between 2020 to 2024.

The most innovative e-learning trends (Lara, et al., 2020) emerging across the globe in the crisis of covid-19 pandemic which is helpful to initiate learning activities most effectively were listed in table 2. below.

Thus, speculating the current trends and changing enhancements in the area of e-learning were dealt with rapid digital transformation in this pandemic situation significantly broadening the growth of e-learning practice to the international market in order to improve the learner's performance by winding up the barriers to growth and adoption. In this grapple time of the pandemic, the usage of the latest technolo-

**An Analysis on E-Learning and Its Recommendations****Table 2. Emerging Trends in E-Learning**

	<b>EMERGING TRENDS</b>	<b>LATEST ARTICLES REF.</b>
1	Mobile Learning	Sattarov & Khaitova, 2019; Banane & Belangour, 2020
2	Social Learning	Souabi, et al., 2020; Souabi, et al., 2020
3	Micro Learning	Dixit, et al., 2012; Giurgiu, 2017; Alqurashi, 2017; Corbell, et al., 2020; Dolasinski & Reynolds, 2020;
4	Video-Based Learning	Wong, et al., 2018; Mohd Kamal, et al., 2019
5	Adaptive Learning	Arsovic & Stefanovic, 2020; Nabizadeh, et al., 2020; Morze, et al., 2021
6	Big Data in e-learning	Sheshasaayee & Malathi, 2017; Banane & Belangour, 2020; Mentsiev, et al., 2020; Moharm & Eltahan, 2020; Khan & Alqahtani, 2020; Chweya, et al., 2020
7	Internet of Things (IoT) in e-learning	Razzaque & Hamdan, 2020; Amasha, et al., 2020; Rukmana & Mulyanti, 2020; Doychev, et al., 2020; Chweya, et al., 2020
8	Beacon Learning	Rajesh, et al., 2018; Griffiths, et al., 2019; Lingwood, et al., 2020
9	Cloud-based e-learning	Rahman, 2016; Siddiqui, et al., 2019; Herdradi, et al., 2020
10	Blockchain-based e-learning	Li, 2019; Humayun, 2020; Lam & Dongol, 2020;
11	Artificial Intelligence in e-learning	Herdradi, et al., 2020; Muniasamy & Alasiry, 2020; Ray, et al., 2020; Tang, et al., 2021; Ouyang & Jiao, 2021
12	Game-based e-learning and Gamification	Yi, et al., 2020; Boychev & Boytcheva, 2020; Bennani, et al., 2020
13	Virtual-reality, Augmented-reality & Mixed-reality in e-learning	Calin, 2018; Martin, et al., 2018; Jung, et al., 2020
14	Content Curator in e-learning	Kukhareenko & Syrotenko, 2014; Wang, et al., 2020; Dede & Forster, 2021
15	User-Generated Content for e-learning	Reimers, 2015; Ganapathi, 2019; Ray, et al., 2020

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gies and recommendation systems are extending a huge amount of support to the learners systematically causing an up-gradation in digital skillsets and modifying basic eLearning philosophy in every industry.

## **CONCLUSION**

Online learning has entirely modified how efficient teaching and revolutionised learning is imparted to the learners in contrast to traditional learning. E-learning technology provides a window to the world's information and growing up facilities that can be accessed universally by users. The eLearning tasks can be segmented as creativity, technologies, learning, and business where both learning and knowledge management involved that empowers learners effectively and contentedly. This field is becoming the mainstream for research in recent days with a lot of investments put forth in web-based learning delivery. This paper represents the various aspect of e-learning, its methods, and enhanced recommendation approaches prevailing in e-learning. The importance of information and communication technology (ICT) in the education system for the competitive society to yield higher productivity, performance, satisfaction, and commitment by the community were clinically measured with the growth of technologies in the learning environment and the actions carried out to boost the usage were scrutinized with the help of recommendation systems. The integral part depicts a greater view of trends in the e-learning recommendation system which will pave a positive path for society's growth. The key purpose of this paper revolves over non-formal education which majorly involves e-learning for the development of professional and organizational growth focusing on the application and implementation of artificial intelligence, machine learning methodologies for the future benefits of human race. By exploring around 121 published research papers, journals, and newspaper articles, the notion of eLearning and its technological growth were identified with high definitions and learning strategies which formulates the learning goals more significant for the learners. The aim of the paper concentrates majorly on the latest trends evolving in the e-learning domain globally and the increased usage in our country during the pandemic and its raising statistics were explained clearly and to come up with the current scenarios in the field of technology ensuring the dependability on the broad domain of e-learning, creating a pathway for the employability and opportunities for evolving edupreneurs. Every latest segment of techniques incorporated with eLearning recommendation systems brings out leading incredible opportunities to see the rapid change unfolding to learn and grow the skilled solutions across the world. I would like to conclude with the quote by John Dewey "If we teach today's students as we taught yesterday's, we rob them of tomorrow".

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