

# Impact of Information Technology in Higher Education

Pooja Singh\*  
Seema Shokeen\*\*

## ABSTRACT

*The education system is categorized into formal education, informal education and non-formal education for better nation-building. These categories of education system comprise of education perceived from all domains like family, schools, colleges, certified courses and several other ways. In this paper, we will be discussing about the education system of India, the higher education system of India which is observed to be a multi-layered formal education system in nature. The main objective of the paper is to discuss about the various levels of education system prevailing in India which are discussed as the five layers namely primary, secondary, higher secondary, graduation and post-graduation. Apart from the above-mentioned objective, the other objectives discussed are about the Online Education system. The pros and cons of the Online education system will be revealed and discussed as per the studies conducted. In the later section of the paper, the concept of SMAC is also introduced in the field of education which primarily focuses on the components of SMAC which are: Social Media, Mobility, Analytics and Cloud Computing, along with the role of SMAC in the online education system. The paper also covers the aspects of growth drivers in the online education system.*

**Keywords:** Online Education, Higher Education, SMAC, Cloud Computing, Social Media

## INTRODUCTION

The various levels of the education system in India are described in five layers namely primary, secondary, higher secondary, graduation and post-graduation with approximately 260 million students enrolled in more than 1.5 million schools [1] and there are roughly 39,000 colleges that are serving the educational needs of around 27.5 million undergraduate and four million postgraduate [2] students. The schools are the foundation of the formal education system in India and hence has to be properly governed and monitored for maintaining various standards. They are governed by state and central bodies, viz. CBSE, ICSE, state and several international boards.

The higher education systems in India is supposed to be one of the largest in the world, which is primarily dominated by the private sectors rather than government sectors. The highest regulatory bodies in India which govern the higher education system in India are the All India Council for Technical Education (AICTE), University Grants Commission (UGC), Medical Council of India (MCI), and the Bar Council of India (BCI), which are responsible to manage the various professional courses offered by them. The higher education system governed by UGC has a 3-tier structure comprising of the university at the topmost level, college at the middle level and the courses at the bottom-most layer. The education system of India can be depicted by a

\*Assistant Professor, Department of Computer Application, Maharaja Surajmal Institute (An affiliate of GGSIP University)  
C-4, JanakPuri, New Delhi – 110058, Email: poojasingh@msi-ggsip.org

\*\*Assistant Professor, Department of Business Administration, Maharaja Surajmal Institute (An affiliate of GGSIP University)  
C-4, JanakPuri, New Delhi – 110058, Email: seemashokeen@msi-ggsip.org

multilayered pyramid structure where the primary education exists at the bottom-most layer and the post-graduation exists at the topmost layer. This can be well depicted through an education pyramid demonstrated below.

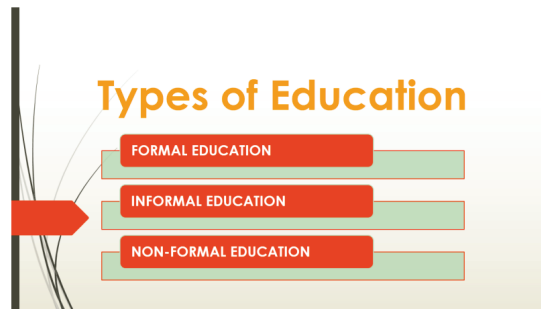


Fig 1: Types of education system in India

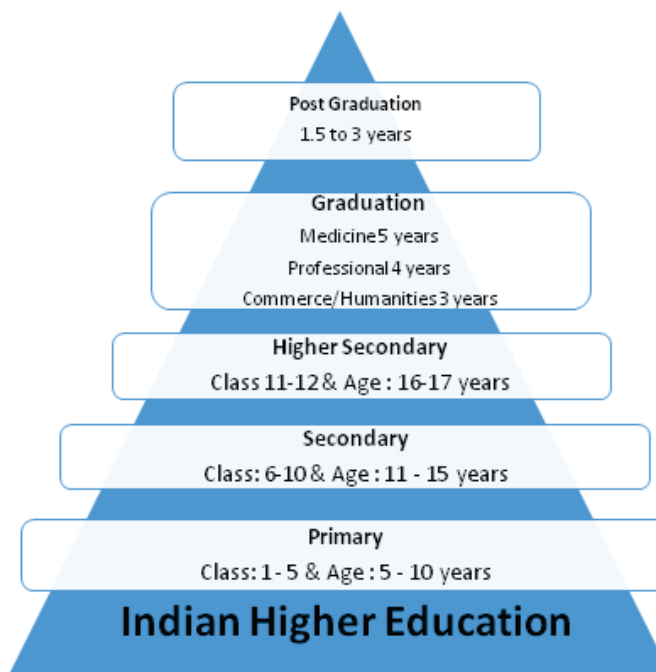


Fig 2: The structure of the Higher Education System in India

The formal education structure comprises of the formal schools and colleges for the higher-level education, where a student is expected to spend approximately 14 years of formal school education including primary, secondary and senior secondary classes (Classes nursery – Class XII) and thereafter graduation of 3 or 4 years and a post-graduation of 2 or 3 years depending on the nature of the course opted for. The informal education system comprises of coaching academies, vocational courses, technology-oriented short courses and also the pre-primary education sector for small children below the age of 3 years. Such courses aid as the supplement or substitute to formal education structure. India's informal education market is one of the largest in the world. The pre-primary market actually does not have any barriers and are above several rules and regulations and hence witnessed a large number of players in the last few years. The prime reasons for the growth of vocational education in India are observed to be the presence of a large working population and an increasing requirement of skilled workers.

## OBJECTIVES

The objectives of the paper are described as

1. To understand the various categories of the education system
2. To understand the impact of information technology in the higher education system
3. To study the need of an online education system
4. To understand the concept of SMAC in the online education system
5. To identify the growth drivers for promoting the online education

## RESEARCH METHODOLOGY

The paper is primarily based on a descriptive study. The various reports belonging to different stakeholders including both government agencies and non-government agencies dealing with the education system are referred and focused for pursuing the study.

## SCOPE

The study would be beneficial for various sectors including the students belonging to different categories of education system particularly the higher education system. It's going to be beneficial for the stakeholders who look forward to some industrial collaboration with the students.

## Online Education

The online education system in India is growing at a very fast pace and for doing this there are several online platform providers that are playing a vital role in spreading the online education ecosystem. Initially, the platform served as the utility resource to connect the students and the content developers and providers. In the past few years, the players of the online education system have widened the scope of the content providers and curators.

Online education in India is a mixed structure of both dedicated online and offline contributors. The Customer – to – Customer (C2C) business models of online education have provided a very sound platform where the entire system connects to the prospective teachers and students. On the other hand the Business – to – Business (B2B) model is much more prevalent in higher education, where the corresponding institutions offer degree/diploma courses to students through their own platforms on their terms and conditions or it may be done through a third party aggregator corporate tie-ups who assist for the development of industry-certified content, that gives the overall acceptance of online education amongst the target users. The efficient internet connectivity and a massive shift towards digital payments have significantly played an important role in the growth of online education in India. The online channel of education is increasingly gaining acceptance amongst the student community in India because of the above-mentioned reasons. The students, therefore, get connected with each other via the internet and they interact with each other by sharing their notes, the innovative ideas and engaging in constructive dialogue on a common platform

The online education ecosystem will observe the collaborations between platform providers and corporates in the future.

- The key players of the online education structure could get associated and connected to the industry which will help them develop the content that is relevant for the current job market.
- Online certifications and re skilling oneself can also lead to enhanced employment opportunities which are being offered only to certified students. This could be facilitated more by suitable corporate partnerships in relevant industries.

Industry collaborations provide a real-time opportunity to the students through the following:

- **Internship opportunities**  
This platform could offer better internship opportunities to the high-performing students that will give them insight into the real working environment. The structure and the working of these internships could be designed with the appropriate industry partnerships.
- **Short-term assignments and live projects**  
The industry expert professional can design some live short term projects for the associated students with respect to their requirements. The students can also be assigned short-term assignments that will enhance the overall learning process and will also provide the platform to gain the required practical experience.

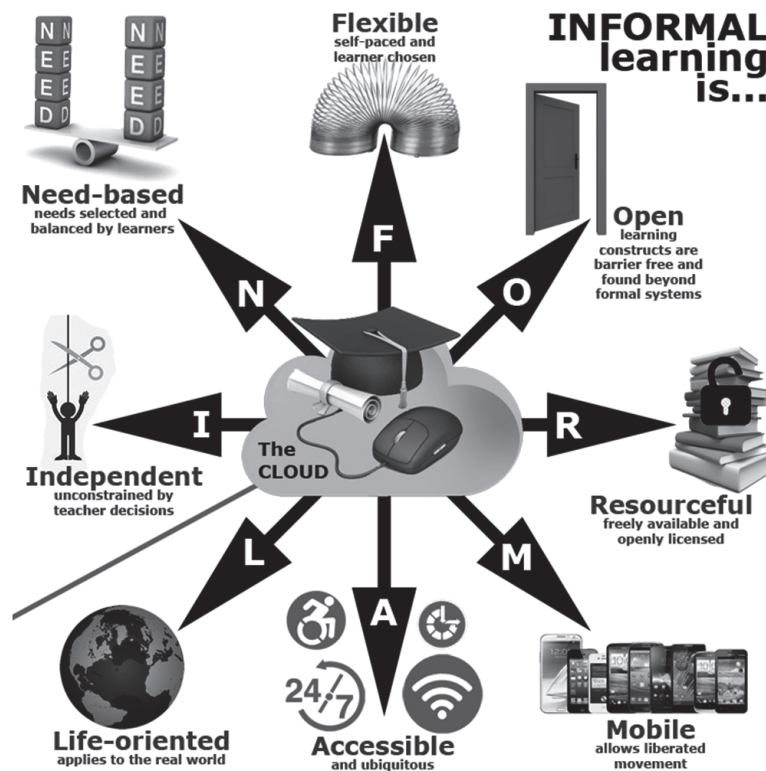


Fig 3: The Informal Education System

## SMAC

Social, Mobility, Analytics and Cloud, abbreviated SMAC, are separate platforms with technologies that evolved during the last few years and have shown enormous enhancement. Instead of treating these four components separately, current corporate organizations have started treating them integrally. Integration of Social, Mobile, Analytics and Cloud presents a prospect for business sectors as well as for the government to increase their revenues by mounting into mega volume margin instead of traditional IT business or e-governance. These four key technologies are working in a combination of each other and bring revolutionary changes in terms of user satisfaction in any domain

### Components of SMAC

<b>Social Media Technologies</b>	There are several social networking services and applications available which helps in enhancing the communication process. Some of the leading examples of such technologies are Facebook, Blogs, Twitter, E-Mail, Wikis, Instant Messengers and many more.
<b>Mobile Technologies</b>	Several technologies that allow anytime anywhere connectivity can be done using the technologies of Tablets, Smartphones, Personal digital assistants(PDAs), and global positioning systems(GPS) to the network.
<b>Analytics Technologies</b>	Analytics provide the process of gathering, classifying, overseeing, determining, examining and reporting a large volume of dissimilar data on a fragmentary basis
<b>Cloud Computing Technologies</b>	These technologies allow the remotecomputing resources which include applications, database and servers to be distributed via the Internet for providing the flexibility of resources with the minimum cost.

### SMAC in Education

#### Social Media

It allows the students to collaborate, communicate, and develop their own communities according to their likings. It enables easy content creation and sharing, Online Collaboration, Conversations. It can be made applicable using Blogs, Wikis, Pod Casting and Screen Casting which can be used to record lectures and provide online lectures.

#### Mobile

Mobility allows communicating anywhere without physical presence at a particular place. It can be made accessible by using certain gadgets or devices like tablets, laptops, netbooks and smartphones etc. The prime features of portability, small size and wireless communication makes it a very popular and most used technology. Aakash is one of the biggest examples of mobile utility in education that links students across various colleges and universities in our country for implementing e-learning[3].

#### Analytics

Analytics refers to the process of making very effective decisions by the utilization of raw data, certain inference rules, and several analysis models available for the decision-makers. Volume, Variety and Velocity are the three main characteristics of Analytics which are very well handled by the various Analytics tools available. Volume refers to a huge amount of data available, Variety refers to data available in an abundance of variety and categories and Velocity refers to the speed of the growth of data. We can very well see that the data in the education sector is very huge and enormous which needs to be analysed properly. This can be better performed by the deployment of various Analytics tools in the education sector which will improve the quality of education. It will utilize the basic data of the students, learner-produced data such as quiz, assignments, faculty produced data such as course content, learning resources.

### Cloud Computing

Cloud computing is a technology for enabling the on-demand network and a very convenient way to access the computing resources available in abundance including servers, networks, applications and services. The main features of cloud computing include Data Storage, data back up and data accessibility. There are two types of cloud infrastructures available namely Internal and External infrastructures. In the internal cloud, resources are used within the organization which is contrary to the external cloud. The very live example of cloud computing in the sector of education is the Learning resources created by IITs which can be accessed in <http://nptel.ac.in/> and <http://textofvideo.nptel.iitm.ac.in/>. It is also one of the biggest examples of Cloud storage. The cloud guarantees that students, instructors, personnel, guardians, and staff have access to basic data utilizing any gadget from anyplace. Both open and private foundations can utilize the cloud to convey better administrations, even as they work with fewer assets. The prime reasons for shifting to cloud computing in the education sector [13] are

- 76% of the institutes have reduced the cost of the applications by moving to the cloud.
- 35% of the institutes have uploaded at least 1 Tb of data to the cloud.
- If statistics are to be believed 43% of the higher education institutes have opted for cloud or planning for cloud computing solutions.

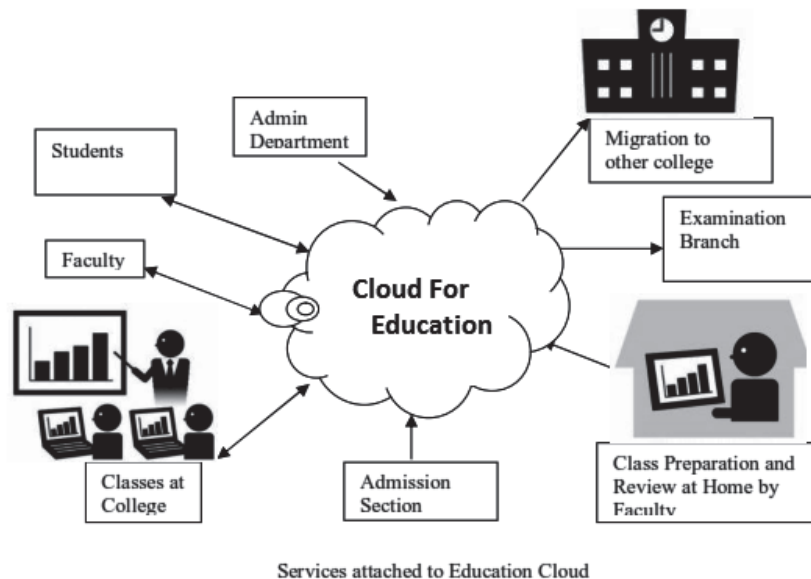


Fig 4: Services of Cloud Computing in Online Education System  
[Source: [http://www.ijrcce.com/upload/2014/february/21\\_Role.pdf](http://www.ijrcce.com/upload/2014/february/21_Role.pdf)]

### Categories of Online Education

The online education system has been categorized into the following categories which are expected to cater to the needs of the students at various levels.

• Primary and secondary education	Supplement to school learning for students enrolled in primary and secondary classes in school
• Higher education	Provide an alternative to traditional higher education courses
• Test preparation	Online programmes aimed at coaching students in preparation for competitive Examinations
• Reskilling and online certifications market	Courses designed to assist users in skill enhancement, which may result in Certifications
• Language and casual learning	Learning of non-academic subjects such as spoken English and playing guitar etc.

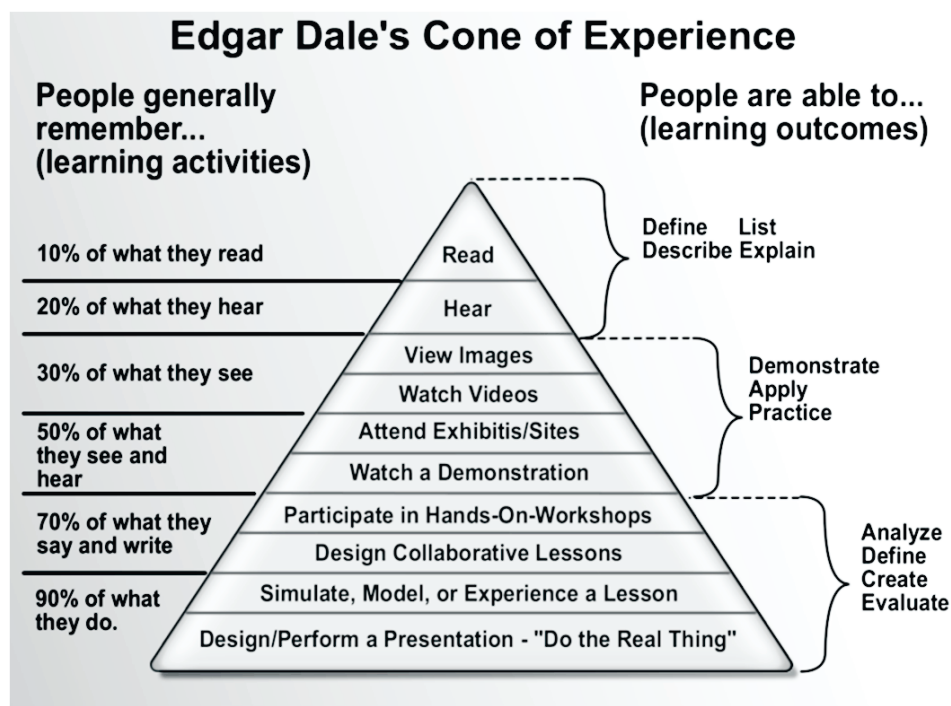


Fig 5: Eager Dale's Model of learning

#### Growth drivers of Online Education system in India

**1. Online education provides a low-cost alternative.**

Lower infrastructure cost and a larger student base helps leverage the economies of scale and hence reduced prices via the online channel. Online skill enhancement courses are nearly 53% cheaper than other traditional alternatives [4]

The cost of the major graduation courses in India are depicted below

**2. The online channel provides quality education to potential students**

Course	Cost at Govt College (in lakhs)	Cost at Private College[5]
Engineering	INR 5-6	INR 8-10
Medical	INR 5-10	INR 18-20
Commerce and arts	INR 2-15(Thousand)	INR 2.5-5
<b>Average Cost of online courses [4]</b>	<b>INR 15000 – 20000</b>	

Open courses and distance learning enrolments in India to rise to around 10 million in 2021 growing at a CAGR of around ten percent[6].

Areas where the availability of quality offline education is low witness higher adoption of non-traditional education methods. For example, states like Kerala, Bihar and Jammu and Kashmir account for ~ 4 Lakh distance learning enrolments [7]. Stark difference in educational qualification between urban and rural Indian population.

### 3. Growing job-seeking population drives the demand for industry-relevant training

- a. ~280millionjobseekersexpectedtoenterthejobmarketby2050[9]

Parameters of Measurement	Urban India[8]	Rural India[8]
% Male Graduates	17	4.5
% Female Graduates	13	2.2
Avg Annual expenditure on primary education	INR 10K	INR 2.5K

- b. Unemployment rate in India at a five year high of around five per cent in 2016[10]  
c. Annual growth rate in the availability of jobs at around two per cent per annum

### 4. Government initiatives to drive adoption of online education

Government initiatives such as SWAYAM, E-Basta, Rashtriya Madhyamik Shiksha Abhiyan (RMSA), Skill India and Digital India will enable the infrastructure needed by students to study online

### 5. Internet penetration witnessing exponential growth across India

India has seen an enormous growth in the rate of its internet users across the country with around 409 million users in today's time [11] With the ease of accessibility and the affordability of smartphones, the users are growing exponentially day by day, which brings everything just a touch away.

### 6. A large fraction of the Indian population is young, thus enlarging the target population for online education

The youth of the country is nearly 46% which lies in the age group of approximately 15-35 yrs [12].The acceptability of online education is the highest in this age segment, as they are highly inspired and maybe low earners as well, so they find the option of online education more suitable as compared to the traditional system of education.



## Factors for adopting online education

### 1. Category of students –

Students with science background opt for online education more as compared to the ones reading humanities or commerce.

Working professionals – the ones who had to drop their studies due to several reasons and are now in the working sector gets an opportunity to continue with their studies or take up some advanced professional courses which will help them to excel in their working domain.

### 2. Quality of content –

The major reason is the abundance of online content available for the students makes it easier for them to have in-depth knowledge about the content. The graphical nature of the content makes it more attractive and interactive for the students to understand the topics.

### 3. Better concentration at home

It is always observed that there are numerous factors that act as distractions for the students once they are out of their homes. It may be either the friends, the environment, atmosphere or many more. Whereas on the other side if we see the situation where the student is at his home and definitely far away from so many distractions he can focus more on his core studies. He is equipped with content and the syllabus and he can invest his quality time in his studies.

### 4. Online Tutors

With the emergence of online education, several tutors have also registered themselves for delivering online lectures which otherwise may not get a good opportunity to work. The students can take up the option of an online tutor of their own choice and get connected for their doubts at their own convenient timings.

### 5. Variety of courses

The online education system provides a huge variety of courses that can be taken up as per choice and convenience by paying a nominal fee for the same.

In the traditional education system, the student does not have any rights to choose their choice of the curriculum but over here they have full authority to choose whatever they wish to study. The student is not bound by the constraints of marks and streams in which they have been fixed for 3-4 years of his higher education.

### 6. Choice of selecting a variety of subjects

Online education also allows the flexibility to design the curriculum of the students as per their choice. The student can read the subjects in any combination which is not at all possible in the traditional education system. A science student good at automobiles can also read psychology or geography which may of his area of interest or a commerce student may read programming as his second very close choice of subjects. This flexibility of designing one's own choice of subjects is only possible through an online system of education.

### 7. Mode of fee payment

The fee for the course adopted may be paid through several ways including online payments completely at the time of purchasing the course or on installment basis during the entire duration of the course. The mode of payment includes both digital payments as well as cash payments whichever is suitable to the person.

### 8. Examinations

The examination system has entirely changed over the years. With the emergence of a huge job market majority of the segments are conducting objective based examination systems which are far much beyond the traditional writing of the lengthy examination paper. The objective of conducting the exams is to check the aptitude of the students and their presence of mind. This can be better judged by conducting objective exams

through multiple choice questions or short questions. This can be better conducted through online examinations using computer technology which saves a lot of time and cost of printing papers.

#### **9. One Demand Examination System(ODES)**

The student has very high flexibility to give their exams as per their choice i.e they can design their examination schedule on their own as per their convenience. There are several number of slots available for the conduct of the examinations from which the student can opt their choices of attempting for the exam. In a traditional examination structure the students does not have any choice over the schedule, they have to take up the exam as per the slot pre-decided and given to them.

#### **10. Credit-based evaluation**

The evaluation system should be transformed completely into the credit-based system rather than the currently available marks based system. The student is liable to score a minimum number of credits for the completion of a particular course, which he can do at any time duration. The duration should also be tried to keep flexible.

#### **11. Evaluation of Theory and Practical subjects**

As the job market demands the practical hands-on experience of the aspirants as compared to just the bookish knowledge it is advised to keep the weightage of theory and practical evaluation to be 40:60 per cent, specifically for the science and technology or engineering-related subjects. The practical oriented subjects (specifically science and technology stream) should not be evaluated for a duration of an hour or two but rather they should be evaluated practically in the real environment of not less than 3-7 days of duration or even more than that in the closed protected environment. Where the students are required to demonstrate the practical output of the given problem. For instance, the lab sessions for developing some models or algorithms should be allowed a good amount of time and then judge the real practical knowledge which is not possible in the traditional methodology of the studies.

#### **12. Regional Language specific content**

As we know that India is a multi-linguistic country where a majority of the population is residing in rural areas and this population is very close to their regional language. The content can be made available to the students in their specific language through the appropriate use of the internet as there are various software available that are proficient to convert the English content or the content in any language to any desired language. This will bring education closer to the people specifically residing in rural parts.

#### **13. Technical Certifications**

The online reskilling and certifications market is comparatively very high, as compared to other categories of online education in India. The online channel is preferred due to the convenience factor and a shorter duration of courses. The category is expected to continue growing at a very high rate as driven by the need for professionals to continuously learn evolving technologies and the demand from new entrants to the workforce trying to find a space.

## **CONCLUSION**

The paper discussed above revolved around the key concept of demand of online education system and the concept of the role of SMAC in various levels of the currently prevailing education system.

The core components of SMAC i.e Social Media, Mobility, Analytics and Cloud computing are found to be very essential in today's changing scenario of education which is the need of the hour, not only in India but across the globe. The paper also gave us an insight into the Online education system which has been very relevant in the various existing categories of education in India which are discussed as Primary and Secondary education followed by Higher Education. Apart from this, there is the demand for an Online examination system which is

very well discussed in the paper. There is a category of various skill-based online certifications also as a component of the education system which enables them to be self-sufficient for being an entrepreneur or even getting an opportunity to get connected to the industry. The multidisciplinary scenario of the education system has brought the entire world together which has generated the need for being multilingual and hence there are several language learning components also which are growing day by day. There are the growth drivers of the Online Education System which discuss the parameters of various needs which promotes the growth of the online education system. Apart from the various growth factors, we had also learnt the factors which had prompted us to accept the online education system with open arms even in a country like India with varied demographics such as population, religion, gender, caste, family background and the different educational backgrounds.

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