Impact of ICT on Higher Education in India with Special Focus on NPTEL

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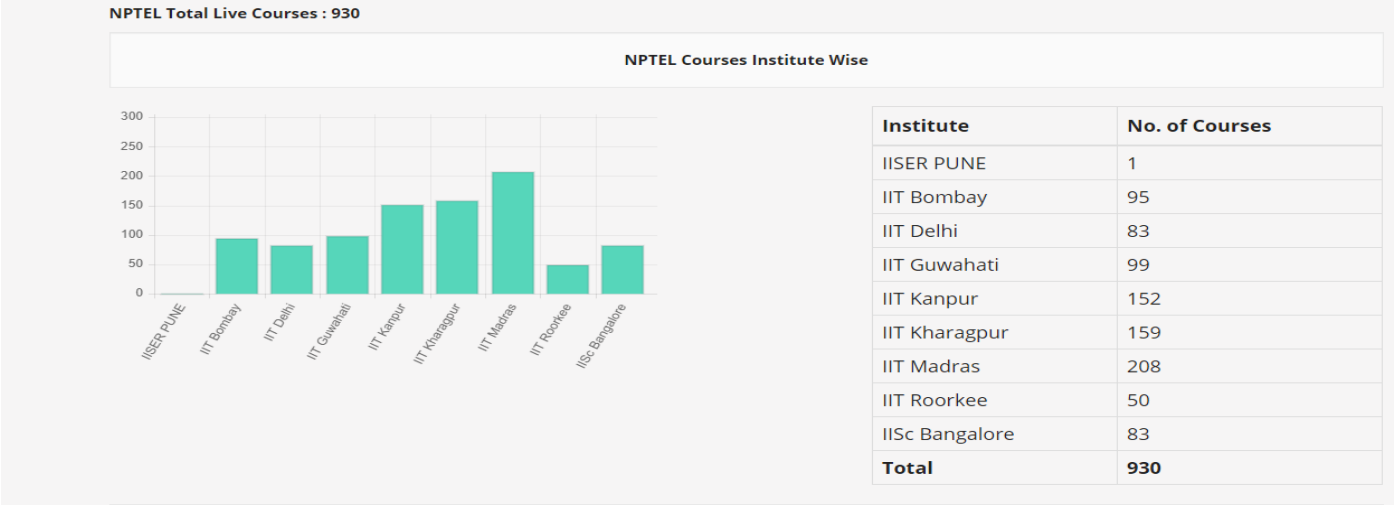
Abstract: Information and communication technologies (ICT) have been used in a larger way in education sector recently. It enhances the quality of education and incorporates new ways to impart knowledge to a vast audience simultaneously through online video courses, e-books, and other interactive tools. NPTEL (National Programme on Technology Enhanced Learning), an initiative by IITs and IISc to enhance technical education in India through ICT mode. Computers and communication technologies have been used in almost every aspect of teaching nowadays but we shall be focusing our study on the impact of ICT on higher education and technical education in India. ICT enabled remote Indian students to gain knowledge on various subjects from eminent faculties that otherwise would not have been possible through traditional classroom-based teaching. This initiative also helping budding teachers and industry professionals to enhance their teaching skills and upgrading knowledge. ICT can be thought of as a tool that will revolutionize the way education is served. In this paper, an attempt has been made to find the impact of NPTEL initiative on its users by collecting and analyzing users' feedback, opinions and general perception of Indian as well as a global audience of these courses. And also try to identify the effectiveness as well as shortcomings of this initiative statistically by sampling user feedbacks.

Index Terms **- ICT, Higher Education, NPTEL, MOOC, e-learning.**

I. INTRODUCTION

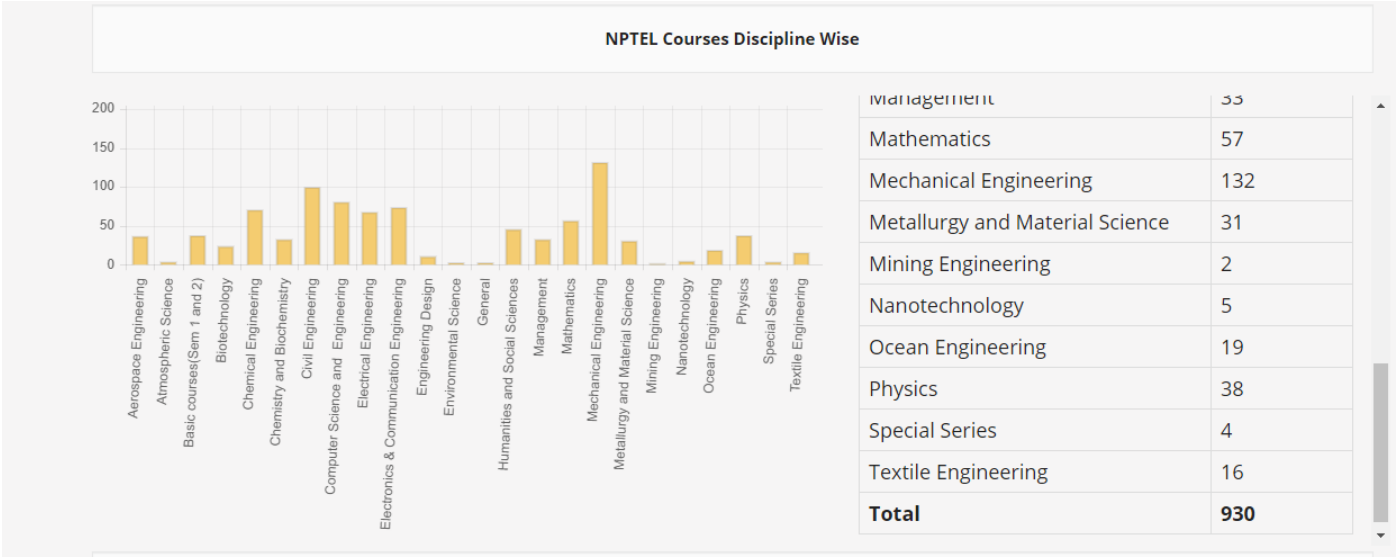
In the prehistoric era mankind first started to use sharp edged stones in hunting or digging for his benefits and ease of doing work and that becomes the first tool made by mankind to aid in his goal achievement. Information and Technology is also similar kind of tool (but many fold advanced) that recently has been put to use by mankind in enhancing his quest for gaining and sharing knowledge.

In India, even a few decades back there were not much demand for higher education but we are progressing rapidly and the need for quality education has been on the rise. There is a gap between supply and demand of good teachers as well as infrastructures and facilities in niche education areas. So, students from less developed areas are losing opportunities and their basic right to quality education is being denied. Distance education is a partial solution to improve the dismal state of engineering education in India. The non-thesis master's degree, known as a postgraduate diploma of IIT Bombay, PGDIIT, available through the distance mode [1]. Use of ICT in higher education has started to fill the gap recently. Globally starting of MOOC (Massive Open Online Course) and in India NPTEL [9] (National Program on Technology Enhanced Learning) initiative by IITs and IISc has been widely accepted by students and academicians. Due to digital India initiatives to create high-speed internet connectivity to every remote village in India and development of National Knowledge Network (NKN backbone) to connect all educational institutes in a network, online virtual courses will be more easily accessible to the larger community of students. The smartphones are being widely used in Education Technology nowadays and its application in Technical & Professional area in India was studied broadly [2]. I also study briefly the impact of ICT in the education sector of Pakistan [3]. Development and future of NPTEL, benefits of NPTEL and impact of ICT in higher education is being analyzed [4]. The technology-based learning environments in order to give both a historical respective on educational technology research and a view of the current state of this discipline are nicely studied [5]. A book on educational development with ICT [6] was very useful for my study. ICT in teacher education was also studied [7][8].



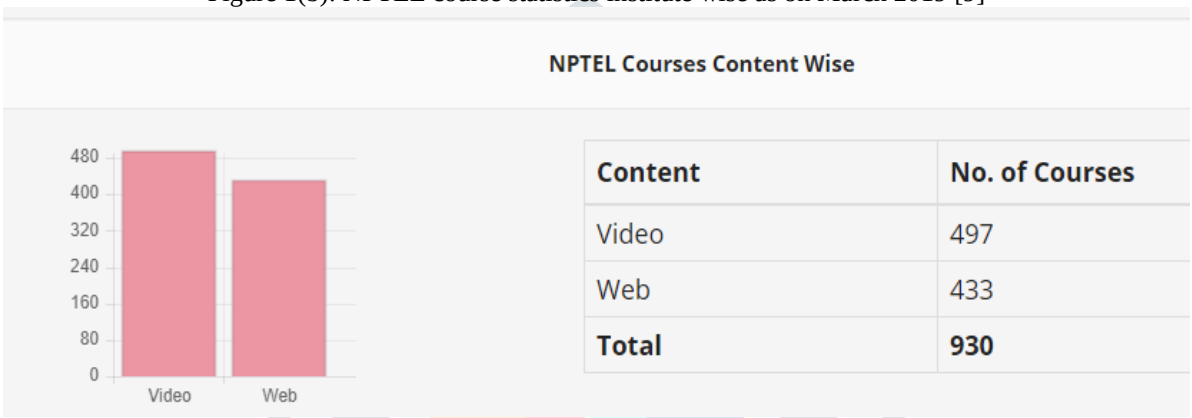
Institute	No. of Courses
IISER PUNE	1
IIT Bombay	95
IIT Delhi	83
IIT Guwahati	99
IIT Kanpur	152
IIT Kharagpur	159
IIT Madras	208
IIT Roorkee	50
IISc Bangalore	83
Total	**930**

Figure 1(a): NPTEL course statistics institute wise as on March 2019 [9]



Management	33
Mathematics	57
Mechanical Engineering	132
Metallurgy and Material Science	31
Mining Engineering	2
Nanotechnology	5
Ocean Engineering	19
Physics	38
Special Series	4
Textile Engineering	16
Total	**930**

Figure 1(b): NPTEL course statistics institute wise as on March 2019 [9]



Content	No. of Courses
Video	497
Web	433
Total	**930**

Figure 1(c): NPTEL course statistics content type wise as on March 2019 [9]

NPTEL homepage has been shown in Figure 2. It consists of video lectures and web lectures on many different courses in engineering, humanities, sciences as well as management as per existing prevailing Indian syllabus. Most of the video lectures are of a duration of around 1 hour and a single course contains around 40-50 lectures covering a one-semester course syllabus. It has provisions to ask questions and getting clarification from concerned faculties. These lectures utilize a multitude of facilities of the video medium such as chalk-and-talk, tablet writing, power point, two- and three-dimensional animations, interactive codes, etc. NPTEL prepares courses with the help of eminent faculties from IITs, IISc, R&D institutes, and other Industries to share knowledge. An online discussion forum is incorporated where learners can ask and clarify questions. Wherever applicable, course assignments, handouts, self-evaluation tasks, etc. have been integrated into the course. Workshops are routinely conducted for institutes, students, mentors, etc. All lecture courses are free of cost and available to all in online as well as in some govt. free to air educational channels. Due to the widespread opening of private engineering colleges by the "For-profit" organizations quality of higher education has been diluted. Also, the number of the good institute of higher learning are relatively few in comparison to the huge number of students seek higher education. So, with the use of NPTEL students of all categories as well as working professionals can enhance their understanding of the subjects. In phase –II work NPTEL has also started online courses and virtual degrees. Core components and objectives of NPTEL is shown in Figure 3.

Figure 2: NPTEL home page as on March 2019 [9]

In this study, we will focus on India specific impact of the use of information communication technology on the mass students with an analysis of students and academicians' feedback and opinion on NPTEL initiative to understand the acceptance by the

general community. Figure 1 shows current statistics with the number of different courses offered by each institute of national importance. Our analysis of data collected from youtube and NPTEL websites reveals that these courses are of much help and appreciated by the less privileged students of private institutes as well as academicians. We shall also try to understand user sentiment about the initiative as well as future direction and issues faced. We find that our NPTEL online courses are also appreciated by students of other countries. The use of information technology and computers for disseminating education to the distant part of the globe has started yielding. Virtual university with all modern facilities and quality teachers for each and every Indian student is not a far-fetched dream due to massive progress in digital India and NKN (National Knowledge Network) initiatives.

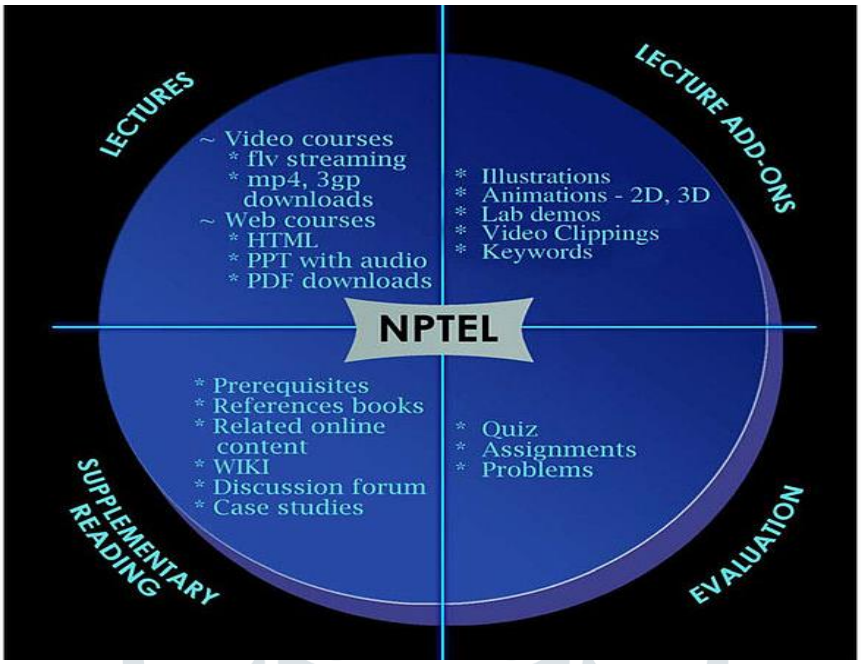


Figure 3: NPTEL Components [10]

II. OBJECTIVE

This study is carried out with the following objectives:

1. To understand the impact of ICT on higher education through user feedback analysis on NPTEL courses.
2. Are the benefits of this new powerful far-reaching tool reaching to the target audience well?
3. We also like to critically comment on the following: In an era of so many social networking activities to draw attention is the ICT mode of education competing well? Are people serious enough on taking benefits from NPTEL?

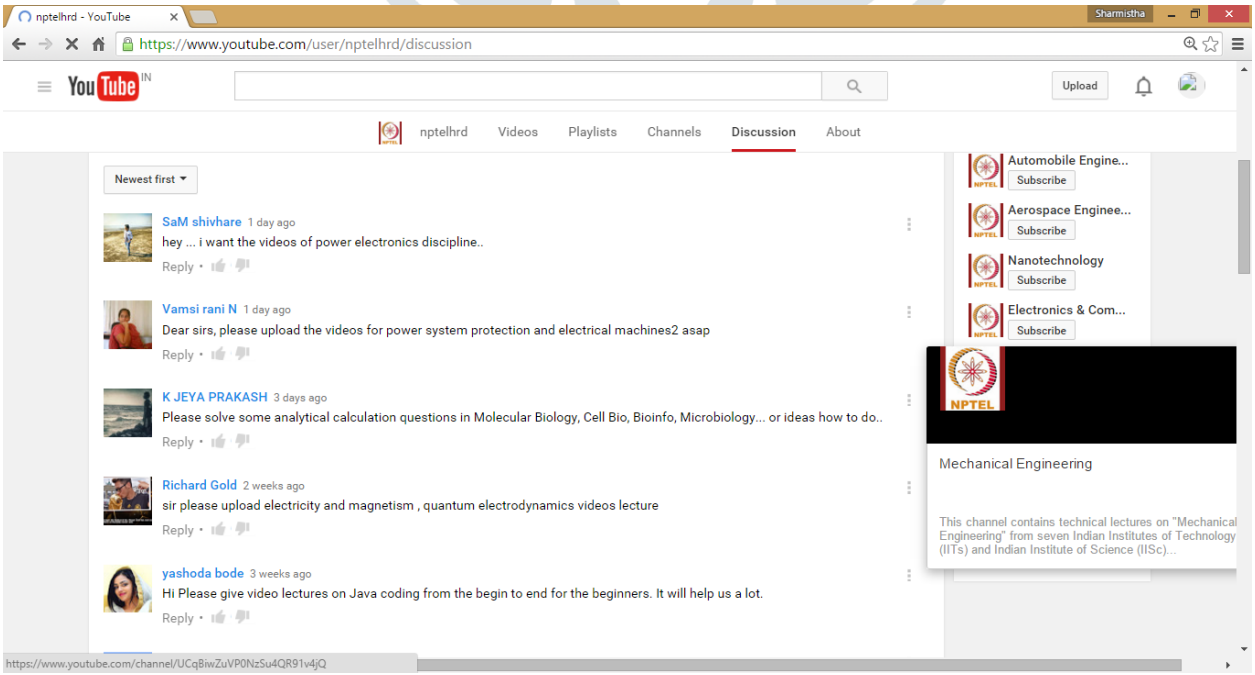


Figure 4: Data collected from User feedback on video courses in youtube NPTEL channel

III. METHODOLOGY AND DATA COLLECTION

We have collected around 170 feedbacks posted by students, faculties and working professionals including researchers and enthusiasts on NPTEL courses on their youtube channel. As these course videos are publicly available in youtube and users can put their feedback in the comments section in the course video page, we have collected those comments and suggestions and feedbacks into a spreadsheet for analysis. We have also collected a number of questions asked by many students and answered by the concerned faculties. This data will help us estimate the number of users seriously using these courses. Also recently online certification courses have also been started. Video feedbacks of the online certification course enrolled students are also available in NPTEL webpage [9]. We have gone through them and jotted down the important points in our spreadsheet.

We have classified feedbacks into some different categories such as appreciation, clarification, constructive criticism, request for a new course, suggestion and misc. We have also analyzed hundreds of feedbacks manually to identify the acceptance of the courses, usefulness to the students and professionals, feedback on way of teaching, etc and rated each of the attributes on a scale of 1 to 5 where 1 is very poor to 5 being very good.

Also, an important piece of information that is readily available from NPTEL youtube channels[11] is that it has a total of 24 different youtube channels with more than 1.4 million subscribers and nearly 3.28 billion views since Nov 2007 till March 2019.

IV. RESULTS AND ANALYSIS

Feedback Type	Feedback Count	Percentage
Appreciation	66	38.8
Clarification	20	11.7
Constructive Criticism	18	10.5
Request for New Course	42	24.7
Suggestion	19	11.1
Misc	5	2.9
Total	170	100

Figure 5: Sample feedback data after categorization

After analyzing the collected feedback data, we have identified the following:

- It is evident that more and more users are viewing these courses and appreciating. So it suggests that ICT mode (interactive e-learning through web and video) is paving its way to a strong future.
- A huge number of 'request for the new course' suggests the well acceptance of this ICT mode of education mechanism among Indian as well as global students' community.
- Digital India and NKN network capacity building will give a huge push to this ICT mode of higher education as more and more remote users will be able to use the Internet.
- It is well understood that there exists a huge demand for such kind of learning tools in the arena of higher education not only in India but throughout the globe.
- With the proliferation of low-cost smartphones and tablets with cheap internet data plan more and more suburban and rural community users are accessing these ICT mode tools to enhance their knowledge.

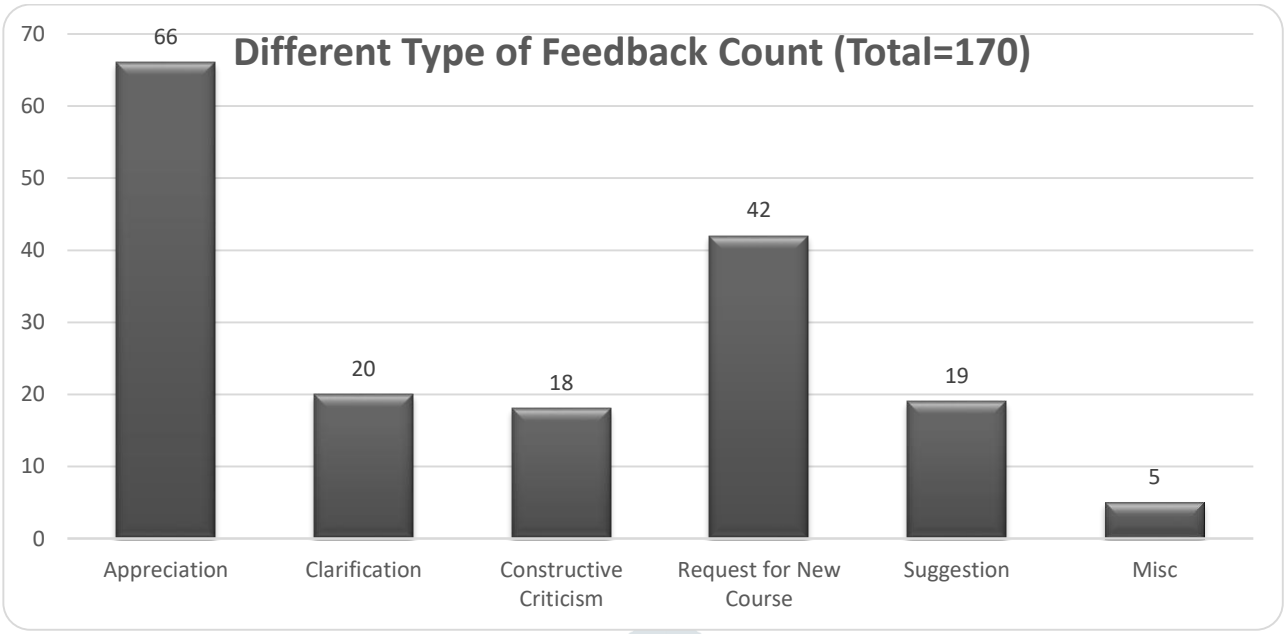


Figure 6: Analysis of different types of feedbacks by feedback count.

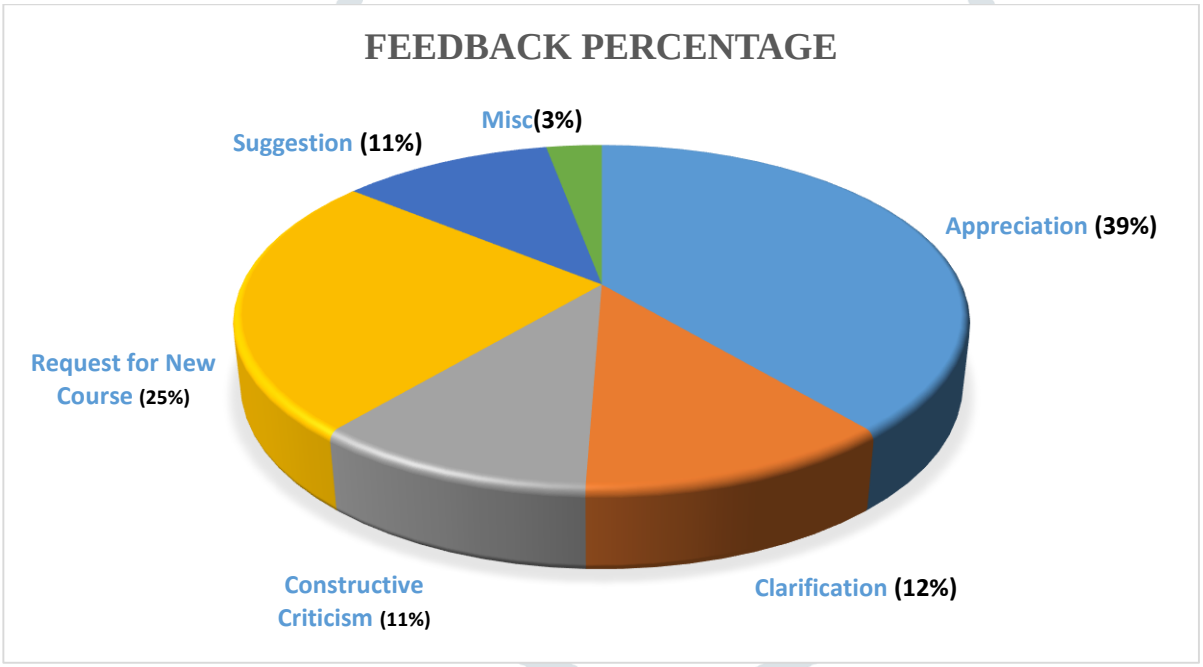


Figure 7: Analysis of different types of feedbacks by percentage.

V. CONCLUSION

This study is by no means an exhaustive sampling of feedbacks and also not all the users of the NPTEL courses leave feedback always. So, our results are only indicative and may vary depending on the sample size, type of user (student or professional or young teachers).

With the completion of the study, we like to iterate that use of ICT modes in higher education indeed enhanced the base levels of understanding. A huge number of view counts indicates a great number of audiences hence wider acceptability of these courses. Again, as so many users have been so much impressed that they to time to leave well-documented feedbacks as well as asking questions related to the topic of the lecture. It is a good assumption that to ask a question user has to watch and understand the lecture. So, by analyzing a good number of questions asked on many different courses signifies that a good number of dedicated students and professionals are spending more time on such educational websites that social media like facebook, tweeter, etc. So, we can say that ICT has a positive impact on higher education and with proper planning and reachability through digital India and NKN network it is going to play a bigger role in quality improvement and skill development of Indian human resource in the coming years. As a future work we plan to design a data warehouse [13] and employ itemset mining technique [14] to analyze the relationship between different types of courses taken together and mine the hidden relationship between users' goal and course objective along with proposing new bucket of courses using predictive recommendation.

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