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A Student-Centric Study on NPTEL Courses: Understanding Learner Outcomes and Course Completion Process

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Abstract

NPTEL MOOCs have truly transformed the learning landscape for students across India, especially in engineering and technology. By making high-quality education accessible and scalable, NPTEL has opened doors for countless learners. The sheer number of students enrolling in NPTEL courses speaks volumes about its popularity and the trust students place in this platform to boost their academic and professional growth. Many students have found that these courses not only deepen their understanding of complex subjects but also equip them with practical skills. Not all students who sign up are able to complete their courses, and issues like unequal access to technology still persist, especially in remote areas. In order to understand the motivational factors and its impact on the completion of the course, a quantitative study has been conducted among the students *(n=49).* Interestingly the study has revealed that the students were able to complete the course by obtaining the certificate due to the promotional activity conducted by the college to get enrolled for the NPTEL course.

Keywords: SWAYAM, NPTEL, MOOCs, learner engagement, course completion, online education, educational media, institutional support, blended learning, motivation, learning outcomes, online learning.

Introduction

Launched in 2017 by the Government of India, SWAYAM is a national MOOC platform designed to promote access, equity, and quality in education by offering free online courses across disciplines from school to postgraduate levels. NPTEL, established in 2003 by leading IITs and IISc, serves as one of SWAYAM's national coordinators, specializing in engineering, science, and humanities. According to a press release from PIB (2025), a total of 733 courses were offered on NPTEL and over 29 lakh students enrolled for the courses during July to December 2024 semester. Of these 9.2 lakh students registered and took exams, making it one of the largest MOOC initiatives across the world, significantly expanding its reach, aiming to democratize education for diverse learners (PIB, 2025).

Despite these achievements, persistent concerns remain regarding low course completion rates and the overall effectiveness of online learning experiences. While national statistics provide insight into enrollment and certification trends, they often neglect the learner's perspective—particularly the influence of institutional policies, personal motivation, and engagement strategies on course outcomes. Globally, MOOC completion rates are typically low, often between 7% and 10%, and similar challenges are observed in the Indian context (Nesterowicz, K *et al*, 2022) [44]. Addressing these issues requires a deeper understanding of how institutional support and learner engagement can be enhanced to improve completion rates and learning effectiveness on platforms like SWAYAM and NPTEL.

Aim of the Study

To understand the engagement and completion process of NPTEL course among the students.

Objectives of the Study

i). To examine the key issues and challenges faced by learners in completing NPTEL courses.
ii). To analyze the impact of learner intent and engagement strategies on course completion rates.
iii). To examine the effective nature of factors associated with the course completion process.

Review of Literature

NPTEL as MOOCs

NPTEL MOOCs play a pivotal role in enhancing learning outcomes for students in India by offering accessible, high-quality educational resources across multiple disciplines and facilitating self-paced, interactive learning experiences (Das & Pawar, 2022) [6]. Although some studies do not directly examine the impact of NPTEL MOOCs on learning outcomes, they recognize NPTEL as a major e-learning initiative that increases accessibility and educational quality

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for engineering students (Kumar *et al*., 2015) [21]. More broadly, MOOCs are noted for aligning with industry requirements and providing cost-effective education, especially benefiting rural students (Banwari, 2018) [8]. Additionally, while MOOCs offer access to instruction from esteemed professors and may revitalize engineering education, they often lack essential physical group activities and laboratory sessions, suggesting that integrating MOOCs with traditional education could enhance learning and address these gaps (Phatak, 2015) [9]. The broader impact of MOOCs also includes transforming education to meet the demands of automation, critical thinking, and emotional intelligence, with future prospects aimed at increasing the relevance and competitiveness of Indian education (Fatima, 2021) [10]. Despite these achievements, persistent challenges remain. Low pass rates, digital fatigue, and technical barriers—such as connectivity issues—can hinder learner satisfaction and success (Das, 2023; Sanzgiri, 2020; Rabin *et al*., 2020) [1, 3]. Disparities in financial aid and access between students from public and private institutions further highlight the need for more equitable policies (Kant & Mehra, 2022) [2]. Research also shows that factors like self-regulation, motivation, and initial behavioral intentions play a significant role in overcoming barriers to MOOCs satisfaction and completion (Rabin *et al*., 2020). Government support for online education has further increased enrollment and completion rates, with future prospects centered on expanding course offerings, integrating advanced technologies, and strengthening collaboration with educational institutions to address diverse learner needs and contribute to a more skilled workforce (Das & Pawar, 2022) [6]. Continued research into learner behavior, gender disparities, and the development of blended learning models will be crucial for optimizing NPTEL's impact ensuring for broader engagement (Das, 2023; Hooda & Dahiya, 2023; Sanzgiri, 2020) [1, 4, 3].

Uses and Gratification Theory Vs Online Learning

The Uses and Gratifications (U&G) theory provides a robust framework for examining how user motives, platform affordances, user activity, and user outcomes intersect to influence the effectiveness of online learning interventions. Curnalia and Ferris (2020) emphasize that these elements are essential for the development and evaluation of interactive course materials, as understanding them enables educators to customize instructional content to better align with students' needs.

> *"This alignment is posited to enhance both cognitive and affective learning outcomes, supporting the predictive utility of U&G theory in online learning contexts".*
>
> *(Curnalia & Ferris, 2020).*

Building on this foundation, the Uses and Gratification Expectancy Model (UGEM) has been proposed as a valuable tool for both researchers and educators. According to Mondi *et al*. (2008) [37], the UGEM facilitates the prediction of the effectiveness of e-learning resource integration within school curricula. Notably, the model's core elements may extend beyond secondary education, indicating its broader applicability across various educational levels (Mondi *et al*., 2008) [37].

Further, Mohammad and Aldamen (2023) [38] highlight that the U&G theory underscores the significant influence of students' needs and motivations on their satisfaction and academic performance. While their work does not directly predict the effectiveness of online learning interventions, it suggests that a nuanced understanding of students' media usage and gratifications can inform targeted strategies to improve online learning outcomes. This is particularly relevant when addressing knowledge disparities among diverse student populations (Mohammad & Aldamen, 2023) [38].

The Uses and Gratification Expectancy (UGE) concept, as outlined by Mondi *et al*. (2007) [39], posits that students' expectations and values regarding e-learning resources are predictive of their perceived e-learning experience. By identifying the cognitive, affective, and social gratifications students seek from online learning interventions, educators can tailor these resources to better meet learner needs, potentially leading to improved outcomes. The UGE model thus provides a comprehensive framework for investigating the relationship between gratifications and learning experiences, offering insights into the effectiveness of online interventions in enhancing student performance (Mondi *et al*., 2007) [39].

However, some studies present limitations regarding the direct application of U&G theory to online learning effectiveness. For example, García-Jiménez *et al*. (2012) [40] focus primarily on Internet use among adolescents, identifying variables such as age and gender that influence usage patterns. Their research does not specifically address the effectiveness of online learning interventions or their impact on student outcomes, leaving the predictive applicability of U&G theory in this context unexplored (García-Jiménez *et al*., 2012) [40].

Similarly, LaRose *et al*. (2008) discuss the uses and gratifications framework in relation to Internet usage, incorporating a social-cognitive model that includes variables like self-efficacy. While their model does not directly address online learning interventions, the underlying approach—understanding motivations and expected gratifications—could be adapted to predict the effectiveness of such interventions, as the model successfully explained variance in Internet usage (LaRose *et al*., 2008).

Finally, Agustini and Indrianti (2023) [42] explore the U&G theory within the context of blended learning, particularly focusing on how students select social media platforms that fulfill their educational needs. Although their study highlights the role of social media in enhancing communication and information access, it does not explicitly examine the prediction of online learning intervention effectiveness on student outcomes, indicating an area for further research (Agustini & Indrianti, 2023) [42].

Learning Outcomes and Issues

NPTEL MOOCs have been recognized for their significant role in enhancing learning outcomes for students in India by providing access to high-quality educational resources and expert-led courses, enabling effective self-paced learning (Singh, 2018) [17]. These platforms are especially valuable for students in rural areas, offering flexibility and a broad range of subjects to cater to diverse learning needs, and aligning with national initiatives like Vision 2020 to position India as a leader in digital education (Chatterjee & Nath, 2014) [12]. While several studies do not specifically address the direct impact of NPTEL MOOCs, they highlight the growing popularity and acceptance of MOOCs in India, including platforms such as Coursera, EdX, and Udacity, which are widely used by Indian students (Malik, 2015; Bisht *et al*., n.d.) [11]. The broader introduction of MOOCs, including

those under the SWAYAM platform, is seen as a means to improve access, equity, and quality in education, promoting lifelong learning and continuous skill acquisition (Bordoloi *et al*., 2020) [14]. Future prospects for NPTEL and other MOOCs in India include expanding enrollment, increasing course offerings, developing partnerships with international providers, and integrating these courses into traditional education systems to foster blended learning environments (Singh, 2018 [17]; Chatterjee & Nath, 2014) [12]. However, to maximize their impact, it is essential to address challenges such as digital literacy, infrastructure, accessibility, and equitable access, while also considering the potential of advanced technologies like artificial intelligence and hybrid learning models to further enhance educational delivery and outcomes (Varun & R, 2023; Kaushik *et al*., n.d.) [15]. Comprehensive research on current MOOCs is essential to overcome challenges in their development and implementation, thereby supporting their ongoing role in transforming India's educational sector. The NPTEL video lectures greatly benefit students by enhancing the teaching-learning experience and increasing access to quality content, though a disparity in faculty expertise between top-tier and other institutions remains a concern that could influence the future effectiveness of NPTEL MOOCs (Pisoni, 2022) [18].

Diverse Course Offerings

NPTEL MOOCs have gained notable traction among Indian learners, especially in engineering and science, demonstrating their potential as a viable alternative to traditional classroom learning for professional development in emerging technologies (Kant & Mehra, 2022) [2]. MOOCs, including NPTEL, offer active learners access to diverse resources and knowledge beyond conventional settings, leveraging new technologies and digital content to facilitate informal, cost-effective learning within virtual communities of practice (Chae *et al*., 2018) [19]. These platforms also serve as valuable alternatives for faculty professional development, enabling professors to enhance their expertise in technology-enabled teaching and graduate supervision through flexible online environments (Alharbi & Jacobsen, 2015) [20]. NPTEL's open courseware, designed for engineering students, utilizes internet and communication technologies to increase accessibility and supports diverse learning styles through interactive forums and varied course materials (Kumar *et al*., 2015) [21]. By promoting flexible, open, and low-cost learning, MOOCs contribute to the democratization of knowledge and support continuous training and updates in line with the demands of a knowledge society (Atiaja & García-Martínez, n.d.). Furthermore, MOOCs provide accessible, flexible, and cost-effective training opportunities that enhance pedagogical and technological skills for teachers, offering alternative credentials recognized by employers (Misra, 2018) [23]. The adaptability and diversity of NPTEL MOOCs are crucial for supporting lifelong learning and professional growth, enabling professionals to remain current with technological advancements (Sullivan *et al*., 2019) [24]. While some studies do not specifically mention NPTEL, they highlight the importance of professional development for teachers in integrating emerging technologies into instruction, suggesting that NPTEL MOOCs could effectively provide flexible, accessible training to help educators adapt to technologically mediated environments (Roy & Giraldo-García, 2015) [25]. Additionally, MOOCs developed for teacher professional development in other contexts, such as Australia, have shown that scalable, ongoing training aligned with curriculum needs can foster community engagement and resource sharing, indicating that NPTEL could offer similar benefits (Vivian *et al*., 2014) [26]. Finally, the need for effective online teacher professional development is underscored by the lack of training in new technologies and online pedagogies, with innovative online methods like NPTEL MOOCs potentially serving as accessible, technology-focused alternatives to traditional classroom learning for educators (Salo, 2011) [27].

Innovative Approaches

Innovative educational approaches, including the integration of emerging technologies such as AI, VR, and online learning platforms, are increasingly recognized as essential for professional development in vocational and higher education (Ghosh & Ravichandran, 2024) [28]. While some studies do not specifically mention NPTEL MOOCs, they emphasize that advancements in immersive technologies, data analytics, and AI can make online platforms highly competitive with traditional classroom experiences, offering flexibility and supporting professional growth in emerging technologies (Reine *et al*., 2021) [29]. MOOCs, including NPTEL, are highlighted as viable alternatives to conventional and distance education, providing accessible, flexible, and diverse learning opportunities that support continuous education and skill enhancement in fast-evolving fields (Basantia & Kumar, 2022) [21]. Evidence from other regions, such as the TESSA MOOC in sub-Saharan Africa, demonstrates MOOCs' effectiveness in facilitating transformative learning and professional development, suggesting that similar models could benefit emerging technology education in different contexts (Stutchbury *et al*., 2023) [31]. Mobile technologies further support just-in-time, flexible professional development, aligning with the principles of MOOCs as alternatives to traditional classroom learning by offering accessible and customized opportunities for educators to enhance their practices in higher education (Dean *et al*., 2015) [32]. Flexible, accredited e-learning platforms like the TELTA course illustrate how online environments foster collaboration and community building, implying that NPTEL MOOCs could similarly advance professional growth in emerging technologies (Rooney, 2015) [33]. MOOCs from leading institutions, such as those offered by Coursera, are recognized for transforming professional development for teachers through relevant, accessible, and tailored content, reinforcing the idea that MOOCs can serve as effective alternatives to traditional classroom learning for a broad audience (Thompson, 2013) [34]. Interactive and distance education systems, akin to NPTEL MOOCs, provide self-paced, technology-integrated learning with immediate feedback, enhancing understanding and problem-solving skills in emerging technologies and meeting the needs of working professionals (Eydgahi & Mawlawi, 1998) [35].

A table summarizing key indicators and numerical data on the impact, challenges, and future prospects of NPTEL MOOCs in India:

Table 1: Key Indicators and Detailed Numbers

Category	Key Indicators	Detailed Numbers	References
Enrollment & Reach	Total Learners Enrolled	23 million+ (as of June 2023)	Kant & Mehra, 2022 [2]; Rachel & Upadhyay, 2023 [5]
Total Exam Registrations	2.86 million (as of June 2023)	Kant & Mehra, 2022 [2]; Rachel & Upadhyay, 2023 [5]	
Completion Rates	Completion Rate Variation	Higher in Computer Science & Engineering; lower in Physics & Electrical Engineering	Kant & Mehra, 2022 [2]; Rachel & Upadhyay, 2023 [5]
Skill Development	Alignment with Industry Demands	Courses closely match industry needs, enhancing employability	Banwari, 2018 [8]; Fatima, 2021 [10]
Equitable Access	Gender Disparity	Predominance of male learners	Rachel & Upadhyay, 2023 [5]
Regional Disparity	Enrollment concentrated in certain states	Rachel & Upadhyay, 2023 [5]	
Technical Barriers	Infrastructure/Connectivity Issues	Significant in remote/rural areas	Sanzgiri, 2020 [3]; Banwari, 2018 [8]
Integration with Traditional Education	Limitation	Cannot fully replace lab/practical sessions and personalized attention	Phatak, 2015 [9]
Technological Advancements	AI & Emerging Tech Integration	Expected to improve personalization, engagement, and completion rates	Das, 2023 [1]
Policy Support	National Education Policy 2020	Emphasizes online education and supports MOOC expansion	Fatima, 2021 [10]
Global Leadership	India's Potential	Large youth population and growing digital infrastructure position India to lead globally in MOOCs	Das, 2023 [1]

The Rising Demand

NPTEL MOOCs have established themselves as a viable alternative to traditional classroom learning for professional development in emerging technologies by offering a comprehensive range of subjects tailored to the evolving needs of professionals (Kant & Mehra, 2022; Kumar *et al*., 2015) [2, 21]. By providing open access to a vast selection of courses, NPTEL enables learners to study at their own pace and convenience, a feature particularly advantageous for working professionals with time constraints (Kant & Mehra, 2022[2]; Kumar *et al*., 2015 [21]). The online availability of these courses ensures that learners from various geographical locations can participate, effectively overcoming the limitations imposed by traditional classroom settings (Atiaja & García-Martínez, n.d.).

The platform's diverse course offerings, especially in engineering and computer science, are crucial for professional growth in emerging technologies, and its emphasis on technical and professional communication aligns with the upskilling needs of today's workforce (Kant & Mehra, 2022) [2]. Furthermore, the cost-effectiveness of NPTEL MOOCs—often free or low-cost—makes them an economically viable option for professional development, particularly benefiting underprivileged learners or those lacking financial aid (Atiaja & García-Martínez, n.d.; Misra, 2018; Kant & Mehra, 2022) [23, 2].

NPTEL also fosters community and interaction through interactive user forums, where students, professors, and teaching assistants collaborate and support each other, creating virtual communities of practice that enrich the professional development experience (Kumar *et al*., 2015; Chae *et al*., 2018) [21, 19]. Recognized as effective tools for lifelong learning, MOOCs empower individuals to remain current with advancements in their fields, and their inherent flexibility and accessibility make them well-suited for continuous learning in the dynamic landscape of emerging technologies (Chae *et al*., 2018 [19]; Sullivan *et al*., 2019 [24]; Vivian *et al*., 2014) [26].

Theoretical Framework and Methodology

This study is positioned within the field of Mass Communication, focusing on uses and gratifications theory to frame SWAYAM NPTEL as a digital mass communication platform delivering educational content at scale. Central to the framework is Uses and Gratifications Theory (Blumler & Katz, 1974) helps explain that learners actively engage with NPTEL courses based on individual needs such as knowledge acquisition, certification, or personal interest. The research aims to understand how digital educational content is received, interpreted, and acted upon by student audiences, while identifying barriers and supports influencing the process.

Employing a quantitative audience research approach, the study uses survey methodology to examine undergraduate students' engagement with the SWAYAM NPTEL platform as a form of educational mass media. The survey, distributed digitally via Google Forms to undergraduate students through a simple random sampling approach, captures data on learner intent, course completion patterns, perceived challenges, and the effectiveness of institutional and platform-level support. A descriptive survey method was chosen for its ability to quantify student experiences and preferences, allowing exploration of patterns across multiple variables and assessment of responses to proposed interventions aimed at improving course completion and engagement. Adopting an exploratory, descriptive approach, the study focuses on identifying patterns and perceptions related to NPTEL course completion. The objective is to understand the experiences of learners with research questions guiding the investigation accordingly.

Data Analysis and Data Interpretation

Objective 1:

i). **Impact of Curriculum Compulsion on Completion Rates:** Students are more likely to complete NPTEL courses when they're made compulsory. Of 45 students for whom the course was mandatory, 32 passed at least one course. In contrast, among the five students for

whom it wasn't required, only one earned a certificate. Still, due to the small sample size, no firm conclusions can be drawn.

ii). **Effect of Course Alignment on Success:** Students choosing courses related to their core subjects had a lower failure rate (18.6%) than those picking out-of-interest courses (28.6%), indicating that personal interest alone may not ensure commitment or success.

iii). **Preference for Shorter Course Durations:** A majority (56%) preferred 4-week courses, hinting at difficulties with time commitment or attention span for longer durations. Only 2% were open to 12-week courses.

iv). **Learning Material Generally Well-Received:** Half of the respondents were satisfied with how material was presented, and 70% agreed it was engaging and current. This suggests the material quality is not a major barrier, although a minority did express dissatisfaction.

v). **Motivation Levels Vary Significantly:** While 56% felt equally motivated for NPTEL and traditional courses, a notable 44% did not. This divide points to a need to examine what factors are affecting student enthusiasm for online learning.

vi). **Perceived Value and Gender Differences:** While 74% of students viewed NPTEL certification as valuable, those who didn't were more likely to fail. Males were less inclined to see the certification's worth, with 40% expressing disinterest compared to just 16.7% of females. Males also had a higher failure rate (25%) compared to females (16.7%).

Objective 2:

i). **Course Attempts vs Certificate Outcomes:** Out of 49 valid responses, about 69% secured one certificate, but only 7% managed two, and a mere 2% got three. Despite 42% students enrolling in two or more courses, just 8% earned more than one certificate—suggesting that higher enrollment doesn't always lead to more completions.

ii). **Assignment Completion not Always Tied to Preparation:** Interestingly, 18% students who thoroughly studied the material still missed assignment deadlines, while 16% who didn't go through all the content managed to submit on time. This suggests time management or assignment complexity could be influencing completion.

iii). **Barriers beyond Content Quality:** A total of 42% participants reported issues with internet access or device availability. Support in these areas, along with better language options and mentoring, could improve accessibility and success rates.

iv). **Mentorship Access Falls Short:** Though 62% expressed a desire for mentor guidance, only half that number actually reached out to college mentors. This highlights a gap between mentorship needs and what's being provided, even though students heavily rely on NPTEL forums or AI for support.

Objective 3:

i). **Gender and Compulsory Status:** Certificate obtained has very weak associations with both gender and compulsory status (Phi ≈ 0.11–0.12), indicating these factors do not meaningfully influence whether students obtain certificates in the sample.

ii). **Gender Vs Promotion Vs Compulsory:** Gender, promotion, and compulsory status are all very weakly associated with each other (Phi < 0.2).

iii). **Certificate Vs College Promotion:** Certificate obtained is strongly associated with course promotion (Phi ≈ 0.72). This suggests that when a course is widely promoted by the college, students are much more likely to obtain certificates.

Conclusions

This study investigated the complex factors affecting completion rates of NPTEL courses, focusing on student motivation, course structure, institutional support, and targeted interventions to enhance learner engagement. Survey data from undergraduate students across multiple disciplines revealed that integrating NPTEL courses as mandatory components within curricula significantly increases completion rates, indicating the strong influence of institutional policy on student participation. However, this effect is mediated by students' perceived value of the courses, as explained by the Uses and Gratifications Theory (Curnalia & Ferris, 2020), with those selecting courses aligned to their core subjects achieving higher success rates than those motivated solely by personal interest.

While 70% of respondents found NPTEL's learning materials engaging, completion rates remained inconsistent due to challenges in time management, technological access, and the availability of institutional mentorship. Even students who completed learning modules often struggled to meet assignment deadlines, pointing to issues with pacing, workload, or course complexity. Institutional support, particularly mentorship, was identified as a critical gap—despite a clear demand, few students accessed available support structures, and NPTEL forums and local chapters were underutilized.

Technical barriers, such as unreliable internet connectivity and limited device access, continue to hinder participation, even in urban areas like Hyderabad. Additionally, a preference for shorter courses was evident, with 56% of students favoring 4-week modules, suggesting that course duration is a key factor in completion. Proposed interventions, including collaborative learning models and flexible evaluation options, received positive feedback, indicating that adaptability in course design could improve retention.

In conclusion, while NPTEL offers accessible, high-quality educational resources, its impact on completion rates is determined by a combination of learner motivation, institutional policies, technological infrastructure, and pedagogical design. To enhance completion rates, future interventions should address not only content quality but also motivation strategies, mentorship effectiveness, structural flexibility, and institutional accountability

Limitations of the Study

Non-compulsory NPTEL Courses: The study's findings are based on responses from only 50 undergraduate students, which restricts the broader applicability of the results. The limited sample size also hindered detailed subgroup analysis, particularly for students without compulsory NPTEL courses or those selecting courses purely out of personal interest.

Disciplinary Representation: Although participants came from diverse streams such as BA, B.Com, B.Sc, and BBA, the study does not capture the perspectives of students in professional fields like engineering, law, or medicine. As these groups constitute a significant segment of the NPTEL learner population, their absence limits the comprehensiveness of the study's conclusions.

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