

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Library Philosophy and Practice (e-journal)

Libraries at University of Nebraska-Lincoln

Fall 10-31-2021

Understanding User Perceptive and Satisfaction Level towards MOOCs: A Comparative analysis of SWAYAM and Coursera

Sarita Gulati

Shivalik Institute of Education and Research, Mohali, gulatarita2005@gmail.com

Ritu Sharma

Department of Library and Information Science, Panjab University, Chandigarh, India, ritusharmapuchd@gmail.com

Amanpreet Kaur Research Scholar

Department of Education, Panjab University, Chandigarh, amansehgal8426@gmail.com

Rupak Chakravarty

Department of Library and Information Science, Panjab University, Chandigarh, India, rupak@pu.ac.in

Follow this and additional works at: <https://digitalcommons.unl.edu/libphilprac>



Part of the [Educational Technology Commons](#), [Library and Information Science Commons](#), and the [Online and Distance Education Commons](#)

Gulati, Sarita; Sharma, Ritu; Kaur, Amanpreet Research Scholar; and Chakravarty, Rupak, "Understanding User Perceptive and Satisfaction Level towards MOOCs: A Comparative analysis of SWAYAM and Coursera" (2021). *Library Philosophy and Practice (e-journal)*. 6551.

<https://digitalcommons.unl.edu/libphilprac/6551>

Understanding User Perceptive and Satisfaction Level towards MOOCs: A Comparative analysis of SWAYAM and Coursera

Abstract

In distance education, e-learning platforms are providing exciting learning opportunities and enhanced learning experiences to teach massive learners of all age groups, race, and gender without any geographical barriers using MOOCs (Massive open online courses) such as SWAYAM and Coursera are to educate the learners of all age groups, race, gender without any geographical barriers. The present study aims to understand the users' perspective and satisfaction level towards MOOCs, explore features of MOOCs, particularly to compare the SWAYAM and Coursera. In this contribution, we seek to answer several research questions on sentiment analysis related to SWAYAM and Coursera mobile apps. MOOCs primarily have web platforms accompanied by their mobile app versions, presenting a comprehensive coverage for users. MOOC platforms like SWAYAM and Coursera also offer their courses through mobile apps. The user reviews contain valuable information which can be utilized for multiple purposes by different stakeholders towards the improvement of the courses, pedagogy, etc. Often the app reviews are remained untapped for evaluation and amendment purposes due to a lack of effective and simple technology as a manual method is time-consuming and tedious. In this study, the user reviews of Coursera and SWAYAM apps have been extracted and analysed by using the web-based sentiment analysis tool AppBot.

Keywords—mobile learning apps, sentiment analysis, MOOCs, Coursera, SWAYAM and Android, m-apps, Massive Open Online Courses, e-learning

Introduction

With widespread use of information and communication technology, twenty first century has witnessed a shift in learning experiences and educational paradigm. Open education system has evolved in many forms over a span of time (Weller, 2020). Academic content quality has also been improved with use of online educational resources. As the world becomes more complex, we need to be more creative to meet the challenges (Robinson, 2011). Now as information technology has been developing, knowledge acquisition is no more restricted to the traditional classroom, MOOCs is now most talked-about topic in the recent education system (Zheng & Yang, 2017). An unprecedented mark is left on the ideology of online education by MOOCs being a relatively new phenomenon (Daniels, Adams & McCaffrey, 2016).

The term MOOC was coined by Stephen Downes and George Siemens to refer to a course entitled Connectivism and Connectivity Knowledge in 2008. MOOCs first introduced in 2008 by Dave

Cormier at the University of Prince Edward and Bryan Alexander of the National Institute for Technology in Liberal Education and emerged in 2012 as a popular learning platform (Kaushik, 2020). MOOCs is a blend of educational technology and online learning; in very short span of time period, it has attracted a large number of learners around the world. Smartphones, being a form of handheld devices, have mobile apps that are user friendly according to user preference; mobile apps are software-based applications developed for mobile devices. There are different categories of mobile apps downloadable from the Google play store for android phones and App Store for iOS devices. Users' feedbacks on these apps appear as reviews on the different platforms for the developers and other interested stakeholders. Hence, user reviews and ratings are essential variables in the development and upgrade of mobile apps.

Stanford offered three online free courses in 2011. Peter Norvig and Sebastien Thurn offered a course Introduction to Artificial Intelligence in which 160000 students get enrolled around the globe out of which more than 20000 students completed the course. These xMOOCs are mainly more focused on reaching the massive audience than interaction between students. In February 2012, Udacity was founded by Thurn to offer free MOOCs. Andrew Ng and Daphne Koller, started Coursera in April, 2012 and made partnership with universities in developing and offering MOOCs. MIT developed the platform MITx to offer MOOCs, in May 2012, MIT partnered with Harvard and renamed MITx as edX which is an American non-profit MOOCs provider.

MOOCs (Massive Open Online Courses)

MOOCs have been hyped massively in the past few years and proved to be game changer in the development and provision of the online education as a great attention is paid to it. The modern MOOC has crossed 180 million learners excluding China in 9 years. MOOCs is a web-based platform which provides a chance to number of students worldwide to enrolled in distance education with the best institutes in the world. It was established back in 2008 and gained momentum in 2012 as a popular learning tool. Millions of people around the world use MOOCs to learn for a variety of reasons, including career development, changing careers, college preparations, supplement learning, lifelong learning, corporate e-Learning & training, and more. A MOOC is a free, massive, open, online course that allows unlimited participation. Some MOOCs can be relatively small in scale, while some can be quite large. MOOCs are asynchronous, open-access, Web-based courses geared toward enrolling hundreds or thousands of students at a time. MOOCs deliver content via recorded video lectures, online readings, and online assessments, as well as various degrees of student-student and student-instructor interaction (Kurt, 2018). It is "an online course designed for large number of participants that

can be accessed by anyone anywhere, as long as they have an internet connection, is open to everyone without entry qualifications and offers a full/complete course experience online for free” (Brouns et al., 2014). They are being served as online structured course platform and glossaries, images, videos, and public repositories have been serving as pedagogical tools in that course platform. MOOCs are student friendly, for there are not long procedures or formalities or pre requisites for enrolment in a course. No any hefty tuition fee is required. Some of them are available free of cost while others only require a nominal charge. MOOCs helps gain education from best faculty of the top universities without any geographical barriers. It turns helpful for those who want to excel being in job by gaining expertise in the field of their interest. MOOCs help such people gain visibility in their organization by getting expertise, rise to promotions, handle competition and ease their survival besides self-contentment and even going indispensable to particular organizations.

Characteristics of MOOCs

MOOCs are available for everyone. These are free and are usually provided by the most trusted and eminent institutions. The characteristics of MOOCs are:

- MOOCs heavily depend on web formats, it uses live streams to build a virtual classroom. The online trainer can organize live sessions with the students providing an opportunity for the students to get in touch with the trainer, ask questions and clear their queries.
- MOOCs can easily create an in-class environment that includes the use of collaborative tools. These open courses support the emergence of learning communities and offer a hybrid distribution of knowledge. Every participant can contribute to this and enrich the course. Q&A forums, social media groups, meetups, are used to encourage a synergetic learning environment.
- In addition to the content designed to convey information, MOOCs also offer tools to assess the smooth transfer and knowledge retention. These online courses offer a dynamic and interactive environment in the form of multiple-choice questions, essays, programmed tests, and fun-filled quizzes. Apart from that, MOOCs also offer certificates to the learners who complete the courses.
- These online courses have time limitation and deadlines with specified start and end dates. The course contents such as documents, videos, exercises, quizzes, essays, and MCQs (multiple choice questions) is delivered every week. The courseware is spread overtime for the learners.

Types of MOOCs

There are considered to be two different types of MOOCs with theoretical differences:

1. cMOOCs: stands for Connective Massive Open Online Courses that share digital online learning elements and environments and are connected together in a variety of ways.
2. xMOOCs: is Extended Massive Open Online Courses. xMOOCs tend to be based on content provided by universities and other educational institutions that provide significant research-based content and background in the online learning content.

Across the world, there are many colleges, universities, and other higher education institutions provide several MOOCs platforms edX, Coursera, Udacity, Future Learn, Canvas Network, Chinese MOOCs, European Multiple MOOC Aggregator (EMMA), EduOpen etc.

Table 1: Some Indians MOOC Platforms and Providers

Sr. No.	Initiative	Year of Launch	Institution Behind platform	URL
1	SWAYAM	2016	MHRD and Microsoft	swayam.gov.in
2	NPTEL	2003	IIT Madras	Nptel.ac.in/
3	mooKIT	2012	IIT Kanpur	www.mookit.co/
4	IIT BombayX	2014	IIT Bombay	iitbombayx.in/

MOOC platforms are globally used for offering online course to the learners. In India SWAYAM has the largest course catalogue amongst all MOOC providers.

SWAYAM (Study Webs of Active Learning for Young Aspiring Minds)

SWAYAM (Study webs of Active Learning for Young Aspiring Minds) is the National MOOC Portal of India. It is owned by Government of India which has been offering online courses in various disciplines such as Science, Engineering and Technology, Humanities and Social Sciences, Law, Management etc. An initiative of the Ministry of Education (MoE), formerly (Ministry of Human Resource Development) (MHRD), SWAYAM aims to provide an integrated online platform for learner centric online courses, covering education and skill sector courses. The objective of the programme is to take the best teaching learning resources to all with no costs. As one of the pillars of the ‘Digital India’ Initiative, SWAYAM seeks to bridge the digital gap for learners who have hitherto remained untouched of the digital revolution and have not been able to join the mainstream of the knowledge economy. (*Swayam Central*, 2016)

Table 2: SWAYAM Progress Timeline

SWAYAM Timeline

2014	Ministry of Human Rights Development (MHRD) announced SWAYAM under its National Mission on Education through Information & Communication Technology (NMEICT).
2015	MHRD formed the ‘Main Committee regarding SWAYAM platform for MOOCs’ to conduct a thorough examination of all elements for a successful MOOC project.
2016 (March)	MHRD developed and provided Guidelines to institutions for development and implementation of MOOCs.
2016 (June)	Microsoft was awarded a contract for development of SWAYAM.
2017	The SWAYAM portal was successfully launched on July 9, 2017.

The MOOCs being offered on SWAYAM following the four-quadrant instructional design, as per the MHRD (Now Ministry of Education, MoE) revised guidelines. The structure of each MOOC has components distributed in 4 quadrants as tabulated below:

Table 3: Four-Quadrant Instructional Design of SWAYAM

Quadrant-I - (e-Tutorial)	Quadrant-II - (e-Content)
<ul style="list-style-type: none"> ▪ Video and Audio Content ▪ Animation, Simulations, video demonstrations, ▪ Virtual Labs, etc., ▪ <i>Transcription of the videos.</i> 	<ul style="list-style-type: none"> ▪ Self-instructional material, ▪ e-Books, illustrations, ▪ case studies, presentations, ▪ Web Resources ▪ Open-source Content ▪ Video, Case Studies, ▪ books including e-books, research papers & journals, ▪ Anecdotal information, ▪ Historical development of the subject, Articles, etc.
Quadrant-III(Assessment)	Quadrant-IV - (Discussion Forum)
Problems and solutions: <ul style="list-style-type: none"> ▪ MCQs, ▪ Fill-ups, ▪ Matching, ▪ Short/Long Q-As ▪ Quizzes, 	<ul style="list-style-type: none"> ▪ Discussion forum for clarification on a near real time basis by the Course Coordinator

<ul style="list-style-type: none"> ▪ Assignments ▪ FAQs, ▪ Clarifications on general misconceptions. 	
---	--

Table 4: The Growth Story of SWAYAM (Manash Pratim Gohain, 2021)

SWAYAM enrolment since its launch in 2017					
Semester	Courses	Enrolments	Exam Registration	Appeared	Certified
Oct 2021	2150	1,25,63,084	11,39,494		83,266
Jan 2020	581	26,33,993	49,203	39,976	32,883
Jan 2019	514	17,90,661	2,09,971	1,88,643	1,64,916
Jan 2018	285	19,41,273	87,114	76,258	66,214
July 2017	323	31,40,935	70,339	63,508	54,132

The number of courses offered on the online platform has more than doubled since 2017. There were 323 courses available in July 2017, which grew up to 2150 in October 2021. Over 2.6 lakh students enrolled in three courses in July 2020, for the courses like Machine Learning, Data Science, Programming, Data Structures and Algorithms using Python and Programming each seeing enrolment of over 40,000 during the semester. These courses were offered by IIT-Madras, Chennai Mathematical Institute and IIT-Kharagpur.

Table 5: Enrolment on SWAYAM platform for General Category (Manash Pratim Gohain, 2021)

Top 3 Online Courses in General Category for July 2020 Semester				
Course	National Coordinator	Discipline	Institutes	Enrolment
Animations	CEC	Computer Science and Engineering	Banaras Hindu University (IIT-BHU)	33,889
Cyber Security	CEC	Computer Science and Engineering	Avinashilingam Institute for home science	21,072

			and higher	
Basics of Digital Marketing	CEC	Management	Devi Ahilya Vishwavidyalaya Indore	17,180

An average of 27.4 lakh learners have joined during every semester since 2019 to study in the courses offered by the institutions like IITs, Indian Institute of science, Banaras Hindu University and IIMs.

Credit Transfer and Academic Bank of Credits (ABC)

SWAYAM is designed to achieve the three cardinal principles of Education Policy viz., access, equity and quality. All the courses are interactive, prepared by the best teachers in the country and are available, free of cost to any learner. However, learners wanting a SWAYAM certificate should register for the final proctored exams that come at a fee and attend in-person at designated centres on specified dates. As per the University Grants Commission (UGC) (Credit Framework for online learning courses through SWAYAM) Regulation 2016 the Indian universities have been advised to identify courses where credits can be transferred on to the academic record of the students for courses done on SWAYAM. All India Council for Technical Education (AICTE) has also put out gazette notification in 2016 and subsequently for adoption of these courses for credit transfer.

The ABC Regulations will encourage a blended learning mode in which students will be allowed to earn up to 50% credits from various HEIs, outside their college/university, registered under this scheme and through SWAYAM. Thus, SWAYAM will serve as a strong facilitator of the credit transfer and credit accumulation system working in sync with ABC. Those admitted in skill-courses from registered higher education institutions offering vocational degree or diploma or postgraduate diploma or certificate programme are also eligible for accrual and redemption of credits under ABC.

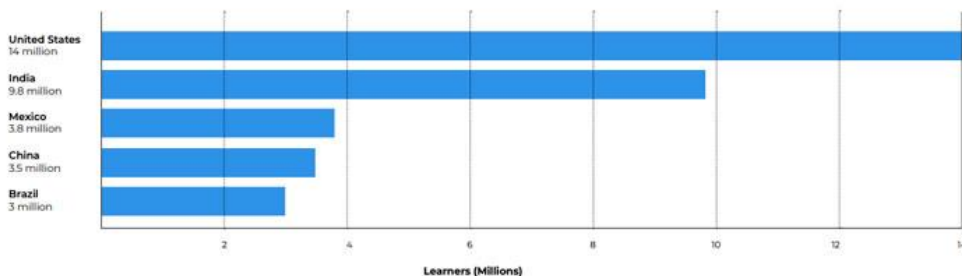
Coursera

Coursera is the global online learning platform that offers anyone, anywhere access to online courses and degrees from world-class universities and companies. It was launched in 2012 by two Stanford Computer Science professors, Andrew Ng and Daphne Koller, with a mission to provide universal access to world-class learning in multilingual. It is now one of the largest online learning platforms in the world, with 87 million registered learners as of June 30, 2021. Coursera partners with over 200+ leading universities and industries partners to offer a broad catalog of content and credentials, including Guided Projects, courses, Specializations, certificates, and bachelor's and master's degrees. Institutions around the world use Coursera to upskill and reskill their employees, citizens, and students

in many high-demand fields, including data science, technology, business and public health. Courses are taught by faculty from Ivy-league universities, including Harvard, Stanford, Princeton, MIT, Cambridge, Oxford and so on.

Global Learner Trends

Top 5 countries with the most learners



Top 5 countries by learner growth

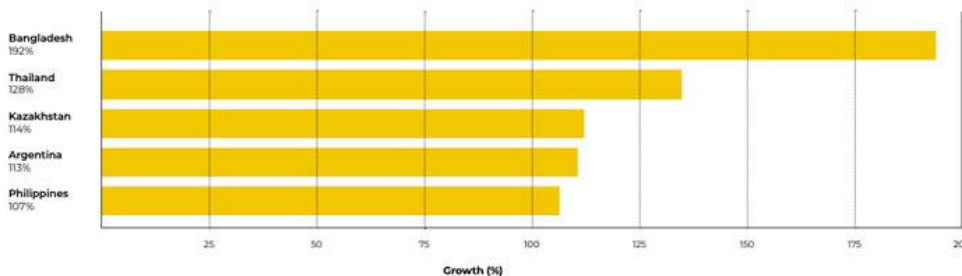


Figure 1: Global learner’s trend

Source: <https://iblnews.org/coursera-reports-a-surge-of-21-million-learners-since-mid-march/>

The maximum learner’s growth can be seen in United States 14 million followed by India 9.8 million, Mexico 3.8 million, China 3.5 million, and in Brazil 3 million respectively.

The growth of learners is rapidly increasing in the countries like Bangladesh 192% followed Thailand 128%, Kazakhstan 114%, Argentina 113% and Philippines 107%.

Both the platforms SWAYAM and Coursera function differently in terms of academic level of courses provided by them, course content, components of courses, assignments evaluation, peer assessment, exams. Basic features of both the apps are given in detail in the following Table no.6.

Table 6: Basic Features of SWAYAM and Coursera App

SN	Features	SWAYAM App	Coursera App
<i>i.</i>	App Size	13M	23M
<i>ii.</i>	Current Version	3.12.0	3.21.1
<i>iii.</i>	Released On	23 August,2016	27 March, 2014

<i>iv.</i>	Updated On	24 September, 2021	12 August, 2021
<i>v.</i>	Downloads	1,000,000+	10M+
<i>vi.</i>	Offered By	IITM	Coursera, Inc.
<i>vii.</i>	Academic level	School (Class 9) to post-graduation level.	Graduate and Post Graduate level
<i>viii.</i>	Founder	Ministry of Education (MoE), Government of India (GoI)	Daphne Koller and Andrew Ng
<i>ix.</i>	Headquarters	New Delhi	California, United States
<i>x.</i>	Ratings	4.2	4.3
<i>xi.</i>	Reviews	40,447	127,400
<i>xii.</i>	Scope	Multiple domains like Engineering, Science, Management, Humanities, Language, Mathematics, Commerce, Arts, and Recreation, General, Library, Education.	Worldwide/universal access and covered 190 countries and offers 5,540 university courses. (https://learnopoly.com/coursera-statistics/)
<i>xiii.</i>	Resource type/ Quadrants	Video Lectures, Reading material, Self-Assessment Lists and quizzes, Online discussion Forum	Course Material-Video, text, transcripts. Assessment Methods- Quiz, uploaded assignment, peer review, projects.
<i>xiv.</i>	Content Form	Various forms such as text, audio, image, video, presentation, animation, application	Various forms such as audio, Video, images, text transcripts, presentation etc.
<i>xv.</i>	Languages/ Content translated (8 languages)	These eight languages--Bengali, Gujarati, Hindi, Kannada, Malayalam, Marathi, Tamil, and Telugu.	English, Arabic, French, German, Indonesian Japanese, Korean,

			Portuguese, Russian, Simplified Chinese, Spanish, Traditional Chinese
<i>xvi.</i>	Access restriction	Accessed by anyone, anywhere at any time.	Learning for Anyone, Anywhere
<i>xvii.</i>	Users	Students, Teachers, Researchers, Librarians, Professionals	Students, Teachers, Researchers, Professionals
<i>xviii.</i>	National Coordinators	9 National Coordinators AICTE,NPTEL,UGC, CEC, NCERT , NIOS, IGNOU, IIMB, NITTTR	Area Served Worldwide
<i>xix.</i>	No. of courses	2150+	380,000+
<i>xx.</i>	Partnering Institutes	203	230 +leading universities& industry partner
<i>xxi.</i>	Completed Courses	4024	80,000
<i>xxii.</i>	Student Enrolment	18470424	87 million registered learners
<i>xxiii.</i>	Exam Registrations	1186772	280,000
<i>xxiv.</i>	Successful Certification	118263	
<i>xxv.</i>	Course Format	Scheduled, Self- Pace	Self-pace, Self-Assessment
<i>xxvi.</i>	Institutional Credits	Yes	Yes
<i>xxvii.</i>	Learning Model	Blended	Blended

xxviii.	Platform Language	Hindi, English	English
xxix.	Mobile App	Yes	Yes
xxx.	App Platform	Android	Android, iOS

SWAYAM and Coursera are two popular education runner platforms among the MOOCs providers. Both are providing best variety of in-depth courses created by renowned universities and subject experts in the world. Every judgement depends on the personal learning experiences and course attended by the learners. A few aspects to compare both the platforms are given the table no.7 below that may be considered for the comparison of SWAYAM and Coursera.

Table 7: Comparison of SWAYAM and Coursera (Okuboyejo & Koyejo, 2021)

Comparison Aspect	SWAYAM	Coursera
Ownership	Government	Private
Teaching Pedagogy	Video lectures, reading material, self-assessment test, online discussion forums for doubt	Video lectures, discussion forums, homework exercise
Types of courses offered	School education, out of school education, Under-graduation, Post-graduation, technical education	MOOC, Specialization, degree, Professional certificate, Master-track certificate, Online degree
Add-ons offered in the course	SWAYAM Certificate (with additional fees)	Quizzes, weekly exercises, peer graded assignments
Credit transfer in course	Yes	No
Cost	Free, additional cost for certificate	Free, paid for certificate
Partners	None	200+ in 24 countries
Collaboration	9 bodies are appointed	4 universities of various countries and 2 International institutions
Certificate Type	Not Sharable	Sharable certificate
Languages Covered	NA	30

Learners	NA	53 million
----------	----	------------

Literature Review and Identification of Research Gap:

A number of studies have examined the perspectives of learners regarding MOOCs using the technology acceptance model (TAM) (Tseng, Lin, Wang, & Liu, 2019). Kundu and Bej (2020) conducted a qualitative survey to investigate the penetration of MOOCs among students and teachers of State Universities in India. The findings revealed that MOOCs have been successful in meeting the learning goals of the learners and teachers. Jaganathan, Sugundan and Kumar (2018) conducted a comparative analysis for MOOCs platforms in Indian and Global scenarios using secondary data. It was found that in the Global scenario, the total number of MOOCs courses stands at 9400, and Coursera is the leading MOOCs provider with 30 million registered users having 2700 courses, and India is the second largest country with its registered users. India is found to be one among the leading countries in terms of enrolments in courses by MOOC providers including edX, Coursera, and Udacity. Kumara and Kumar (2020) studied the satisfaction level of learners from the MOOC run by SWAYAM, Coursera, Future Learn, and edX on four parameters i.e., course content, course delivery, course assessment, and course support through a structured questionnaire. The qualitative results highlighted that (65%) learners preferred SWAYAM and Coursera, followed by edX (15%), Udacity (10%), and Future Learn (5%). Patel and Parekh (2020) analysed the e-learning platforms SWAYAM, edX, and Coursera. It was found in the study that Coursera has the maximum number of partners, users, and courses compared to SWAYAM and edX and has collaboration with 4 universities of various countries and 2 international institutions. Udemy offers courses in 65 languages, Coursera provides courses in 30 languages, whereas SWAYAM makes use of only the English language. Among all the three platforms, Coursera and Udemy weigh on almost the same scale, whereas SWAYAM lags behind in various aspects. Kumar and Mahendraprabu (2021) conducted a study which aims at practicing the open educational resources of the state universities of Tamil Nadu, research scholars on their SWAYAM programme. From the 300 state universities of Tamil Nadu, research scholars were selected as the study sample by adopting a simple random sampling method. The findings and suggestions of the study revealed that OER have much significance to many research scholars. Lundqvist, Karsten et al. (2020) explored the use of automated sentiment analysis in assessing student experience in a beginner computer programming MOOC. A dataset of more than 25,000 online posts made by participants during the course was analysed and compared to student feedback. The results were further analysed by grouping participants according to their prior knowledge of the subject. The participants who had prior experience criticized

the MOOC structure but remained positive overall: 78.3% were positive while only 21.7% were negative.

The review of literature has revealed that many studies have been examined so far on the different MOOCs platforms using various statistical techniques but there is no any study comes in light which has studied the sentiment analysis of the SWAYAM and Coursera online study platforms provide under MOOCs. The present study aims to understanding users' perceptive and satisfaction towards MOOCs, a Comparative analysis of SWAYAM and Coursera will be done using the reviews, ratings monitoring, replies and analysis collected through AppBot application and feedbacks given on Google Play app store.

Scope of the Study:

SWAYAM and Coursera apps have been evaluated using a sentiment analysis approach to know the user satisfaction of both apps. The reviews were collected from 27th Nov 2019 till 12th Oct 2021 with a rating count of 40,447 for SWAYAM and Coursera reviews were collected from 17th Nov 2016 till 12th Oct 2021 with Rating Count 1, 27,400.

Study Objectives:

The study aims to investigate to what extent app development teams can leverage crowdsourcing mechanisms for planning future changes. Specifically, opinion mining is conducted to compare SWAYAM and Coursera mobile android app. This study is an attempt to achieve following research objectives:

- i. To ascertain the satisfaction level of learners with SWAYAM and Coursera mobile app (Android).
- ii. To analyse the textual content from user feedback, comments and ratings of the SWAYAM and Coursera mobile app users.
- iii. To analyse the sentiments of the users towards the SWAYAM and Coursera m-app.
- iv. To examine the dominance of positive or negative sentiments of users regarding the efficacy of the SWAYAM and Coursera mobile app.
- v. To compare the SWAYAM and Coursera mobile app user reviews as expressed in Google Play.

Research Design/Methodology

Mobile learning applications (apps) are increasingly and widely adopted for learning purposes and educational content delivery globally, especially with the massive means of accessing the internet. Users often give feedback, share their experience, and general satisfaction via the reviews and ratings

for these m-apps. These can be assessed for app evaluation and deciding future course of action. When requests made through user reviews are addressed with utmost satisfaction, the app rating will be equally high. Online store reviews are free and fast crowd feedback mechanisms that developers can use as a backlog for the development process. Google Play, the official mobile app store for Android devices, allow users to rate the apps using star ratings and text reviews. The star ratings range on the scale of one to five. Reviews consist of free-text descriptions without having a predefined structure wherein users can freely express their views to describe problems, issues, and desired features. The review is also used to describe impressions, positions, comparisons, and attitudes of the users towards the apps. To assess, evaluate and compare the SWAYAM and Coursera m-apps, Sentiment Analysis (SA) technique was adopted. It is an advanced technology to analyse and perceive the behaviour of a user. Sentiments are feelings, opinions, emotions, likes/dislikes, good/bad. For analysing sentiment, unstructured text data is processed to extract, classify, and to understand the feelings, opinions, or meanings expressed across hundreds of platforms. SA aims to analyse and find the emotion or intent behind a piece of text or speech or any mode of communication which may further be broadly categorised as positive, negative, or neutral. SA is also known as Opinion Mining, Sentiment mining, Subjectivity Analysis, Opinion extraction. It is the practice of applying natural language processing text analysis, computational linguistics, and biometrics to systematically identify, extract, qualify and study affective state of subjective information such as opinions, attitudes, and feelings expressed in texts. In this study, the user reviews of Coursera and SWAYAM app have been extracted and analysed by using web-based sentiment analysis.

4.1 Tools used to extract and mine the app reviews

The analytics are performed by using AppBot (Appbot.co) software which captured, monitored, measured and analysed the reviews for a particular period. This software provides easy-to-understand insights into an app using Artificial Intelligence algorithm tools and also provides a large number of data-mining and sentiment analysis features in different categories such as Reviews, Sentiment, Words, Phrases, Topics, and Languages. Data Statistics from the software is collected till 12th Oct 2021.

Results and Discussion:

The following table provides some key information and descriptive statistics of both SWAYAM and Coursera m- app. SWAYAM has received 11,722 reviews and the Coursera app has received 25,066 reviews.

Table 8: Reviews of SWAYAM and Coursera on Google Play

App	Positive Sentiment	Rating Count	Average Review	5-star counts	4-star counts	3-star count	2-star count	1-star count
SWAYAM	61%	40,447	3.7	6,133	1645	827	557	2,560
Coursera	59%	1,27,400	3.8	13,319	3,599	2,469	1,761	3,918

Looking at all the ratings, including those without a review, for SWAYAM, 52.3 % of the ratings were 5-star ratings and 21.8 % were 1-star ratings. The average rating was 3.7 stars. For Coursera, 53.1 % of the ratings were 5-star and 15.6 % were 1-star ratings. The average was 3.8 stars. For the ratings with reviews, 5-star ratings made up the largest proportion of the reviews for both SWAYAM and Coursera. In terms of positive sentiments, SWAYAM received 61% positive sentiments whereas in case of Coursera, 59% of the sentiments were found to be positive, giving SWAYAM a slight edge over Coursera when it comes to positive perception of the users. However, it remains to be understood the reasons accounting for 39% - 41% of negative sentiments.

Table 9: Star Rating for Coursera and SWAYAM

Star Ratings	Coursera				SWAYAM			
	No. of Reviews	No. of Reviews (%)	No. of Reviews Replied	No. of Reviews Replied (%)	No. of Reviews	No. of Reviews (%)	No. of Reviews Replied	No. of Reviews Replied (%)
Five	13319	53	34	< 1%	6133	52	66	1%
Four	3599	14	44	1%	1645	14	38	2%
Three	2469	10	36	1%	827	7	28	3%
Two	1761	7	52	3%	557	5	33	6%
One	3918	16	71	2%	2560	22	243	9%
Total	25066	100	237		11722	100	408	

Total Reviews: Coursera 25066, SWAYAM 11722

The above table provides information about star ratings from 1 to 5 with a number of reviews on that rating and the number of reviews replied to by the developers of the app. For Coursera, 53% reviews

(n=13319) are associated with 5-star ratings with less than 1% response rate (n=34). Similarly, 14% reviews (n=3599) are associated with 4-star ratings with 1% response rate (n=44). Likewise, 10% reviews (n=2469) are associated with 3-star ratings with 1% response rate (n=36), 7% reviews (n=1761) are associated with 2-star ratings with 3% response rate (n=52) and 16% reviews (n=3918) are associated with 1-star ratings with 2% response rate (n=71).

For SWAYAM, 52% reviews (n=6133) are associated with 5-star ratings with 1% response rate (n=66). Similarly, 14% reviews (n=1645) are associated with 4-star ratings with 2% response rate (n=38). Likewise, 7% reviews (n=827) are associated with 3-star ratings with 3% response rate (n=28), 5% reviews (n=557) are associated with 2-star ratings with 6% response rate (n=33) and 22% reviews (n=2560) are associated with 1-star ratings with 9% response rate (n=243).

The statistics shows that the number of reviews replied by reviewers for Coursera are near to negligible and very less in SWAYAM.

Table 10: AppBot Sentiment data

Sentiments	Coursera	Percentage	SWAYAM	Percentage
Positive	14687	58%	7163	61%
Neutral	1644	7%	607	5%
Mixed	1736	7%	747	6%
Negative	6999	28%	3205	27%
Total	25066	100	11722	100

AppBot uses an advanced method, based on Artificial Intelligence (AI) and Natural Language Processing (NLP), to assign one of the four types of sentiments for each given review: positive, neutral, mixed, and negative sentiment. The above table depicts the number and percentage of sentiments (Positive, Mixed, Neutral, and Negative) of SWAYAM and Coursera. Positive comments contain mostly positive sentiments. Neutral comments lack strong sentiment, mixed comments have conflicting sentiment and negative comments contain mostly negative sentiments. The Coursera app has received more reviews compared to SWAYAM app.

Breakdown Sentiment Status of SWAYAM and Coursera

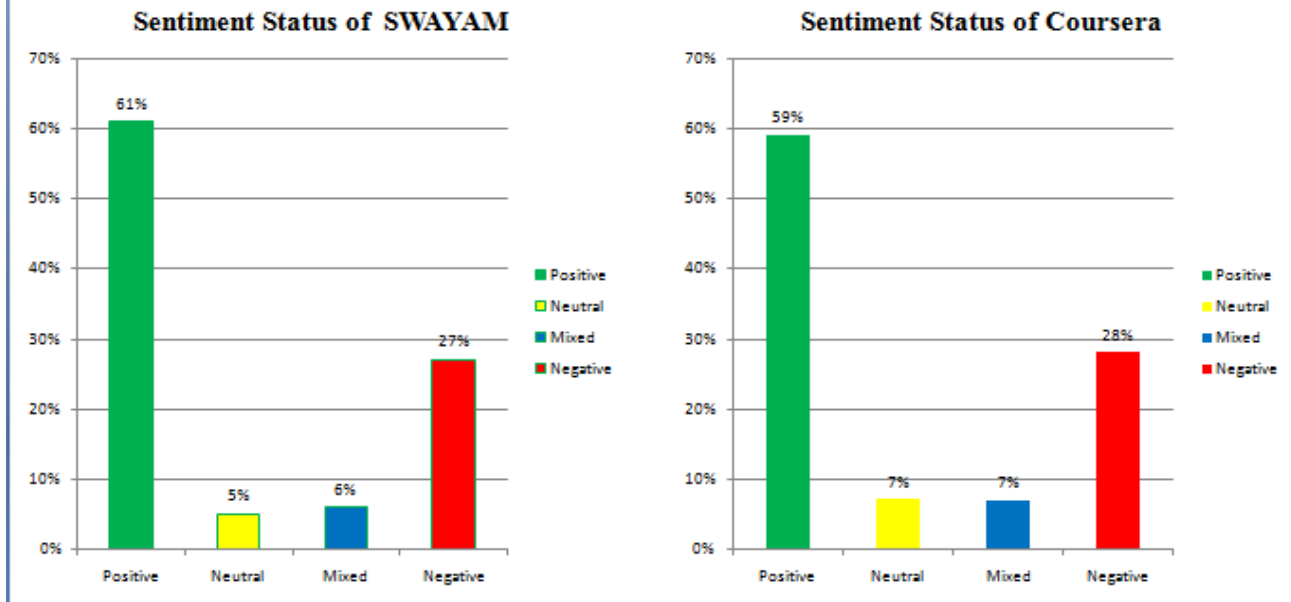


Figure2: Breakdown Sentiment Status of SWAYAM and Coursera (Total Reviews: Coursera 25066, SWAYAM 11722)

The Sentiment breakdown chart in the above figure depicts the Comparison of the Sentiment breakdown status in proportion of positive, Negative, Neutral, and Mixed Reviews of the SWAYAM and Coursera apps as mentioned in Google Android play store. Our chosen data-mining tool supports the above four types of sentiments for each given review. To classify the sentiment for a given review, AppBot calculates and provides a sentiment score for each review (a value between 0-100%). This tool highlighted that app users are optimally positive for both SWAYAM and Coursera apps.

Star Rating	SWAYAM (%)	Coursera (%)
Five	65%	65%
Four	16%	15%
Three	6%	7%
Two	3%	3%
One	10%	10%

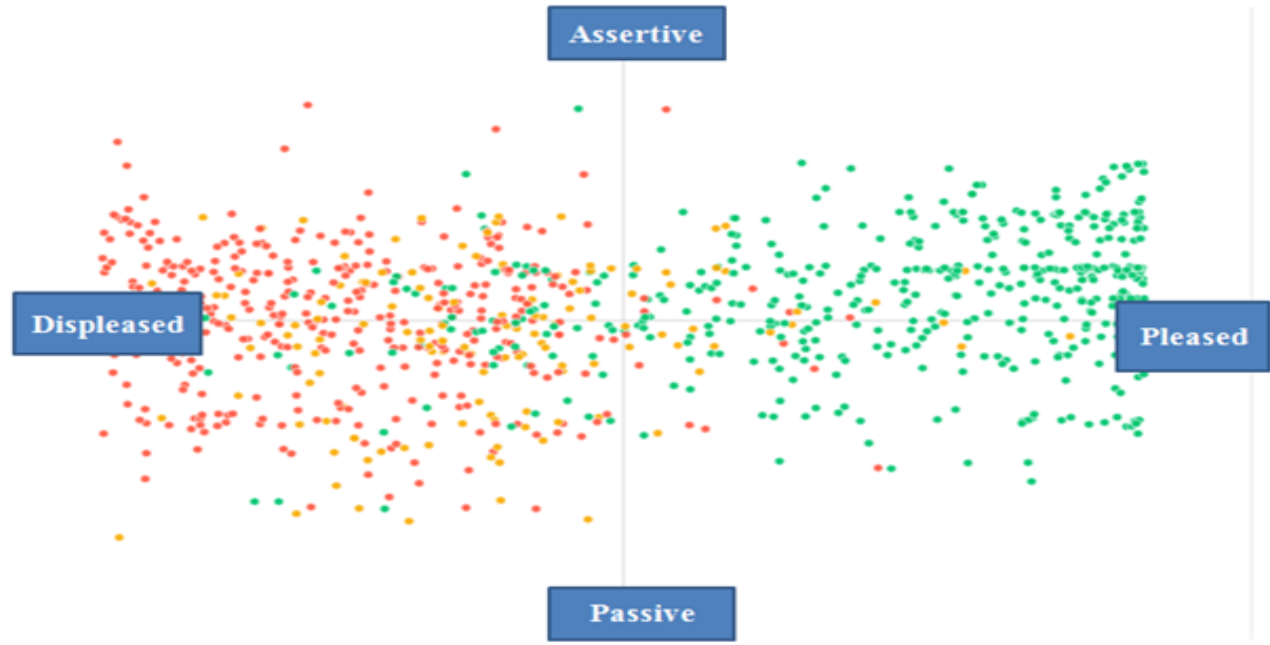
Table 3: Breakdown of Ratings

The above table depicts the information about percentage of star ratings. The reviews were collected with rating count 40,447 for SWAYAM and for Coursera with Rating Count 1, 27,400. Both apps have average stars 4.2 and average star rating of reviews and Count of all reviews, includes those without text.

Word Cloud of Interesting Words

For generating word clouds based on reviews, AppBot provides six types of options to filter review subsets: interesting reviews, popular reviews, critical reviews, trending up reviews, trending down reviews, and new reviews. The Popular tab shows the 10 common words in reviews that help to identify the most common themes in-app reviews, and the Critical tab is a quick way to find scary stuff in reviews. This can help isolate bugs and crashes, so one can quickly locate and fix problems in app faster. In Figure 6, words in a word cloud are coloured according to their sentiments in reviews. AppBot provides four types of sentiments: positive (green labels in the word cloud), negative (red), neutral (grey), and mixed (orange). Reviews related to a specific term can be listed by clicking on particular word appearing in the word-cloud which provides a lot of insight including word sentiments. User sentiments are displayed visually with colour indications, each colour representing a sentiment type, the red being negative and green being positive sentiments.

Coursera



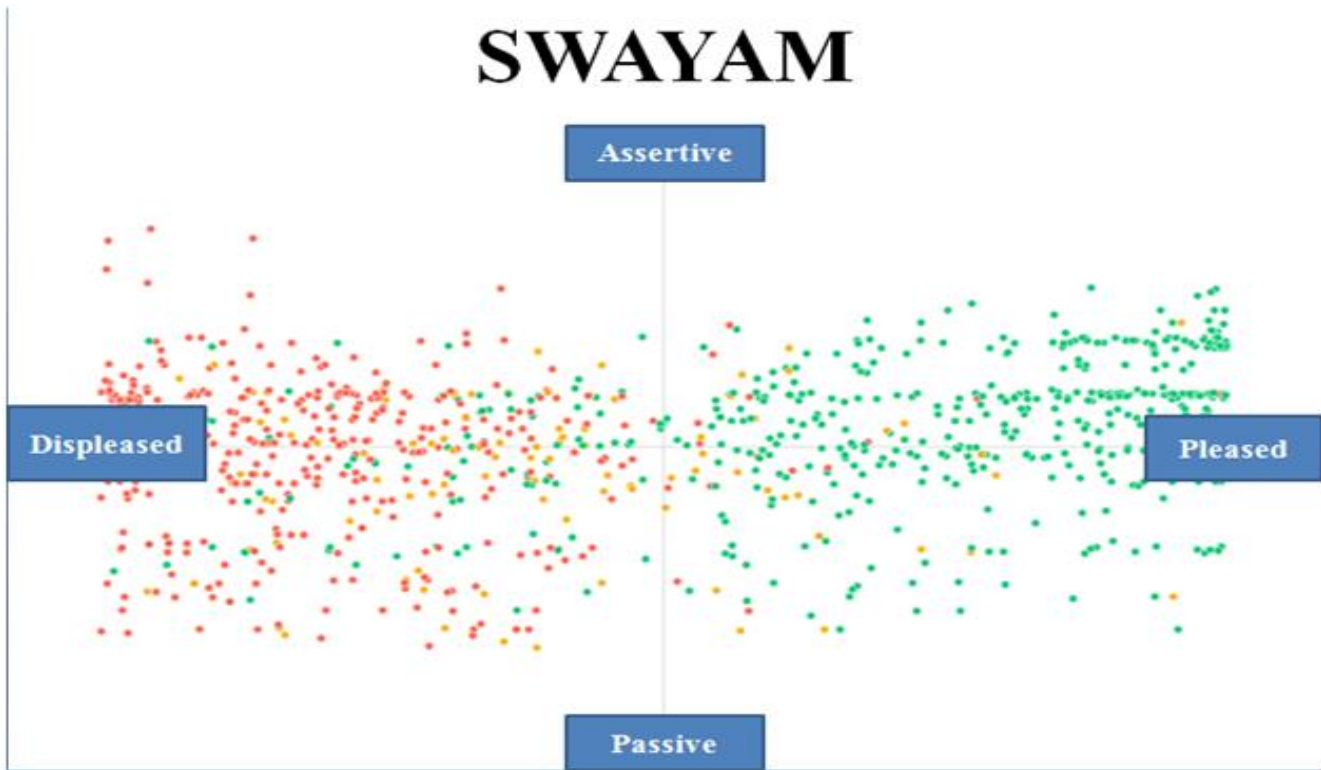
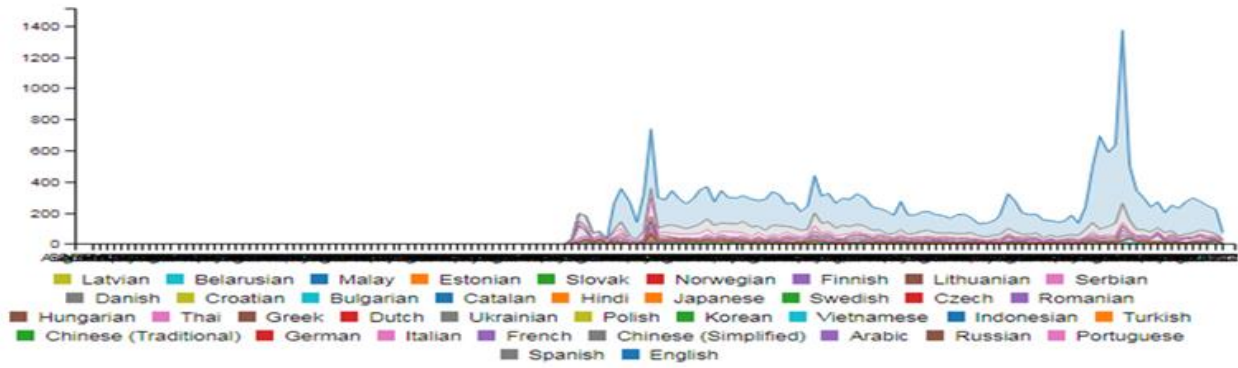


Figure 5: Emotion Visualizer

The Emotion Visualizer helps to identify the reviews that matter the most. Colourful dots indicate sentiments of reviews where Green indicates positive sentiment; orange indicates neutral and red indicates negative sentiment. The X-axis shows how pleased vs displeased a user appears to be. Most pleased users will be at the far right, neutral users in the centre, and most displeased users at the far left. The Y-axis show active or passively they have expressed themselves. Users who feel strongly about what they are saying will appear at the Assertive end of the axis. Indifferent users will appear at the Passive end. Hovering over any of the dots will display the specific review it relates to.

Review by Language

Coursera Reviews Per Language Over Time



SWAYAM Reviews Per Language Over Time



Figure 6: Review by Language

25,067 reviews of Coursera are available in 38 languages and 11,722 reviews of SWAYAM are available in 4 Languages.

Compare

An overview of sentiment and trends for all apps. [Learn more >](#)

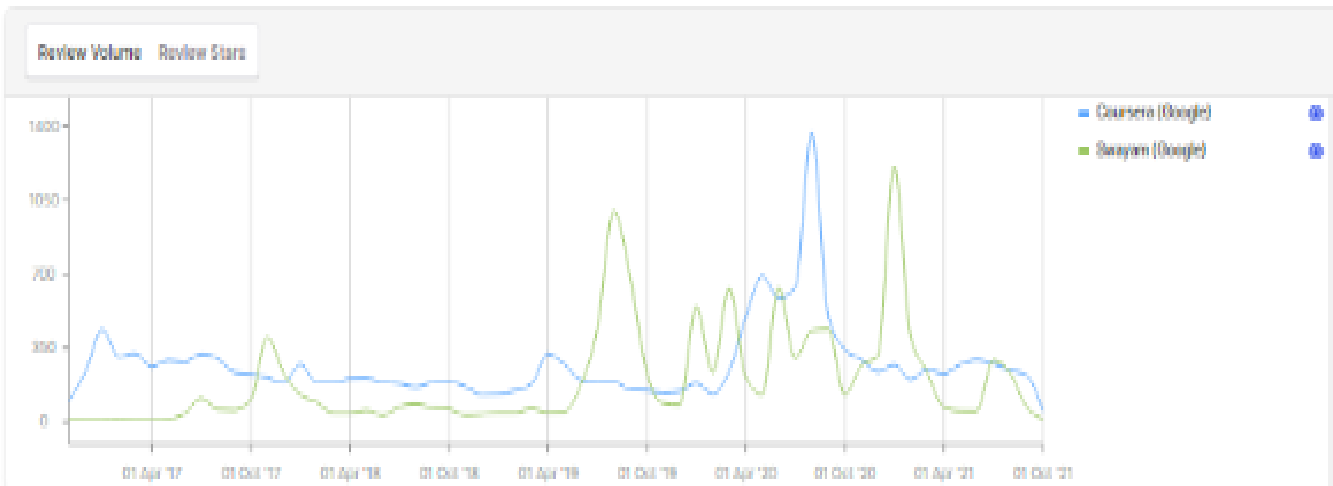


Figure 7: Compare review volume and review stats

By re-viewing and analysing the datasets, AppBot has made comparison table containing data for review volume and review stats for each platform (SWAYAM and Coursera).

Sentiment Timeline of SWAYAM and Coursera

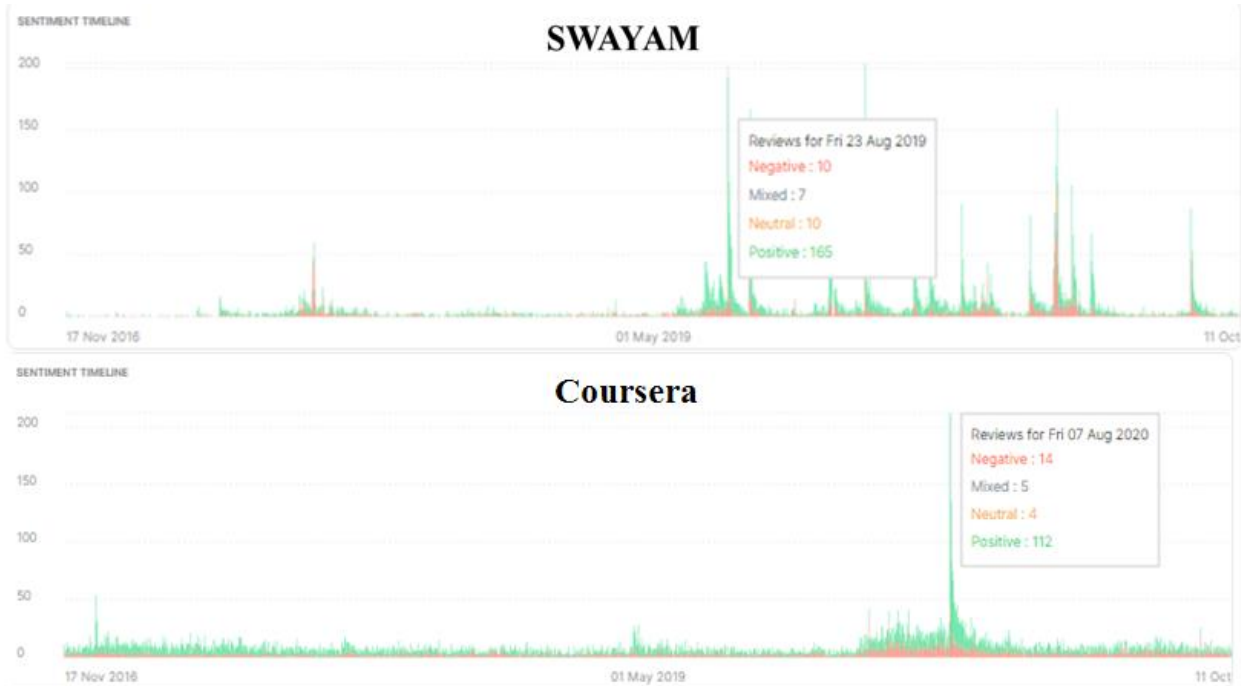


Figure 8: Sentiment Timeline

In SWAYAM, figure shows some tweaks at the beginning of 2017. The most positive trends are at the beginning of the course. This is reasonable as people tend to be more enthusiastic about the course in the first stages as it happens in this course. The figure also shows that the percentage of positivity is decreasing with certain peaks towards throughout 2018, with a prominent negative peak on May 30. This Figure shows there have been 165 positive reviews on 23 August 2019. SWAYAM 2.0 Launched in 2019 with enhanced features and facilities. It offers Online Degree programme through SWAYAM by Top Ranking Universities. There has been a slow and steady increase in positive reviews. In 2021 it shows a prominent negative peak on 3 Jan.

In Coursera, the Sentiment Timeline helps to understand trends in positive and negative sentiment over the examined time period. Each bar represents a day. 'Positive' sentiment is marked with green, 'Neutral' with orange, 'Negative' with red and 'Mixed' with blue. In 2016, a number of tweaks can be seen. A switch in scheduling led to a big jump in the number of courses that users could register for at any given point in time. Throughout the year, the Coursera UI has undergone a lot of tweaks and the learner experience has changed a lot. The Android app has also been updated constantly. This figure shows some tweaks at the beginning of 2017. It shows that the percentage of positivity is decreasing

with certain peaks throughout 2018. In 2020, MOOCs post-pandemic figures have reached a broader population with a wider interest. In 2021 it shows a downfall in positive reviews with a prominent negative peak on August 24.

Review Volume of SWAYAM and Coursera

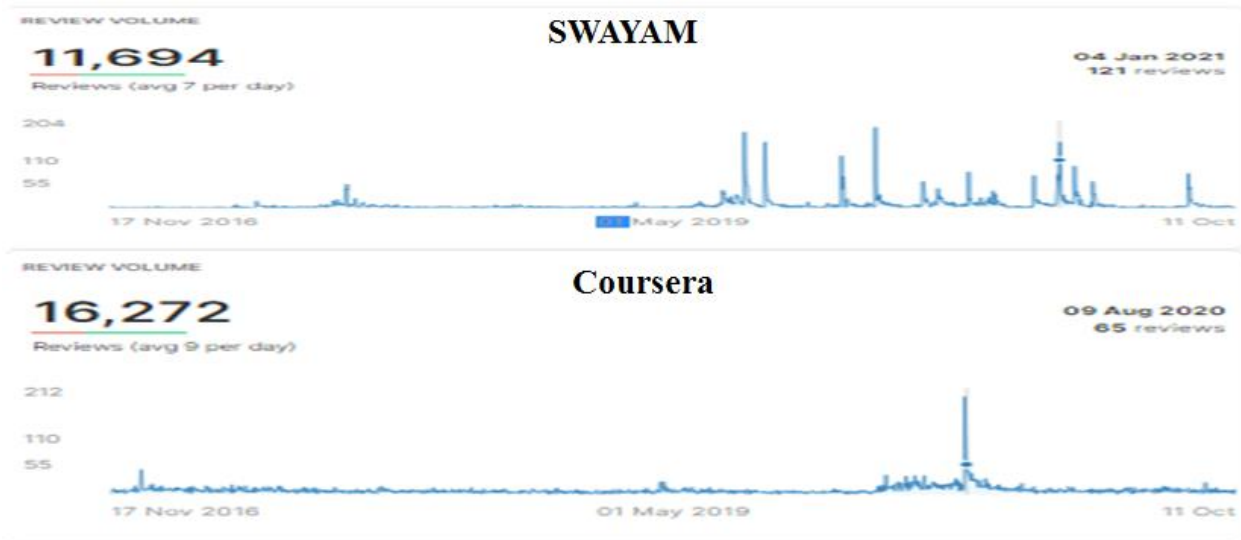


Figure 9: Review Volume

SWAYAM has total number of 11,694 reviews with average 7 reviews per day. On 18th March 2020 SWAYAM had 204 reviews as compare to 121 reviews on 4th Jan 2021. Coursera has total 16,272 number of reviews with average 9 reviews per day. On 9th August 2020 Coursera had 65 reviews.

Trends of SWAYAM and Coursera

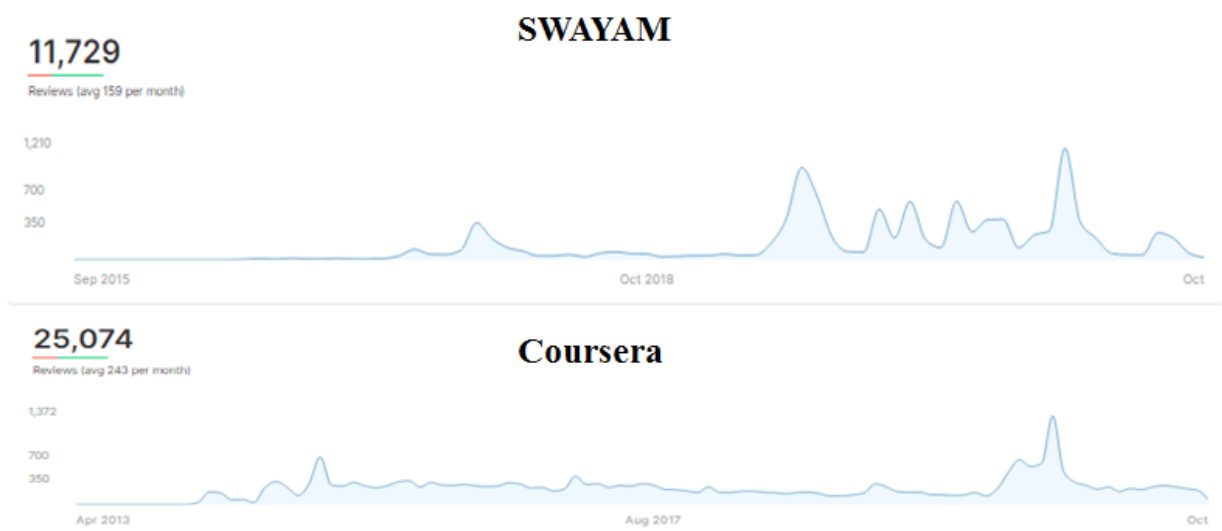


Figure 10: Trends

There are 11,729 reviews of SWAYAM in total, with a monthly average of 159 reviews where as there are 25,074 reviews of Coursera in total, with a monthly average of 243 reviews.

Major Findings:

- AppBot uses AI models for automatic sentiment analysis and found 11722 users' reviews from SWAYAM and received 7163 positive reviews while 607 is neutral, 747 is mixed and 3205 negative reviews wherein for Coursera the total number of reviews found were 25066 and received 14687 positive reviews while 1644 is neutral, 1736 is mixed and 6999 negative reviews. SWAYAM received 61% positive sentiments whereas, in the case of Coursera, 59% of the sentiments were found to be positive.
- The statistics show that the number of reviews replied to reviewers for Coursera are near to negligible and very less in SWAYAM. So, the development team of both apps need to be anticipatory and initiative in replying to user reviews. Responding to reviews, especially containing some issue is critical as it will help in enhancing the retention while reducing the dropouts. Also, it will facilitate new enrolments.
- Looking at all ratings, including those without a review, for SWAYAM, 52 % of the ratings were 5-star ratings and 22 % were 1-star ratings. For Coursera, 53 % of the ratings were 5-star ratings and 16 % were 1-star ratings. The average rating of the Coursera and SWAYAM apps were found to be 3.8 and 3.7 respectively.
- Sentiment timeline shows that Coursera post-pandemic figures have reached a broader population with a wider interest. Coursera figure reflects 112 positive reviews as on 7 August 2020. SWAYAM Figure had 165 positive reviews as on 23 August 2019.
- Coursera Reviews were given using 38 languages while for SWAYAM only 4 languages were used as medium of expression. This can be attributed to the fact that SWAYAM has a large user-base from India while Coursera users are scattered throughout the globe.
- The overall findings reveal that app users are optimally positive for both SWAYAM and Coursera m-apps.
- SWAYAM figures for Oct 2021 are found 22 positive, 3 mixed, neutral-0, Negative-17 reviews. Coursera figures for Oct 2021 reflect 105 positive, 15 mixed, 8 neutral, 82 Negative reviews.
- Average star rating of SWAYAM was reduced by 0.0411 in this period. On the other hand, Average star rating of Coursera was reduced by 0.0148 in this period.

Conclusion:

MOOCs are extensively used by students and learners. There is an utmost necessity to study the viability of a MOOC from the perspective of users as they are the main stakeholders. For this, research is based on the opinion/reviews of users as primary data. It is worthy to note that India has a population of 315 million students [the highest in the world]. Out of this population, only 0.4 million have enrolled for SWAYAM and more importantly, only 8% of the enrolled students have completed a course in SWAYAM. This data vividly proclaims the non-popularity of SWAYAM.

The study was conducted using AppBot software to extract the data and to discover the emotions, feelings, sentiments of the users and sentiment analyses is applied to get the results. Mining and analytics of user reviews of MOOCs apps provides deeper insights to various stakeholders, for example, app developers, education experts, decision-makers and the public. Of course, such analyses provide some pieces of the 'big picture. The reviews for the study included 11722 for SWAYAM and 25066 for the Coursera app as of 12th October 2021. The authors believe that our work in this paper makes useful contributions to the literature on this topic by presenting a comparative analysis of what users think of SWAYAM and Coursera, MOOCs apps.

MOOCs are definitely going to get more popular over the coming years, and especially keeping in mind the COVID-19 scenario, MOOCs will definitely attract a wider audience.

References

- App review & ratings analysis for mobile teams. (n.d.). Retrieved from <https://AppBot.co/>
- Brouns, F., Mota, J., Morgado, L., Jansen, D., Fano, S., Silva, A., & Teixeira, A. (2014, October). A networked learning framework for effective MOOC design: the ECO project approach. In 8th EDEN Research Workshop. Challenges for research into open & distance learning: Doing things better: Doing better things (pp. 161-171). EDEN Oxford, United Kingdom Budapest, Hungary.
- By the numbers: MOOCs in 2020 — Class central. (2020, December 8). Retrieved from <https://www.classcentral.com/report/mooc-stats-2020/>
- Chakravarty, R., & Kaur, J. (2016). MOOCs in India: Yet to shine. *International Journal of Information Studies and Libraries*, 1(1). doi:10.21863/ijisl/2016.1.1.001

- Daniels, L. M., Adams, C., & McCaffrey, A. (2016). Emotional and social engagement in a Massive Open Online Course: An examination of Dino 101. In *Emotions, technology, and learning* (pp. 25-41). Academic Press.
- Definition of massive open online course (MOOC) - Gartner information technology glossary. (n.d.). Retrieved from <https://www.gartner.com/en/information-technology/glossary/massive-open-online-course-mooc>.
- Jaganatthan, G. S., Sugundan, N. & Kumar, S.S. (2018). MOOCs: a comparative analysis between Indian scenario and global scenario. *International Journal of Engineering & Technology*
- Jagetiya, A., Challa, R. K., & Prashanthi, G. (2018). MOOCs: Education for all– on going development in India. 2018 IEEE 6th International Conference on MOOCs, Innovation and Technology in Education (MITE). doi:10.1109/mite.2018.8747144
- Kaushik, A. (2020). Literature on massive open online courses (MOOCs) and library Literature on massive open online courses (MOOCs) and library and information science: an analysis and information science: an analysis. Retrieved from <https://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=7863&context=libphilprac>
- Key characteristics of MOOC: How do they impact learning? (2021, June 29). Retrieved from <https://www.drcsystems.com/blogs/key-characteristics-of-mooc-how-do-they-impact-learning>
- Kumar, P., & Kumar, N. (2020). A study of learner's satisfaction from MOOCs through a mediation model. *Procedia Computer Science*, 173, 354-363.
- Kumar, K. S., & Mahendraprabu, M. (2021). Open educational practices of SWAYAM programme among research scholars. *Education and Information Technologies*, 1-25.
- Kurt, S. (2018). Massive open online courses (MOOCs), Definitions. *Educational Technology Research and Development*.
- LeCounte, J., Nafukho, F., Valentin, M. A., Johnson, D., & Valentin, C. (2014). The MOOCs: characteristics, benefits and challenges. In Edinburg, UK: University Forum for Human Resource Development.
- Lundqvist, K., Liyanagunawardena, T., & Starkey, L. (2020). Evaluation of student feedback within a MOOCs using sentiment analysis and target groups. *International Review of Research in Open and Distributed Learning*, 21(3), 140-156.
- Massively open online courses (MOOCs). (n.d.). Retrieved from <https://www.mcgill.ca/maut/news-Current-affairs/moocs>.
- National Institute of educational planning and administration - NIEPA online course. (n.d.). Retrieved

from https://www.niepa.ac.in/niepa_online_course.aspx

Patel, A., & Parekh, Y. (2020). Comparison study of online education platform. *Towards Excellence*, 27-35. Doi: 10.37867/te120403

Robinson, K. (2011). *Out of our minds: Learning to be creative*. John Wiley & Sons.

Swayam central. (n.d.). Retrieved from <https://swayam.gov.in/about>

Tseng, T. H., Lin, S., Wang, Y. S., & Liu, H. X. (2019). Investigating teachers' adoption of MOOCs: the perspective of UTAUT2. *Interactive Learning Environments*, 1-16.

What is a MOOC? (2020, April 16). Retrieved from <https://oxford-review.com/oxford-review-encyclopaedia-terms/moocs-cmoocs-and-xmoocs-definition-and-explanation/>

Weller, M. (2020). Open and free access to education for all. In *Radical Solutions and Open Science* (pp. 1-15). Springer, Singapore.

Zheng, Y., & Yang, R. Y. (2017). The rise of MOOCs: The literature review of research progress and hot spots of MOOCs education in mainland China. *Eurasia Journal of Mathematics, Science and Technology Education*, 13(9), 6165-6174.