Collaboration Tools In MOOC: A Provider's Perspective

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Abstract: *Collaboration tools are incorporated in Massive Open Online Course (MOOC), to promote community-based learning. Although existing MOOCs incorporate the functionality of collaboration using various tools such as wiki and forum, there is no mention of the feature specification list of these tools. MOOC providers integrate either third-party tools or develop their own tool. The objective of this study is to view the collaboration tools used in MOOC from a provider's perspective, giving insight into the technological dimension of these tools in terms of their features. The study is based on six popular MOOC platforms including both, open-source and proprietary platforms. The features of collaboration tools supported by the chosen MOOC platforms are identified and formulated in the form of checklists. As an outcome of our study, we suggest the set of features that may be provided for collaboration tools in MOOC by the providers, to facilitate the learning.*

Keywords: *MOOC, Collaboration Tools, Forum, Checklist, Higher Education.*

I. INTRODUCTION

Online education supports various learning methodologies and pedagogical practices. The use of these practices has resulted in a shift from teacher-centered learning to student-centered learning. The delivered instructions support learning methodologies and pedagogical theories, like, the theory of behaviorism, instructivism, social-constructivism, and connectivism. Massive Open Online Course (MOOC) is a popular way to deliver online education, globally.

MOOC supports the social-constructivist theory of learning that allows group interaction, mutual work, discussion, and collaborative knowledge formation [1]. Here, the learning emerges from connection among learners, in a spontaneous way [2]. It enhances the learner's participation, allows them to create information, and construct personal links [3] [4]. Additionally, tasks like commenting, replying, updating and sharing, facilitate construction of knowledge for the learners, engaged in common learning goals. Tools are integrated into MOOC to support collaboration functionality.

MOOC platforms support the collaboration functionality, either using an already existing tool or developing their own tool. Though there are several tools, such as the forum, chat,

and wiki for offering collaboration functionality in general, there is a need to identify the collaboration tools for MOOC providers, specifically. Moreover, for each of these tools, the MOOC providers need to know the list of tools, features supported by each of these tools. To best of our effort, we could not find any work that gives a technological insight into the collaboration tools used in MOOC, in terms of features.

Though there is a lot of research work on MOOC, not many questions are addressed from the perspective of a provider, like, what are the ways for offering the tool, and, what features must be offered by a tool. Mainly, research in MOOC discusses the impact of courses on learners, type of courses, the design of courses, type of learners, factors affecting learning parameters like learner performance and engagement. The purpose of this study is to provide a perspective of collaboration tools in MOOC from the technological point of view.

This study is significant because considering the technological dimension is as important as the pedagogical aspect since it affects the learner's experience during learning process. Also, since the learner dropout rate and lesser engagement has always been a major concern, the providers need to work on providing better technical support to the learners in addition to the improved course content and/or course design. Moreover, providing a feature to the learner opens up the chances of analyzing the learners' interaction or behavior around that feature, which is not possible otherwise.

II. RELATED WORK

Much work has been done related to understanding effects of collaboration tools used for learning such as learner performance, satisfaction, engagement, overall learning [5]-[7]. However, these studies do not focus on collaboration in MOOC. Few recent studies have focused on identifying the new potential of using some specific tools of collaboration in MOOC for different reasons. The studies focus to identify new affordances of using blog and forums [8]; change in completion rate using cooperative model of MOOC [9]; positive or negative effects of massiveness in social participation [10]; changes of emotions in forum [11]; and relation of interaction in content with the social community using forum [12]. Researchers have also analyzed learner patterns in discussion forums [13], track conversations and participation in Twitter and Google Plus [2], to help providers to better understand requirements and cater to user needs.There are few studies that discuss the selection of tools for social networking and collaboration in MOOC. Alario-Hoyos *et al.* [14]

Revised Manuscript Received on 30 March 2019.
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Retrieval Number: F2765037619/19©BEIESP
Journal Website: www.ijrte.org

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Published By:
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analyze five tools and suggests that forum is preferred by learners for interaction and discussion. Kop, Fournier, & Mak [15] consider different aspects, like, the role of facilitator, pedagogy and structure constraints; for building connection and collaboration. Some of the studies conducted are for specific platforms. Mustea, Herman, & Naaji [16] report the list of collaborative tools offered by Moodle. Alario-Hoyos *et al.* [14] analyze the impact of social tools on MiríadaX platform.Though several papers exist that focus on different aspects of collaboration tools. But we could not find any work listing the features of the tools in MOOC.

III. RESEARCH MOTIVATION AND PURPOSE

Though there is a lot of research in MOOC, not much is done from a technological perspective contributing to the course provider and developer as the main stakeholders. We could not find any research work that focuses mainly on the technical support offered by the MOOC platforms for collaboration in terms of specific features.

The purpose of this study is to give an insight into the technological aspect of collaboration tools provided in the MOOC platform. The study seeks answers to the following questions:

RQ1: Which collaboration tools are supported and used by the MOOC providers?

RQ2: For each collaboration tool offered, what are the features supported by different MOOC platforms?

RQ3: What are the features that are supported by only a few platforms and not by all, in general?

IV. METHODOLOGY

For the purpose of this study, we decided to identify platforms based on their popularity, license availability (open-source, proprietary), and reported use for offering MOOC. The same provider may also offer a diverse set of features for different courses depending upon the subject domain, and/or the specific organizational needs. To cover the diversity of features, we have considered all these aspects of the providers. We selected 6 platforms, where three are popular proprietary platforms, namely *Coursera*, *edX*, and *Udacity*; and three are open-source platforms that include *Open edX*, *Canvas*, and *Sakai*.

Coursera is the largest and most popular platform followed by edX [17]. Based on review report of Shah [17] and Mooclab [18], *edX, Coursera, Udacity* are the top MOOC platforms based on several parameters, like, no. of courses, no. of users, certification, interface usability, social tool, and features. *Open edX* drives edX, which is one of the popular and largest MOOC providers. Also, "edX had been the most open of all the MOOC platforms" until 2018 [19]. *Sakai* has been identified among the top two open-source learning platforms [20, 21]. Various elite institutions, including IITK and University of Amsterdam, use Sakai for offering MOOC courses [22]. Canvas platform drives the Canvas Network that is the third largest platform based on the number of courses offered [23].A descriptive and quantitative methodology was applied on the platforms; to get a holistic view of the collaboration functionality, which includes the tools, methods, and features, provided by the identified platforms.

Since the nature of the platform license decides the accessibility of its features for anyone; we have treated propriety and open-source platforms differently for the purpose of the study. To study proprietary platforms, several courses were selected that are offered under diverse subject areas by different institutions. We enrolled for more than 50 courses in the selected platform and analyzed the collaboration tools and their respective features provided for the learner. The details of sample courses selected are listed in Table 1. The study of open-source platform involved three modes - 1) Exploring the source code, 2) Document Analysis (release document, user guide, literature), and 3) Try and Test method via Demo Sites and Sandboxes. The information gathered and our observations formed a baseline for identifying the tools, components, and features, to formulate the checklists.

Table 1: Details of the sample courses selected for the study of proprietary MOOC platforms

S. No.	Proprietary Platform	Number Selected		
		Institution	*Subject*	*Course*
1.	Coursera	13	5	14
2.	edX	15	6	26
3.	Udacity	None	5	13
		Total	**16**	**53**

V. COLLABORATION TOOLS IN MOOC

MOOC includes several collaborative learning tools like, forum, wiki, blog, e-portfolio, and video conference, to facilitate mutual work that allows the community of learners in a course to assist their peers. The tools facilitate learners to work on a single project to achieve a common learning goal. The collaboration tool wiki is associated with the course site, while a blog is associated with a user or MOOC platform.

Forum tool in MOOC is used by the instructor to start a discussion on a specific topic, maintain it, and make comments on issues raised during the discussion. The learners contribute by answering, commenting, and providing feedback. Forum centralizes the contributions (post, response, and comment), discussions, opinions on a selected topic, and maintains a hierarchy of discussion topics in the form of threads. Table 2 summarizes features of the forum. The forum tool has five components- *All Discussion, Post, Graded Post, Response,* and *Comment*. *All Discussion* facilitates learner to have all discussions at one place and allow them to view discussions in the form of list or categories, where each further has several other filtering options like trending, followed, pinned. *Post* allows the learners to post their problems by simply adding a post.

On each post, other participants provide their opinions in the form of response or comment that are handled by *the Response* and *Comment* component, respectively. The post, response, comments can be edited, updated or deleted by the contributor. For each contribution, several controls are provided to the learner, like, voting, marking as read/unread and star.

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Graded post allows providing grades to the contributor and makes it mandatory for the learner to participate in the post.

Table 2: The feature checklist of Forum in MOOC platforms

Component	Activity	Option	Parameter	C	E	U	O	N	S
All Discussion	View List	Details	Title, Type, Date, Unread messages	✓	✓	✓	✓	✓	✓
		Category	Topic, Followed Post/ Pinned, List	✓	✓	✓	✓	✓	✓
		Filter	Shows all/ Unanswered/ Unread	✓	✓	✓	✓	✓	-
		Identifier	Pinned, Following, User Type	✓	✓	✓	✓	✓	-
		Sort	Recent/Most Activity/Most Votes/ Date	✓	✓	✓	✓	✓	✓
		Status	Correct, Read, Subscribed, Graded, Total	✓	✓	-	✓	✓	-
	View Category Wise	Topic	Topic Name	✓	✓	✓	✓	✓	✓
		Filter	Show all, Unread, Unanswered	-	✓	✓	✓	✓	✓
		Other	Pinned/Participant's, Liked/Recent, Date	✓	✓	-	✓	✓	✓
	Keep Updated	Show	Unread, New	-	✓	✓	✓	✓	-
		Updates	Podcasts / Email	✓	✓	✓	✓	✓	✓
	Search	From List	Topic, Post, Text	✓	✓	✓	✓	✓	-
Post	View	Detail	Title, Author, Content, Category, Unread/ Read	✓	✓	✓	✓	✓	✓
		Controls	Vote, Follow, Report, Mark Read, Print	✓	✓	✓	✓	✓	✓
		Filter	Message Content/ Subject Only	-	-	-	-	-	✓
	Add	Topic	List	-	✓	✓	✓	-	-
		Title	Title Box	✓	✓	✓	✓	✓	✓
		Text	Text Box, Preview	✓	✓	✓	✓	✓	✓
		More	Post Type, Add File, Date, Select Content	✓	✓	✓	✓	✓	✓
		Options	Follow, Post Anonymously, Allow Reply/Like	✓	✓	✓	✓	✓	-
	Edit, Delete	Change	Topic, Content, Type	✓	✓	✓	✓	✓	✓
	Feedback	Positive	Vote, Follow, Answered, Like	✓	✓	✓	✓	✓	-
		Negative	Report	✓	✓	-	✓	-	-
Graded Post	Open Post	Post Info	Points, Title, Author, Content, # Comments	✓	-	-	-	✓	-
		Control	Review Now	✓	-	-	-	✓	-
		List Info.	Title, Topic, Date, Time, Original	✓	-	-	-	✓	-
	View Post	Controls	Discussion, Rubric, Add Comment	✓	-	-	-	✓	-
	Comment	Options	Comment Box, Attach File / Media	✓	-	-	-	✓	-
	Feedback	Peers	Feedback Box for peers	-	-	-	-	✓	-
Response	View	Detail	Title, Author, Content, # Read/ Response, Id	✓	✓	✓	✓	✓	✓
		Controls	Vote, Check Correct, Report, Reply Copy Link	✓	✓	✓	✓	✓	✓
			Like, Mark Read, Go to First, Reply to Initial	-	-	-	-	✓	✓
	Add Response	Field	Text Box, Add file, Original Text	✓	✓	✓	✓	✓	✓
		Controls	Preview	✓	✓	✓	✓	-	-
	Edit, Delete	Change	Content	✓	✓	✓	✓	✓	✓
Comment	View	Detail	Original Comment, Author, Day	✓	✓	-	✓	✓	-
		Controls	Edit, Delete, Report	✓	✓	-	✓	✓	-
	Add Comment	Field	Comment Box , Add Attachment	✓	✓	-	✓	✓	-
		Controls	Preview	✓	✓	-	✓	-	-
	Edit, Delete	Change	Content	✓	✓	-	✓	✓	-

C - Coursera, E - edX, U - Udacity, O-Open edX, N-Canvas, S-Sakai

Wiki is used to showcase knowledge and to exchange the information. A wiki has mainly three components- *Wiki Page*, *Article* and *Comment*. A user can see basic information about the purpose of this wiki on the wiki page. Information is added to the wiki in the form of articles. A user can edit, delete, and track history of its modification. A wiki allows managing the changes using controls like previous version, and revert the changes. Also, a user can comment on the added articles. Table 3 displays the list of features provided by the wiki tool in MOOC.

Blog in MOOC is used for sharing course-related information, ideas, suggestion, and comments on a topic. A list of the blog feature for a web application is discussed [24]

that can be used for MOOC.

E-portfolio is a recent addition to the family of collaboration tools in MOOC. It provides a platform to display academic work. For example, a project, knowledge of a specific area; or to share personal information, like, resumes, a simple subjective website (e.g., my blog). The

features provided by e-portfolio tools in MOOC are listed in Table 3.

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E-portfolio has four main components- *E-portfolio*, *Dashboard page*, *Section* and *Page*. E-portfolio provides a place to the learner for showcasing their work and it can be kept private or made public. A brief view of the e-portfolio is provided to the user on the dashboard page. In e-portfolio, the content is divided into sections and pages. Learners use various forms of content in e-portfolios like text, image, presentation, and video. Some providers allow content to be downloaded for viewing without accessing the e-portfolio site.

Video conference facilitates face-to-face interaction and exchange of dialogues, among instructor and learner. The video conference sessions are provided as office hours, webinars, hangouts etc. Generally, MOOC providers use third-party tools – Coursera, edX, Udacity, Open edX uses *Google Hangout,* whereas Canvas and Sakai use *BigBlueButton*.

Video conferencing tools have mainly four components – *Conference page, General Conference, Personal Conference*, and *Conference Interface*. Users can view the information about a conference session. General conference is a session usually created by the course instructor, in contrast to personal conference, set up by learners for informal communication among learners and/or instructors. The users manage their interactions using the conference interface for airing the video, audio, recording video, sharing files, presentations or other resources. Our earlier work [25] lists features of a video interface in MOOC. Table 4 lists the features of video conferencing tool provided in MOOC

Some other tools are incorporated in MOOC to improve collaboration. *Google Docs* and *Google drive* allows multiple users to work on the same document. All users access a single copy of the document that reflects changes in real time. The instructor uses these tools to share attendance sheets, extra learning resources and to create a group project.

Table 3: The feature checklist of wiki and e-portfolio tool in MOOC platforms

	Component	Activity	Options	Parameters	C	E	U	O	N	S
Wiki	Wiki Page	View	Details	Info., Purpose, Content, Edit Date, Author	✓	✓	✓	✓	✓	✓
			Control	Info	-	-	-	-	✓	-
				View	-	✓	✓	✓	✓	-
				Edit, History	✓	✓	✓	✓	✓	✓
				Delete	✓	-	✓	-	-	✓
			Other	Up level, Add Article, Filter, Visited	-	✓	-	✓	✓	✓
		Subscribe	Email	Notification Preference	✓	✓	✓	✓	✓	✓
			RSS Feed	As per Notification Preference	-	-	-	-	✓	-
		Search	Text Box	Article Title, Text	✓	-	-	✓	✓	✓
	Article	Add	At level	Same Level/ Below Current Level	-	✓	-	✓	✓	✓
			Fields	Title, Content (Editor)	✓	✓	✓	✓	✓	✓
			Optional	Keywords for Slug, Insert Content	✓	✓	✓	✓	-	✓
		Edit	Modify	Title, Content, Summary	✓	✓	✓	✓	✓	✓
			Controls	Edit, Summary Field, Preview	✓	✓	✓	✓	✓	✓
		Delete	Confirm	Yes/ No	✓	✓	✓	✓	✓	-
		History	List	Version Number	✓	✓	✓	✓	✓	✓
			Previous	Select From List Previous Version	✓	✓	✓	✓	✓	✓
			By Line	See Changes line by line	✓	✓	✓	✓	✓	-
			Replace	Replace Changes with Previous	✓	✓	✓	✓	✓	✓
			Merge	Combine a Current & Previous Ver.	-	✓	-	✓	-	-
		List of Article	Detail	Date, Author, Article No., Message	✓	✓	✓	✓	✓	✓
			Controls	History, Hide Comment, Edit, Delete	✓	✓	-	✓	✓	✓
	Comment	Add	Option	Text Box	-	-	-	-	✓	-
		Controls	Hide	Hide/ Unhide the Comment Content	-	-	-	-	✓	-
		Edit	Change	Content	-	-	-	-	✓	-
E-Portfolio	E-Portfolio	Create	Fields	Name, Make it Public / Private	-	-	-	-	✓	✓
		Open	List	Title, # Pages, Date / Time	-	-	-	-	✓	✓
		View	Content	Section/ Page/ Comment	-	-	-	-	✓	✓
		Edit	Fields	Name, Make it Public / Private	-	-	-	-	✓	✓
		Delete	Confirm	Yes/No	-	-	-	-	✓	✓
		Share	URL/ Link	Copy and Paste the link	-	-	-	-	✓	✓
		Download	In Zip File	All Content	-	-	-	-	✓	-
		Preview	For page	See the page created	-	-	-	-	-	✓
		Help	Wizard	Guide /Template	-	-	-	-	✓	✓
	Dash Board	View	Status	Private / Public	-	-	-	-	✓	✓

Component	Activity	Options	Parameters	C	E	U	O	N	S
Page		URL	Link of e-portfolio	-	-	-	-	✓	✓
		Submission	Recent submissions	-	-	-	-	✓	✓
		Page, Section	Title	-	-	-	-	✓	-
		Delete	Manages Delete	-	-	-	-	✓	✓
	Controls	Download, Delete	Manage Deletion & Download	-	-	-	-	✓	✓
	Setting	Organize	Sections / Page	-	-	-	-	✓	✓
		E-Portfolio	Update Name, Make Public	-	-	-	-	✓	✓
Section	Add	Field	Section Name	-	-	-	-	✓	✓
	Reorder	Select Title	Drag & Drop to Reorder	-	-	-	-	✓	✓
	Edit	Update	Section Name	-	-	-	-	✓	✓
	Delete	Confirm	Delete all section & pages	-	-	-	-	✓	✓
Page	View	Page, Comment	Content of page & Message	-	-	-	-	✓	✓
	Add Page	Fields	Pg. content, Msg. Pg, Name	-	-	-	-	✓	✓
	Reorder	Page	Drag & Drop to Reorder	-	-	-	-	✓	✓
	Edit	Update	Page Name, Content,	-	-	-	-	✓	✓
		Option	Comment, Upload file, Preview, Save	-	-	-	-	✓	✓
	Add Comment	Fields	Comment	-	-	-	-	✓	✓
	Delete	Confirm	Delete Page & Comments	-	-	-	-	✓	✓

C - Coursera, E - edX, U - Udacity, O-Open edX, N-Canvas, S-Sakai

Table 4: The feature checklist of the video conference in MOOC platforms

Component	Activity	Options	Parameters	C	E	U	O	N	S
Conference Page	View Info	Details	Name, Description, Type, Scope	✓	✓	✓	✓	✓	✓
	View New	Details	Title, Date, Status, Users, Recording	✓	✓	✓	✓	✓	✓
		Option	Join/ Start	✓	✓	✓	✓	✓	✓
	View Ended	Details	Recording, Date, Playback, Length	✓	✓	✓	✓	✓	✓
		State	No Recording / View/ Preparing	-	-	-	-	✓	✓
General Conference	Create/ Join	Start/Join	Create new/Join Conference	✓	✓	✓	✓	✓	✓
		Settings	Audio, Install Plug-in, Browser, Other	✓	✓	✓	✓	✓	✓
	View	Interface	Interface Options to interact	✓	✓	✓	✓	✓	✓
Personal Conference	Create	Fields	Name, Type, Duration, Description,	-	-	-	-	✓	✓
		Options	Enable record, Time Limit, Invite	-	-	-	-	✓	✓
		Settings	Audio, Browser Permission, Other	-	-	-	-	✓	✓
	Edit	Change	Name, Type, Duration, Record, Detail	-	-	-	-	✓	✓
	Delete	Confirm	Yes/ No to delete conference	-	-	-	-	✓	✓
Conference Interface	Video	Controls	Display, View, Advance, Help	✓	✓	✓	✓	✓	✓
	Options	Recording	Enable/ Disable	✓	✓	✓	✓	✓	✓
		User Detail	Name, Type (Moderator/Presenter)	✓	✓	✓	✓	✓	✓
		Settings	Lower All Hands, Mute/Lock Users	✓	✓	✓	✓	✓	✓
		Share Media	Share (Desktop, Video), Make Public /Private, Join, Audio, Record, Mute	✓	✓	✓	✓	✓	✓

C - Coursera, E - edX, U - Udacity, O-Open edX, N-Canvas, S-Sakai

VI. RESULTS AND DISCUSSION

RQ1: Which collaboration tools are supported and used by the MOOC providers?

From the study of selected platforms, it is found that there are five tools which are mainly used by the MOOC platforms for collaboration purpose. These tools are: 1) *Forum*, 2) *Wiki*, 3) *Blog*, 4) *E-portfolio*, and 5) *Video Conference*.

Generally, the forum is considered as an integral part of MOOC. Moreover, *forum* and *Wiki* are the tools provided by all platforms. For *blogging*, MOOC provides use the third-party blogging software like Wordpress.com and blogger.com. For *video conference,* all platforms use the open-source third-party tool, Google Hangout or BigBlueButton.

RQ2: For each collaboration tool offered, what are the features supported by different MOOC platforms?

The features offered by the different tools supported by the selected platform are identified. The identified features are formulated in the form of checklists. The features supported by the forum in MOOC platforms are presented in Table 2. Table 3 lists the features of wiki and e-portfolio. The video conference tools features are summarized in Table 4. The list of features for blogging is not presented here since it already exists (as mentioned earlier).

RQ3: What are the features that are supported by only a few platforms and not by all, in general?

As a result of our study, the feature checklist presented gave us an insight into the specific features of each tool.

- *Graded post* of the forum is supported by Coursera and Canvas, only.
- *Comment* in a forum is not provided by Udacity and Sakai. Both of them use the two-level hierarchy of forum threads having post and response only.
- *Filter* to view a forum post is only supported by Sakai.
- *Comment* in a wiki is allowed by Canvas only.
- *RSS feed* in the wiki page for subscription and "info" control to view is provided by only Canvas.
- *Search* in the wiki is not supported by edX and Udacity.
- *E-portfolio* tool itself is supported by only two platforms Canvas and Sakai.
- *Personal Conference* of the video conference is supported by BigBlueButton, a third party tool used by Canvas and Sakai.

From the study of specific features, we found that in *the forum* 'graded post' can be provided to improve learner engagement. Since in graded post learners need to grade the post of their peers, it makes them active learner rather than just consuming the learning resources. The forum thread is maintained as a three-level hierarchy of post, response, and comment. An absence of "comment" makes the hierarchy as level 2, where the learners cannot give their feedback on an individual response but they are allowed to give it on post only. Applying the "filter" on the view allows the learners to view the required post. So, this feature is helpful and can be provided for learner's better experience. *Wiki* is used to maintain the details of learning, learning material to be shared and worked in collaboration with other learners. So, providing feedback "comment" and "searching" a specific entry is one of the required features of the wiki. *E-portfolio* is helpful for the learners in showcasing their knowledge, maintain the record of their learning, keeping the project and sharing it with others. We suggest the inclusion of this tool in the MOOC platform where the individuals are meant to keep the focus on individuals learning. For video conferencing, the 'personal conference' let the individual learners create a meeting session with the learners. No other means of face to face communication is available for learner-learner communication than the personal conference. So, for the required personal conference, BigBlueButton tools can be used in MOOC. Figure 1, displays coverage of the checklist features for forum, wiki, and e-portfolio. Some of our observations are as follows-

- *Canvas* platform provides maximum features for each collaboration tool.
- For *Forum*, the *Canvas* provides highest percentage of features ~87% followed by *Coursera* (~85%) and *edX* (~76%), while the Sakai offers the least features (~31%) among all.
- For *Wiki*, the best feature support is offered by *Canvas* (~95%) followed by *Open edX* (~59%), whereas *Udacity* (~38%) provides the least number of features.
- *E-portfolio* is supported by only two platforms. They have less difference in the number of features supported. *Canvas* provides better support with ~97% and *Sakai* offers ~95% features.

VII. CONCLUSION

This study aims to explore the collaboration tools in MOOC from the technological perspective, for the provider and developer. It gives an insight into the collaboration tools and their supported features in MOOC, for the platform provider. It is found that forum, wiki, blog, e-portfolio, and video conference, are the collaboration tools used in MOOC. In this paper, the features of these tools are identified and presented in the checklist. The checklist is useful during incorporating collaboration functionality in MOOC. The checklist presented here is extensible in nature and can be updated easily to add any new feature and option.
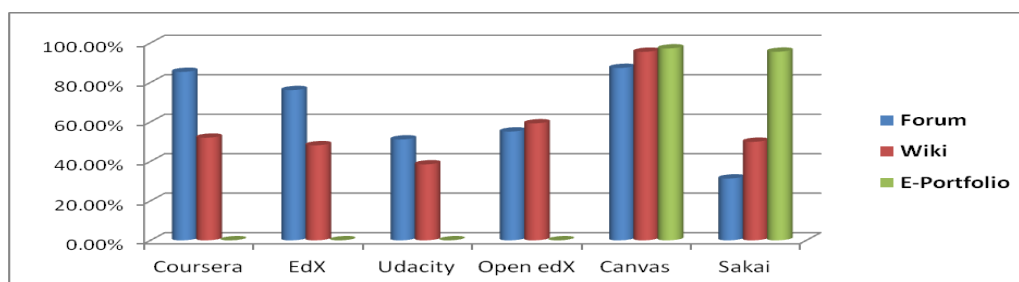

Figure 1: Graph showing the percentage of features from the checklist, used by the MOOC providers

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Retrieval Number: F2765037619/19©BEIESP
Journal Website: www.ijrte.org

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