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Offering Web-based Tools via Library Websites for Academic and Research Progression: An Analytical Study

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Abstract

The purpose of the present study is to explore the possibility of integrating various online tools and apps with the library website and to identify the issues and benefits of implementing these tools. Quantitative online survey method was used using Google form in the present study to investigate the perception of the academic community involving students, teachers, and research scholars across higher education institutes in West Bengal, India about the online tools and apps and how they respond while interacting with these tools. Based on the responses to a series of questions, the study analyzed user observation and found purposive involvement of the academic community with various online tools and apps. The study identified the areas requiring improvements to maximize the usability of the tools and illustrated the usefulness of these tools in academic and research progression. The study also presented a schematic diagram of possible benefits and major constraints while implementing these tools. The research provides an overview of various online tools and apps facilitating academic and research progression and makes an attempt to convince librarians towards the informed selection of tools and highlights the utility of these tools among the academic community.

Keywords: Research collaboration, Web 2.0, Social media, Teaching-learning, Library, Remote access

1. Introduction

The web has gradually become more interactive offering multiplicity of synergistic platforms with passing days to provide engaging ways for students, teachers, and scholars to interact with each other and share their ideas (Al-Hariri, et al., 2015; Maor et al., 2016; Solan & Quan-Haase, (Eds), 2017; De Sarkar, 2017; Kapoor, 2018). The phenomenon turns out to be more realistic because of the new normal, a situation that we have never witnessed earlier. Covid 19 pandemic enforced lockdown and social distancing has compelled academic institutions to switch over to an online mode of teaching-learning. Lashley, et al., (2020) in their very recent study examined the potentiality of online tools to offer a student-centric immersive environment for improved teaching-learning activities together with addressing safety to experiential learning as well. Covid 19 has forced 290 million students out of schools (UNESCO) and studies focused on the only viable option to continue educational progression that is via online mode during the prolonged closure of educational institutions (Martinez, 2020; Mishra, et al, 2020). The situation demands a total reshuffling of the education system in tune with the development of web and web-based technologies over the years. The tools and apps which were used as a supplement to the physical mode of the teaching-learning process have now become sole way and not complement to pedagogical approach - online class replaces physical classroom, youtube replaces visualization of lab experiments, webinars replaces conferences, CBT replaces training, message board/ newsgroup replaces group discussion, Google form replaces MCQs, Blackboard replaces face-to-face class, and so on. Even before the induction of the Covid pandemic there has been an increasing trend among the academia to use online platforms for academic and research activities which can be visible with more and more online tools being adopted in library websites

and increasing tendency among the students to get inclined on web-based platforms to carry out their projects and supplement their classroom study. Researchers are engaged in uploading their theses in digital repositories, becoming proactive to submit their preprints in open access repositories for more citations and comments to improve their writings, becoming members of online forums for improved sharing of their ideas, and finding a platform for collaboration and networking.

1.1 What are online tools
An online tool is a software that runs on a web browser and just needs an internet connection to function. There are a multiplicity of online tools/ apps (applications)/ programs/ platforms that we regularly come across such as - online information retrieval tools/ platforms, social networking tools/social media apps, computational tools, data analysis tools/ apps, survey tools, information discovery platform, GIS apps, photo/ video sharing apps and so on. Studies abound to investigate the use of online tools in educational sectors (Broadbent and Poon, 2015; Eom and Ashill, 2016; Singh and Thurman, 2019), however, there is no such study as comprehensive as to encompass different tools and applications that are being viewed by the academia as having the potentiality to improve the academic activities and research productivity. Therefore our present investigation highlights the result of a survey conducted among the academic community of West Bengal, India to find its perceived observation about the utility of the web-based tools/ apps/ platforms in academic and research progression. Online tools/ apps/ platforms/ programs are all referred to here, simply as tools or apps for the ease of communication. Based on their basic functional properties, different tools are categorized and illustrated in Table 1

Online Tools
Common social connections (Facebook, Twitter, MySpace, Google+...)
Professional social connections (LikedIn, Classroom2.0, Edmodo...)
Video sharing (YouTube, iTune, Vimeo, Bilibili, ...)
Photo sharing (Flickr, Instagram, Picasa, Pinterest, Photobucket, SmugMug...)
Slide sharing (SlideShare, SlideRocket, SlideServe)
Social bookmarking (Delicious, StumbleUpon, Digg, CiteULike...)
Microblogging (Tumblr, Plurk, Cif2.net...)
Geolocation sharing (Foursquare, Whrrl...)
Blogging (Blogger, WordPress...)
Wikis (Wikipedia, WikiEducator, Wikibooks, WikiMapia...)
Event tracker/ meeting scheduler (Google Calendar, Doodle, Timebridge...)
Cross-platform instant messaging (WhatsApp, WeChat, Viber, Kik, Tango, Nimbuzz...)
Video conferencing (Skype, TeamViewer, AnyMeeting...)
Digital publishing platform (issuu, Scribd...)
Online survey tool (Google form, SurveyMonkey, eSurveysPro, SurveyGizmo...)
Platform for managing and sharing researchers' professional information (Researcher ID, Emerald Research Connections...)
Accessing, creating, editing and sharing documents online (Google Docs, Zoho Docs, Dropbox, infoRouter...)
User-controlled academic publication database (Google Scholar, CiteSeerX, GetCITED...)
Computational & data analysis (Scylab, Jupyter, Metlab, BioSPICE, RStudio...)
Statistical analysis (SPSS, JMP, Scilab)
Graphical management (Grapher, GNU octave, DataGraph, Grace...)
GIS tool (Google Earth Pro, Arc GIS, BatchGio...)
Following and sharing research (Academia.edu, ResearchGate, Epernicus, ScienceStage...)
Citation managing (RefWorks, Zotero, Mendeley, EndNote...)

Table 1 : List of online tools identified for the survey

2. Review of literature

The Internet continues to delimit users' expectations and betrays the adequacy of library service provision in present days in its usual form. Consequently, usual library resources in physical form fall short of meeting users' demands and throws open avenues for users to better access information elsewhere on the web. However, the academic community is skeptical about the authenticity of ubiquitously available information on the net. On the contrary, the usefulness of different tools and apps have been investigated widely to portray their efficacy to act as a bridge between the prospective user with their purposive activity and the desired outcome. Net-based apps and tools for differential activities are gradually being adopted by libraries to provide users better immersive environment to search for desired content, carry out research work, communicate with like-minded people, portray their research output, and so on (Kroski, 2008;

Linh, 2008; Garoufallou and Charitopoulou, 2012; Hricko, 2010; Mahmood and Richardson, 2013; De Sarkar, 2015).

During the period, broadly from 2006 to 2016, plenty of studies in various levels have emerged, underpinning the application of Web 2.0 or the interactive web in libraries (Blansit, 2006; Aharony, 2009, Harinarayana and Raju, 2010; Khan and Bhatti, 2012; Isfandyari-Moghaddam and Hosseini-Shoar, 2014; Tella and Oladapo, 2016). The studies were either conducted on a group of libraries or individual libraries or among the librarians or users in a geographical area to collect their opinions about the behavioral aspect of web 2.0, to investigate the viability of web 2.0 applications in the library, the risk factors associated to the use of web 2.0 tools; to suggest how value-added services could be introduced with the adoption of web 2.0 applications; to showcase how to integrate web 2.0 tools with inherent library service provision; to figure out which web 2.0 tool is more effective and widely used; to identify the factors affecting the adoption of web 2.0 tools in libraries; and the likes (Tripathi and Kumar, 2010; Chua and Goh, 2010; De Sarkar, 2015; Shah and Ahmad, 2016). Another interesting approach of all the above studies was that the majority of web 2.0 related research was primarily confined to third-world countries. The best possible explanation for that may be two folded. Firstly, the adoption of web 2.0 tools in developing or under-developed countries usually follows the implementation in developed countries, where the usability of those tools has already been tested to some extent. This is so because, in general, developed countries lead in R&D work and model designing, preceding the discovery of various apps. Therefore what we see now, is the application-related research here. Next, due to several issues like poor net connectivity, fund constraints, lack of proper supporting devices come in the way of implementation of web 2.0 tools and various other applications in libraries.

In a slightly different narrative, while involving the array of internet bases tools, studies also emerged focusing on the community sharing web 2.0, better known as social media tools, and their use in the education sector and library as well (Gruzd, et al., 2012; Khan and Bhatti, 2012; Casey and Worden, 2016; Kapoor, 2018). Rowlands (2011) highlighted the potentiality of social media at various steps of the "research lifecycle", from recording research problems, setting research objectives, and sharing research findings. They identified collaborative authorship as the most popular social media approach in a research setting. They also pointed out that scholars from humanities and social science prefer social media the most in disseminating their research output since unlike scientists having quicker and responsive communication systems, the social scientists had a slower and weaker system before the emergence of social media. Gruzd, et al., (2012) put forward specific tools of social media preferred by the scholars in their research and identified factors influencing their perceived intention to embrace social media in their research workflow.

Tools and apps, especially those meant for library use, require validation checks before implementation. Hanrath and Kottman (2015) studied the usability of a discovery tool among a select group of users in the Kansas University Library. Using Google analytics they measured participants' success rate in using the discovery tool to carry out research work and identified areas where the tool needs further improvements. To study the usability of the discovery tool, Yesmin and Ahmed (2016) compared Koha with VuFind and recorded University students' perceived preference level for searching catalogs using the above tools. They observed that

students consider VuFind more effective than Koha for resource discovery because of its robust power to search through distributed web content and retrieve integrated results via a single presentation. The above study is among several others which, compared a set of discovery tools and concluded on the efficacy of one over the other, based on some criteria determined by the preference level of the studied user groups; explained in detail how to integrate discovery platform into library service provision; identified usability challenges and ways to address those challenges (Way, 2010; Comeaux, 2012; Fawley and Krysak, 2014; Niu, et al. 2014; Foster, 2018).

Since easy access to library services and facilities remain the primary concern among academia, De Sarkar (2015) explained how to integrate various tools as web browser extensions, for speedy access to resources. While studying the implementation, experiences, and issues relating to the induction of the WeChat account to the Jinan University Library, Zhu (2016) opined that the tool enables sharing of the University Library collection and services among its academic community and encourages stronger bonding between the Library and the user community. Al-Qallaf and Ridha (2019) studied 110 academic library websites and based on the content analysis of data gathered along the library website evaluation checklist, portrayed how libraries intend to improve their website qualities with the integration of tools and applications to provide quicker and easier access to content-rich information and diverse web-based library services. Reasoning the importance of online citation tools, based on a study conducted among the users of Delhi University Library, Madhusudhan (2016) observed that EasyBib is the most preferred citation tool among the respondents to carry out their academic and research work, and library website remains the gateway to acquaint them about the citation tool and its utility. While studying the viability of bibliometric mapping software tools like CiteSpace, HistCite, and VOSviewer to conduct a content analysis of a sample of nearly 500 English journal articles, to determine the citation practices, Pan, et. al., (2018) observed that the above tools are fast adopted in libraries for research purpose.

Mainstream literature abounds with the usability of different tools and applications to enhance collaboration between the users and the library. Published literature with perspectives on promoting the inclusion of library services and resources in different platforms is ubiquitous. However, there is hardly any piece of research noticed, covering different tools and applications with diverse functionalities, integrated with library websites, highlighting their effectiveness among the scholarly community. Therefore, the researchers were interested to carry out the study with the following objectives.

3. Objective of the study
- To identify the most preferred tools by the academic fraternity
- To find out how predominant the factors relating to age in shaping the demand for online tools
- To ascertain how far the accessibility of resources meet the academic needs
- To identify the areas requiring improvements to maximize the usability of the tools
- to investigate the perceived views of academia about the usefulness of online apps and tools to contribute to academic and research progression.

4. Methodology
A quantitative survey method was used in the present study to investigate the perception of the academic community in higher education institutes in West Bengal, India based on the impact of online tools and applications in its academic and research pursuit.

4.1 Population
All postgraduate students, scholars, and faculty members and equivalent category having Indian nationality, associated with higher education institutes comprising universities, colleges conducting postgraduate courses, and research institutes in West Bengal were the population of the study. Among the faculty members the following categories were made - rank of assistant professor and equivalent category; associate professor and equivalent category; professor and equivalent category; and guest teachers/ part-time teachers as per the faculty ranking pattern set by the UGC, higher education commission in India. Among the students, those who were enrolled in regular courses in universities, postgraduate colleges, and research institutes were considered. Teachers, students, and scholars were either residing in on-campus hostels (before pandemic) or off-campus premises. The study was conducted from December 2020 till May 2021.

4. 2 Sample and sampling technique
Scanning the websites of the universities, postgraduate colleges, and research institutes in West Bengal, we have collected the email addresses of faculty members. However, it was initially very difficult to find communication addresses of students and scholars, which we later managed to gather, making a personal approach to individual faculty members. Once we found a student's/ scholar's WhatsApp number, we requested him/ her to send us the WhatsApp numbers of their fellow students/ scholars. Finally, a sample of 2000 people was selected based on a convenient sampling method, ie., a method whereby a sample is taken from a population based on ease of access.

In the above quantitative survey research, we employed "non-probabilistic convenience sampling technique" which signifies that we cannot generalize the findings and the outcome is limited to the population surveyed or may be extended to a population with a similar academic setting like having similar infrastructure, same kind internet facilities, similar working environment, average financial conditions of the students, hostel facilities and so on. The findings will give us an idea about the perceived use of tools and apps based on the perceptions and level of preferences of the academic community.

4.3 Data collection
The research has used Google Form to obtain data. The use of Google Form for data collection has been widely used in survey research (Herlina, et al., 2019; Arafat, et al, 2020; Van Nguyen, et al., 2020). A questionnaire was prepared in English using Google Form for the students, research scholars, and faculty members in higher education institutes in West Bengal to study their perceptions on the use of online apps and tools. Invitations to fill-up questionnaire links were sent to the academic community via email and WhatsApp. In all, 2000 questionnaires were sent and 548 persons responded to the survey. The subset response rate was 27%. Through filled-in questionnaires, the perceptions, experiences, preferences, and cognition of students, scholars, and faculty members about the use of online tools and applications were consolidated for

analysis. Their opinions and observation were also analyzed to understand their reflections and expectations.

4.4 Data analysis and findings

The data obtained as responses via filled-in Google Form were approached and each response was carefully read followed by data cleansing. Data cleansing was done by the 1st investigator which was cross-checked by the 2nd investigator. Only 2 responses were removed for inappropriate data. Therefore, 546 responses were finally selected for analysis. Designation-wise representation of the academic community that participated in the survey is depicted in Chart 1. As expected, the students' community represents the larger section of the respondents in our survey. Representation of the community of research scholars comes next, followed by the assistant professors or equivalent category.
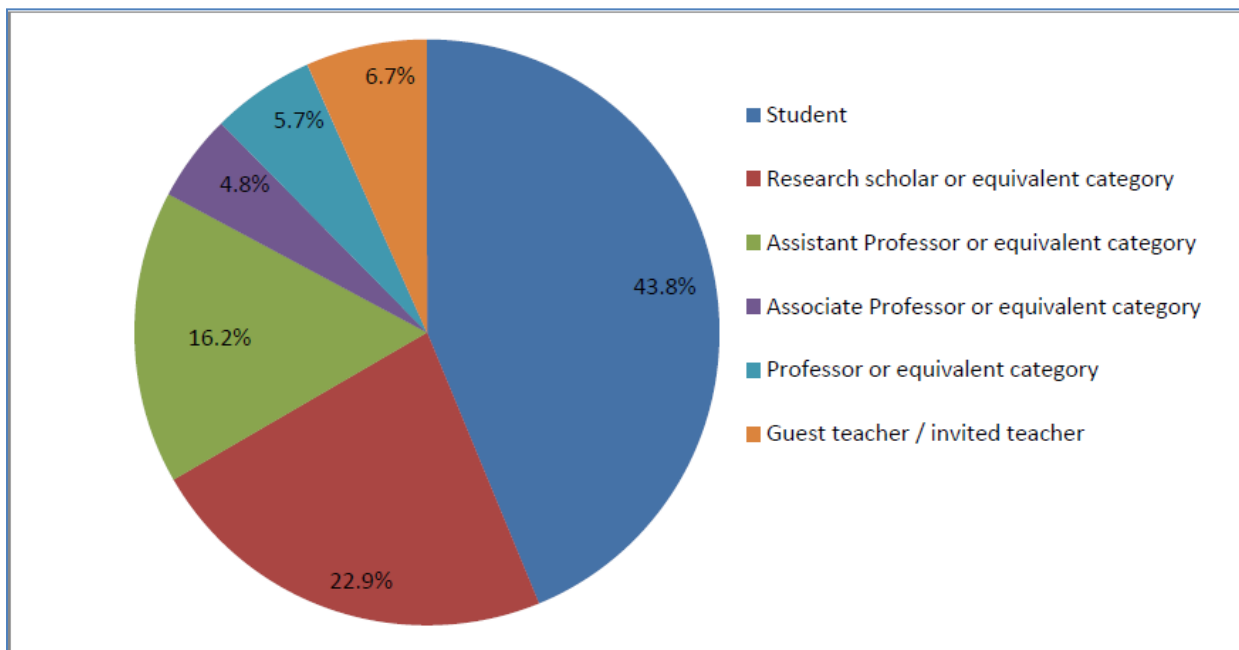

Chart 1: Designation-wise representation of the respondents participated in the survey.

As choosing the appropriate tool/ app ensures a better response to a specific service, the use of appropriate gadgets for the specific array of functions also makes certain the maximum utility of the device. However, due to various constraints, the different sections of the academic community compromise with gadget selection, in terms of its type, features, range of functionality, and so on. Limitations to use appropriate gadgets and lack of awareness about different tools/ apps lead to underutilization of tools/ apps. Interestingly, the survey displays device-wise adoption rates among the academic community featuring the trend of proportionate use of different types of gadgets (Chart 2).
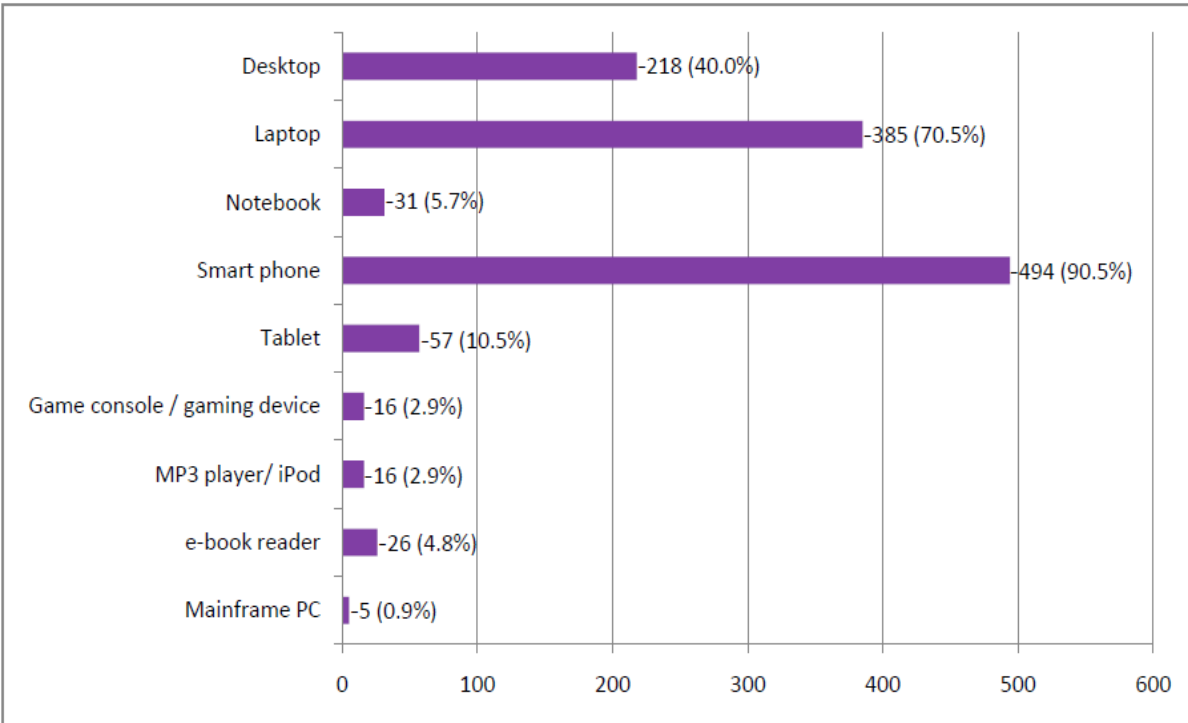
Chart 2 : Extent of adoption of various gadgets by the academic community

Objective-wise data analysis and findings were presented below :

 4.4.1 *Preferred tools in academia:* The gathered data were subjected to percentage analysis to identify the most preferred tools as perceived by the academic community of West Bengal. Table 2 displays the details of tools and those mostly preferred by the academic community. Tools related to common social connections such as Facebook, Twitter, MySpace, Google +, etc., are mostly preferred by the academic community (77%) which signifies common social connections are deeply embedded in the workflow of the academic community for sharing and exchanging information both formal and informal type, keeping in touch with colleagues and fellow researchers and for promoting creative activities. Cross-platform instant messaging tools like WhatsApp, WeChat, Viber, Kik, Tango, Nimbuzz, are preferred by 70% of the respondents to communicate for class and course projects, to stay tuned with news and events relating to workshops, seminars, conferences, and to display researchers' scholarly contribution besides informal communication. Video sharing sites like YouTube, iTunes, Vimeo, Bilibili are preferred mostly by the teachers (65%) to share online demo as a supplement to a class lecture. Video sharing has become the only choice in the Covid pandemic where practical classes are few and far between. Video conferencing apps like Skype, Google Meet, Zoom, Webex, AnyMeeting have been increasingly used (52%) by the academic community, particularly during the forced lockdown, to conduct class lectures, meetings/ conferences, online courses, webinars, even Ph.D. seminars are also being conducted via video conferencing. Among the responses as filtered from the box called 'other tools', the notable were AddOns and PlugIns. Those are especially a kind of code snippet used as a proxied links to off-campus resources. Despite the differential rate of

adoption along the types of tools, teachers, students, and scholars, in general, feel impressed in using online apps and tools as is evident from their trend in responses.

Online Tools	Responses	%
Common social connections (Facebook, Twitter, MySpace, Google+...)	421	77%
Professional social connections (LikedIn, Classroom2.0, Edmodo...)	224	41%
Video sharing (YouTube, iTune, Vimeo, Bilibili, ...)	354	65%
Photo sharing (Flickr, Instagram, Picasa, Pinterest, Photobucket, SmugMug...)	109	20%
Slide sharing (SlideShare, SlideRocket, SlideServe)	140	26%
Social bookmarking (Delicious, StumbleUpon, Digg, CiteULike...)	10	2%
Microblogging (Tumblr, Plurk, Cif2.net...)	10	2%
Geolocation sharing (Foursquare, Whrrl...)	10	2%
Blogging (Blogger, WordPress...)	68	12%
Wikis (Wikipedia, WikiEducator, Wikibooks, WikiMapia...)	234	43%
Event tracker/ meeting scheduler (Google Calendar, Doodle, Timebridge...)	172	32%
Cross-platform instant messaging (WhatsApp, WeChat, Viber, Kik, Tango, Nimbuzz...)	380	70%
Video conferencing (Skype, TeamViewer, AnyMeeting...)	286	52%
Digital publishing platform (issuu, Scribd...)	10	2%
Online survey tool (Google form, SurveyMonkey, eSurveysPro, SurveyGizmo...)	260	48%
Platform for managing and sharing researchers' professional information (Researcher ID, Emerald Research Connections...)	62	11%
Accessing, creating, editing and sharing documents online (Google Docs, Zoho Docs, Dropbox, infoRouter...)	218	40%
User-controlled academic publication database (Google Scholar, CiteSeerX, GetCITED...)	192	35%
Computational & data analysis (Scylab, Jupyter, Metlab, BioSPICE, RStudio...)	43	7%
Statistical analysis (SPSS, JMP, Scilab)	107	19%
Graphical management (Grapher, GNU octave, DataGraph, Grace...)	95	17%
GIS tool (Google Earth Pro, Arc GIS, BatchGio...)	34	6%
Following and sharing research (Academia.edu, ResearchGate, Epernicus, ScienceStage...)	198	36%
Citation managing (RefWorks, Zotero, Mendeley, EndNote...)	52	10%
Other tools	17	3%

Table 2 : Extent of preference of different tools among the academia

4.4.2 *Impact of age on the use of online tools*: There is a sharp demarcation in the use of certain electronic devices and online tools across age groups. Chart 3 shows different age groups participating in the survey. However, for the sake of ease of analysis, different age groups were

merged to obtain two basic clusters of age groups - younger group (<35 years) and elder age group (>35 years). Age group <35 years represents students, majority of research scholars and assistant professors or equivalent category.
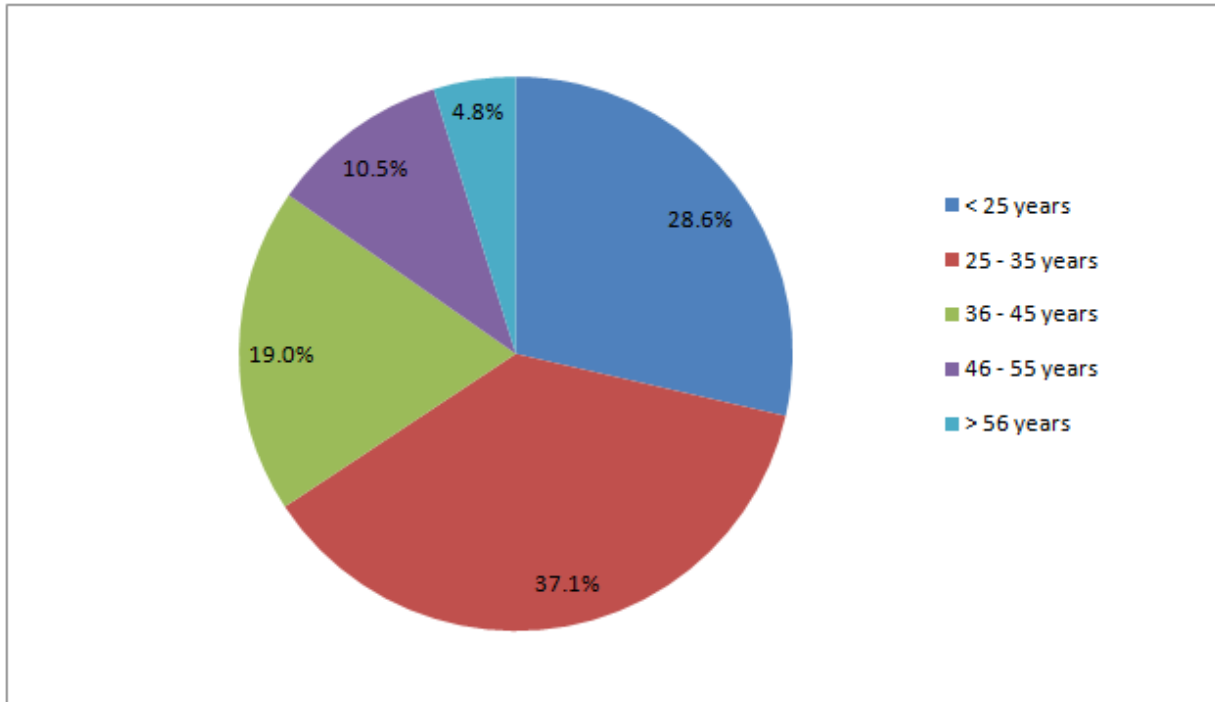

Chart 3 :Different age groups participating in the survey

To investigate the preferential use of electronic devices among the different age groups, it was noticed that the younger age group insightfully favors gaming devices, e-book readers, laptops, smartphones, and tablets (Chart 4).
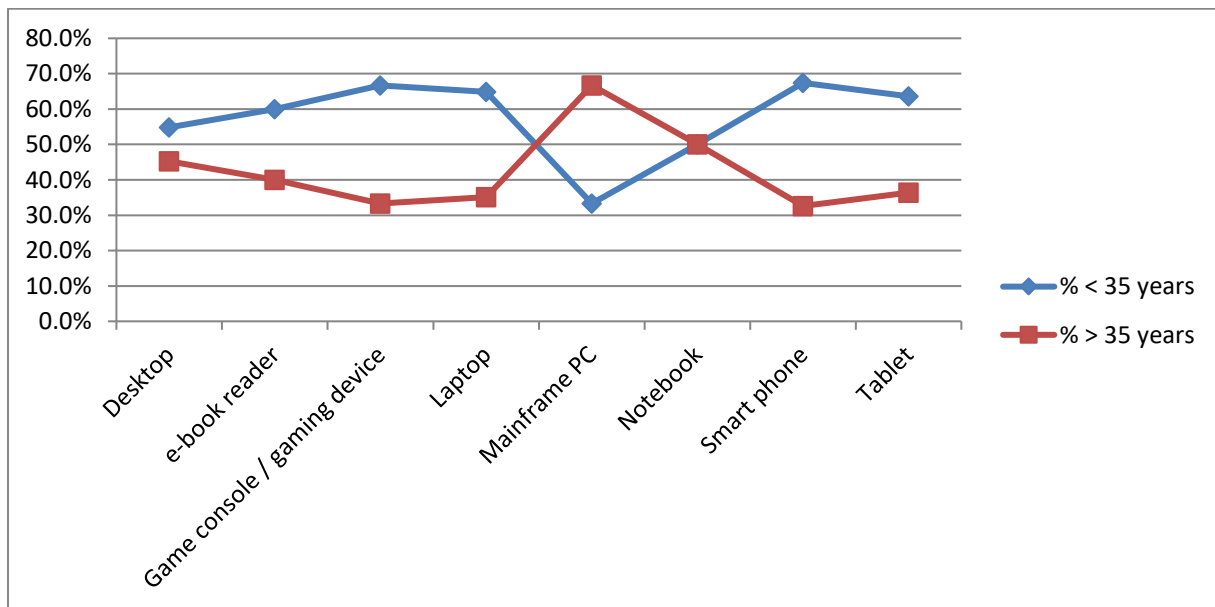
Chart 4 : Differential use of electronic gadgets across younger and elder age groups.

Again, about the use of online tools, it appeared that the younger age group is a strong predictor of diversified use of certain tools, especially blogging, video sharing, and photosharing (Chart 5). While calculating age group-wise adoption of tools, the tools which have <10% adoption rate were excluded to have some noticeable results. Moreover, the tools, having <30% of percentage difference of adoption among the two age groups, were considered equally shared, to have some distinct differences in adoption along age-groups. It is quite obvious that younger generations are more familiar with some upcoming technologies and are inquisitive to get involved with newer applications and feel comfortable with some experimentations. Significantly, professional social connections, video conferencing, slide sharing are favored tools among the elder age groups, indicating role difference perhaps has greater involvement with older age group - preferring professional connections for communication with distant collaborators, video conferencing for online classes and training, slide sharing for online presentation of their research and topic of discussion. On the flip side, age group is a poor predictor for common social connections, cross-platform instant messaging, graphical management, statistical analysis, wikis, etc., since, irrespective of age groups, students, scholars, and teachers favor those tools to be inducted into their workforce for continued academic and research pursuit.
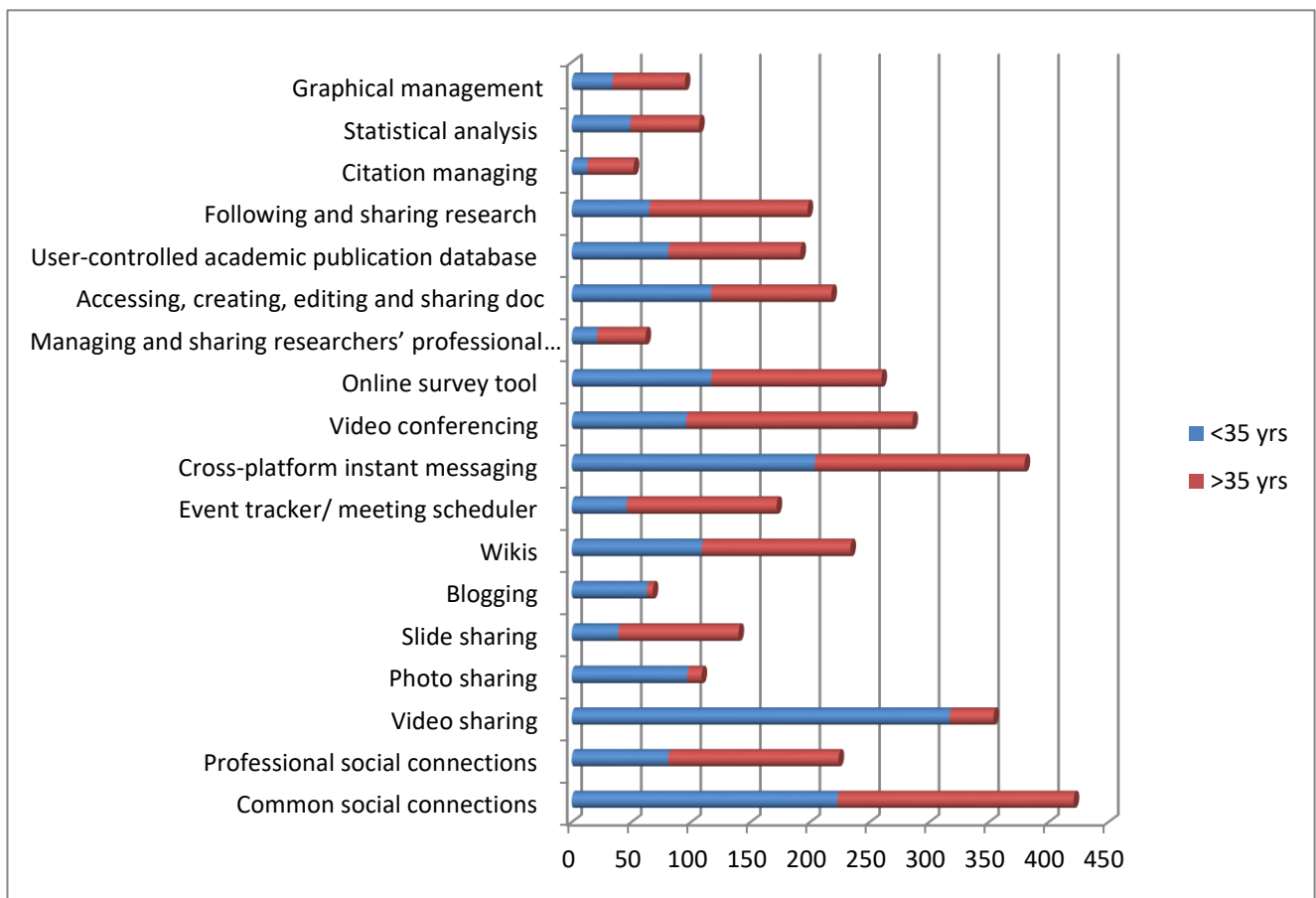
Chart 5 : Age group -wise (<35 years and >35 years) preference of online tools among the academic community

4.4.3. Resources accessibility and academic progression: Ease of use act as a notable determinant of perceived usefulness (Joo and Choi, 2015), and ease of access determines the ease of use (Yoon, 2016). Therefore, ease of access to resources among the academic community increases the chance of enhanced use of resources for academic and research purposes. Hence resources accessibility constitutes a strong predictor for academic progression. While investigating the differential use of open access resources and proprietary resources, the study found that accessibility remains a strong determinant. Chart 6 illustrates that 90.5% respondents argued that they prefer open access resources at home, mainly because of the availability internet facility at home, limited access to paid resources from home and financial constraints to accessing paid resources from own fund. Since the network connection has improved over the years, internet speed in accessing resources from home is not a major constraint now.
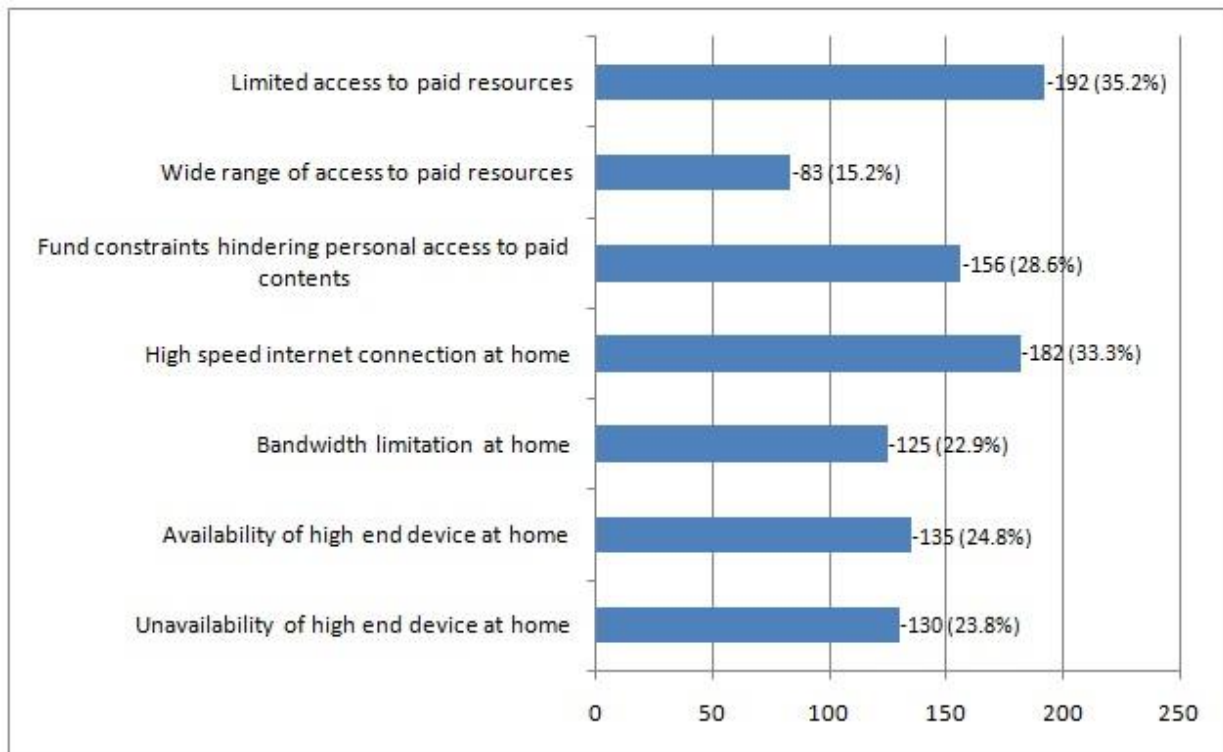

Chart 6 : Resource accessibility from home

On the contrary, the paid resources are the favored choice of the academic community when it comes to comparing resource accessibility from institutions/libraries/information centers, etc (Chart7). Therefore, there seems to be a role difference, with subscribed/perpetual/renewed/on-trial resources are more accessible from on-campus, augmented by the easy availability of paid resources together with high institutional internet bandwidth and lab facilities.
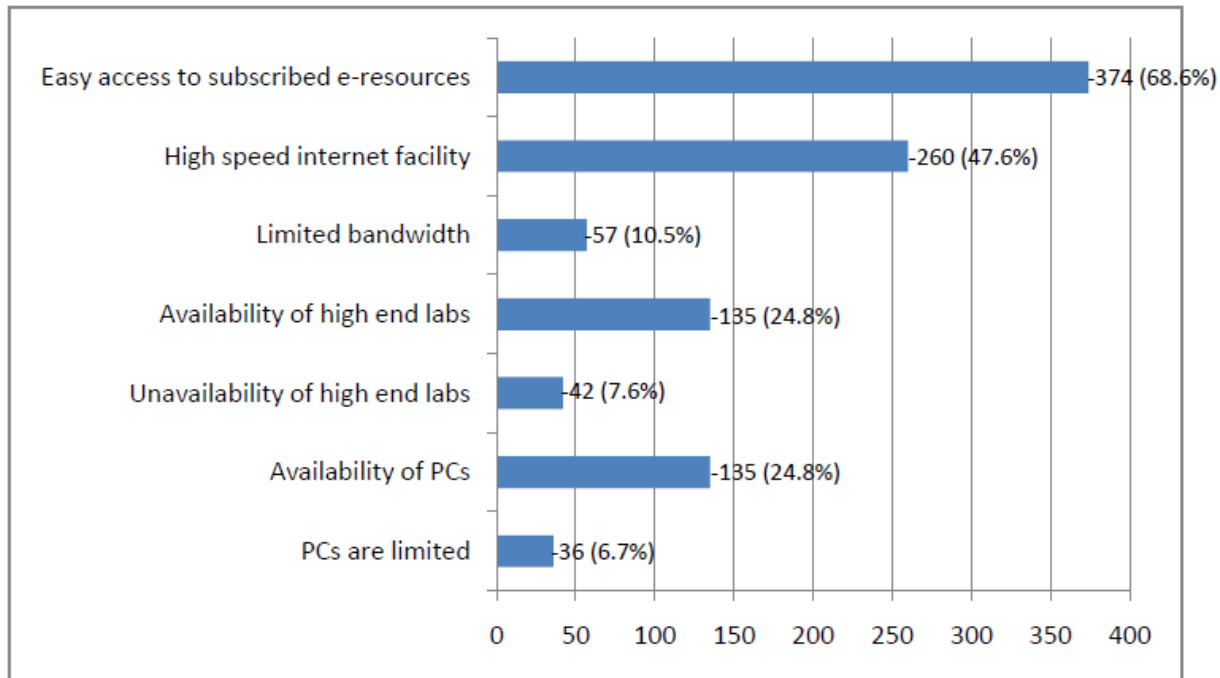
Chart 7 : Resource accessibility from institution

The issues relating to the underutilization of resources, especially the institutionally subscribed/ perpetually accessible resources from outside the institution may be addressed with the adoption of tools with proxied links to paid resources.

4.4.4. Areas requiring improvements to maximize the usability of the tools: The academic community through their responses strongly underpinned that certain areas require major attention for the optimum utilization of tools and apps (Table3). They observed (84%) that lack of formulation of any clear-cut policy on the use of various apps at the university/ institute level, the tools and platforms did not receive due recognition. This has a direct sequel to the lack of adequate promotional or awareness activities by the institutes/ universities to highlight the utility of diverse tools. Consequently, 80% of respondents hinted about that. A sizeable section of respondents (74%) feel that the lack of appropriate electronic gadgets to use various tools and applications may hinder the proper use of resources. Since electronic gadgets, in many instances, have purposive usability, one kind of gadget may not be fit for all-purpose use. For social connection, we may use smartphones, but for Slideshare, we may choose a device with a larger screen, for video streaming the device with a graphics card installed will be much effective, for conferencing a device with a camera is a must. Even smartphones have a diverse range of capacities, features, and supportive abilities that alter the browsing experience of users. A good number of respondents (75%) believe that a lack of positive attitude to use various web-based apps comes in the way of improved use of diverse tools. Users' attitudes may change the better way if they have a clear understanding of the tools and their usefulness. A positive attitude increases the use of tools, resulting in deeper incorporation in the academic sphere. Morony, et al., (2013) long ago, predicted that lack of a positive attitude is related to anxiety and subdued self-efficacy. Yoon (2016) argued that attitude is a strong determinant for the 'intention to use'. Therefore, a better acquaintance with web-based tools increases tool bonding and motivates

users to improved use of resources. Some of the respondents even admitted that they never knew the names and functions of many tools and they feel overwhelmed with the information of free availability of the majority of the applications. Respondents believe that online tools may be used as a source for malware/ spyware (79%) and even involved in infringement to privacy (83.3%). The possible solution to this is to route users to specific tool-based resources/ facilities integrated with the library website through login ID authentication.

Please identify your level of agreement with following statements concerning hurdles in implementing online apps & tools for academic and research progression:	Agree strongly	Agree moderately	Agree slightly	Disagree slightly	Disagree moderately	Disagree strongly
Lack of university/ institute formulated clear-cut policy on the use of various tools	35.0%	29.0%	20.0%	6.0%	5.0%	5.0%
Lack of proper electronic gadgets to use internet	14.8%	31.6%	27.7%	10.9%	7.9%	7.1%
Lack of time to get involved into social sharing sites	16.2%	33.3%	21.0%	12.4%	9.5%	7.6%
Cost of high end connectivity	24.8%	37.1%	14.3%	12.4%	6.7%	4.7%
Lack of technical knowledge	19.0%	25.7%	21.9%	10.5%	14.3%	8.6%
Lack of adequate awareness about the variety of applications	25.6%	29.5%	25.8%	7.6%	6.7%	4.8%
Lack of supportive software and hardware tools	26.8%	27.8%	22.6%	6.2%	7.3%	9.3%
Lack of positive attitude to use various web based apps	25.2%	29.3%	20.2%	10.1%	7.1%	8.1%
Online sites may act as a source for malware/ spyware	25.5%	28.6%	24.5%	10.2%	6.1%	5.1%
Online platforms sometimes involve in Infringement to privacy	33.3%	36.4%	14.1%	7.1%	5.1%	4.0%

Table 3 : Constraints on the adoption of online tools

4.4.5 Usefulness of online apps and tools in academic and research progression: Respondents insightfully feel that online tools and apps have the potential to impact the workflow of the academic and scholarly community (Table 4). Respondents (89%) feel online tools improve their academic endeavors and research skills. Online tools can be used for better searching and discovery, project designing, research designing, data collection, data analysis, referencing, writing, pre-print, post-print, and publication. The academic community (86%) even realize that tools accessible via various social media platforms support research activities. Guidance to use social media properly and the initiative to integrate social media applications with library websites is very vital to harness the potentiality of social media applications for academic and research skill development. Respondents perceive that online tools expand the visibility to their research contribution across the continents (83%); widens the scope of accessibility to other researchers' contribution (84%); and help them keep in touch with like-minded academics/ researchers (85%). Since collaboration in research with the coordination of researchers, institutes, and communities help to solve issues and lead to innovations precisely (Bansal, et al., 2019), a research collaboration among researchers from different fields under different

background has been gaining ground. Giving importance to inter / intra-disciplinary research, 81% of respondents feel the need for research collaboration and they lay credence to the role of different online platforms, especially the social media for building effective networking among like-minded researchers to expand the scope of better skill development and of course, improved access to funding. Online tools sense contents matching one's requirements, create bibliographies and can organize, share and manage research output. Online tools also provide the opportunity to hold forums for discussing the topic of interest. Users can participate in active discussion, upload their content for presentation, carry out group assignments, and so on. The majority of respondents (>80%) feel comfortable with online tools and recognize their ability to a multiplicity of functions. A trend that acknowledges a sharp shift of users' attitude - getting more inclined towards online tools and gadgets which indicates that library websites should have increased accommodation for tools and applications with annotations and guides to using, to remain relevant in the changing circumstance.

Please mark your level of agreement with the following statements pertaining to the usefulness of apps / platforms for academic and research pursuit:						
	Agree strongly	Agree moderately	Agree slightly	Disagree slightly	Disagree moderately	Disagree strongly
Online tools improve my academic endeavours / research skills	53.0%	25.0%	11.0%	2.0%	4.0%	5.0%
Online tools provide necessary support to proceed with academic/ research activity	37.6%	40.5%	7.9%	3.0%	4.0%	6.9%
Various tools for conducting research can be easily accessible from the social networking platform	27.7%	26.7%	23.8%	5.9%	9.9%	6.0%
Online tools help me expand the visibility to my contribution across the continents	40.0%	30.0%	13.0%	5.0%	3.0%	9.0%
Widens the scope of accessibility to other researchers' contribution	38.0%	36.0%	10.0%	4.0%	6.0%	6.0%
Online tools help me keep in touch with like-minded academics/ researchers	47.0%	26.0%	12.0%	3.0%	5.0%	7.0%
Online tools provide me enhanced scope for collaborative research	34.0%	37.0%	10.0%	5.0%	8.0%	6.0%
Online tools offers me a platform for managing my research output	42.0%	25.0%	18.0%	4.0%	6.0%	5.0%
Provides me the opportunity to hold forums for discussing topic of interest	43.0%	26.0%	13.0%	6.0%	5.0%	7.0%

Table : 4 : Perceived usefulness of online apps and tools in academic and research progression

5. Discussion and Conclusion
The above findings pave the way for improved understanding among the academia on the utility of different online tools and their importance in teaching-learning and research. The tools are more pertinent in the Covid pandemic situation when in many countries physical classes have

been replaced by online classes with the provisioning of incorporation of various tools integrated with the library website and course modules for better online coordination. Online tools help remove usual classroom constraints with quicker access to resources and facilities. The categorization of online tools (Table 1) highlights the functional distribution of commonly used resources and their area of applicability.

One of the most vital issues identified by the respondents, impeding the implementation of online apps and tools for academic and research progression, is the lack of university/ institute formulated a clear-cut policy on the use of various tools. The majority of the respondents viewed that adequate awareness among the academia about the variety of applications is also an impediment to the proper use of various tools. Lack of proper awareness also made some respondents believe that online tools may infringe their privacy and may send malware instead. Lack of technical support, proper gadgets, high-speed connection, and overall lack of clear-cut ideas about the utility of various online tools have deterred the academic community from developing a positive attitude towards fuller utilization of available tools and apps. Since usefulness, interaction, and ease of use influence user attitude (Yoon, 2016) towards improved usability, interaction with various online tools may be facilitated with awareness building and ease of use may be augmented with the integration of tools to the library website at a suitable location with better visibility. For a better understanding of the constraints on the adoption and usefulness of tools, a schematic diagram has been presented (Figure 1).
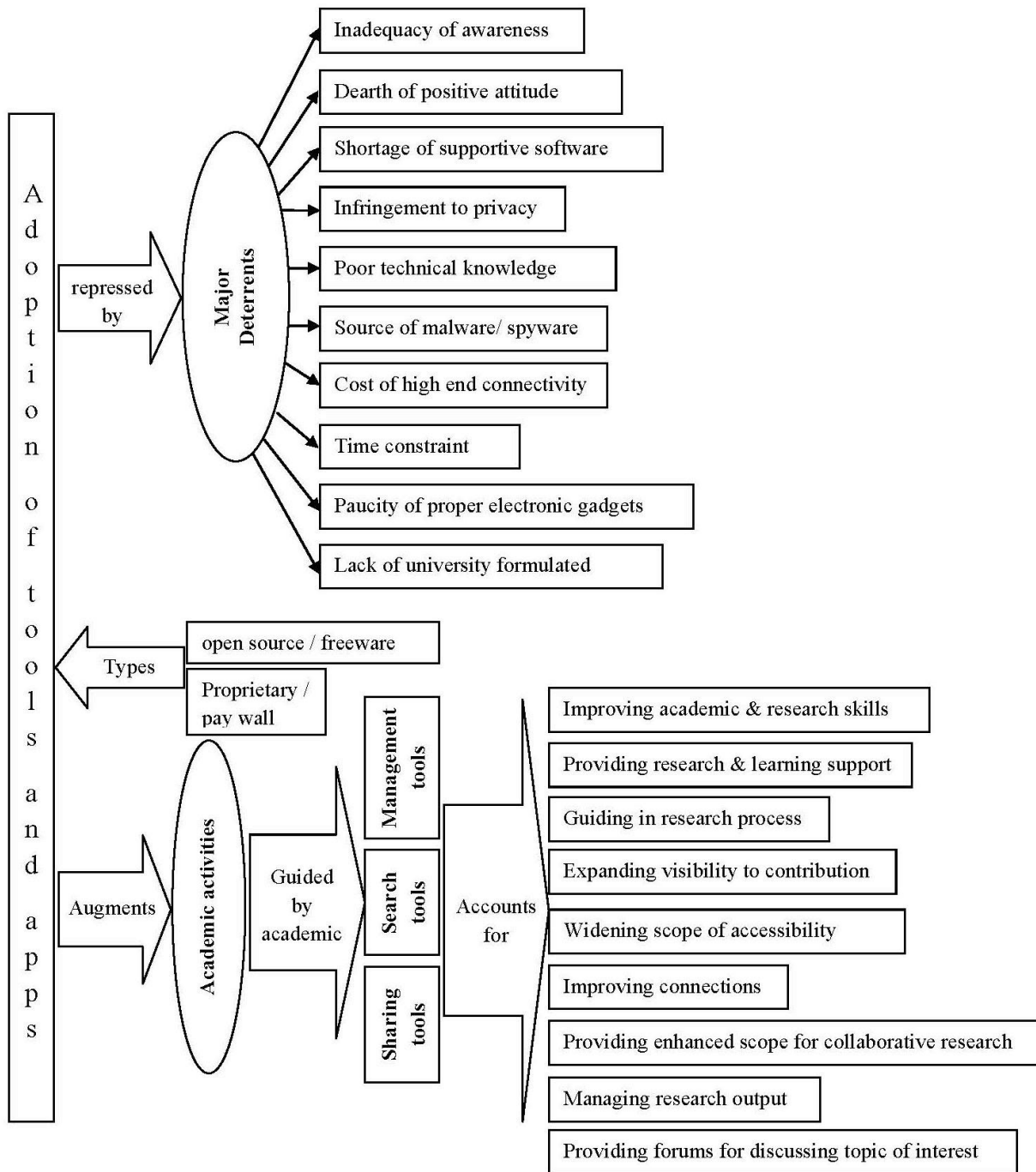
Figure 1 : Schematic diagram depicting common constraints on implementation and possible benefits of adoption.

Some online tools have already been adopted by various institutes, consequently, those tools got integrated with the library website. However, the majority of the tools are either never used or least used by individual users, primarily because of a lack of awareness among users over their usability. The role of the higher education department in framing a guideline for the use of online tools and applications may facilitate the use of select tools in higher education institutes. Universities also need to frame their policy based on higher education guidelines to suit their

local needs. Accordingly, university and college library websites may incorporate various tools according to their needs and promote their proper use via various awareness campaigns like notification, user guides, online training, and workshop. To protect user privacy for select tools, basically that proprietary in nature, library websites may introduce some kinds of authentication mechanisms and implement blockchain/ bit-coin technology wherever needed. Online tools underpin value proposition within an institution and beyond and impact on social dynamics with improved inter-personal bonding among the co-researchers and strengthen trust-building in a collaborative setting.

The research provides an overview of various online tools and apps, facilitating academic and research progression and makes an attempt to convince librarians towards an informed selection of tools, and highlights the utility of these tools among the academic community. The above study will help to design a library website with the integration of various tools and apps, supported by required annotations and guides for proper use for academic and research purposes. To have fuller utilization of institutionally paid resources, the library website may also additionally integrate tools with proxied links to resources, such as library toolbar, AddOns, PlugIns, Proxy Bookmarklet, etc. The initiative will augment on-campus access as well as off-campus access via user authentication, helping users quicker approach resources. Future studies may be extended to the academic community of broader geographical areas to gauge the perception of the population at a wider range that will help to generalize the findings in a more precise way. Since the study was not framed for subject-wise analysis, further research may underpin subject-wise user perceptions and place a comparative picture on the differential rate of adoption of tools among the academic community along the major disciplines, multidisciplinary areas as well as the interdisciplinary sphere.

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