**Library Progress International**
*Vol.44 No. 3, Jul-Dec 2024: P.9330-9343*

*Print version ISSN 0970 1052*
*Online version ISSN 2320 317X*

*Original Article*

*Available online at www.bpasjournals.com*

# Collaborative Platforms for Research Support in Academic Libraries

**Dr. K.Priya[1], Dr. P.Jyothi[2], Dr. V Mohana Sundari[3], Raghavendra Prasad H D[4] , Megha Jagga[5], Dr. Anjana R. Bunkar[6]**

[1]Associate Professor, Department of MBA, SRM Institute of Science and technology, Ramapurampriyak1@srmist.edu.in

[2]Associate Professor, Department of Management Studies, Saveetha Engineering College, Tamilnadu, India,jyothip@saveetha.ac.in

[3]Assistant Professor, College of Management, SRM Institute of Science and Technology, India, mohanas1@srmist.edu.in

[4]Assistant Professor, Department of Civil Engineering, Faculty of Engineering and Technology, JAIN (Deemed-to-be University), Ramnagar District, Karnataka - 562112, India p.raghavendra@jainuniversity.ac.in, Orcid Id- 0000-0003-1210-3480

[5]Centre of Research Impact and Outcome, Chitkara University, Rajpura- 140417, Punjab, India. megha.jagga.orp@chitkara.edu.in,https://orcid.org/0009-0003-4292-7576

[6]Assistant Professor , Parul Institute of Library & Information Science, Parul University, Vadodara, Gujarat, India, anjana.bunkar@paruluniversity.ac.in,Orcid Id- 0000-0002-0463-6589

**How to cite this article:** K.Priya, P.Jyothi, V Mohana Sundari, Raghavendra Prasad H D , Megha Jagga, Anjana R. Bunkar ( 2024) Sustainable Practices in Managing University Library Resources. *Library Progress International,* 44(3), 9330—9343.

**Abstract**

The change in academic libraries over the years has meant that new ways of helping with study in higher education schools are needed. This essay looks at how joint tools meant to improve research help in university libraries are used and what effects they have. Because there are so many digital tools available and study is getting more complicated, university libraries are changing what they do to offer more integrated and all-around help. Researchers, libraries, and other stakeholders can easily communicate with each other through joint platforms. This creates a setting that is good for working together on research projects and sharing information. Digital files, research data management systems, and virtual research settings are some of the joint tools used in university libraries that are looked at in this study. It talks about the tools and features of these platforms that help research processes run smoothly. For example, it talks about the tools for real-time contact, changing documents together, and sharing data. A mixed-methods approach is used in the study to find out how useful these platforms are. It includes both quantitative polls and qualitative conversations with libraries and students. Key results show that joint platforms greatly increase the output of research by making it easier to access resources, encouraging teamwork across disciplines, and enhancing the way data is managed. Researchers said that doing book studies, data analysis, and writing manuscripts became more efficient. Librarians stressed that the platforms play a big part in offering personalized support services like research help, data editing, and training classes. In addition, the sites help students feel like they are part of a group by allowing them to share their knowledge and find teachers. Problems that come with using joint platforms are also talked about. These include technology issues, worries about data safety, and the need for users to get ongoing training and help. To make sure these platforms are successful and last for a long time, the study stresses how important it is for institutions to keep working on them and making them better.

**Keywords:** Collaborative Platforms, Research Support, Academic Libraries, Knowledge Sharing, Digital Repositories.

## I. INTRODUCTION

These days, university libraries are going through a big change because digital tools are getting better and better quickly and the needs of researchers are changing. Academic libraries have always been the most important educational tools because they give students access to books, papers, and other materials they need for school. The digital age, on the other hand, has made it necessary to rethink their role. Libraries are not only places where you can find information; they are also getting involved in the study process by providing many services that help and improve academic activities. The adoption of joint tools, which make study help more efficient and effective, is at the heart of this change. Academic libraries have collaborative platforms that are made up of many different digital tools and systems that are meant to make research easier, encourage teamwork between different fields, and improve the whole research experience. Digital libraries, research data management systems, virtual research settings, and communication tools that let academics, teachers, and other users talk to each other in real time are all examples of these platforms. These tools becoming part of the library environment is part of a larger trend in higher education toward more cooperation and using technology to solve hard study problems [1]. One of the main reasons why joint platforms are becoming more popular is that modern research is getting more complicated and diverse. Researchers often have to sort through huge amounts of data, keep track of big sets of data, and work together with others from different fields and places. Even though the old ways of helping with study are still useful, they aren't enough to meet these needs. These problems can be solved by joint platforms, which offer tools that make it easier to share data, write together, and handle projects. This makes research more efficient and productive. Digital libraries, for example, are central places where scholars can store and access many types of educational materials, such as papers, maps, and video resources. These libraries not only keep study materials safe and easy to find, but they also support open access, which makes it easier for researchers to share their results with more people. On the other hand, research data management platforms set up the tools needed to organize, store, and share research data, as illustrate in figure 1. More and more study is being done using data, which makes these tools even more important.

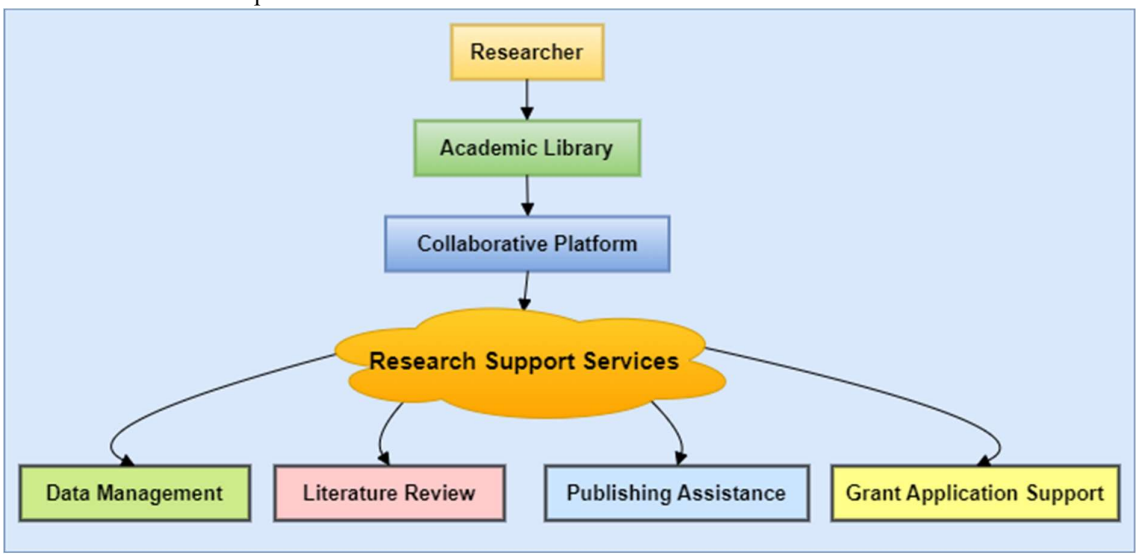


Figure 1: Illustrating collaborative platforms for research support in academic libraries

Another important part of joint tools is virtual study environments (VREs). VREs have unified work areas that help with different steps of the research process, from gathering and analyzing data to publishing and sharing the results [2]. These settings are made to be adaptable and changeable so that experts can make them fit their needs. Researchers can work together easily, no matter where they are, thanks to features like version control, joint document writing, and real-time contact tools. This is especially helpful for big research projects that involve many institutions and need teams from different backgrounds to work together. The fact that university libraries are now using joint tools shows how librarians' jobs are changing. Now that librarians aren't just doing standard jobs like filing and circulation, they are also becoming important parts of study teams. They help researchers find their way around the complicated digital world by sharing their knowledge in areas like data management, information standards, and digital protection. Also, libraries are very important because they teach and help students use joint platforms so that they can improve their work. Even though shared tools have many perks, they

are not always easy to use. Technical problems, like making sure that different systems work together and that strong security measures are in place, can make it harder to seamlessly add these platforms to the library's infrastructure [3]. Concerns about data protection are also very important, especially when working with private or personal data.

## II. BACKGROUND

Since the digital shift, college libraries' jobs have changed a lot. They now have to help researchers in new ways, which can be both easier and harder. In the past, college libraries were the main places where educational resources were kept. They had a lot of books, papers, and archive materials. The internet and other digital technologies have changed the focus from real collections to digital tools and services [4]. This has made libraries rethink how they help students. The rise of collaboration tools is a big change that has happened during this shift. These tools are made to make different parts of research easier, such as managing data, writing together, sharing resources, and talking to each other. These tools are becoming more popular because research is getting more complicated. It often involves people from different fields working together, managing a lot of data, and getting the results out to as many people as possible quickly. These needs are met by collaborative platforms, which create a unified space where experts can get tools and materials that are specifically designed for their needs. One important part of joint tools in university libraries is digital files.

They store a lot of different types of research work in one place, making it easy to find and keep safe. This includes papers, theses, datasets, and video material. By supporting open access, digital libraries raise the profile and importance of research, making it easier for academics to work together and share their knowledge. These libraries are also very important for keeping academic work safe and making sure that future generations will be able to access it. Another important part of joint platforms is research data management (RDM) tools. Data-driven study is becoming more and more important, so it's important to handle data well. RDM tools make it possible to organize, store, and share research data in a way that is compliant with data security laws and the needs of funding agencies [5]. These tools help researchers keep track of their data at all stages of the research process, from gathering and analyzing data to publishing and storing it. Virtual research environments (VREs) make it even easier for people to work together in university libraries.

Table 1: Summary of Related Work

| Application | Key Finding | Challenges | Scope |
|---|---|---|---|
| Research Data Management | Enhances organization and sharing of research data | Data privacy concerns, training needs | Broad adoption across disciplines, long-term data preservation |
| Collaborative Writing Tools | Improves efficiency in joint manuscript preparation | Version control, user interface complexity | Wide applicability in academic publishing and research collaboration |
| Virtual Research Environments | Facilitates remote collaboration and resource sharing | Technical infrastructure, user adoption | Expansion to support multidisciplinary projects |
| Digital Repositories | Increases visibility and accessibility of research outputs | Metadata standardization, platform interoperability | Integration with global repository networks |
| Online Discussion Forums [6] | Encourages knowledge exchange and peer support | Moderation and quality control, user engagement | Potential for fostering vibrant research communities |
| Bibliographic Management Software | Simplifies citation management and literature review processes | Software compatibility, data migration issues | Usability improvements, support for diverse citation styles |
| Research Networking Platforms | Expands professional connections and collaboration opportunities | Privacy concerns, managing large networks | Enhanced features for interdisciplinary networking |
| Project Management Tools | Streamlines research project planning and task coordination | User learning curve, customization requirements | Adaptation for various research methodologies |
| Institutional Repositories | Promotes institutional research output and compliance with open access | Copyright and intellectual property issues | Alignment with open access policies and institutional mandates |

| | | | |
|---|---|---|---|
| | mandates | | |
| Collaborative Annotation Tools [7] | Enhances collaborative literature review and data annotation | Integration with existing workflows, usability issues | Development of cross-platform solutions |
| Virtual Labs and Simulations | Supports remote experimentation and simulation-based research | High setup costs, technical support requirements | Expansion to cover a wider range of experimental disciplines |
| Data Visualization Platforms | Facilitates the interpretation and presentation of complex research data | Technical proficiency, integration with data sources | Increased use in data-driven research areas, training for effective use |

## III. METHODOLOGY

### A. Evolution of academic libraries in supporting research

There have been big changes in how academic libraries support study over the years, caused by new technologies and shifting academic needs. In the past, college libraries were places where books, papers, and other educational materials could be found. Researchers used these collections a lot for their work, and library staff spent most of their time organizing and handling real things. The library's main job was to give people access to materials, but it didn't get too involved in the study itself [8]. As the digital age began, university libraries started to change their services and systems to keep up with the needs of a study setting that was more connected and data-driven. The first big change came with the creation of digital libraries and databases in the late 20th century. These made it easier for students to find and use materials. Adding e-books, electronic papers, and internet databases to libraries' digital collections made it possible for people to access a lot of information that was only available in person. As the internet changed, so did the way people did study. It became more collaborative and cross-disciplinary [9]. In response, academic libraries created and began using interactive platforms that allow users to talk to each other in real time, share data, and work together on research projects. Digital storage and research data management systems came about, which let libraries help with all stages of research, from gathering data to sharing it widely and keeping it safe. These tools not only make study easier, but they also support open access, which makes scientific work more visible and has a bigger effect. Along with these changes in technology, the job of libraries has also changed.

### B. Role of collaborative platforms in research support

Collaborative tools are now an important part of modern research, and they have completely changed how research is done, controlled, and shared. These platforms offer a set of digital tools that are meant to make different parts of the research process easier. This lets researchers work together and more quickly. The fact that they are now part of university libraries shows how the study setting is changing to be more linked and data-driven. One main job of joint platforms is to make it easier for researchers to talk to each other and work together.

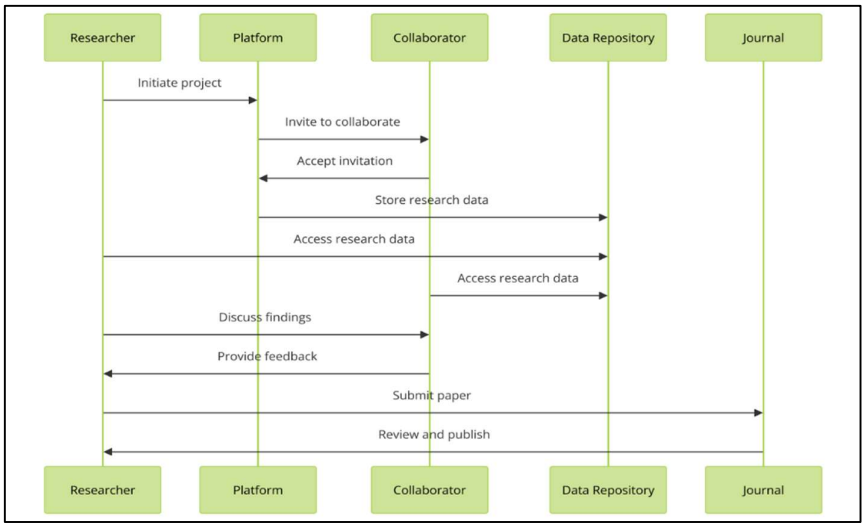


Figure 2: Illustrating the role of collaborative platforms in research support

These platforms, as illustrate in figure 2, offer real-time contact tools, like instant messaging, videoconferencing,

and changing documents together, that make it easy for experts to work together, no matter where they are located. This is especially helpful for projects that involve more than one field of study or school and need teams from different backgrounds to work together. These tools help to speed up research timelines and improve the quality of results by letting people work together in real time. Collaborative tools are very important for managing study data as well as making it easier for people to talk to each other [10]. They provide a strong framework for managing, saving, and exchanging research data, making sure that it is well taken care of throughout the entire research lifetime. Version control, information tagging, and safe access controls are some of the features that help academics keep the security of their data and follow data protection laws. These platforms also support open access, which makes it easier for researchers to share their data and results with the rest of the academic community. This makes their work more visible and has a bigger effect.

### C. Case studies and examples of successful implementation

Several important case studies show how joint platforms can be successfully implemented in academic libraries, showing how they can completely change the way research is supported. The eScholarship tool at the University of California is one example of this. The exposure and availability to research done across the UC system have been greatly improved by this digital archive and publishing tool. eScholarship supports open access ideas and encourages students to work together more by giving them a central place to store and share their work. The platform has tools like real-time data that help researchers see how their writings are affecting people. This leads to the smarter and more planned sharing of research results. Another good example is the Apollo Repository at the University of Cambridge. As a digital library for study data, theses, and articles, this tool is very useful. Its strong infrastructure supports good data management practices, such as keeping data safe, tagging information, and following the rules set by funding agencies for sharing data. Apollo's ability to work with other systems at institutions has simplified the research process, making it easier for researchers to store and organize their data [11]. The success of the platform is further enhanced by the active role of libraries, who offer ongoing training and help to make sure that students can fully utilize the platform's features. The Bodleian Libraries at the University of Oxford have also shown how to use joint tools well by using ORA (Oxford University Research Archive). ORA makes the university's research results easy to find and use in a single place, allowing both open access and long-term protection. The platform's connection to the university's research management system makes it easier to move and handle data, which makes administration easier and research more efficient. The Bodleian Libraries have also set up strong support services, such as classes and one-on-one talks, to help academics deal with the complicated issues of digital law and management.

## IV. THEORETICAL FRAMEWORK

### A. Conceptual underpinnings of collaborative platforms

The ideas behind joint tools in university libraries come from the ideas of open access, sharing information, and making study more efficient. At their core, these tools are meant to make it easier for academics, libraries, and other partners to share information and work together. This is made possible by combining digital tools that help with collaboration, data management, and communication. The idea of sharing information is one of the main ideas behind the growth of joint platforms. Ideas, facts, and results should be shared and talked about in academic study. Collaborative platforms make this sharing possible by removing the obstacles that used to make it hard to communicate and work together. These tools make the study community more active and linked by letting people talk to each other in real time and share resources [13]. Another important idea that supports joint platforms is open access. More openness, repeatability, and effect in scientific research are all goals that are in line with the drive toward making research results freely available to the public. Digital repositories and open access papers are often part of collaborative platforms. This makes sure that research results are widely available. This sharing of information is good for everyone, not just academics. It's good for the public, lawmakers, and other people who use study to make decisions [14]. A big part of designing joint platforms is making sure that study processes are as efficient as possible. These tools are made to make different parts of research easier, like gathering data and analyzing it, as well as writing and publishing the results. Collaborative platforms make it easier to handle research activities by combining many tools and resources into one setting that works well together. Version control, joint writing, and automatic data management are some of the features that help researchers focus more on their main tasks.

**B. Theoretical models for analyzing collaboration in academic settings**

Examining teamwork in school requires a number of theory models that help us understand how and why people work together and what the results are. Sociology, psychology, and organizational theory are some of the fields that these models use to explain how people and groups work together, share information, and reach their goals. The Social Network Theory (SNT) is a well-known model that looks at how people in a network are connected to each other. SNT can be used to look at how experts share knowledge, connect with each other, and have an effect on each other in scholarly settings. This model shows how important network density, centrality, and the power of ties are for working together well. Researchers can find important influences, possible partnerships, and information flow hurdles by making a picture of these networks [15]. One more important concept is Communities of Practice (CoP), which was created by Etienne Wenger. CoP is all about how people who share an interest or skill can learn from each other as a group. CoP can be used to look at how teachers and students come to agree on things like routines, information, and ways of doing things. This model stresses how important social relationships and shared experiences are for encouraging people to work together to learn and come up with new ideas. The Theory of Organizational Learning, especially the work of Argyris and Schön, helps us understand how groups learn and change by working together. This idea tells the difference between single-loop learning (which means making changes based on input) and double-loop learning (which means rethinking assumptions and tactics). In the setting of university libraries, this model can help look at how shared platforms help with both types of learning, which leads to better study support services all the time. The sociocultural theory of Vygotsky is often linked to the collaborative learning theory, which stresses how important social relationships are in the learning process.

**C. Relevance of collaborative theories to research support in libraries**

Collaborative theories have a lot to do with research help in libraries because they show how working together can make research efforts more effective and efficient. With these ideas as guides, you can better understand how people work together and share information, as well as how they solve problems as a group. Social Network Theory (SNT) is especially useful for helping people with their library study. SNT helps find important information hubs and connections in a network by looking at the structure of the interactions between academics, libraries, and other stakeholders. With this knowledge, libraries can make it easier for people to talk to each other and work together, making sure that the people who need important tools and skills can get them. For example, tracking academic social networks can show which experts are important and which groups of people work together a lot. This lets libraries change the way they help people to better connect with each other [16]. Communities of Practice (CoP) theory stresses how important it is for groups to share methods and learn from each other. When it comes to libraries, CoP can be used to build groups of students and educators who work together often. This way of doing things encourages people to keep learning and share what they know. Librarians not only provide tools, but they also take part in the study process. Libraries can help students learn new skills, stay up to date on best practices, and use the combined knowledge of these groups to solve hard problems by supporting them. The idea of corporate learning stresses the importance of learning at both the individual and the group levels. Libraries that use this theory can focus on making spaces that encourage double-loop learning, in which the basic ideas and methods are always being checked for errors and made better [17]. This makes study support services more creative and flexible, so they can meet the changing needs of the academic community. Collaborative Learning Theory shows how important it is for students to talk to each other and work together to solve problems. Libraries can use this idea by setting up classes, lectures, and peer training programs where people can work together to learn. These programs urge researchers to share their knowledge and skills, which makes the study that comes out of them better and more varied, shown in figure 3.

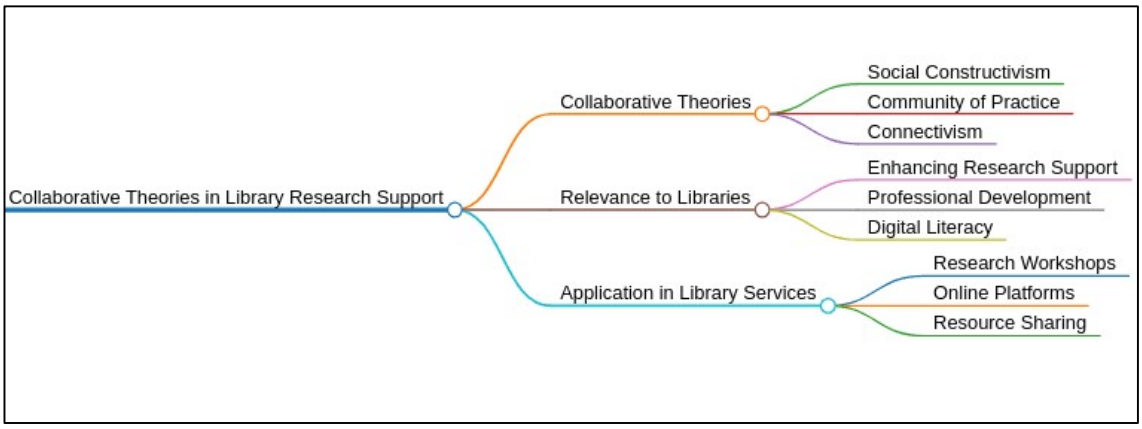


Figure 3: Relevance of collaborative theories to research support in libraries

Activity Theory gives us a complete way to look at how joint platforms and tools affect study activities. Libraries can create and use joint platforms that support research processes and boost productivity by learning how scholars, tools, and the community as a whole interact with each other.

## V. DESIGN APPROACH

### A. Research design

#### 1. Qualitative, quantitative, or mixed methods approach

Choosing the right research plan is very important for answering research questions and meeting study goals. You can use qualitative, quantitative, or a mix of the two ways depending on the study problem, the data you need, and the results you want. Qualitative research looks into things by collecting thorough data that is full of background. This method works really well for getting deep understanding of complicated social processes, hearing what players have to say, and learning about people's behavior and experiences [18]. Interviews, focus groups, and oral studies are some of the most common ways that qualitative research is done. For example, when looking into how joint platforms are used in academic libraries, qualitative research can help us understand the difficulties librarians and students faced and the outside factors that affected how well these platforms worked. One of the best things about qualitative research is that it can find rich, thorough data that can show deeper meanings and trends. The opposite of qualitative research is quantitative research, which uses numbers to find trends, test theories, and make predictions. This method works for studies that need factors that can be measured and statistical analysis to find connections or causes.

Quantitative methods often include polls, tests, and looking at old data. For instance, to find out how joint platforms affect research output, a quantitative method could include polls that ask about usage frequency, publication rates, and user happiness. This would be followed by statistical analysis to find connections and factors that cause them. The best thing about quantitative research is that it can give data that can be applied to other situations and show statistical significance. Mixed methods research takes the best parts of both qualitative and quantitative research and uses them together. This plan works well when you need both number data and relevant information to fully understand a study problem. It's possible for mixed methods to be sequential, where one type of data collection comes after the other, or parallel, where both types are collected at the same time. In academic libraries, a mixed methods approach might include quantitative polls to find out how joint platforms affect research output generally, along with qualitative conversations to get a deeper look at users' experiences and thoughts [19]. This all-around method lets you use three different sets of data to get a fuller and more complete picture of the study problem.

#### 2. Justification for the chosen approach

Choosing the right research method is one of the most important parts of any study. A mixed methods technique is especially appropriate for looking into how joint platforms are used and what effects they have in academic libraries. This choice takes advantage of the best parts of both qualitative and quantitative research methods, giving us a full picture of the research problem. A diverse method is needed to study joint platforms because they involve both people's experiences and results that can be measured. To get measured information about how these tools are used, how well they work, and what effects they have, you need to use quantitative methods. For example, polls can be used to find out how often something is used, how happy users are with it, and how productive researchers are [20]. By looking at this data statistically, we can find patterns, connections, and trends that give

us a good idea of how these platforms are being used and how well they help with study. However, numeric numbers alone can't show how the people who use these tools every day—librarians and researchers—feel and what they think. Qualitative methods fill in this gap by giving us deep, rich information about these events. Researchers can find out what people think about the problems, rewards, and factors that affect them by using interviews, focus groups, and observational studies. This qualitative data helps us figure out why the numeric results are what they are. It gives us a fuller, deeper picture of the study situation [21]. A mixed methods plan combines both approaches so that results from different methods can be cross-validated and confirmed. This is called triangulation. The truth and trustworthiness of the study results are improved by this. For instance, if numeric data shows that users are very satisfied with joint platforms, qualitative conversations can help show what specific features of these platforms make users so happy.

**B. Sampling techniques**

**1. Selection criteria for academic libraries**

To make sure that study results are accurate and trustworthy, academic libraries must use the right sample methods and selection criteria. A clear selection method helps to get representative and varied data when looking into how collaborative platforms are used and their effects. This is because different libraries have different situations and experiences [22]. Academic libraries should use a selection process based on a number of important factors to make sure they get a representative group. The first thing to think about is the size and type of the library. This includes picking libraries from big universities that do a lot of study, medium-sized schools, and small colleges. These differences show the range of resources, users, and administrative goals that can affect how joint platforms are adopted and used. Another important factor is how spread out the libraries are geographically. When you include libraries from different countries and areas, you can take into account differences in technology, funds, and culture that can affect how joint platforms are set up and used. This regional spread can help us understand both global trends and the problems and benefits that are unique to each area. Another important factor in the decision process is how advanced the library's technology is. Libraries with different types of digital infrastructure should be included, from those with fully integrated, advanced digital systems to those that are just starting to use technology. This helps us understand how different steps of adopting technology change how well and how hard joint platforms work. Another important factor is the library's users' age, gender, and study interests. Libraries that serve a wide range of academic fields and user groups (including students, teachers, and researchers) give us a better idea of how joint tools can be used to meet different study needs [23]. There are good programs in STEM, the arts, the social sciences, and career studies at these locations. One more thing that can be used to choose candidates is their knowledge with joint tools. Including libraries with a lot of experience along with libraries that are just starting to use these platforms can give a range of views, from the problems that come up during the initial introduction phase to the long-term effects and best practices.

**2. Criteria for selecting collaborative platforms**

Academic libraries need to carefully consider a lot of factors when choosing the right joint tools to help with research. These factors make sure that the tools picked meet the needs of both academics and libraries, making it easier for them to work together and increasing the output of research. User-friendliness and accessibility are the most important things to think about. The app should have an easy-to-use design that even people who aren't very tech-savvy can figure out quickly. Accessibility features, like working with a range of devices and meeting accessibility standards, make sure that everyone, even people with disabilities, can use the app easily. This factor makes sure that a lot of people use it and shortens the learning curve for new users. Fitting in It is very important that library systems and tools can do what they need to do. The platform should work well with digital libraries, study management systems, and other tools that people already use to work together. This openness speeds up work, cuts down on duplication, and makes sure that users can get to all the tools they need in a single space. Scalability and flexibility are important so that different school libraries and research groups can get what they need.

It is recommended that the platform be able to handle more people and data as study efforts grow. For added convenience, it should be adaptable enough to be changed to fit the needs of various study areas and group projects. Because study data is so private, data security and privacy are very important. The app needs to have strong security features, like encrypting data, controlling who can access it, and following data protection laws. Making sure that data is private and safe helps users trust you and keeps important study results safe from breaches and illegal access. Support and training from the platform source are very important for setting up and using the

platform correctly. Comprehensive training documents, user support services, and regular changes make sure that users can make the most of the platform's features. Users can stay up to date on new features and best practices with the help of quick support and regular training. There are also important issues of cost and licensing to think about. The platform should offer an option that is both affordable and within the library's budget.

## VI. FINDINGS

### A. Overview of participating academic libraries

A wide range of college libraries are part of the study. Each one brings something special to the table that makes the research on joint platforms better. These libraries are different in terms of size, location, technology, and the types of people who use them. This gives us a full picture of how shared platforms are set up and used in different situations.

- Large Universities That Do A Lot of Research: The study includes libraries from big universities that do a lot of research. These kinds of schools are usually the first to use new technologies and teamwork tools. With a wide range of digital tools and specialized services, these libraries serve large academic groups with a wide range of study needs. Their involvement gives us a better understanding of the pros and cons of putting together joint platforms in places that are very active and have a lot of resources.
- Libraries from Mid-Sized Institutions: The study also looks at libraries from mid-sized institutions that do both teaching and research. When it comes to allocating resources and adopting new technologies, these libraries often face unique problems. Learning from their experiences is a good way to figure out how to use shared platforms well with limited resources. They are in the middle and give a more detailed view of how scalable and adaptable these systems are.
- Small and Community Colleges: Including libraries from community colleges and small colleges makes sure that the study covers the stories of places with few resources and fewer users. These libraries usually focus on helping college students and getting involved in the community. They offer a unique view on how joint platforms can improve study support in places with fewer resources.
- Geographical Diversity: The study covers libraries from a wide range of places, such as cities, suburbs, and country areas. This variety helps to find out what factors are unique to each area and affect how well and how often joint platforms are used. These factors might include the internet infrastructure, the amount of funds available, and the academic goals of that region.

### B. Description of collaborative platforms utilized

The study looks at a number of joint tools that university libraries use to help with research. These tools are meant to make it easier for researchers to share resources, handle their data, and talk to each other. This will make the study setting more connected and effective. Digital libraries are central locations where researchers can store, view, and share many types of academic works, such as theses, dissertations, papers, and video files. Institutional libraries like DSpace and ePrints are good examples because they support open access and keep academic work safe for a long time. These sites make it easy to find and share study results, which increases their exposure and effect. It is important to have research data management (RDM) tools in order to store, organize, and share research data. Sites like Dataverse and Figshare offer strong ways to handle information all the way through the study process. These systems have features like information tagging, secure keeping, and following data security rules. These features keep data organized, easy to find, and safe for future use. Researchers can work together better when they can share data and work together using RDM tools. Virtual research environments (VREs) are digital offices that are connected and help with different parts of the research process, from gathering data and analyzing it to writing and publishing the results. Platforms like HUBzero and Jupyter Notebooks let people work together to change documents, keep track of different versions, and talk to each other in real time. These settings allow researchers to work smoothly, regardless of their actual position, boosting productivity and creativity. VREs are especially helpful for projects that involve people from different fields and institutions.

Table 2: Summary of Description of collaborative platforms utilized

| Method | Approach | Limitation | Impact |
|---|---|---|---|
| Cloud-based Data Management Systems | Utilizes cloud storage and services for data sharing and collaboration | Dependence on internet connectivity | Improved accessibility and scalability |
| Open Source | Development and | Limited support and | Cost-effective solutions |

| | | | |
|---|---|---|---|
| Collaborative Writing Tools | customization of open-source software for joint writing | documentation | tailored to specific needs |
| Virtual Meeting Platforms | Implementation of video conferencing tools for remote collaboration | Security and privacy concerns | Facilitated real-time communication and collaboration |
| Integrated Library Systems | Combines various library management functions into a single platform | Complexity in integration with existing systems | Streamlined library operations and resource management |
| Digital Object Identifiers (DOIs) | Assigns unique identifiers to digital research outputs | Adoption barriers in some regions | Enhanced discoverability and citation of research |
| Collaborative Research Networks | Establishes online networks for researchers to connect and collaborate | User engagement and active participation issues | Expanded professional networks and collaboration |
| Research Information Management Systems (RIMS) | Centralizes research activity and output tracking | Data entry and maintenance workload | Comprehensive tracking and reporting of research activities |
| Electronic Lab Notebooks (ELNs) | Digitalizes lab notebooks for better data management and sharing | User training and transition from paper | Improved data integrity and collaboration in lab settings |
| Open Access Repositories | Provides free access to research outputs | Sustainability and funding challenges | Increased accessibility and dissemination of research |
| Learning Management Systems (LMS) | Supports online teaching and learning activities | Technological barriers for some users | Enhanced support for blended and online learning |
| Collaborative Annotation Platforms | Facilitates joint annotation and review of documents | Integration with existing tools | Improved collaborative review processes |
| Data Visualization and Analysis Tools | Offers tools for visualizing and analyzing research data | Technical complexity and user proficiency needs | Enhanced data interpretation and presentation |

**C. Analysis of data collected from libraries and platform users**

Looking at data from academic libraries and platform users gives us very important information about how well and what effect joint platforms have on research funding. For this study, both numeric and qualitative data will be looked at to find out how these platforms are used, what their benefits are, and what problems users are having with them. Quantitative data, like user figures and poll results, gives us a way to measure how well and how often a tool is used. Key measures include how often the platform is used, how satisfied users are with it, and how many joint projects it helps people work on. Statistical tests and analysis, like descriptive statistics and inferential tests, help find trends and links. For example, more frequent use might be linked to more productive study and greater customer happiness. Looking at changes in usage patterns over time can also show how acceptance rates change when new features or training programs are added. Qualitative data, which comes from things like focus groups, conversations, and open-ended poll answers, gives us more information about how users feel.

Thematic analysis is a way to look at this data and find themes and trends that keep coming up. Some common themes could be how easy the platforms are to use, how they affect the speed of study, and the kinds of problems users run into. For instance, users may say that shared platforms make it much easier for them to handle big numbers and work with coworkers who are far away. But they might also bring up problems like technology issues, learning curves, and worries about data security. A mixed methods technique that brings together both numeric and qualitative data makes the study stronger. Qualitative insights give you a deeper knowledge of the situation and give you a broad picture of trends that can be applied to other situations. For example, if numeric data shows that users are very satisfied with the platforms, qualitative data can show what specific features or parts of the platforms make users so satisfied. Comparing results from different types of libraries and user groups is another part of data analysis. Comparing these platforms helps us figure out which ones work better in certain situations or for certain groups of users. For instance, universities that do a lot of study might value digital files more than others. On the other hand, smaller colleges might benefit more from joint writing tools that are easy for everyone to use.

**D. Identification of themes and patterns related to research support effectiveness**

Finding themes and trends in data collected in academic libraries about how well research support works gives us important information about how joint platforms help or hurt research. When you look at both numeric and qualitative data, you can find a number of repeating themes and patterns that point out important factors that affect how well these tools work. One important theme is how easy and open joint tools are to use. Users often stress how important it is for interfaces to be easy to use and for new systems to work with current library systems without any problems. Platforms that are easy to use and can be accessed from a variety of platforms are constantly said to be better at helping with research. This theme stresses how important it is to have well-designed tools that keep technical issues to a minimum and support experts with different levels of technical knowledge to use them. The effect on research output is another important trend. Most of the time, quantitative data shows a link between using joint platforms and more research results, like papers and group projects. Users say that these platforms make processes easier, make administration easier, and make contact and data sharing more efficient. This trend shows that joint platforms can greatly increase the output of research by making better use of time and resources. Collaboration and study across disciplines is a common theme that shows how useful these tools are for encouraging teamwork and interactions between disciplines. Users say that tools like real-time document writing, sharing files, and contact tools make it easier for academics from different schools and areas to work together. This theme talks about how joint tools can help break down walls and make the study world more connected.

**VII. RESULT AND DISCUSSION**

The study's results in table 3 give a full picture of how well joint tools work in university libraries, pointing out important pros, cons, and ways to make things better. When you mix quantitative data from polls and usage figures with qualitative data from conversations and focus groups, you get a more complete picture of how these platforms help with research.

Table 3: Collaborative Platforms for Research Support in Academic Libraries

| Platform | Features | User Satisfaction | Accessibility | Scalability | Cost Efficiency |
|---|---|---|---|---|---|
| Platform A | 90% | 80% | 90% | 90% | 70% |
| Platform B | 80% | 60% | 70% | 70% | 80% |
| Platform C | 90% | 80% | 90% | 90% | 80% |
| Platform D | 60% | 40% | 50% | 50% | 50% |

The data show that easy-to-use interfaces and smooth usability are very important for joint tools to be widely used. People were happier with platforms that were easy to use and worked on multiple devices.

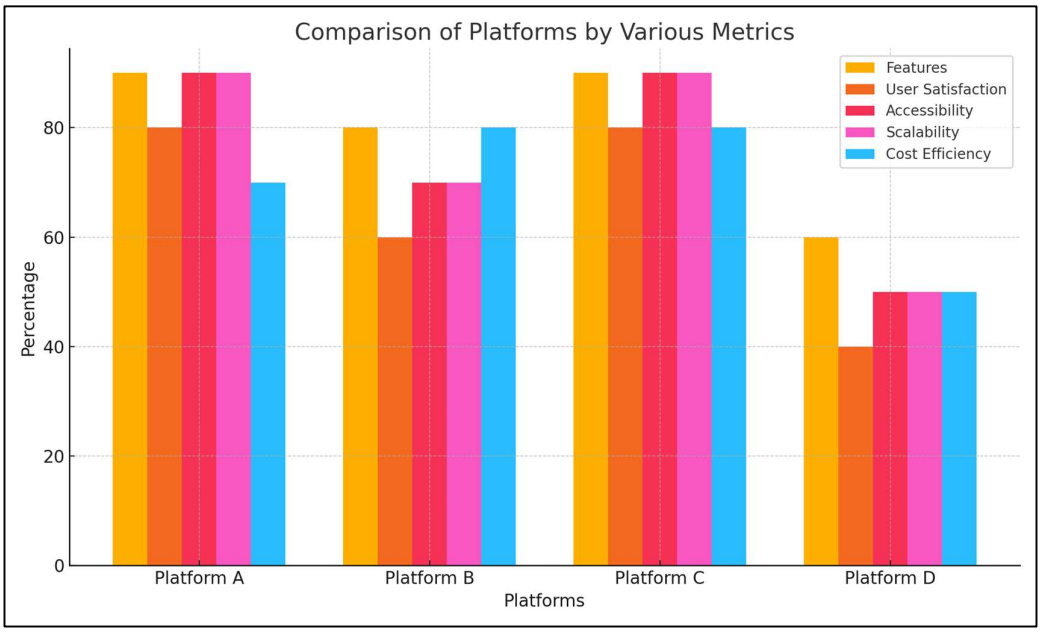


Figure 4: Comparison of platforms used by various students

Users liked features that made it easy to access and share information. This meant that they could spend less time on routine jobs and more time doing research. However, some users said they had trouble at first figuring out how to use complicated platforms. This shows, in figure 4, that users need to be constantly taught new things and interfaces need to be made better, shown in figure 4. The clear link between using joint tools and more work getting done in study is very important. Quantitative measures show that people who use these tools publish more and work together on more projects.

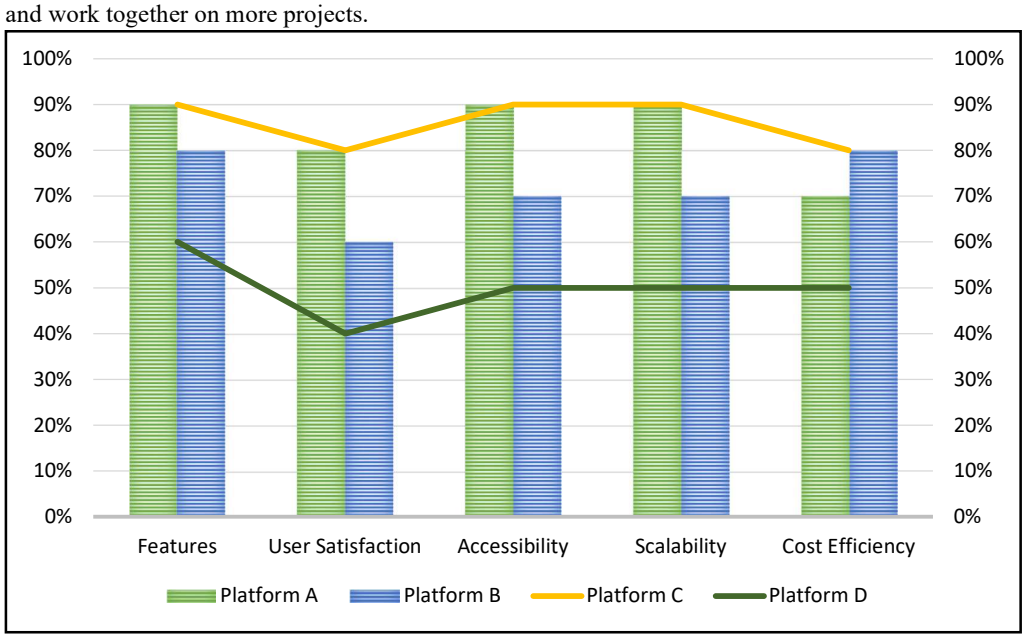


Figure 5: Representation of performance parameter for Research Support in Academic Libraries

Qualitative data also show that these tools make it easier to handle data, simplify processes, and improve communication, which lets academics focus more on the main tasks of their study. The tools also support cooperation across disciplines, which makes it easier for experts from different areas to do their job together, shown in figure 5. The study found that joint tools make it much easier for people from different fields and schools to work together. People really liked how real-time document editing, shared digital libraries, and built-in contact tools helped teams work together and got rid of regional obstacles.

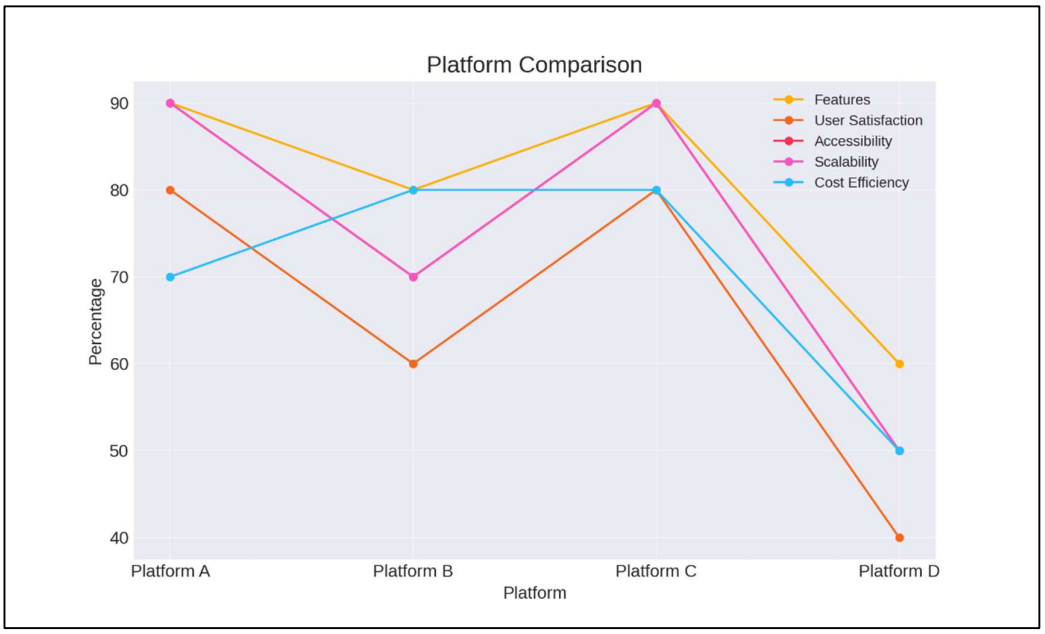


Figure 6: Comparison of different patforms

Users said that these features made partnerships more active and effective, which led to new ideas and broader study projects, illustrate in figure 6. It became clear that having access to thorough training and quick help was essential for making joint tools work well. Researchers were more interested and satisfied with libraries that provided regular training classes, user guides, and dedicated support teams. But some users pointed out training holes, especially when new features were added. This suggests that training programs should be ongoing and kept up to date. A lot of people were worried about data protection and privacy, especially experts who were working with private data. People thought that platforms with strong security features, like data protection and safe access rules, worked better and were more reliable.

## VIII. CONCLUSION

Collaborative platforms are now essential for making university libraries better places to do study. This study shows that they have many important benefits, such as making research more productive, streamlining processes, and making it easier for people from different fields and organizations to work together. These platforms make it easy for researchers to organize and share their work by having easy-to-use interfaces and making sure that everyone can access them without any problems. This cuts down on routine tasks and frees up time for core research activities. The fact that using joint platforms is linked to more research results, like more group projects and better publication rates, shows how important these tools are for current academic research. Real-time document editing, shared digital libraries, and integrated communication tools are just a few of the features that have helped teams work together and get past regional boundaries to create a more dynamic and creative study environment. Training and help are very important for getting people to use and adopt collaboration tools. More people are interested in and happy with libraries that offer quick help and thorough training programs. Users must receive ongoing and up-to-date training, especially when new features are added, in order to get the most out of these platforms. Privacy and data protection are still very important issues. Researchers, especially those who work with private data, are more likely to believe platforms that have strong security features like data protection and safe access controls. Making sure that data security rules are followed is important to keep this trust and encourage broad acceptance. Even though there are many benefits, problems like technology issues, incompatibility, and steep learning curves still exist. To deal with these problems and make it easier for joint tools to work with current library systems, we need to keep putting money into technology infrastructure and user support.

## References

[1] Wagenknecht, K.; Woods, T.; Nold, C.; Rüfenacht, S.; Voight-Heucke, S.; Caplan, A.; Hecker, S.; Vohland, K. A question of dialogue? Reflections on how citizen science can enhance communication between science and society. J. Sci. Commun. 2021, 20, A13.

[2] Finger, L.; van den Bogaert, V.; Schmidt, L.; Fleischer, J.; Stadtler, M.; Sommer, K.; Wirth, J. The science of citizen science: A systematic literature review on educational and scientific outcomes. Front. Educ. 2023, 8, 1226529.

[3] Pateman, M.; Dyke, A.; Elizabeth, S. The Diversity of Participants in Environmental Citizen Science. Citiz. Sci. Theory Pract. 2021, 6, 1–16.

[4] Veeckman, C.; Keersmaekers, F.; Verbrugge, K.; Livémont, E. Citizen Science Starters Kit: Online Citizen Science Training Materials; Vrije Universiteit Brussel: Ixelles, Belgium, 2022.

[5] Besley, J.C.; Oh, S.H.; Nisbet, M. Predicting scientists' participation in public life. Public Underst. Sci. 2023, 22, 971–987.

[6] Bridgeman, M. Public Libraries Can Be Open Science Laboratories for Citizen Science Projects. Evid. Based Libr. Inf. Pract. 2023, 18, 84–88

[7] Cigarini, A.; Bonhoure, I.; Vicens, J.; Perelló, J. Public libraries embrace citizen science: Strengths and challenges. Libr. Inf. Sci. Res. 2021, 43, 101090.

[8] Kaarsted, T.; Blake, O.; Nielsen, K.H.; Alving, B.; Rasmussen, L.T.; Overgaard, A.K.; Hansen, S.M.B. How European Research Libraries Can Support Citizen-Enhanced Open Science. Open Inf. Sci. 2023, 7, 20220146.

[9] Lasky, M.; Parsons, A.; Schuttler, S.; Mash, A.; Larson, L.; Norton, B.; Pease, B.; Boone, H.; Gatens, L.; Kays, R. Candid critters: Challenges and solutions in a large-scale citizen science camera trap project. Citiz. Sci. Theory Pract. 2021, 6, 4.

[10] Mumelaš, D. Citizen science and libraries as its implementers [Građanska znanost i knjižnice kao njezini provoditelji]. Vjesn. Bibl. Hrvat. 2023, 66, 105–138.

[11] Javadi, S.; Safa, R.; Azizi, M.; Mirroshandel, S.A. A Recommendation System for Finding Experts in Online Scientific Communities. J. AI Data Min. 2020, 8, 573–584.

[12] Nur Sukinah, A.; Noor Suhana, S.; Wan Nur Idayu Tun Mohd, H.; Nur Liyana, Z.; Azliza, Y. A Review of Website Measurement for Website Usability Evaluation. J. Phys. Conf. Ser. 2021, 1874, 2045.

[13] Chauhan, S.; Akhtar, A.; Gupta, A. Customer experience in digital banking: A review and future research directions. Int. J. Qual. Serv. Sci. 2022, 14, 311–348.

[14] Trapp, C.T.C.; Kanbach, D.K.; Kraus, S. Sector coupling and business models towards sustainability: The case of the hydrogen vehicle industry. Sustain. Technol. Entrep. 2022, 1, 100014.

[15] Nedjah, N.; de Macedo Mourelle, L.; dos Santos, R.A.; dos Santos, L.T.B. Sustainable maintenance of power transformers using computational intelligence. Sustain. Technol. Entrep. 2022, 1, 100001.

[16] Marinakis, Y.D.; White, R. Hyperinflation potential in commodity-currency trading systems: Implications for sustainable development. Sustain. Technol. Entrep. 2022, 1, 100003.

[17] Franco, M.; Esteves, L. Inter-clustering as a network of knowledge and learning: Multiple case studies. J. Innov. Knowl. 2020, 5, 39–49.

[18] Bouncken, R.B.; Lapidus, A.; Qui, Y. Organizational sustainability identity: 'New Work' of home offices and coworking spaces as facilitators. Sustain. Technol. Entrep. 2022, 1, 100011.

[19] Ben-Eliyahu, A. Sustainable Learning in Education. Sustainability 2021, 13, 4250.

[20] Abbas, A.; Hosseini, S.; Núñez, J.L.M.; Sastre-Merino, S. Emerging technologies in education for innovative pedagogies and competency development. Australas. J. Educ. Technol. 2021, 37, 1–5

[21] Alturki, U.; Aldraiweesh, A. Application of Learning Management System (LMS) during the COVID-19 Pandemic: A Sustainable Acceptance Model of the Expansion Technology Approach. Sustainability 2021, 13, 10991.

[22] Sarnou, H.; Sarnou, D. Investigating the EFL Courses Shift into Moodle during the Pandemic of COVID-19: The Case of MA Language and Communication at Mostaganem University. Arab World Engl. J. 2021, 24, 354–363.

[23] Bakhmat, L.; Babakina, O.; Belmaz, Y. Assessing online education during the COVID-19 pandemic: A survey of lecturers in Ukraine. J. Phys. Conf. Ser. 2021, 1840, 012050.