

A Review on Emerging Trends and Technologies in Library

Som Nepali¹, Rajesh Tamang²

Department of Social Work, Rajagiri College of Social Sciences (Autonomous), Kalamassery, Kochi, India

Email address:

nepalisom6@gmail.com (S. Nepali), dany2053@gmail.com (R. Tamang)

To cite this article:

Som Nepali, Rajesh Tamang. A Review on Emerging Trends and Technologies in Library. *American Journal of Information Science and Technology*. Vol. 6, No. 1, 2022, pp. 8-15. doi: 10.11648/j.ajist.20220601.12

Received: March 4, 2022; **Accepted:** March 21, 2022; **Published:** March 31, 2022

Abstract: Library service through mobile technology is a recent trend in library service. Mobile technology and its development have given rise to the excitement of faculty and student fraternity. This type of infrastructure needed by libraries to provide such services. The awareness about technologies like Mobile based services, Augmented Reality, Gamification, Internet of Things applications. The method opted for the study is descriptive and the tool used for collecting information is web survey. Literature related to emerging trends in libraries was collected from similar projects and other related articles from web. The project was started by analysing the technological developments in various libraries, kinds and new trends that emerged recently. Relevant data regarding the topic is also collected from scholarly publications and online databases to review the benefits, usage and the importance of emerging technology trends in libraries. This topic deals with new developments and techniques that are evolving in libraries. Some of the new trends are identified in this work. The limitation of the study is that, as many innovations are being introduced and also developed, only a selected number of technologies are included in the study.

Keywords: Library, Technology, Methods, Trends, Development

1. Introduction

The libraries need to have an ambition in adopting the new technologies and the cost of implementing the new technologies are also an important thing [1]. Before implementing these technologies, feasibility study is a must. It is said that libraries do not implement any technology on the basis of what the users will do today [2] but also with the expectation of it will meet the changing needs of the users over in future therefore the decisions need to be made with future [3]. While invention of technologies the structure of libraries is also changed that is the library materials, media, means for accessing information, nature of buildings etc. the technology systems includes digital devices, operating systems, digital media, networks and servers, audio visual systems etc. are used for access information and also the information's in the libraries become digitalized it is called as digital information [4-8]. Now in libraries both the forms are available [9]. This study is to make an awareness on the current or emerging trends of libraries now there are several trends that have been emerged but libraries and users are not much aware of these things and some of these trends are not been used in our libraries so the purpose of my study is to

make every one aware of these trends and make the libraries to use these trends [10]. The trends and technologies of libraries are cloud computing, QR code, Green Library Concept, Artificial Intelligence, Augmented Reality, Mobile Based Services, Robotics, ICT applications so on [11].

Applications and AI in many IT oriented educational institutions, their services would increase day by day, contributing reported information relevant to AI about its AI about its AI technology [12] and its Applications and AI in many IT oriented educational utilities in different areas or subject areas [13]. The effect of QR code and ARA on the management institute's library services, and to study the influencing factors when using the ARA and QR code service. The direction of e-books, iPad, and kindles could be the future, but the bulk of the information of the world is still preserved in millions of printed books Shelves for libraries [14]. The library is unable to place all books in digital format, as this there are different technical concerns, such as copyrights and other problems [14]. Scientists due to the development of mobile base facilities such as these, the researcher spent more time on the Internet. Such as tablets, iPhone, iPad, cell phones, etc. Even so, they are unable to achieving all satisfactory data.

Some basic concepts to choose evaluate cloud services for

the library. Before introducing data on the cloud, the benefits, drawbacks and enhancements need to be seriously considered. On the theory of SWOT analysis, the paper also explains its merits and demerits [15]. According to the findings the Cloud computing has advantages and disadvantages of its own. The libraries were automated, networked and are now progressing through fewer paper or virtual libraries [16]. Application programs in library science are also used to collect challenges in the profession librarians intended to achieve economy in the management of information [17]. A proper idea about the important of trends and techniques in library and also wrote this article based on his plans, implements and experience with the emerging trends and technologies, collect various information from different databases the report covers, what are the important of technology and trends [18]. It is being used in different fields and different technological ideas are still growing. The IoT definition, its historical context and its future library applications are discussed in this paper. Some of the difficulties that the library specialist will face when implementing it are also examined [19]. The proposed a structure for the application of the use of internet of thing to renovate traditional library systems to become smart online library systems. The IoT allows a physical object (such as a book or other text typologies) to be linked to real-time communication technologies through the use of RFID tags and small sensors.

The Green Library Movement involves librarians, libraries, towns, cities, colleges and universities dedicated to developing green libraries and reducing Eco degradation. Green Libraries highlight the needs of a library, green development and real energy use cost reductions. Library's job is to serve its community [20]. This study analyse that the Societies need libraries and librarians to serve as responsible role models by providing accurate information on green topics, from alternative procurement strategies to renewable energy choices [21]. The historical growth of QR code and Augmented Reality Applications in mobile Value Added Services (mass), to study library users' knowledge of QR code and AR application, and to investigate the effect of QR code and ARA on delivering mobile base library services. Librarian's shelves Because of various technical concerns, such as copyrights and other issues, the library is unable to place all books in digital format. Scientists spent more time on the Internet as a result of the construction of mobile base facilities like these [22]. Tablets, iPhones, iPads, and cell phones, for example. Despite this, they are unable to obtain all necessary data.

In some cases creating games that focus on certain aspects of the library experience, as with this method students are more attract to library with this new learning platform. It improves the intellectual creativity of students [23].

The cloud computing and its potential club-based implementations with library resources in an environment focused on the internet. Cloud computing technology has become a blessing for libraries and provides a variety of different solutions. Libraries' opportunities to link their

services to clouds. This research may be valuable in the identifying and generating library cloud related resources. This study gives principles and implications for cloud computing. To boost their services in a more effective manner, cloud-based software in libraries [24]. The result shows that, before clubbing library services with cloud-based technology, it is time for libraries to start thinking and provide their customers with secure and fast services.

The QR Code implementation in library and how it applicable and encourage students in the Brigham Young University. It is a literature review article that gives an awareness about the QR Code and its applications in library. The Herald B Lee Library in Brigham Young University adopted QR Code for marketing purpose [25]. The author has searched relevant articles and literatures and the studies based on the survey done in the libraries.

2. Emerging Trends and Technology

2.1. Augmented Reality (AR)

AR (augmented reality) is a cutting-edge technology that allows users of smart devices to view the natural environment via a digitally enhanced lens. AR may be used for headphones and/or digital devices like tablets, smartphones, and even desktop computers. Software, sensors, and digital projectors make up the systems, which enable digital displays to be projected onto real-world objects [26]. Since augmented reality has the ability to change what is actually happening, it is a great fit for libraries. Library professionals should commit to working with AR applications more effectively and efficiently under the library – AR binary in light of today's customers' requirements.

By integrating sights, sounds, and smells into the natural world as it is, Augmented Reality aids in the physical world. People can interact with both virtual and augmented reality because AR is too similar to the real world [27]. Augmented reality combines the physical and virtual worlds.

2.2. Augmented Reality Applications Used in Libraries

Aurasma: This cutting-edge augmented reality software was created by Cambridge-based Tech Company Autonomy in 2011 and was recently obtained by Hewlett-Packard. It encourages one to see and communicate with the world in a different way, according to Dunleavy and Chris. Every picture, entity, and even location can have its own aura thanks to Aurasma [28]. Auras can be as basic as a video with a link to a website or as complicated as a lifelike motion graphics.

Layer: The world's first AR browser for iPhone and android is called Layer. It integrates information from GPS, compasses, and tilt sensors with the figure captured by the camera. It makes use of this knowledge to overlay areas of interest on top of the camera's figure. The app used within the library, similar to Aurasma, enables developers to incorporate multimedia of any kind to bring state figures to life and improve the audience experiences.

Google Goggles: It is a Google-created figure recognition mobile app that employs augmented reality. It has a lot of potential for use in a library. It's used to make research based on figures captured by mobile devices. Snapping a photograph of a well-known landmark, for example, will search for information about it, while taking a picture of an item's barcode will check for product details.

libARi: It is an AR software that is intended to assist users in locating a particular document in the library. In order to use the library efficiently, students must understand why documents are classified and how to locate the numbers on the racks. Furthermore, it helps us to browse any particular book in the same way they have become used to searching for something on the web.

ShelvAR: It is made up of a Mobile application and a collection of encoded labels that depict call numbers on book spines. The app reads all the tags at once when a librarian keeps a smartphone or tablet camera up to a shelf, thanks to the recent technology that can interpret multiple patterns even when they are tiny when viewed from the perspective.

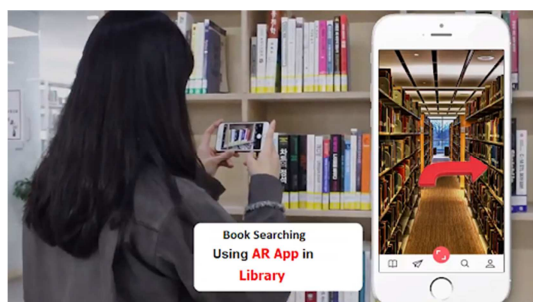


Figure 1. Augmented Reality applications in mobile.



Figure 2. Children plays puzzle games in libraries.

3. Gamification

Gamification is a strategy that utilized for drawing in individuals in libraries with the assistance of little games like riddles, quiz and so on. And everything to do with altering actions and developing sentimental connections with resources and facilities [29]. Gamification is a method that libraries may use to involve and inspire the public to use the library, but it is not a fast fix and should be used with

intelligently. Stories can influence everyone. The library career is well aware of this. In games, the story aspect is often very significant and serves as a way to keep players interested in the game. This feature is used in a variety of library gamification projects. It's often used in conjunction with the gaming feature Search. A quest is a section of the story in which you should resolve certain secrets or puzzles in order to go further in the story.

3.1. Elements

Narratives:

Each walk investigates an account of a conventional individual's life and universe, furnishing people with data about the city's past just as abstract history as the walk and story progress.

Quest:

Each excursion is create with different troubles you need to meet to continue ahead in the walk and the story.

Progression:

There is a sensible development on the course of the walks and the game gives contribution on how people progress through the story.

Feedback:

The decisions the players make trigger criticism from the game. "Incredible – The appropriate response was right. Proceed towards the water pinnacle to get the last inquiry of your excursion"

Leaderboards:

Leaderboard available in the weekly at the library.

Rewards:

After completing the journey inside the library, people get rewards and all walk ending in the library.

3.2. Advantages of Gamification

1. Boosts your efficiency.
2. Increases motivation.
3. It promotes creativity.
4. Helps to improve communication.
5. Encourages user participation.
6. Introduces new dynamics to the game.
7. Helps to develop specific abilities.
8. Projects a professional figure.

3.3. Limitations

Weak gamification is the first strategy to change in gamification. If poorly designed, gamification will easily fail. Creating a library game or gamifying certain elements of a library does not ensure that it will be well received by its intended audience. Games that are either too difficult or too boring are both poorly designed [30]. Naturally, designing and developing a good game is much more difficult than designing and developing a bad one. The game's quality, or how enjoyable it is, will make or break your library's gamification project.

Most educational games failing, according to game designer Gabriel Zicherman, for one simple reason: they

aren't entertaining [31, 32]. 10 He claims that the fundamental problem with most educational gaming is that the educational objective takes precedence over the enjoyment of the gaming experience: in other words, educational gamers are so focused on getting the game to teach that they neglect to devote enough time and attention to perfecting the game's experience.

4. Robotics in Library

In the modern era libraries going to create a new beginnings with the help of technologies. One of the latest technology used in libraries is robotics. Robotics and artificial intelligence (AI) developments are having an impact on library operations and facilities. Scrambling, rolling, flying, and climbing are all tasks that the robots engage in [33]. Libraries, as well as the wider knowledge (and social) world in which we all work, are affected by robotics.

Libraries can integrate robotics with other AI technologies like a drone being controlled by a robot can make sure that the library is always under surveillance. Talking robots can be placed in various sections of the library as a user aid and guide. Shanghai library has put up a humanoid robot at the entry which will interact with the users and clarify their doubts [34]. The applications of robotics in libraries are widespread and in present days, no doubt that robots will dominate the libraries signalling the staff-less libraries ahead.



Figure 3. Robots in library.

4.1. The Concept of AI and VR

With the aid of motors and machine learning, robots can understand and perform tasks. A robot is a system that can perform complex acts with the assistance of coded programmes, which are performed by a computer [35]. Robotic technology, just like other disruptive technologies like IoT, 3D Printer, AI, VR and so on, has revolutionized information service delivery in libraries in different ways.

Both housekeeping activities and work in the library parts can be performed by robots. In the library, for example, there are autonomous shelf reading robots, virtual reality, Virtual agents, and intelligent robots for reference services and circulation record maintenance [36]. The librarian can control the robot with the remote or technologies of artificial intelligence and virtual reality.

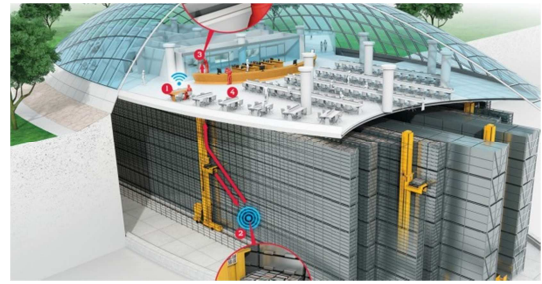


Figure 4. Underground robot library concept.

4.2. Book Delivery by Robots

The needed books with their numbers are given as input to the robot first. The robot will identify the books by detecting the RFID of the books on the shelf. If the RFID is matching with the saved book details, a notification will be sent to the shelf unit. The corresponding tray will come forward and the book will be deposited into the robot's basket [37]. Further, the book will be headed to the collection centre from where the users can collect it. The whole process looks as follows;

The process of delivery of books starts by inputting the required books along with their numbers in the microprocessor of the robot. Then it will recognize the book according to their RFID in the shelf and associate it with the particulars of the saved book and a notification will be sent to the shelf unit. The specific tray containing the book will come forward and the book will be dropped in the robot's basket. The book will be available to the user only after the robot reaches the collection centre. The process is illustrated in the following figure:

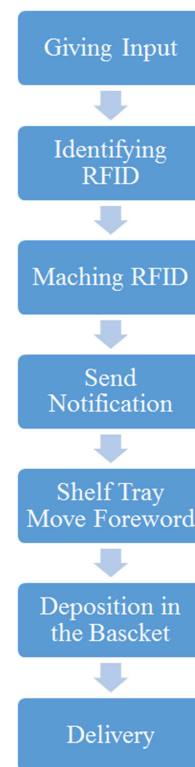


Figure 5. Book Delivery system.

5. Green Library

In the advancement of modern technology, human lifestyles have shifted, resulting in a slew of issues in the environment and on the planet; the green library idea is seen as a significant solution to these issues. The idea of green has become a movement in all fields, and libraries are one of them. Now that libraries have adopted the green concept, it has had a huge effect on people [38]. The green philosophy has been discovered to have decreased the conception of oil, power, and is therefore environmentally friendly; however, it is not completely applicable to the industry, but it is on the increasing position.

Green libraries, also known as sustainable libraries, are those that are constructed in an environmentally friendly manner; they are a subset of the larger green building movement. Libraries are places that people of all ages can learn for the rest of their lives. Libraries are important information sources for raising environmental awareness.

The advantages of natural sunshine and natural ventilation are maximised in eco libraries. Green libraries are thoughtfully built with site selection, building planning, energy usage, and materials in mind, as well as human welfare implications. The key functional areas of green library building are

1. Site Location;
2. Water Conservation;
3. Energy Efficiency;
4. Materials;
5. Indoor air quality.

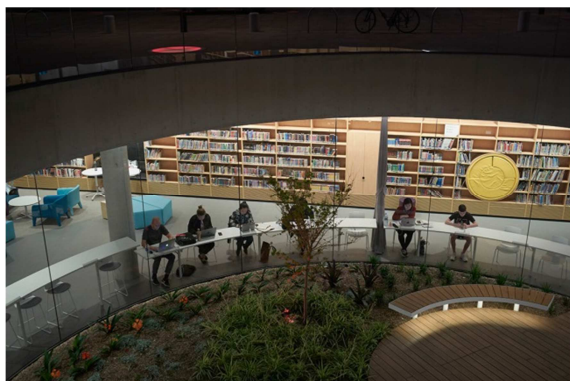


Figure 6. Green Library.

5.1. Role of Green Librarians

1. Librarians should promote green concept in libraries by adopting various green strategies.
2. Promote green techniques and tools.
3. Find out and adopt more eco- friendly strategies that suitable to the libraries.
4. He should act as a role model to the users and promote green concept among them.
5. Motivate other libraries.

5.2. Benefits of Green Library

1. Green libraries will reduces the pollution in the environment.

2. It reduces the operating cost of the libraries by the less consumption of energy resources.
3. It can be constructed in affordable cost.
4. They decrease waste by adopting waste management strategies.
5. Minimize the consumption of environmental resources.
6. Green libraries reduces the mental stress of patrons thus it improves the productivity.
7. It makes the libraries attractive.

5.3. Library Associations and Library Training Providers Should

1. Assist librarians in comprehending AI's influence, as well as its interactions with privacy and moral values. Librarians should be able to acquire appropriate digital skills and knowledge, according to library training providers.
2. Advocate for libraries to play a larger role in transforming educational institutions as they adjust to the changes in the labour market that AI can bring.
3. Collaborate with AI researchers and developers to build library-specific applications that adhere to ethical and privacy requirements and are tailored to the needs of libraries and their patrons.

6. Methodology

The path in which researchers may conduct their research is known as Research Methodology. It depicts the process by which these researchers formulate their problem and goal, as well as how they present their findings based on the data gathered during the study period [39]. This chapter on research design and methodology also explains how the final research result will be obtained in accordance with the study's goal. A search for information is referred to as "research." Research can also be defined as a scholarly and methodical search for accurate information on a specific topic. Because it is a scholarly practice, the term "study" should be used in a scientific context. Research methods apply to all of the techniques and processes used to conduct research.

A descriptive analysis is a correctly interpreted fact-finding investigation. It is a research method that employs a sample size. It focuses on specific aspects or dimensions of the problem being investigated. Its goal is to gather detailed data and insight that can be used to produce more extensive studies. Data is collected through the use of appropriate tools.

6.1. Data Collection

The process of collecting quantitative and qualitative data on particular factors in order to evaluate outcomes or gain actionable insights is known as data collection. To ensure that the data you collect is clean, consistent, and trustworthy, you must follow a well-defined process. Facts and other related materials from the past and present that serve as the basis for research and analysis are referred to as data. The data serves as a starting point or raw material for study.

6.2. Sources of Data

In most cases, we can obtain data in two methods: primary and secondary. Data collected in a typical setting through perception or questionnaire review are examples of data obtained in an uncontrolled situation. Secondary data comes from a variety of sources, including magazines, books, papers, newspapers, reports, the internet, and more. Primary sources are original sources from which the investigator collects information that has never been seen before. Primary information are first-hand accounts gathered through various methods such as interviews, mailings, and discoveries. Evidence that has been collected and assembled for a specific purpose is known as secondary sources. Primary sources include freely available compendia as well as previously gathered statistical statements and records, the evidence of which researchers may use in their research. Only a few examples include census surveys, annual reports, and financial statements. Along with published records and accounts, primary sources include both recorded and unpublished documents.

6.3. Tools for Data Collection

The observation approach is used to evaluate the data that has been collected. Website analysis is the tool used. The most significant benefit of an observational approach is that it allows you to record social interactions as they occur. Many research methods rely heavily, if not entirely, on recalling past experiences, but observational methods produce findings that are more applicable to real-life situations. A competent researcher may use this approach to analyse and capture all of the minor details of a culture that may seem insignificant to some. To review the benefits, usage, and relevance of emerging technology trends in libraries, relevant data is collected from academic journals and online databases.

7. Findings

Through the study found out several more trends and technologies that have been emerged in libraries but not at all is been used in every libraries.

1. There are several new technologies available in the library, it is found in the research that new technologies which I have taken to analyses.
2. These technologies help the librarian to avoid the repetitive, routing, clerical housekeeping works in the library.
3. Library professionals change themselves to adapt to new technologies, they must take training, attend seminars, conferences and acquire knowledge to add their knowledge level.
4. It was observed that the innovation of technologies and trends made a big change in the field of libraries.
5. It is found out that there are several more inventions are done for libraries.
6. It is find out that it reduced the work load of the staff

and help them to more focus on other important works.

7. It saves the time of the users.
8. It is found that it is very interesting to access thus it attract more users to libraries.
9. It is found that every inventions in libraries in every field is more and more useful to the professionals and both users too.
10. It is found that inventions like augmented reality and virtual realities makes the users more memorable it is more beneficial for students.
11. By the introduction of new technologies the users need not to approach libraries this helps mostly to the busy workers they can access needed resources by virtually.

8. Suggestions

1. Libraries should provide proper training regarding the new inventions to the library professionals.
2. If the library management or government should provide more funds to the libraries for implementing the new technologies because the libraries in rural areas, small towns and villages have no enough funds to afford the cost.
3. Conduct trainings to library science students regarding new inventions of libraries and how to operate it.
4. Make the concepts like green library compulsory in every libraries.
5. Make aware of the libraries about the importance and benefits of the technologies.

9. Conclusion

The ultimate purpose of my project is that to get an overview of emerging trends and technologies of libraries because there are lots of LIS students and professionals are in the libraries who are not well aware of the current trends in libraries not even the name. I collected maximum information from internet. I have clearly found that due to the emerging trends the appearance of libraries, roles of library professionals etc. become changed. Library become very user friendly thus peoples become love to approach libraries than before. The new changes make an effective influence in the library professionals it reduced the workload of professionals and allow them to focus on other major works. Through the study I understand the various trends its uses, important, benefits etc.

It is clearly found that all the trends are very effective and useful to both library professionals and users. It improves the efficiency and quality of libraries, peoples get more attractive and children's get more excited to approach libraries. By more knowledge we can build a good community.

References

- [1] S. Patel, S. O. Badir, and G. A. Molander, "Developments in Photoredox-Mediated Alkylation for DNA-Encoded Libraries," *Trends Chem.*, vol. 3, no. 3, pp. 161–175, Mar. 2021, doi: 10.1016/J.TRECHM.2020.11.010.

- [2] G. Ifijeh and F. Yusuf, "Covid – 19 pandemic and the future of Nigeria's university system: The quest for libraries' relevance," *J. Acad. Librariansh.*, vol. 46, no. 6, Nov. 2020, doi: 10.1016/J.ACALIB.2020.102226.
- [3] Y. Zhou, W. Shen, J. Peng, Y. Deng, and X. Li, "Identification of isoform/domain-selective fragments from the selection of DNA-encoded dynamic library," *Bioorganic Med. Chem.*, vol. 45, Sep. 2021, doi: 10.1016/J.BMC.2021.116328.
- [4] J. Cox, "The higher education environment driving academic library strategy: A political, economic, social and technological (PEST) analysis," *J. Acad. Librariansh.*, vol. 47, no. 1, Jan. 2021, doi: 10.1016/J.ACALIB.2020.102219.
- [5] B. Multala, J. Wagner, and Y. Wang, "Durability standards and clothing libraries for strengthening sustainable clothing markets," *Ecol. Econ.*, vol. 194, Apr. 2022, doi: 10.1016/J.ECOLECON.2022.107358.
- [6] R. Rana, "Research trends in library and information science in India with a focus on Panjab University, Chandigarh," *Int. Inf. Libr. Rev.*, vol. 43, no. 1, pp. 23–42, Mar. 2011, doi: 10.1016/J.IILR.2011.01.006.
- [7] V. H. Y. Chan, D. K. W. Chiu, and K. K. W. Ho, "Mediating effects on the relationship between perceived service quality and public library app loyalty during the COVID-19 era," *J. Retail. Consum. Serv.*, vol. 67, Jul. 2022, doi: 10.1016/J.JRETCONSER.2022.102960.
- [8] W. S. Wallace, C. Soehner, and G. Hatch, "Measuring the impact of a library-hosted showcase event," *J. Acad. Librariansh.*, vol. 47, no. 5, Sep. 2021, doi: 10.1016/J.ACALIB.2021.102428.
- [9] M. Garnar and J. Tonyan, "Library as place: Understanding contradicting user expectations," *J. Acad. Librariansh.*, vol. 47, no. 5, Sep. 2021, doi: 10.1016/J.ACALIB.2021.102391.
- [10] T. K. Ocran, E. P. G. Underwood, and P. A. Arthur, "Strategies for successful implementation of mobile phone library services," *J. Acad. Librariansh.*, vol. 46, no. 5, Sep. 2020, doi: 10.1016/J.ACALIB.2020.102174.
- [11] D. E. Hubbard and A. Vaaler, "An exploratory study of library science journal articles in syllabi," *J. Acad. Librariansh.*, vol. 47, no. 1, Jan. 2021, doi: 10.1016/J.ACALIB.2020.102261.
- [12] C. Y. Tran and J. X. Guo, "Developing user-centered collections at a research library: An Evidence-Based Acquisition (EBA) pilot in STEM," *J. Acad. Librariansh.*, vol. 47, no. 5, Sep. 2021, doi: 10.1016/J.ACALIB.2021.102434.
- [13] Q. Huang, "Recent advances of information literacy education for international students in Chinese academic libraries," *J. Acad. Librariansh.*, vol. 48, no. 2, Mar. 2022, doi: 10.1016/J.ACALIB.2022.102497.
- [14] J. Feng and N. X. Zhao, "A New Role of Chinese Academic Librarians-The Development of Embedded Patent Information Services at Nanjing Technology University Library, China," *J. Acad. Librariansh.*, vol. 41, no. 3, pp. 292–300, May 2015, doi: 10.1016/J.ACALIB.2015.03.010.
- [15] A. G. Talavera-Caro *et al.*, "Emerging trends and future perspectives on enzyme prospection with reference to food processing," *Value-Addition Food Prod. Process. Through Enzym. Technol.*, pp. 139–151, 2022, doi: 10.1016/B978-0-323-89929-1.00019-6.
- [16] H. Rafique, A. O. Almagrabi, A. Shamim, F. Anwar, and A. K. Bashir, "Investigating the Acceptance of Mobile Library Applications with an Extended Technology Acceptance Model (TAM)," *Comput. Educ.*, vol. 145, Feb. 2020, doi: 10.1016/J.COMPEDU.2019.103732.
- [17] P. S. Begum, S. Rajagopal, and M. A. Razak, "Emerging trends in microbial fermentation technologies," *Recent Dev. Appl. Microbiol. Biochem.*, pp. 113–119, 2021, doi: 10.1016/B978-0-12-821406-0.00011-4.
- [18] M. S. Zakaria, "Data visualization as a research support service in academic libraries: An investigation of world-class universities," *J. Acad. Librariansh.*, vol. 47, no. 5, Sep. 2021, doi: 10.1016/J.ACALIB.2021.102397.
- [19] R. K. Stark, E. Opuda, J. McElfresh, and K. Kauffroath, "Scavenging for evidence: A systematic review of scavenger hunts in academic libraries," *J. Acad. Librariansh.*, vol. 47, no. 3, May 2021, doi: 10.1016/J.ACALIB.2021.102345.
- [20] S. F. Samsuddin, H. A. M. Shaffril, and A. Fauzi, "Heigh-ho, heigh-ho, to the rural libraries we go! - a systematic literature review," *Libr. Inf. Sci. Res.*, vol. 42, no. 1, Jan. 2020, doi: 10.1016/J.LISR.2019.100997.
- [21] F. R. Allen and M. Moyer, "A library seating census: Gathering seating occupancy data in an academic library to reveal furniture preferences and inform future planning," *J. Acad. Librariansh.*, vol. 47, no. 5, Sep. 2021, doi: 10.1016/J.ACALIB.2021.102427.
- [22] H. J. Scholl, "The Digital Government Reference Library (DGRL) and its potential formative impact on Digital Government Research (DGR)," *Gov. Inf. Q.*, vol. 38, no. 4, Oct. 2021, doi: 10.1016/J.GIQ.2021.101613.
- [23] E. Mbunge, S. Jiyane, and B. Muchemwa, "Towards emotive sensory Web in virtual health care: Trends, technologies, challenges and ethical issues," *Sensors Int.*, vol. 3, p. 100134, 2022, doi: 10.1016/J.SINTL.2021.100134.
- [24] T. Koltay, "Accepted and Emerging Roles of Academic Libraries in Supporting Research 2.0," *J. Acad. Librariansh.*, vol. 45, no. 2, pp. 75–80, Mar. 2019, doi: 10.1016/J.ACALIB.2019.01.001.
- [25] E. D. Cassidy, A. Colmenares, G. Jones, T. Manolovitz, L. Shen, and S. Vieira, "Higher education and emerging technologies: Shifting trends in student usage," *J. Acad. Librariansh.*, vol. 40, no. 2, pp. 124–133, 2014, doi: 10.1016/J.ACALIB.2014.02.003.
- [26] G. D. Shin, K. Jeon, and H. E. Lee, "Public library needs assessment to build a community-based library: Triangulation method with a social media data analysis," *Libr. Inf. Sci. Res.*, vol. 44, no. 1, Jan. 2022, doi: 10.1016/J.LISR.2022.101142.
- [27] Y. Zhang, M. Wu, W. Miao, L. Huang, and J. Lu, "Bi-layer network analytics: A methodology for characterizing emerging general-purpose technologies," *J. Informetr.*, vol. 15, no. 4, Nov. 2021, doi: 10.1016/J.JOI.2021.101202.
- [28] B. Mehra, E. S. Sikes, and V. Singh, "Scenarios of technology use to promote community engagement: Overcoming marginalization and bridging digital divides in the Southern and Central Appalachian rural libraries," *Inf. Process. Manag.*, vol. 57, no. 3, May 2020, doi: 10.1016/J.IPM.2019.102129.

- [29] N. E. Akwang, "A study of librarians' perceptions and adoption of Web 2.0 technologies in academic libraries in Akwa Ibom State, Nigeria," *J. Acad. Librariansh.*, vol. 47, no. 2, Mar. 2021, doi: 10.1016/J.ACALIB.2020.102299.
- [30] Y. K. Sunkari, V. K. Siripuram, T. L. Nguyen, and M. Flajolet, "High-power screening (HPS) empowered by DNA-encoded libraries," *Trends Pharmacol. Sci.*, vol. 43, no. 1, pp. 4–15, Jan. 2022, doi: 10.1016/J.TIPS.2021.10.008.
- [31] M. Bladek, "Student well-being matters: Academic library support for the whole student," *J. Acad. Librariansh.*, vol. 47, no. 3, May 2021, doi: 10.1016/J.ACALIB.2021.102349.
- [32] C. J. Cremin, S. Dash, and X. Huang, "Big data: Historic advances and emerging trends in biomedical research," *Curr. Res. Biotechnol.*, vol. 4, pp. 138–151, 2022, doi: 10.1016/J.CRBIOT.2022.02.004.
- [33] H. Vonkova, J. Jones, A. Moore, I. Altinkalp, and H. Selcuk, "A review of recent research in EFL motivation: Research trends, emerging methodologies, and diversity of researched populations," *System*, vol. 103, Dec. 2021, doi: 10.1016/J.SYSTEM.2021.102622.
- [34] R. Izuagbe *et al.*, "Effect of perceived ease of use on librarians' e-skills: Basis for library technology acceptance intention," *Libr. Inf. Sci. Res.*, vol. 41, no. 3, Jul. 2019, doi: 10.1016/J.LISR.2019.100969.
- [35] V. Armann-Keown and L. Patterson, "Content analysis in library and information research: An analysis of trends," *Libr. Inf. Sci. Res.*, vol. 42, no. 4, Oct. 2020, doi: 10.1016/J.LISR.2020.101048.
- [36] M. Ashiq, S. U. Rehman, M. Safdar, and H. Ali, "Academic library leadership in the dawn of the new millennium: a systematic literature review," *J. Acad. Librariansh.*, vol. 47, no. 3, May 2021, doi: 10.1016/J.ACALIB.2021.102355.
- [37] V. Gupta, L. Rubalcaba, C. Gupta, and L. F. Pereira, "Library social networking sites for fostering startup business globalization through strategic partnerships," *J. Acad. Librariansh.*, 2022, doi: 10.1016/J.ACALIB.2022.102504.
- [38] M. Zamani, H. Yalcin, A. B. Naeini, G. Zeba, and T. U. Daim, "Developing metrics for emerging technologies: identification and assessment," *Technol. Forecast. Soc. Change*, vol. 176, Mar. 2022, doi: 10.1016/J.TECHFORE.2021.121456.
- [39] L. Saunders, "Academic Libraries' Strategic Plans: Top Trends and Under-Recognized Areas," *J. Acad. Librariansh.*, vol. 41, no. 3, pp. 285–291, May 2015, doi: 10.1016/J.ACALIB.2015.03.011.