Analysis of the Database Use by the Students of Industrial Engineering in Hybrid Mode Post Covid-19

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Abstract

The COVID 19 pandemic forced many universities to move on from an in-person mode to a remote work and on-line classes in order to continue the academic activities. One of the measures to stop the transmission of the virus was the discontinuation of the in-person activities. It was a challenge for many to meet this radical change in such a short time; a challenge that had to be accepted worldwide considering information and communication technologies as a critical factor. At this time, the COVID 19 is under control with a significant decrease in the number of cases, this situation has allowed many universities to returned to the in-person activities and other universities have chosen a hybrid mode that still allows the on-line activities. Therefore, this work studies the hybrid mode adopted by the university where the Industrial Engineering school belongs. One of the most relevant information resources in these days has been the database which is available in libraries. This study analyzes the use of databases during the pandemic until the present by the students of the Industrial Engineering school in a hybrid mode. It has been possible to obtain the statistics of access to the database with positive results toward its use by the students. The students affirm that they are satisfied with the infrastructure, and the physical and electronic resources in the hybrid modality. The results also indicate an increase in the access to the databases. As a conclusion, there was an increase in the annual enquiries/visits from the students of the Industrial Engineering school, also, not all the databases the students got access were related with the Industrial Engineering school. This indicates that the students have adapted to the hybrid modality taking advantage of the databases provided by the university.

Keywords

Scientific databases, hybrid modality

1. Introduction

Research in the education of engineering students regarding databases, Ishaq et al, mentions that it evolves over the years taking into account the knowledge influenced by modernity and technological advances. This leads to the develop of a variety of tools for the students to access databases with an easier interaction alongside visual support or gamification [1]. According to Kim & Yang [2] the academic library is one of the most important attributes for a university. Also, Okoye et al indicates that digital technology generates a positive impact on the education of the undergraduates since it provides important access to information and learning; and databases, in particular, can promote learning in undergraduates [3]. It can be affirmed that for the elaboration of academic works, according to Enrique & Freire, is very important and necessary to have a

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correct search for information in order to obtain an adequate and update theoretical framework [4].

Currently, scientific and technological development has made a way for search tools known as digital databases where information is stored. On the other hand, Enrique & Freire mention that there is a problem for engineering students regarding the access to scientific reliable information from the academic databases [4]. Regarding the academic environment of industrial engineers, for Ahenkorah-Marfo, it depends to a large extent on the academic literature in order to keep it up to date of research advances. Therefore, the different academic institutions offer subscription to the databases to facilitate their own access. Trough time and during the pandemic, M. Ahenkorah-Marfo mentions that despite the benefits and advantages that databases offer to students there are challenges in databases that cannot be ignored. Therefore, it is important to keep studying the means and ways to guarantee the maximum use of databases[5].

Before the pandemic, undergraduates used to search into databases to carry out various research projects during their last year. However, it depends on the quality, the way of access and the knowledge the student has in order to take advantage of the resources; as a result, there are few students taking advantage of these platforms [6]. Nowadays, with COVID-19, Hina Batool et al. mentions that the different academic libraries must seek new approaches regarding the service and provision standards of information through databases [7].

As a result of the pandemic there are many substantial social burdens, both the developed and developing world are demanding for proactive library services [7]. A clear change in academic libraries during the pandemic is the increase in electronic resources [8]. On the other hand, Scoulas points out the importance on the in-person and on-line use and access to the library where the students who get the access have a greater sense of belonging than those who never use this resource [9]. It is also associated to the mentioned by Anderson et al., about the factors related to accessing the databases such as the user demography, duration, type of enquiry and the different perceptions the engineering students have about their use [10].

The accelerated development of information and communication technologies (ICTs) in the last three decades has allowed the appearance of a large number of resources in the field of education [11] although, for Tukur, the use of technology in database is still in its early stage in developing countries [12]. The new lifestyle has challenged the traditional library services [13]. The remote education was introduced in educational institutions at all levels as part of the restrictions to prevent the COVID – 19. The TICs allow a wide range of on-line databases to be [12] available for students as long as the institutions determine it since they are in charge of the subscription and renewal of the databases. In 1950 the development of electronic resources began; however, it was not until the beginning of the 1960s that the first adequate searchable database appeared [5].

Adekunle Ajayi et al. mentions that electronic resources are those that can be reachable electronically and deal with different topics. They can be references or full-text databases allowing search for relevant articles on a specific topic [14]. The specialized and multidisciplinary scientific databases are a valuable resource in universities. The use of these, according to M. Ahenkorah-Marfo, is essential to justify the existence and the long-term presence of any university library [15] as an important resource nowadays. Tuku considers that the employment of the databases should be promoted to get potential users so they can get relevant information [12].

According to T. Keane et al. there are three alternatives to develop classes in higher education, the first is the in-person classes, the second is the on-line classes and the third one is classes that use the two previous modalities, which is known as hybrid or blended learning [16]. Blended learning is a heterogeneous mode of teaching and learning that combines in-person and online modes [17].

The professional career under study started in the blended learning or hybrid modality in 2022. During 2020 and 2021 this professional career was held on-line because of the health emergency as a result of the Covid-19 pandemic. Before that, the professional career was developed in-

person. For that reason, it is of interest to analyze the use of databases and how the pandemic has affected the use of this resource in students who are currently in hybrid modality.

2. Methodology

The participants in this study are students from the Industrial Engineering school of a private university in Arequipa city located in the southern of Peru. The quantitative method was employed in order to work with data collected from surveys and reports about the access to the databases.

Regarding the survey, it was carried out in a form from Google Forms whose link was sent to the students' e-mails. The evaluation scale was from 1 to 5, were 1 = Strongly disagree; 2 = Disagree; 3 = Neutral; 4 = Agree; and 5 = Strongly agree. The group of questions corresponds to the annual survey carried out by the library of the private university from where the dimension on infrastructure, and the physical and electronic resources have been considered for this study.

The records of the private university were employed in order to review the statistics of access to the databases, taking into account only those corresponding to the Industrial Engineering school. Then, the information was processed in Power BI and Microsoft Excel in order to consolidated them into queries/visits per year and per database considering the gender of the users.

3. Results

Table 1 shows the satisfaction of the students related to the physical-electronic resources provided by the private university in the hybrid modality. It can be noticed that the indicator with the highest score is the one related with physical bibliographic resources followed by the indicator related to electronic resources, databases and electronic bookstores; which indicates that students in hybrid modality feel satisfied with the library service. In this sense, regarding the infrastructure and physical-electronic resources, the indicators acceptable values prove that students from the Industrial Engineering School are satisfied in terms of sufficient and availability of the resources. If the students are satisfied with their services and facilities, as well as been satisfied in meeting the needs in learning and research, they will be more likely to use databases [18].

Table 1
Satisfaction results on infrastructure and physical and electronic resources in hybrid mode.

Indicator	Result
The library environments are modern and sufficient.	3.61
Physical bibliographic resources (books, theses, magazines or similar) are sufficient	3.94
Electronic resources, databases and electronic bookstores are sufficient and highly available	3.89
The equipment and information technologies (TICs) in the library are modern and sufficient	3.83

The analysis of the reports indicates that in 2020, 17,343 queries/visits were registered by students as it is indicated in Table 2. This number of queries/visits has been increasing during the following years resulting in 27,358 queries/visits in 2021 and 51702 queries/visits in 2022. This represents a global value in the Industrial Engineering School. If these values are related with the number of students enrolled in those years, then it results that in 2020 an average of 1,208 students were enrolled; 1,334 students were enrolled in 2021; and 1,396 students were enrolled in 2022. As a result, it could be inferred that a student in 2020 got access to the databases

14 times; 21 times in 2021; and so far in 2022 an industrial engineering student would have got access the databases 37 times.

Table 2
No. of enquires/visits per year into databases from the Industrial Engineering School

Year	Queries/visits
2020	17343
2021	27358
2022	51702

Figure 1 classifies the numbers of queries/visits by gender, indicating that at the beginning of the pandemic, women were the ones who mostly consulted the databases remaining that way during the 2021. However, in 2022, male students in hybrid modality have been getting more access to the databases. In this sense, there is a significant increase in the number of queries/visits in both male and female, resulting in more than three times for men from 2020 until 2022.

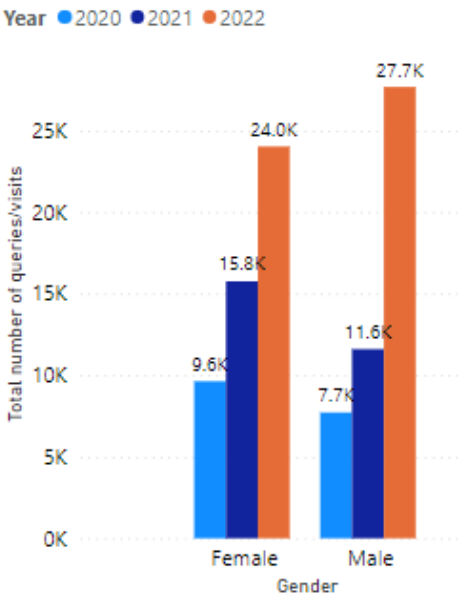

Figure 1: Number of queries/visits by gender and year

Finally, Figure 2 shows the different kind of databases provided in the virtual library of the university and their accesses.

The reports of the access to the databases show that the four main databases visited by the Industrial Engineering students are: Sintesis, Scopus, Science Direct and Web of Science. Also, the results show that students visited databases that are not related to the engineering majors.

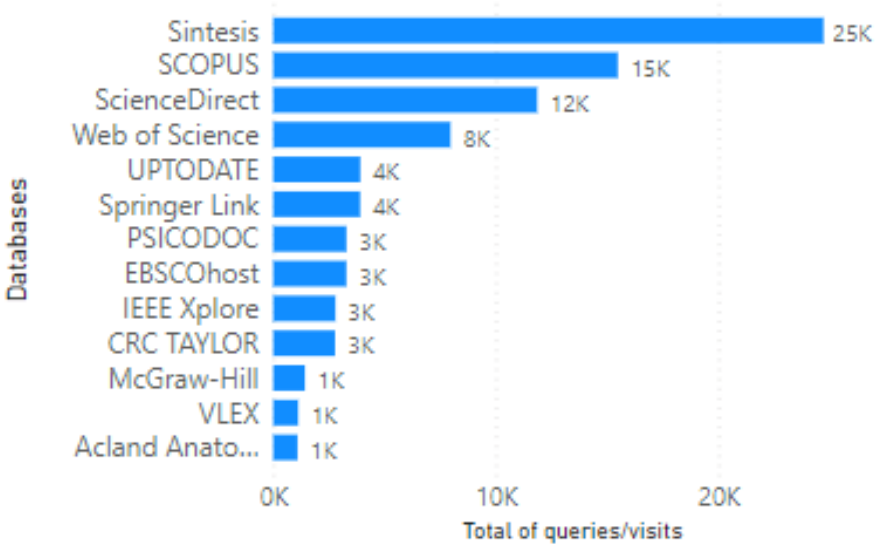

Figure 2: Number of queries/visits per database.

4. Conclusions

As a conclusion, there was an increase in the number of annual queries/visits to databases by the Industrial Engineering students, but it was also found that part of the queries/visits to databases was little or nothing related to the career of industrial engineering. For that reason, it is important to reinforced or developed strategies and techniques regarding the access and use of databases for students to achieve efficient and timely use of them that allow developing and strengthening the skills and competences of students in this engineering field.

Finally, it is important to mention that COVID-19 forced academic institutions to move on to the virtual modality, where the use of access to databases by industrial engineers was highlighted as it is proved by the increase in the annual consultations/visits and how the Engineers adapted to virtuality and applied a secure data source for academic work.

References

[1] M. Ishaq et al., "Advances in database systems education: Methods, tools, curricula, and way forward," Educ Inf Technol (Dordr), Aug. 2022, doi: 10.1007/s10639-022-11293-0.

[2] Y. Kim and E. Yang, "Academic library spaces and student activities during the COVID-19 pandemic," Journal of Academic Librarianship, vol. 48, no. 4, Jul. 2022, doi: 10.1016/j.acalib.2022.102529.

[3] K. Okoye et al., "Impact of digital technologies upon teaching and learning in higher education in Latin America: an outlook on the reach, barriers, and bottlenecks," Educ Inf Technol (Dordr), 2022, doi: 10.1007/s10639-022-11214-1.

[4] E. Enrique and E. Freire, "LA BÚSQUEDA".

[5] M. Ahenkorah-Marfo, "Domain Analytic Approach to the Use of Academic Databases by Graduate Students."

[6] O. Destiny Apuke and T. Onosahwo Iyendo, "University students' usage of the internet resources for research and learning: forms of access and perceptions of utility," Heliyon, vol. 4, p. 1052, 2018, doi: 10.1016/j.heliyon.2018.

[7] S. Hina Batool, A. Malik, M. Safdar, and A. Farzand Ali, "Pandemic Information Access Challenges and Expectations about the Post-Covid Era: A Survey of Pakistan Students' Opinion Regarding Academic Libraries' Services and Staff," The Journal of Academic Librarianship, vol. 48, p. 102604, 2022, doi: 10.1016/j.acalib.2022.102604.

[8] A. Green, “Post Covid-19: Expectations for Academic Library Collections, Remote Work, and Resource Description and Discovery Staffing,” Journal of Academic Librarianship, vol. 48, no. 4, Jul. 2022, doi: 10.1016/j.acalib.2022.102564.
[9] J. M. Scoulas, “College students’ perceptions on sense of belonging and inclusion at the academic library during COVID-19,” Journal of Academic Librarianship, vol. 47, no. 6, Dec. 2021, doi: 10.1016/j.acalib.2021.102460.
[10] R. Anderson, K. Fisher, and J. Walker, “Library consultations and a global pandemic: An analysis of consultation difficulty during COVID-19 across multiple factors,” Journal of Academic Librarianship, vol. 47, no. 1, Jan. 2021, doi: 10.1016/j.acalib.2020.102273.
[11] H. Chen, A. Y. M. A. Islam, X. Gu, T. Teo, and Z. Peng, “Technology-enhanced learning and research using databases in higher education: the application of the ODAS model,” Educ Psychol (Lond), vol. 40, no. 9, pp. 1056–1075, Oct. 2020, doi: 10.1080/01443410.2019.1614149.
[12] L. M. Tukur, “AWARENESS, AVAILABILITY AND UTILIZATION OF DATABASES AMONG UNDERGRADUATE STUDENTS OF FEDERAL UNIVERSITY OF AGRICULTURE (FUAM) MAKURDI BENUE STATE.” [Online]. Available: https://digitalcommons.unl.edu/libphilprac
[13] S. H. Batool, A. Malik, M. Safdar, and A. F. Ali, “Pandemic Information Access Challenges and Expectations about the Post-Covid Era: A Survey of Pakistan Students’ Opinion Regarding Academic Libraries’ Services and Staff,” The Journal of Academic Librarianship, vol. 48, no. 6, p. 102604, Nov. 2022, doi: 10.1016/j.acalib.2022.102604.
[14] S. Adekunle Ajayi, O. A. Shorunke, M. A. Aboyade, S. Adekunle, and B. Ajayi, “Library Philosophy and Practice (e-journal),” 2014. [Online]. Available: http://digitalcommons.unl.edu/libphilprachttp://digitalcommons.unl.edu/libphilprac/1182
[15] M. Ahenkorah-Marfo, “Domain Analytic Approach to the Use of Academic Databases by Graduate Students.”
[16] T. Keane, T. Linden, P. Hernandez-Martinez, and A. Molnar, “University Students’ Experiences and Reflections of Technology in Their Transition to Online Learning during the Global Pandemic,” Educ Sci (Basel), vol. 12, no. 7, Jul. 2022, doi: 10.3390/educsci12070453.
[17] N. Rudhumbu, “Applying the UTAUT2 to predict the acceptance of blended learning by university students,” Asian Association of Open Universities Journal, vol. 17, no. 1, pp. 15–36, Jun. 2022, doi: 10.1108/AAOUJ-08-2021-0084.
[18] A. Y. M. Atiquil Islam, “Development and validation of the technology adoption and gratification (TAG) model in higher education: A cross-cultural study between Malaysia and China,” International Journal of Technology and Human Interaction, vol. 12, no. 3, pp. 78–105, Jul. 2016, doi: 10.4018/IJTHI.2016070106.