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# Integrating Social Media as a Communication Tool in STEM Education: Infographics of the UNJ Digital Library System

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## Abstract

The purpose of this study is to produce an Instagram infographic account of the Universitas Negeri Jakarta (UNJ) library, which can be used as a personal or public reference to find out library-related information. The method used in this research is research and development by adopting the 4D model approach, which is carried out from the first step to the fourth step including Define, Design, Develop, and Disseminate. The UNJ's infographic library Instagram account contains library information content including the number of library visitors, number of book borrowers, number of library collections, e-journal and e-book services, number of library members, and total collections of scientific works, thesis, and references. The development of the Instagram infographic account is validated by a design expert.

**Keywords**: infographic, library, social media

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## INTRODUCTION

Information charts, commonly called "infographics", are used to communicate complex data in interesting ways. Infographics are defined as collections of one or more visualizations that have been modified manually to highlight certain points about the data (Lo Duca & McDowell, 2024; Retnaningtyas et al., 2024). Infographics are defined as visual translations of data and short texts that have been arranged so that they tell a story or support a position (Wu & Liu, 2024). It can also be said that infographics are visual representations of information, data or science in the graphic form (Jaleniauskiene & Kasperiuniene, 2024). Infographics make

complicated information that can be briefly and visualized in graphics so that information is easily understood (Marcelle et al., 2024).

Another opinion explains that infographics are visual data that aims to provide information from a phenomenon (Garreton et al., 2023). Infographics aim to make it easier for people to remember and understand information without having to read long texts (Christensen et al., 2023; Şanal & Torun, 2024). Also, infographics aim to inform, entertain or invite readers. Infographics have many goals, which depend on what infographics are made and what they are made for (Casillan et al., 2023; Mohamadpour et al., 2024; Zadro et al., 2024). An infographic has its character that can attract readers, namely the presence of images, illustrations, graphics and data that are more dominant than text that is combined in such a way that it becomes an interesting, useful and easy to remember information. Infographics are designed so that they can inform and influence the reader to do something (Li et al., 2023; Chanzu et al., 2023).

In processing a knowledge visually, the human brain will process information even up to 60,000 times faster than the text is read (Fallon & Pylkkänen, 2024). This fact is true because nearly 50% of the human brain is involved in visual processing and 70% of all sensory receptors are located in the eye, the brain only takes 150 milliseconds to process a symbol and 100 milliseconds to interpret it (Enge et al., 2023). This time is much faster than the time needed to read and understand instructions in text (Chen et al., 2024). Therefore, visuals are easier to remember and process by the brain.

Various studies have proven the benefits of using infographics. One of them is a study that states that the level of understanding of drug labels is higher if the label instructions are in the form of text and images. From the results of a survey, it is known that only 70% of patients can understand the label drug instructions in the form of text alone. Meanwhile, almost 95% of patients can understand the label of drug instructions described in the form of text and images. Then another study conducted at the Wharton School of Business found that only 50% of the audience could be trusted by a verbal presentation, while 67% of the audience could be convinced by a verbal presentation that had an interesting visual (Mand et al., 2024). In the world of education research, the use of infographics for the effectiveness of learning mathematics in the classroom which results in more than 80% of students surveyed has a positive attitude towards the use of infographics in learning (McNeil & Konicki, 2024).

Infographics are packaged in such a way as to produce a piece of information for the reader, which consists of illustrations, text, data, and images which are combined and give birth to a print and digital information (Jensen et al., 2024). As seen at this time, infographics are everywhere, in urban landscapes as well as brief infographics that are disseminated quickly through social media (Zhang & Zhang, 2025). In this modern era, social media is very close to human life. Social media such as WhatsApp, Instagram, Snapchat, and Twitter have a relatively large number of users. Millions of people around the world use this social media platform for interaction and marketing. To start a new business through social media, Instagram is a good choice. In 2019, Instagram will become the most popular social media platform in image

marketing because in addition to its large number of users it also has easy and simple access to distribution and uses (Alqabbani et al., 2025). So the use of the Instagram platform as a means of spreading infographics is very good.

The development of infographics has been in many fields. One of the best in the world of journalism, infographics. This is reminiscent of reading techniques such as storytelling for readers (Yang et al., 2024). Besides, infographic itself is a hot topic in health research and libraries (Rudd, 2024). Research on the use of infographics has also been carried out by Ahlryd and Hanell (2024), where infographics are used by librarians to improve hospital library programs. Besides, Wang et al. (2024) also conducted, namely how the representation of visual information, data, library knowledge is processed into infographics by librarians so that it can be more easily accessed by library visitors and can also help increase visitor attraction.

Some libraries outside and within the country already have infographics as a promotion of their library services. For example, infographics made by the National Library of America in Figure 1. Containing content related to library visitors in 2011 both direct personal visits or by phone or computer, percentage of member card users, percentage of visitor satisfaction with libraries in America, additional contributions to library funds, the number of libraries in America, as well as the three largest libraries in America. Furthermore, infographics from the University of Maryland academic library in Figure 2. contain content of their library promotion, which discusses and counts the number of reference databases in the library that can help their students who are visiting the public who are looking for references.

As for those from within the country such as the infographic library of the Gajah Mada University (UGM) engineering faculty in Figure 2. which contains annual content shown in 2017 related to increased activities in the library, the number of e-books and e-journals, the number of collections, the number of collection loans. , most borrowers, the most borrowed books, video tutorials, and information related to the library room. and infographics created by the Bandung Institute of Technology (ITB) library in Figure 3. which contains information content related to how to access e-journals and e-books.

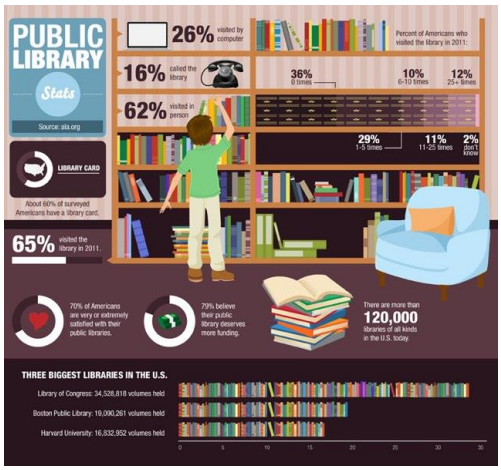



**Figure 1.** American national library infographics

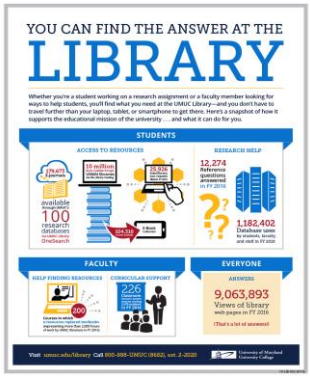



**Figure 2.** University of Maryland library infographics


**Figure 3.** FT-UGM Library Infographics

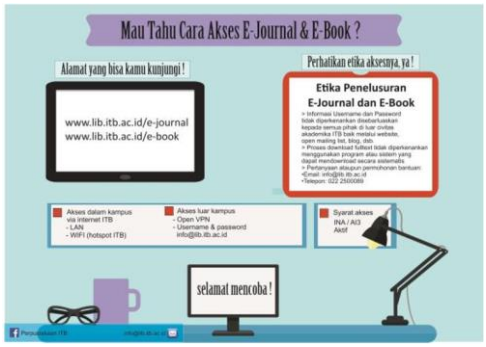



**Figure 4**. Bandung Institute of Technology Library infographics

At the UNJ the infographic about the library is digitally displayed on the UNJ library website (http://lib.unj.ac.id/). However, the information was not very well known by UNJ students themselves. According to the results of a survey conducted by the author of UNJ students, it turns out that 42.9% did not know about the information in the UNJ library. The survey was conducted not only that, but the authors also surveyed what information they wanted to get and their answers were information about the number of library visitors, the number of borrowers of books, the number of library collections, e-journal and e-book services, the number of library members, and the total collection of scientific papers, theses, and references. The author also conducted a survey related to the use of a suitable platform for its

distribution 59.7% chose Instagram social media because according to them this was the easiest to reach and was one of the applications that they often opened on their mobile phones.

The survey results on the Instagram platform as a container for spreading infographics are not surprising, because based on the previous discussion that in 2019 Instagram will be the most popular social media platform in image marketing because in addition to a large number of users it also has easy and simple access and distribution.Based on this, this study aims to produce an Instagram infographic account at the UNJ library, which contains library information content including, number of library visitors, number of book borrowers, number of library collections, e-journal and e-book services, number library members, and total collections of scientific papers, theses, and references.

## METHOD

This research and development are following scientific principles, with the following steps: Define, Design, Develop, and Disseminate. Research and development here aim to produce an Instagram infographic account at the UNJ library. The UNJ library infographic account contains library info content including the number of library visitors, number of book borrowers, number of library collections, e-journal and e-book services, number of library members, and total collections of scientific works, theses, and references.

### Define

At this stage, an initial analysis is carried out to bring up the basic problems faced, in this case, the dissemination of the questionnaire and results in the information of the institution's library being unknown to its students. By analyzing at this stage alternative problems will be obtained, making it easier to determine what will be developed, in which case the alternative is Instagram infographics.

### Design

At this stage, the library infographics are given the name, collecting library data needed by library users. Then proceed with infographic design. After that, the selection of suitable media for infographic distribution is carried out, namely the Instagram social media platform.

### Develop

At this stage, infographic design development is carried out after being assessed by the design expert. The implementation starts from assessment, revision, evaluation after revision (second assessment), then continues with the second revision, and continues to be repeated as such until it produces a prototype that is ready to be disseminated.

**Disseminate**

The distribution of Instagram accounts is done through personal, spread through other social media, library websites, and notifications in the library directly. So that all students on campus know the existence of instagram infographics.

## RESULTS AND DISCUSSION

Following the results of a survey that shows information about the number of library visitors, the number of borrowers of books, the number of library collections, e-journal and e-book services, the number of library members, and the number of collections of scientific works, theses, and references regarding information that students want to look for UNJ. Related information is made in infographics that have been made. The following is a table of data about this information and the final infographic results took the last five years were taken from 2014 to 2018.

**Data 2014**

The library provides E-journal and E-book services through a subscription to Ebsco e-journals, allowing the academic community to access a vast collection of high-quality digital resources. The library's collection consists of diverse books and reference materials, as detailed in Table 1, which lists the quantity of collections. Table 2 presents the aggregate number of library visitors by faculty, providing insights into the utilization of library services across several departments. Furthermore, Table 3 illustrates the aggregate number of book borrowers each month, indicating a significant interest in the library's lending services.

**Table 1.** Number of library collections

| No | Collections | 2013 | | Additional Collections | | 2014 | |
|---|---|---|---|---|---|---|---|
| | | Title | Copies | Title | Copies | Title | Copies |
| 1 | Book | 25851 | 79659 | 3120 | 5884 | 28971 | 85543 |
| 2 | Thesis | 40919 | 50438 | 3421 | 3421 | 44340 | 53859 |
| 3 | Research Report | 3081 | 3351 | 254 | 254 | 3335 | 3605 |
| 4 | Thesis/Dissertation | 3532 | 3804 | 285 | 285 | 3817 | 4089 |
| 5 | Topographic maps | 70 | 70 | 0 | 0 | 70 | 70 |
| 6 | Magazine subscribed | | | | | 26 | 78 |
| 7 | Magazine of donations | | | | | 48 | 1790 |
| 8 | Journal subscribed | | | | | 17 | 98 |
| 9 | Journal of donations | | | | | 140 | 162 |
| | | | | | Total Collection | 80764 | 149294 |

**Table 2.** Total library visitors per faculty

| No | Faculty | Total |
|---|---|---|
| 1 | FIP | 7465 |
| 2 | FBS | 10659 |
| 3 | FIS | 20465 |
| 4 | FT | 15241 |
| 5 | FMIPA | 8440 |
| 6 | FIK | 607 |
| 7 | FE | 13647 |
| 8 | PPS | 2576 |
| 9 | Lecturer | 267 |
| 10 | Employee | 57 |
| 11 | Etc | 5521 |
| | Total | 84945 |

**Table 3.** The total number of book borrowers per month

| No | Month | Total |
|---|---|---|
| 1 | January | 1713 |
| 2 | February | 5645 |
| 3 | March | 4999 |
| 4 | April | 4236 |
| 5 | May | 4255 |
| 6 | June | 2639 |
| 7 | July | 809 |
| 8 | August | 504 |
| 9 | September | 3904 |
| 10 | October | 4035 |
| 11 | November | 3469 |
| 12 | December | 4385 |
| | Total | 40593 |

**Data 2015**

In 2015, the library expanded its digital resources by acquiring subscriptions to 1,833 Springer e-journals and 16,630 Ebsco e-journal titles. The library acquired e-books from a variety of publishers, such as Springer (6,517 items), Wiley (35), Cengage (37), and Elsevier (201 items) (ScienceDirect). The library's commitment to offering a comprehensive and diverse selection of academic resources is illustrated in Table 4, which displays the total volume of its collections. The degree of participation and utilization across all disciplines is reflected in Table 5, which delineates the aggregate number of library visits by academics. The number of library collections that have been borrowed is depicted in Table 6, which indicates the extent of user engagement with the available resources.

**Table 4.** Number of library collection

| No | Collections | 2014 | | Additional Collection | | 2015 | |
|---|---|---|---|---|---|---|---|
| | | Title | Copies | Title | Copies | Title | Copies |
| 1 | Book | 28971 | 85543 | 3570 | 6349 | 32541 | 91892 |
| 2 | Thesis | 44340 | 53859 | 7721 | 7721 | 52061 | 61580 |
| 3 | Research Report | 3335 | 3605 | 435 | 435 | 3770 | 4040 |
| 4 | Thesis | 2672 | 2672 | 1216 | 1216 | 3888 | 3888 |
| 5 | Dissertation | 1145 | 1145 | 4252 | 4252 | 5397 | 5397 |
| 6 | Topographic maps | 70 | 70 | 0 | 0 | 70 | 70 |
| 7 | Magazine subscribed | 26 | 78 | 0 | 177 | 26 | 255 |
| 8 | Magazine of donations | 48 | 1790 | 110 | 842 | 158 | 2632 |
| 9 | Journal subscribed | 17 | 98 | 3 | 28 | 20 | 126 |
| 10 | Journal of donations | 140 | 162 | 79 | 204 | 219 | 366 |
| | Total Collections | | | | | 98150 | 170246 |

**Table 5.** Total library visitors per faculty

| No | Faculty | Total |
|---|---|---|
| 1 | FIP | 9914 |
| 2 | FBS | 11150 |
| 3 | FIS | 20586 |
| 4 | FT | 14477 |
| 5 | FMIPA | 9273 |
| 6 | FIK | 1053 |
| 7 | FE | 12213 |
| 8 | PPS | 3891 |
| 9 | Lecturer | 278 |
| 10 | Employee | 108 |
| 11 | Etc | 7207 |
| | Total | 90150 |

**Table 6.** The number of library collections that have been borrowed

| No | Month | Total |
|---|---|---|
| 1 | January | 2694 |
| 2 | February | 6408 |
| 3 | March | 6649 |
| 4 | April | 5110 |
| 5 | May | 5023 |
| 6 | June | 2706 |
| 7 | July | 893 |
| 8 | August | 1111 |
| 9 | September | 4900 |
| 10 | October | 3808 |
| 11 | November | 7278 |
| 12 | December | 4137 |
| | Total | 50717 |

**Data 2016**

In 2016, the library enhanced its digital resources by acquiring subscriptions to 16,630 Ebsco e-journal titles, 1,833 items from Springer, and 831 titles from Elsevier. The e-book library expanded by obtaining 6,517 items from Springer, 35 from Wiley, 37 from Cengage, and 201 titles from Elsevier (ScienceDirect). Table 7 depicts the total number of library collections, demonstrating the library's ongoing commitment to meeting academic needs by significant resource augmentation.

**Table 7.** Total of the Library Collection

| No | Collection | 2015 | | Additional Collection | | 2016 | |
|---|---|---|---|---|---|---|---|
| | | Title | Copies | Title | Copies | Title | Copies |
| 1 | Book | 32541 | 91829 | 2385 | 6630 | 34926 | 98522 |
| 2 | Thesis | 52061 | 61580 | 2425 | 2425 | 54486 | 64005 |
| 3 | Research Report | 3770 | 4040 | 165 | 165 | 3935 | 4205 |
| 4 | Thesis | 3888 | 3888 | 1083 | 1083 | 4971 | 4971 |
| 5 | Dissertation | 5397 | 5397 | 832 | 832 | 6229 | 6229 |
| 6 | Topographic maps | 70 | 70 | 0 | 0 | 70 | 70 |
| 7 | Magazine subscribed | 26 | 255 | 0 | 119 | 26 | 374 |
| 8 | Magazine of donations | 158 | 2632 | 0 | 546 | 158 | 3178 |
| 9 | Journal subscribed | 20 | 126 | 0 | 28 | 20 | 154 |
| 10 | Journal of donations | 219 | 366 | 0 | 145 | 219 | 511 |
| | Total Collection | | | | | 105040 | 182219 |

Table 8 displays data on the total number of library visitors classified by faculty, demonstrating user engagement across several academic disciplines. Moreover, Table 9 demonstrates the volume of library collections that have been borrowed, indicating consistent and robust utilization of library resources.

**Table 8.** Total library visitors per faculty

| No | Faculty | Total |
|---|---|---|
| 1 | FIP | 4458 |
| 2 | FBS | 4722 |
| 3 | FIS | 9450 |
| 4 | FT | 6758 |
| 5 | FMIPA | 5008 |
| 6 | FIK | 421 |
| 7 | FE | 4872 |
| 8 | PPS | 2001 |
| 9 | Lecturer | 15 |
| 10 | Employee | 21 |
| 11 | Etc | 4332 |
| | Total | 42058 |

**Table 9.** The number of library collections that have been borrowed

| No | Month | Total |
|---|---|---|
| 1 | January | 2825 |
| 2 | February | 4691 |
| 3 | March | 5212 |
| 4 | April | 4423 |
| 5 | May | 3259 |
| 6 | June | 3044 |
| 7 | July | 814 |
| 8 | August | 1049 |
| 9 | September | 4248 |
| 10 | October | 3270 |
| 11 | November | 2920 |
| 12 | December | 2209 |
| | Total | 37964 |

**Data 2017**

In 2017, the library continued to serve the academic community effectively, as reflected in the data on user engagement. Table 10 presents the total number of library visitors per faculty, offering insight into the level of access and utilization across various departments.

**Table 10.** Total library visitors per faculty

| No | Faculty | Total |
|---|---|---|
| 1 | FIP | 7662 |
| 2 | FBS | 6905 |
| 3 | FMIPA | 11662 |
| 4 | FIS | 11221 |
| 5 | FT | 10501 |
| 6 | FIO | 685 |
| 7 | PS | 2250 |
| 8 | FE | 6594 |
| 9 | Public | 11018 |
| 10 | Employee | 12 |
| 11 | PPG | 67 |
| 12 | Lecturer of FBS | 7 |
| 13 | Lecturer of BPPS | 3 |
| 14 | Lecturer of FT | 11 |
| 15 | Lecturer of FMIPA | 5 |
| 16 | Lecturer of FIP | 4 |
| | Total | 68607 |

**Table 11.** The number of library collections that have been borrowed

| No | Month | Total |
|---|---|---|
| 1 | January | 2881 |
| 2 | February | 1992 |
| 3 | March | 4211 |
| 4 | April | 1091 |
| 5 | May | 1482 |
| 6 | June | 2076 |
| 7 | July | 2228 |
| 8 | August | 1185 |
| 9 | September | 4026 |
| 10 | October | 3463 |
| 11 | November | 2614 |
| 12 | December | 3557 |
| | Total | 30806 |

Furthermore, Table 11 highlights the number of library collections that have been borrowed, demonstrating the sustained interest and active use of the library's resources by students, faculty, and researchers.

**Data 2018**

In 2018, the library maintained its commitment to academic support through a substantial and varied collection of resources. As shown in Table 12, the total library collection comprised 5,274 titles and 6,752 copies, including 1,015 book titles (2,493 copies), 134 research reports, 3,247 theses, 663 additional theses, and 206 dissertations. This diverse collection reflects the library's role in preserving and providing access to a wide range of academic works. Table 13 presents the total number of library visitors per faculty, with the Faculty of Social Sciences (FIS) having the highest number at 22,879, followed by the Faculty of Engineering (FT) with 22,350, and the Faculty of Language and Arts (FBS) with 15,271, contributing to a total of 93,370 visitors across all faculties. Meanwhile, Table 14 shows the number of library collections that have been borrowed, indicating a continued high level of user engagement and resource utilization.

**Table 12.** Total of the Library Collection

| No | Collection | Total | |
|---|---|---|---|
| | | Title | Copies |
| 1 | Book | 1015 | 2493 |
| 2 | Research Report | 134 | 134 |
| 3 | Thesis | 3247 | 3247 |
| 4 | Thesis | 663 | 663 |
| 5 | Dissertation | 206 | 206 |
| Total | | 5274 | 6752 |

**Table 13.** Total library visitors per faculty

| No | Faculty | Total |
|---|---|---|
| 1 | FIP | 11000 |
| 2 | FBS | 15271 |
| 3 | FMIPA | 8369 |
| 4 | FIS | 22879 |
| 5 | FIO | 829 |
| 6 | FE | 12672 |
| 7 | FT | 22350 |
| Total | | 93370 |

**Table 14.** The number of library collections that have been borrowed

| No | Month | Total |
|---|---|---|
| 1 | January | 8553 |
| 2 | February | 4891 |
| 3 | March | 13860 |
| 4 | April | 9974 |
| 5 | May | 7323 |
| 6 | June | 4166 |
| 7 | July | 6585 |
| 8 | August | 2250 |
| 9 | September | 6771 |
| 10 | October | 6876 |
| 11 | November | 5970 |
| 12 | December | 5200 |
| Total | | 82419 |

The following infographics have been made based on data obtained. Infographics about library visitors in 2014 based on Table 2.

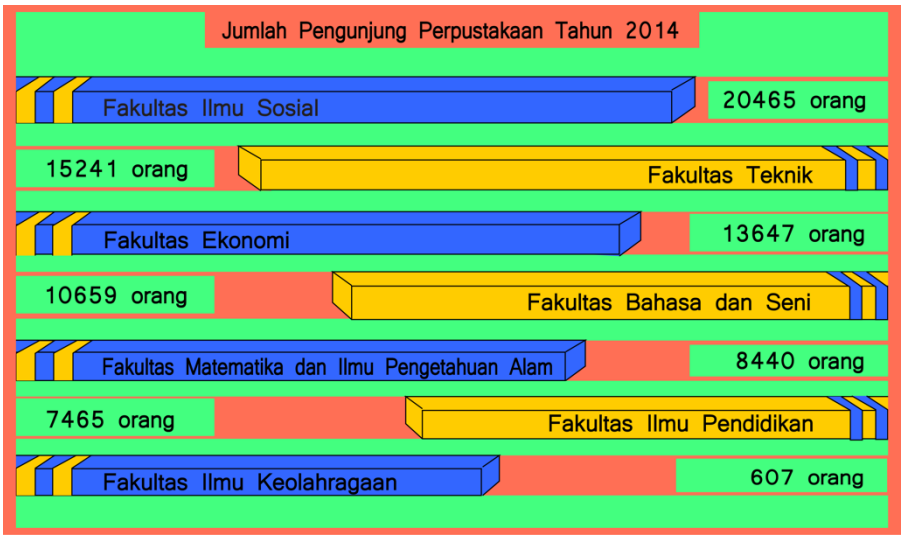



**Figure 5.** Total library visitors in 2014

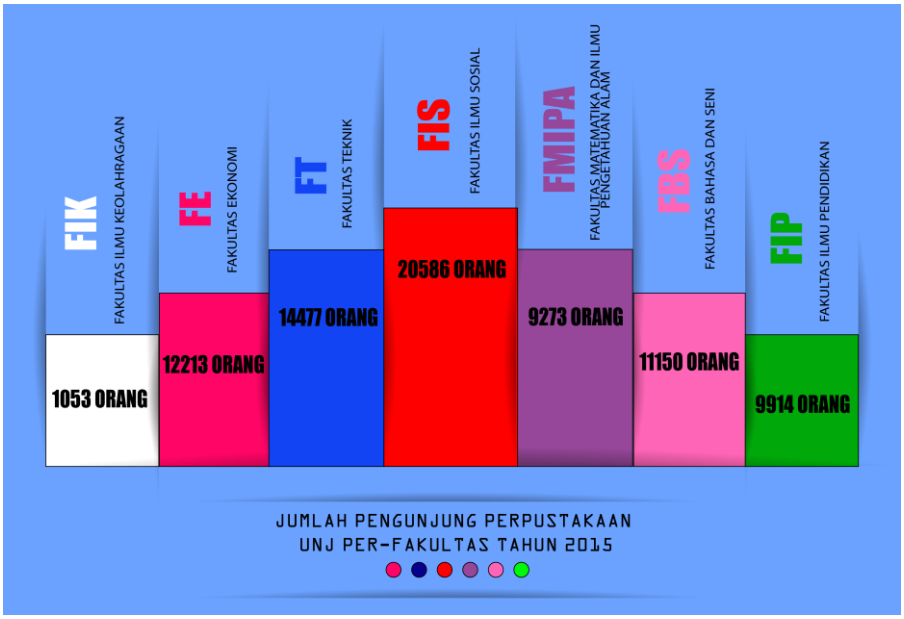



**Figure 6.** Total library visitors in 2015

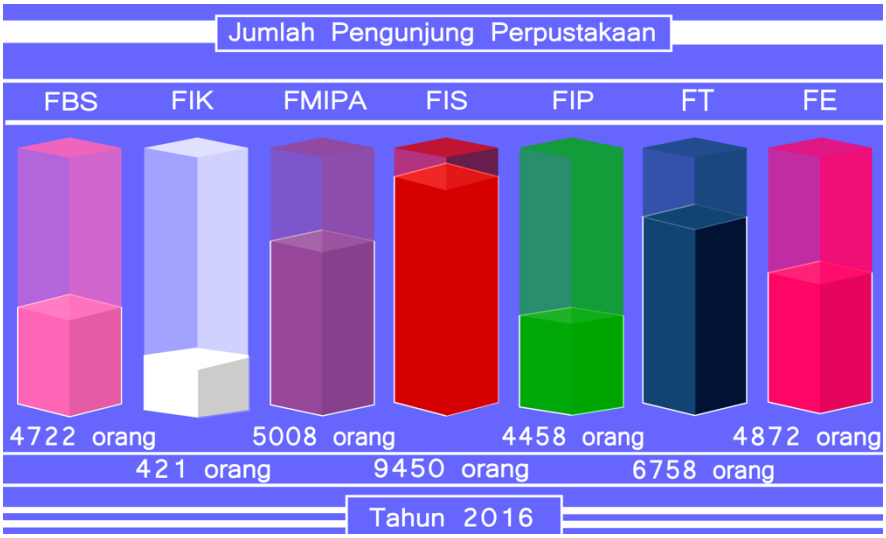



**Figure 7.** Total library visitors in 2016

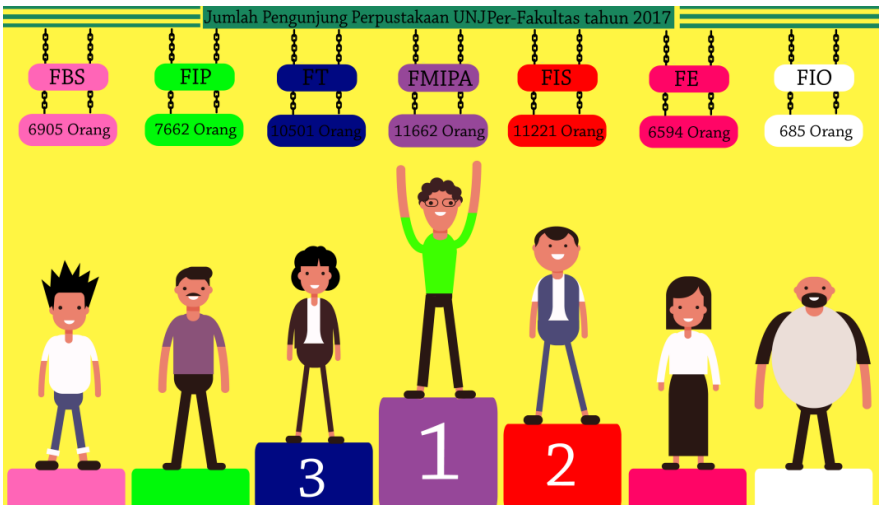



**Figure 8.** Total library visitors in 2017

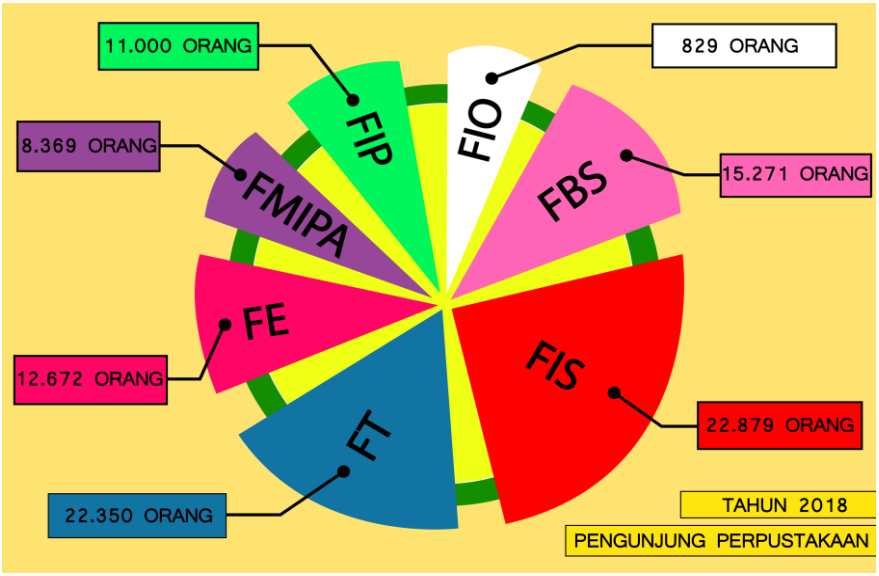



**Figure 9.** Total library visitors in 2018

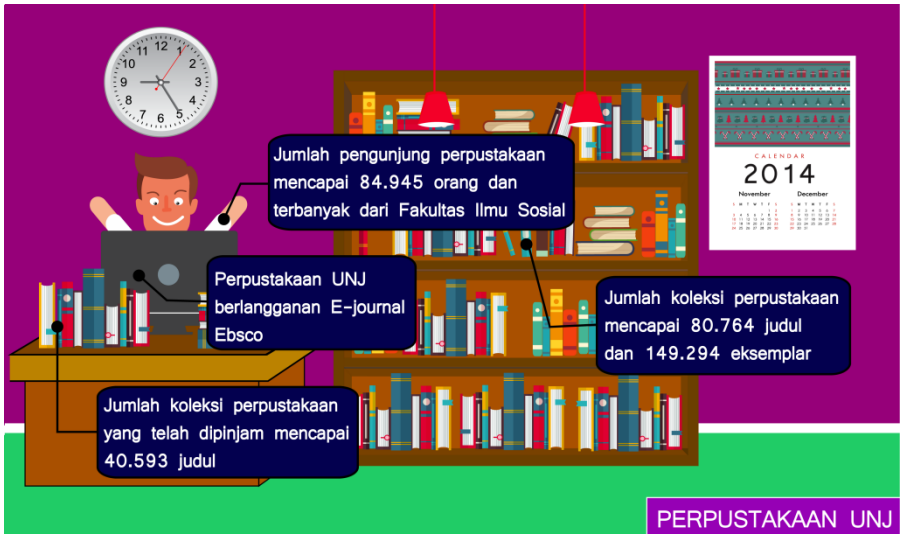



**Figure 10.** General library infographic information in 2014


**Figure 11.** General library infographic information in 2015


**Figure 12.** General library infographic information in 2016

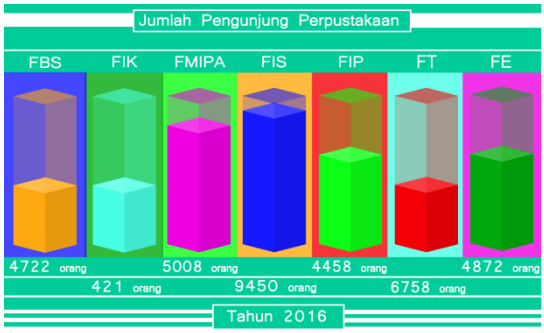
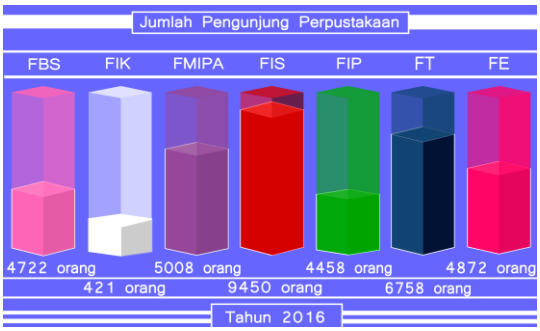

**Figure 13.** General library infographic information in 2017


**Figure 14.** General library infographic information in 2018

## Design Feasibility Test Results

Design feasibility is assessed with seven aspects of visual structure, readability, color, illustration and drawings, layouts, icons and symbols, and typography. For aspects of visual structures developed in 4 statements. For the readability, aspect is developed in 4 statements. For color, aspects are developed in 3 statements. For the illustration aspect and the drawings are developed in 4 statements. For layout aspects developed in 3 statements. For the icon and symbol aspects are developed in 3 statements. For typographical aspects developed in 3 statements. The following depictions of products before and after are discussed with design experts.

**Tabel 15.** Comparison of Initial Products with Product Revisions

| Intial Product (Before Revision) | Final product (After Revision) |
|---|---|
|  <br>Color selection is less matching and too flashy. |  <br>The color selection is more similar and not striking. |
|  <br>The basic colors are too bright so the white text is not too visible and the color boundaries between the faculties make the colors pile up. |  <br>The choice of the base color is more black so that the white text is visible and there are no color boundaries between faculties so there is no piling up the color. |
|  <br>The background color of the writing is better than the basic color and the selection of colors is older and softer so the text is legible. |  <br>The background color is by the basic color of the floor and the writing can be read. |

| Intial Product (Before Revision) | Final product (After Revision) |
|---|---|
|  <br>The choice of the basic color of the information writing is better to adjust the color of the floor with the black font color and the basic color of the writing "PERPUSTAKAAN UNJ" and "2016" is recommended according to the color of red on the clothes illustration of people in infographics. |  <br>The base color of the writing adjusts the color of the floor with the black font color and the basic color of the writing "PERPUSTAKAAN UNJ" and "2016" |

## CONCLUSION

Learning with this STEM learning approach is very effective for discussing the concept of wave rectifier circuits for learning materials in vocational schools. Students can learn the design and analysis of half-wave rectifier circuits, center-tapped full-wave rectifiers, and 4-bridge full-wave rectifiers through simulations on NI Multism 13.0 software. In addition to strengthening students' theoretical understanding of the basic concepts of wave rectifiers, this STEM approach learning method can also hone practical skills, such as designing circuits, analyzing, and calculating average voltage.

The development of STEM-based teaching materials in the form of PowerPoint presentations supports the learning process by presenting theory, application, and worksheets to measure students' level of understanding. Through the integration of science, technology, engineering, and mathematics elements, the STEM approach is able to improve students' analytical skills, creativity, and innovation, making them better prepared to face the demands of the industrial revolution 4.0 era.

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