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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.

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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.

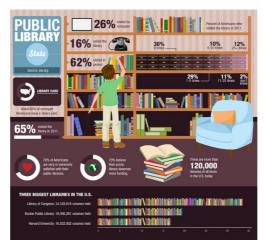


Figure 1. American national library infographics





Figure 2. University of Maryland library infographics



Figure 3. FT-UGM Library Infographics

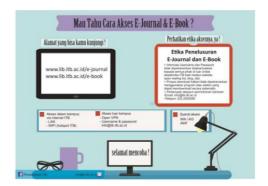


Figure 4. Bandung Institute of Technology Library infographics

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

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

		4. Numbe	2014		Additional		2015	
No	Collections			Colle	Collection			
		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

IUDI	Tuble 9: 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

	nave been bonowed	
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	
	Т	otal Coll	ection			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

i abic .	io. Total library visitor.	s 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

	Mat have been bor	
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



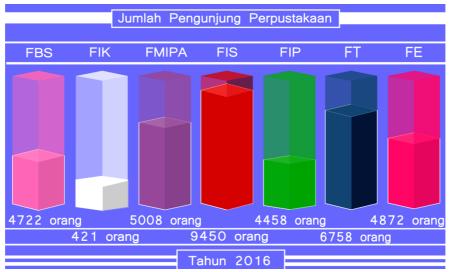


Figure 7. Total library visitors in 2016

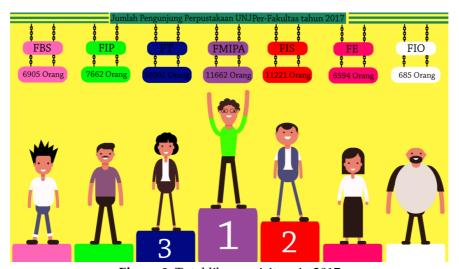


Figure 8. Total library visitors in 2017

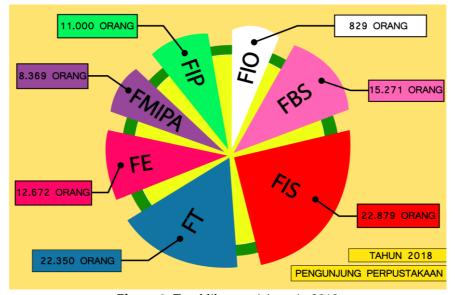


Figure 9. Total library visitors in 2018





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)



Color selection is less matching and too flashy.



The color selection is more similar and not striking.



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.



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.



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.



The background color is by the basic color of the floor and the writing can be read.



Intial Product (Before Revision)



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.

Final product (After Revision)



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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