



Virtual Literacy as a Digital Communication Means for Dissemination of Agricultural Information

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ABSTRACT

This study examines the implementation of virtual literacy by the Center for Agricultural Library and Literacy (BB PUSTAKA) of the Indonesian Ministry of Agriculture as a digital communication innovation for disseminating agricultural information. Using a qualitative case study approach, the research is grounded in Everett M. Rogers' Diffusion of Innovation theory to explain how new practices are introduced and adopted by communities. Data were collected through interviews, observations, and document analysis. The findings reveal that virtual literacy, delivered through Zoom, YouTube streaming, and social media, has effectively expanded access to agricultural information, bridging geographical barriers and engaging diverse stakeholders such as farmers, extension workers, researchers, academics, and agribusiness actors. Beyond one-way communication, virtual literacy provides interactive features that foster two-way dialogue, enhance knowledge transfer, and validate information with practical field evidence. For farmers and extension workers, it serves as a fast, accurate, and relevant information source, while for BB PUSTAKA, it strengthens institutional image, networks, and digital knowledge repositories. Overall, virtual literacy has proven to be an effective, inclusive, and sustainable medium for accelerating agricultural transformation toward modern, productive, and competitive systems

INTRODUCTION

The development of digital technology has brought significant transformations across various sectors, including agriculture. Access to agricultural knowledge and information is a key factor in improving productivity and sustainability in the agricultural sector. However, farmers in many areas, especially in rural regions, still face challenges in accessing relevant agricultural information due to limited digital infrastructure and low levels of digital literacy (Setiawan, 2024). This gap hinders the adoption of innovation and sustainable farming practices, ultimately affecting farmers' productivity and welfare. Along with the increasing penetration of the internet and digital devices, virtual literacy has emerged as an innovative solution to address these challenges. Virtual literacy refers to the ability to access, understand, and utilize open digital resources, which can serve as an effective means of disseminating information (Lubis et al., 2023).

Law Number 3 of 2017 states that literacy is the ability to interpret information critically so that every individual can access knowledge and technology as an effort to improve their quality of life (Aswita et al., 2022). According to Handayani (2020), literacy is an individual's language ability, including listening, speaking, reading, and writing to communicate in different ways according to its purpose. Information literacy is part of community empowerment in the field of information (Hasugian in Junaidi, 2022). It refers to the ability to search for, evaluate, and use the required information effectively. Agricultural information literacy needs to be instilled by stakeholders in the agricultural sector, such as researchers, policymakers, extension workers, and others, because the speed and ease with which farmers obtain information can only be achieved if farmers are aware of its importance (Junaidi, 2022).

Virtual Literacy (VL) is literacy based on interactive online communication using video conferencing facilities that can be attended by various users according to their needs (Grahani & Priambudi, 2024). The Center for Agricultural Library and Literacy (BB PUSTAKA), which carries out information dissemination activities, targets virtual literacy to accelerate access to agricultural information, particularly agricultural technology, for farmers as the primary user group. In addition, virtual literacy can also be used as a medium to connect various stakeholders, including agricultural entrepreneurs and agricultural technology experts, in accordance with the information needed.

Data from the Telecommunication Statistics of Indonesia Catalogue 2023 explains that internet usage is dominated by social media activities and accessing information or news, with respective percentages of around 95.56% and 79.04% (Telecommunication Statistics of Indonesia, 2023). Meanwhile, according to We Are Social, the number of internet users in Indonesia released in January 2023 reached 202.6 million, equivalent to 73.7% of the total population (Kemp, 2024). The internet has transformed the way people communicate and access information, particularly during the pandemic.

LITERATURE REVIEW

Diffusion of Innovation Theory

The development and innovation in the digital world, such as virtual literacy, are closely related to the Diffusion of Innovation theory. This theory was first introduced by Everett M. Rogers, who sought to explain how innovations are introduced and adopted by a community or social group (Anistasya et al., 2025). The diffusion of innovation is also one of the most widely used communication theories in various discussions concerning the socialization of new ideas. In the context of this study, the researcher also applies this theory since virtual museum tours represent a form of innovation and a new idea for society in engaging with museums. According to Rogers (Sutjipto, 2019), innovation is defined as an idea, activity, or object that contains elements of novelty.

Syarif (2025) emphasized that the diffusion of innovation does not occur automatically, but rather involves four main elements that influence one another. These elements are: (1) Innovation, generally understood as a context involving the introduction of something new; (2) Communication Channels, which serve as the medium between communicator and communicant in conveying messages. In this context, communication channels are categorized into two types: mass media and interpersonal communication, each with its own advantages and disadvantages; (3) Time, which encompasses the entire sequence of processes, actions, or conditions as they unfold; and (4) Social System, which can be defined as a set of interrelated units engaged in solving problems to achieve common goals.

Furthermore, Rahmawaty et al. (2025) explain that diffusion of innovation is a process by which an innovation is communicated through certain channels to audiences or members of a social system. Within this theory, the media serve as the primary platform for delivering information. Moreover, the media play an important role in promoting the diffusion and adoption of both social and technical innovations associated with modernization (Santoso, 2016). Anistasya et al. (2025) further highlight that there are four stages in the diffusion of innovation process: (1) Knowledge, which refers to individuals' awareness of the existence of an innovation and its functions; (2) Persuasion, which relates to individuals' attitudes toward accepting or rejecting the innovation; (3) Decision, which involves individuals' choice to adopt or reject the innovation; and (4) Confirmation, which refers to individuals seeking reinforcement for the decisions they have made. This stage is flexible and may change if conflicting messages about the innovation are received.

Digital Communication

Digital communication is a virtual phenomenon that takes place online. It is dynamic and continuously evolving along with the development of new internet-based tools and applications (Puspitaningrum, 2021). The rapid growth of communication technology has transformed the way individuals exchange information and interact with one another. Digital communication is gradually replacing traditional forms of communication. Various media are used in digital communication, including Zoom Meetings and Google Meet, which are among

the most commonly utilized platforms for disseminating information. According to Chrisnatalia & Rahadi (2020), several characteristics of digital media can facilitate learning.

The use of communication technology is inseparable from the role of the internet. Supported by internet connectivity, digital communication media are capable of linking information with individuals who need it. With today's interconnected technologies, Bagus (2025) discusses how the world has become a global village. This term refers to the use of digital communication technologies that transform the entire planet into a village by providing instant access to information anytime and anywhere it is needed. The application of such technologies not only fosters discoveries but also transforms society through technical innovations. Internet media offer significant advantages, including wide and borderless reach, as well as affordable costs (Wulandari et al., 2020).

The current era of digitalization has enabled the emergence of new organizational forms for producing or introducing goods and services in a more organized and interconnected manner within an electronic information network system (Estede et al., 2025).

METHODOLOGY

The method employed in this study is the case study method with a qualitative approach. To provide perspective on a particular issue, this research uses a single-case study that focuses only on one specific case (Cresswell & Poth, 2016). The single case highlighted in this study relates to virtual literacy activities carried out by The Center for Agricultural Library and Literacy (BB PUSTAKA) in disseminating information. Qualitative research emphasizes an approach aimed at exploring and understanding the meaning of individuals or groups regarded as social or human problems (Juita et al., 2025). According to Palupi et al. (2025), qualitative research is an approach to data collection within natural settings, intended to describe a phenomenon in which the researcher acts as the key instrument using purposive sampling. Purposive sampling refers to the selection of non-random samples based on a focused consideration of the research objectives (Lenaini, 2021).

The data collection methods in this study consisted of interviews with staff members of BB PUSTAKA as well as several community members who had participated in the virtual literacy activities. To remain focused on the research objectives, the interviews were conducted in an organized manner using pre-formulated questions, with the expectation that informants would clarify the issues under investigation (Hariyono et al., 2025). In addition to interviews, the researcher also conducted observations to obtain data not available through interviews, by analyzing documents from digital media and reviewing relevant literature.

The data obtained from interviews, documents, and field notes were systematically analyzed and organized as part of the data analysis process. This process involves searching for and classifying notes, interviews, and other records in order to better understand all the collected information and to communicate the findings. There are three main steps in the data analysis

process: analyzing different types of data, classifying or categorizing the data, and interpreting or constructing meaning from the data (Hidayat et al., 2025).

RESULTS AND DISCUSSION

In this study, the researcher interviewed five staff members of the Center Agricultural Library and Literacy (BB PUSTAKA) who play key roles in the planning and communication strategies of Virtual Literacy Live in Action. They are: Ifan Muttaqien, Head of the Agricultural Literacy Substantive Group; Eni Kustanti, Sub-coordinator of the Agricultural Science and Technology Publication and Promotion Group; Boy Dewa Priambada, Sub-coordinator of Information Technology Governance; Shintawati Octaviani, Public Relations Officer; and Mohammad Afrilian Ramadhan, Computer Specialist.

These varied informant criteria were selected in order to obtain more diverse data from different perspectives. In addition, the researcher also compared and validated the data regarding the innovations and information disseminated by BB PUSTAKA through Virtual Literacy Live in Action with responses from several community members who had participated in the program online. From their experiences, the researcher was able to gather insights into whether this feature has provided a sufficient alternative for the dissemination of agricultural information.

A. Understanding Virtual Literacy in the Agricultural Context

The results of interviews with informants reveal that the concept of virtual literacy is understood as a form of literacy carried out through digital or online media. Informants, namely Ifan, Eni, and Afrilian, consistently emphasized that virtual literacy is an innovation that utilizes modern information and communication technologies, such as Zoom, Google Meet, YouTube Streaming, and social media platforms like Facebook, Instagram, and TikTok to deliver information and knowledge to the wider public, particularly farmers. This perspective aligns with Van Dijk (2020), who stresses that virtual literacy is not merely a technical skill in operating digital devices but also the ability to access, comprehend, and optimally utilize digital resources. Thus, virtual literacy can be positioned as an effective interactive communication medium for disseminating agricultural information.

Informants highlighted that BB PUSTAKA has developed the program "Agriculture Live in Action" as a concrete practice of virtual literacy. Initially, the program was relatively simple, limited to live reporting of harvest conditions in the field. Over time, however, BB PUSTAKA began to establish standard operating procedures (SOPs) and more systematic event rundowns, making the activities more organized and consistent. The concept of Live in Action is also considered distinctive, as agricultural information and technology are not only presented theoretically but also demonstrated directly through field practices that can be virtually observed by farmers, extension workers, practitioners, and the general public.

Furthermore, virtual literacy is understood not merely as one-way information delivery but as a form of two-way interaction. Through interactive features such as the "raise hand" and live chat functions in Zoom, as well as

comment sections on YouTube, participants are provided with space to interact directly with presenters. If certain questions remain unanswered during the session, BB PUSTAKA offers follow-up mechanisms by connecting participants with resource persons or directing them to the agricultural information repository it maintains. This demonstrates that virtual literacy also functions as a medium of communication and cross-sector collaboration, in line with BB PUSTAKA's role as a facilitator of agricultural information.

In terms of substance, informants stressed that the information disseminated through virtual literacy is always grounded in strong scientific foundations and practical field experience. BB PUSTAKA collaborates with researchers, university lecturers, extension workers, and technology-adopting farmers to provide presentations and testimonies on the application of specific agricultural technologies. Through this approach, the information received by the public is not only theoretical but also supported by concrete evidence of implementation in the field. This model supports the assertion in the background section that digital literacy can accelerate the dissemination of innovations and sustainable agricultural practices by providing valid, relevant, and easily understandable information.

Additionally, informants acknowledged that the initial idea of virtual literacy at BB PUSTAKA emerged from interactions with the public on social media, particularly from comments and topic requests received via Facebook. This shows that the information needs of society, especially farmers and extension workers, play a crucial role in determining the themes of virtual literacy activities. Thus, the concept of virtual literacy in agriculture is not only driven from the top down by the Ministry of Agriculture's policies but also evolves participatively based on the aspirations and needs of information users. Overall, the understanding of virtual literacy at BB PUSTAKA is consistent with the objectives of virtual literacy outlined in academic literature, namely to broaden access to agricultural information through digital media, bridge geographical limitations, and create communication spaces between researchers, extension workers, agribusiness actors, and farmers. Therefore, virtual literacy functions not only as a medium for information dissemination but also as a tool of digital communication that promotes knowledge transfer and supports sustainable agricultural development.

B. The Process of Understanding and Preparing Virtual Literacy

Informants stated that the time required to understand and implement virtual literacy varied. According to Ifan and Boy, the concept was initially not fully clear, leading BB PUSTAKA to undergo a process of trial and error before identifying the right format. The first activities were limited to brief reports on harvest conditions in the field, which were then broadcast live. Over time, however, these activities evolved into programs with more structured rundowns and standard operating procedures (SOPs). Eni added that the preparation process for Live in Action events generally takes between one week and one month, depending on the complexity of the topic and the readiness of the location. Prior to the implementation day, the team always conducts field surveys and technical rehearsals, particularly to ensure the quality of the internet connection, which is the main requirement for the success of the event.

Meanwhile, Boy and Afrilian emphasized that from a technical perspective, BB PUSTAKA prepares a backup internet connection to allow an immediate switch in case of disruptions during the event.

C. Visualization and Presentation Appeal

The visual aspect is one of the most important components in ensuring the effectiveness of virtual literacy. According to Shintawati, visualization functions as a key support to make the material easier for participants to understand. For instance, when broadcasting agricultural practices in the field, the role of the cameraman is crucial in ensuring that the objects displayed are clear and informative. Ifan also emphasized that BB PUSTAKA incorporates infographics and promotional videos about agricultural technology at the beginning and end of each session, so that the audience gains a comprehensive overview of the topic being discussed. This aligns with findings in the literature, which state that digital visualization can enhance both the attractiveness and the comprehension of participants toward agricultural literacy materials (FAO, 2021).

BB PUSTAKA identifies farmers, livestock breeders, and extension workers as the primary target audience, followed by the general public. For this reason, virtual literacy is designed in the form of a live field reality show with a reporting concept, where reporters interview resource persons directly. The program is packaged in a popular language to ensure it is easily understood by the target audience and includes material presentations as well as Q&A sessions. The selection of themes is determined through surveys distributed via social media and extension worker groups. The results of these surveys show that the most popular topics include improved crop varieties, cultivation technologies, post-harvest technologies, and appropriate technology.

Virtual literacy is essentially a literacy model based on interactive online communication using video conferencing facilities that can be accessed by diverse users according to their needs. For agricultural libraries, virtual literacy is intended to accelerate access to agricultural information, particularly agricultural technologies, for users, especially farmers. In addition, virtual literacy can also be used as a medium to connect various stakeholders, including agricultural entrepreneurs and agricultural technology experts, according to farmers' needs. In the future, this medium is also expected to be utilized for capacity building as well as agricultural business transactions. One of the applications that can be easily and affordably used by participants for virtual literacy is Zoom. One such activity developed to disseminate agricultural technologies is Live in Action Agricultural Technology.

The input components of virtual literacy activities include funding, human resources for implementation, and supporting equipment. Regarding human resource needs, since the same personnel are often required across different activities, allocation is arranged as efficiently as possible. In addition, coordination with other work units or technical implementing units (UK/UPT) as sources or providers of technological information continues to be strengthened so that the preparation of materials can be completed comprehensively and in a timely manner.

Table 1. Virtual Literacy 2021

N O	Title	Time	Collaboration	Number of Participants
1	Integrated Livestock Bioindustry	19 February 2021	BB PUSTAKA - BPSIP Central Java	1.558
2	Arabica Coffee Cultivation, Processing, and Marketing	25 March 2021	BB PUSTAKA - BRMP TRI	1.278
3	Caring for the Earth with Environmentally Friendly Agriculture	22 April 2021	BB PUSTAKA - BPSI Lingtan	1.315
4	Farming Success with Balanced Fertilization	20 May 2021	BB PUSTAKA - Pusluhtan - BRMP Lahan	3.229
5	Increasing Mango Yields with UHDP Technology	8 June 2021	BB PUSTAKA - Ditjen Hortikultura - IPB	384
6	Utilizing Science and Technology Information for Agricultural Development	26 August 2021	BB PUSTAKA - BPP Pathok Beusi	1956
7	A Complete Guide to Porang Cultivation	22 September 2021	BB PUSTAKA - BRMP Aneka Kacang	333
8	Environmentally Friendly Rat Pest Control with Tyto Alba	26 October 2021	BB PUSTAKA - Distankan Kab. Sukoharjo	1.633
9	A Complete Guide to Export-Quality Ornamental Plant Cultivation	26 November 2021	BB PUSTAKA - BRMP Tanaman Hias	1.633

Table 2. Virtual Literacy 2022

N O	Title	Time	Youtube Link	Number of Participants
1	Integrated Rice Pest Management	2 March 2022	https://www.youtube.com/watch?v=frnIwKIYZsc	248
2	The Ease of Soybean Cultivation	14 April 2022	https://www.youtube.com/watch?v=1eP7f5qAdhI	588

3	IP 400 Development	25 May 2022	https://www.youtube.com/watch?v=pOwx5Y9XzWo	530
4	Measuring Greenhouse Gas Effects	5 July 2022	https://www.youtube.com/watch?v=6u9bBv3CITg	854
5	Planting Shallots in Suboptimal Land	11 August 2022	https://www.youtube.com/watch?v=8VN-B7SjnPc	376

In addition, agricultural technology live videos have been conducted four times. The concept of these live videos is to present resource persons directly in the broadcast so that the public can ask questions if there are parts of the tutorial that are not clearly understood. The live videos are delivered through real-time YouTube streaming, which is accessible only during the event. Once the session ends, the live video can no longer be viewed.



Figure 1. Virtual Literacy Live in Action

The outcome of this sub-activity is the successful delivery of agricultural technology information as well as information about BB PUSTAKA, thereby accelerating the flow of technological information to the wider community. The use of video as a medium for delivering agricultural information and technology makes it easily accessible to the public, considering that almost everyone now has access to video-playing devices and can replay the content at their

convenience. Furthermore, to facilitate public access to information, the videos have been uploaded to YouTube.com, given that it is currently the most widely used platform by the public for searching information and viewing videos.

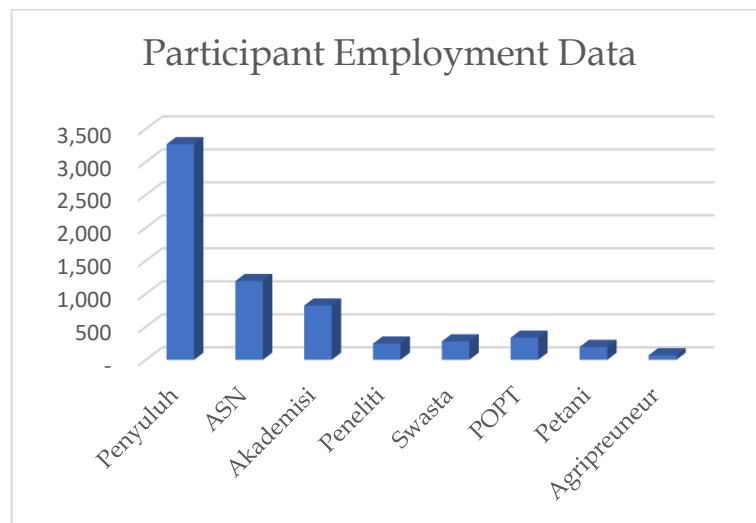


Figure 2. Participant Employment Data

From the nine Virtual Literacy sessions with the Live Agriculture in Action concept, it can be seen that the professions of the participants were as follows: extension workers (3,268), civil servants (ASN) (1,192), academics (822), researchers (246), private sector employees (279), plant protection officers (POPT) (336), farmers (195), and agripreneurs (69). A total of 6,047 participants filled out the questionnaire out of the overall 13,319 participants.

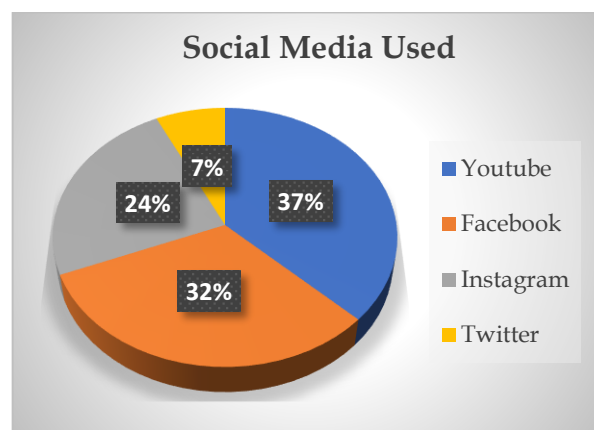


Figure 3. Social Media Used

The most frequently accessed social media platform by participants was YouTube, with 4,010 users, followed by Facebook with 3,440, Instagram with 2,593, and Twitter with 773 participants.

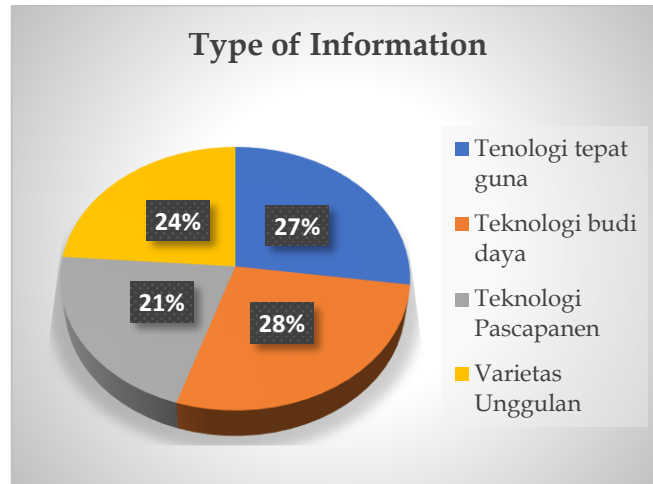


Figure 4. Type of Information

Based on the data above, it can be seen that the type of information most needed by participants is cultivation technology, chosen by 3,940 participants. This is followed by appropriate technology, selected by 3,860 participants; superior varieties, chosen by 3,383 participants; and post-harvest technology, selected by 3,008 participants.

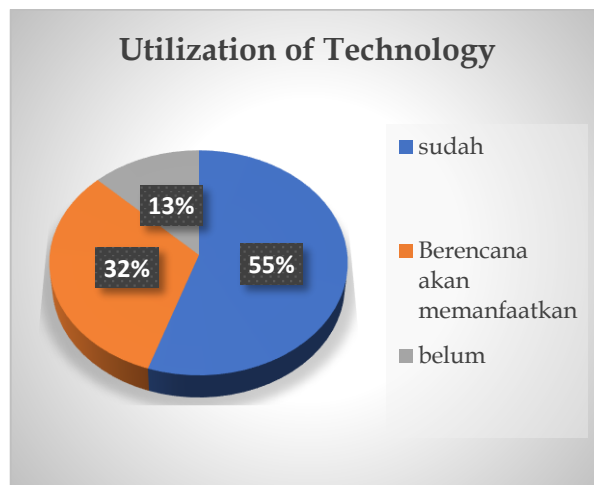


Figure 5. Utilization of Technology

Based on the data above, it can be seen that 3,535 participants have already utilized agricultural technologies developed by the Ministry of Agriculture, 2,064 participants plan to utilize them, while 808 participants have not yet made use of them.

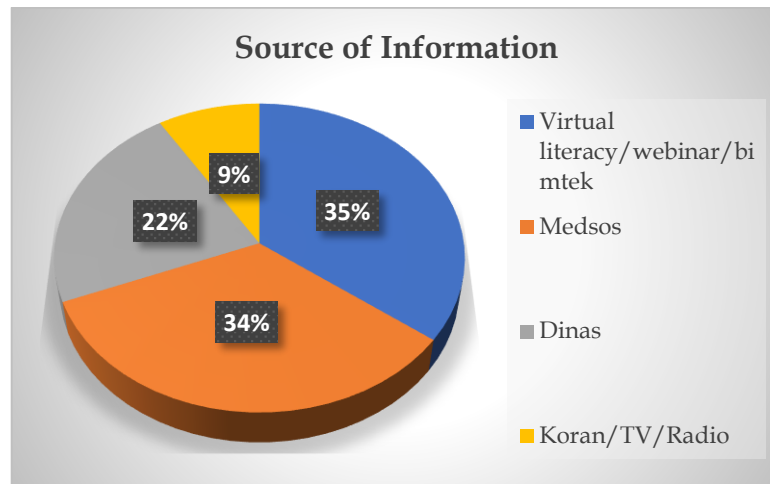


Figure 6. Source of Information

Based on the data above, it can be seen that 3,535 participants selected virtual literacy as their source of information, followed by 3,396 participants who chose social media.

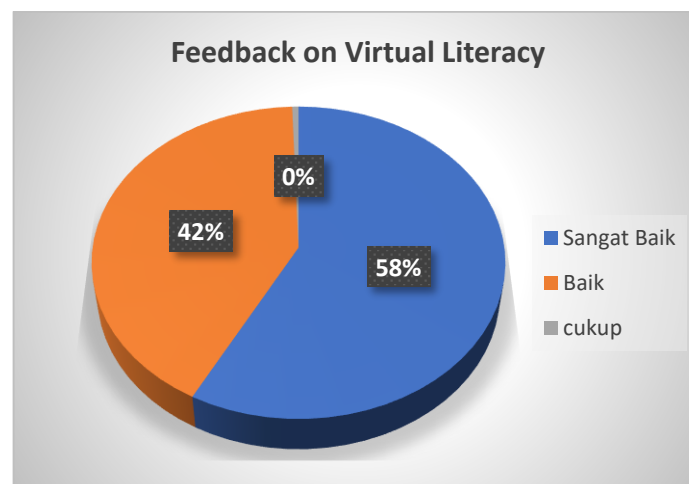


Figure 7. Feedback on Virtual Literacy

Based on the data above, 3,434 participants evaluated the implementation of virtual literacy as very good, while 2,473 participants assessed it as good.

D. The Impact of Virtual Literacy on Stakeholders and BB PUSTAKA

The virtual literacy program has brought tangible benefits for both farmers and BB PUSTAKA. From the perspective of farmers and extension workers, this activity has become a source of fast, accurate, and easily accessible information, even for those living in remote areas with limited digital infrastructure. The information obtained is considered relevant and aligned with their needs, particularly regarding agricultural technologies, crop cultivation practices, and government policies such as the balanced fertilization program.

From BB PUSTAKA's perspective, the successful implementation of virtual literacy has contributed to enhancing the institution's image as a

facilitator of digital agricultural information. Furthermore, BB PUSTAKA has gained wider recognition among stakeholders, expanded its networks, and enriched its agricultural knowledge repository, which can be accessed by the public through digital platforms such as YouTube and the official website.

CONCLUSION AND RECOMMENDATION

This study demonstrates that virtual literacy, developed by The Center for Agricultural Library and Literacy (BB PUSTAKA) under the Ministry of Agriculture, represents a strategic innovation in the dissemination of agricultural information in the digital era. The use of online communication technologies, such as Zoom, YouTube Streaming, social media, and Agriculture Live in Action, has proven effective in expanding access to information, reaching farmers, extension workers, researchers, academics, and the general public. This initiative successfully bridges geographical limitations while serving as an interactive communication medium between agricultural experts, agribusiness actors, and farmers in the field.

In terms of substance, the information delivered is not only theoretical but also validated by practical field evidence through the involvement of researchers, extension workers, and technology-adopting farmers. This approach strengthens public trust and ensures that the information received can be directly applied. From a process perspective, BB PUSTAKA applies thorough preparation, ranging from field surveys and technical trials to the development of standard operating procedures (SOPs) while involving dedicated teams supported by adequate human resources and technological capacity.

Moreover, virtual literacy has generated tangible impacts for both stakeholders and BB PUSTAKA. Farmers and extension workers benefit from fast, accurate, and relevant agricultural information, while BB PUSTAKA has strengthened its image as a facilitator of digital literacy, expanded its networks, and enriched its agricultural knowledge repository accessible to the public. This success aligns with Rogers' Diffusion of Innovation theory, in which the adoption of new technologies is made possible through appropriate and interactive digital communication channels.

In conclusion, virtual literacy can be regarded as an effective, inclusive, and sustainable digital communication medium for disseminating agricultural information. Moving forward, the optimization of this initiative holds potential not only to strengthen the digital literacy capacity of the agricultural community but also to support the acceleration of agricultural transformation toward a more modern, productive, and competitive system.

FURTHER STUDY

This study still has shortcomings, so in order to improve it and give readers more insight for future research, more investigation is required on the subject of Virtual Literacy as Digital Communication for the Dissemination of Agricultural Information.

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