



# Designing and Evaluating an Effective Online Training Program for Health Information Systems Implementation in Indonesia

Untoro Dwi Raharjo

Faculty of Health, Department of Medical Record and Health Information, Universitas Jenderal Achmad Yani Yogyakarta,  
Yogyakarta, Indonesia

Jl. Brawijaya Jl. Ringroad Barat, Gamping Kidul, Ambarketawang, Kec. Gamping, Kabupaten Sleman, Daerah Istimewa Yogyakarta  
55294, Indonesia

Email: [untorodr.unjaya@gmail.com](mailto:untorodr.unjaya@gmail.com)

**Abstract**—Online training for health information system (HIS) introduction and capacity building offers a valuable solution for reaching remote healthcare providers. This approach provides cost-effectiveness and broad geographical reach. However, despite these advantages, online training presents several challenges, complicating its development. We aimed to design a precise online training program systematically which can be an alternative to reach remote healthcare providers. We also intend to give an important evaluation and possibility of online training in improving healthcare providers related to health information system. This paper shared insights from implementing online training for a zoonosis information system through an action research approach using a four-cycle process. We collaborated with stakeholders from various sectors, targeting healthcare providers at Primary Healthcare Centers (PHCs), zoonosis program coordinators from District and Provincial Health Offices across 10 regions in Indonesia, and national-level stakeholders. To ensure seamless online training, we used multiple platforms, including a Learning Management System, Wiki.js, Zoom Meetings, and an online discussion group. A hierarchical training model was developed, allowing national stakeholders to become trainers in future sessions. Despite the benefits in delivering new knowledge and experience in HIS, significant challenges included internet connectivity issues, affecting 60.00% of participants. The participants' experience was a positive based on Community of Inquiry (CoI) evaluation framework. The evaluation showed that participants generally had a positive experience. Overall, online training proves to be an effective strategy for enhancing the information and technology skills of remote healthcare providers in HIS.

**Keywords:** Online Training; Health Information System; Community of Inquiry; Zoonosis Information System

## 1. INTRODUCTION

Health Information Systems (HIS) are vital for managing health data, facilitating timely monitoring, analysis, and intervention in various public health issues. In the digital age, real-time access, integration, and analysis of health data are crucial for enhancing the effectiveness of health programs and swiftly responding to disease outbreaks. Training in HIS use plays as a basic step to ensure health workers can leverage this technology for data-driven decision-making and formulating effective health policies (Hemingway-Foday et al., 2019). Traditionally, this training has been conducted face-to-face, but situations such as pandemics, natural disasters, or logistical challenges can make in-person training impractical or impossible (Sarasnita et al., 2021). To overcome these challenges, traditional training has evolved into more flexible online formats using digital technology (Ma et al., 2023).

Online training allows trainers and trainees to engage in educational activities without the need to be in the same physical space, utilizing digital platforms such as Learning Management Systems (LMS), video conferencing tools, and online collaborative applications. This approach ensures training continuity during crises and extends reach to remote or underserved areas. Online training supports interactive learning through multimedia presentations, video lectures, and virtual simulations, providing flexibility and diverse learning methods (George et al., 2019; Machleid et al., 2020). While it offers significant advantages, challenges such as ensuring reliable internet access and designing user-friendly materials remain. Nevertheless, online training represents a resilient and inclusive solution for capacity-building in healthcare, enhancing HIS skills and contributing to improved health outcomes across diverse populations.

Online training for health information systems provides numerous advantages, particularly in geographically diverse contexts like Indonesia. With over 17,000 islands and a widely dispersed population, traditional face-to-face training often proves impractical and costly. Online training enables healthcare workers in remote areas to access essential knowledge and skills without extensive travel, thereby reducing both costs and time. This method has become increasingly crucial during situations such as the COVID-19 pandemic, where movement restrictions and physical distancing make traditional training methods unfeasible (Siribaddana, 2019).

Adopting online formats allows training programs to be more flexible and accessible. Digital platforms, including Learning Management Systems (LMS) and video conferencing tools, facilitate the effective delivery of training content. Healthcare workers can engage in educational activities from any location, making it possible to maintain continuous training even during crises. This approach not only ensures the uninterrupted development of skills but also broadens the reach of training initiatives, allowing for the inclusion of participants from remote or underserved areas. The online format allows for the use of interactive multimedia, simulations, and practical exercises that can be accessed according to the participants' schedules, offering flexibility that is not available in conventional training. However, online training faces several challenges (Dehnavieh et al., 2019; D. W. Martin et al., 2020; Uba et al., 2021). The availability of technological infrastructure, such as stable internet connectivity and adequate hardware, is often a major obstacle, especially in remote areas. Additionally, there is a need to ensure that online training materials are well-

adapted to various levels of understanding and user skills, and to provide sufficient technical support during the training (Brennan et al., 2019; George et al., 2019).

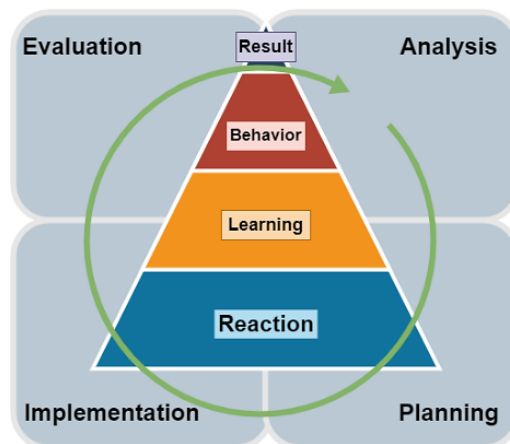
Williams et al. also explained, to address these challenges, online training strategies must be tailored to local conditions. This might include using downloadable training modules that can be accessed offline, developing user-friendly materials with easily understood language, and providing regular discussion or technical guidance. Ongoing evaluation is also crucial to measure the effectiveness of the training and to provide feedback for further improvements (Williams et al., 2020). One of the example of online training that has been developed and implemented to healthcare providers is zoonosis information system training. This online training was done by collaboration of multistakeholders at the national level, non-government organization (NGO) and academicians. The online training had several focuses such as introduction new of zoonosis disease registries in the system, improving healthcare providers knowledge and practice related to the system, evaluation and mentoring (Raharjo et al., 2022).

Those process can be a fruitful information for building the online training in context of health information system capacity building. Online training for health information systems offers significant opportunities to expand training coverage, enhance the capacity of healthcare workers, and accelerate the adoption of health technology across all regions, including remote areas. With proper planning and implementation, this approach can overcome various geographical and logistical barriers, support the strengthening of health systems, and improve the response to public health challenges overall. This study aimed to explain how the online training development process in context to build the human capacity for health information system utilization. We also intend to give an important evaluation and possibility of online training in improving healthcare providers related to health information system. Some variables, such as trainees' knowledge and responses were also identified in this study. The variables influenced participants' knowledge acquisition during the online training on the zoonosis information system information system, contributing insights into the effectiveness of the training program and its impact on healthcare practitioners' capabilities in managing zoonotic diseases effectively. The results of this study can be a reference for designing an effective online training for healthcare providers in the context of digital capacity of health information system.

## 2. RESEARCH METHODOLOGY

### 2.1 Basic Research Framework

This study employed an action research method structured into four cycles: analysis, planning, implementation, and evaluation. The online training development and evaluation referred to Kirk Patrick's model of Training Evaluation but we focused on level 1 reaction and level 2 learning. Figure 1 explained the combination of both approaches that had been used in this study. The research relied on secondary data from the evaluation of an online training program on the zoonosis information system and its post-training implementation assessment conducted in September 2020. Qualitative data sources included in-depth interviews with key informants involved in zoonosis information system online training development, survey to trainees, and documentation of the online training process. The study monitored the engagement of healthcare providers as a participant during online training, participants' knowledge and skills after acquiring online training. Additionally, quantitative data from the online training evaluation were used, including survey results, participant module test scores, Learning Management System (LMS) usage, and pretest and posttest scores.



**Figure 1.** Online Training Development and Evaluation Framework

The study focused on 10 target provinces for the online training on the zoonosis information system: D.I. Yogyakarta, North Sulawesi, Central Sulawesi, South Sulawesi, Bali, West Kalimantan, West Nusa Tenggara, Jambi, Bangka Belitung and Central Java. Two provinces, D.I. Yogyakarta and South Sulawesi, were selected as pilot project locations due to their endemic status for zoonotic diseases according to Ministry of Health of the Republic of Indonesia. The research was conducted from March to April 2022 after obtaining ethical approval from the Ethics Commission of

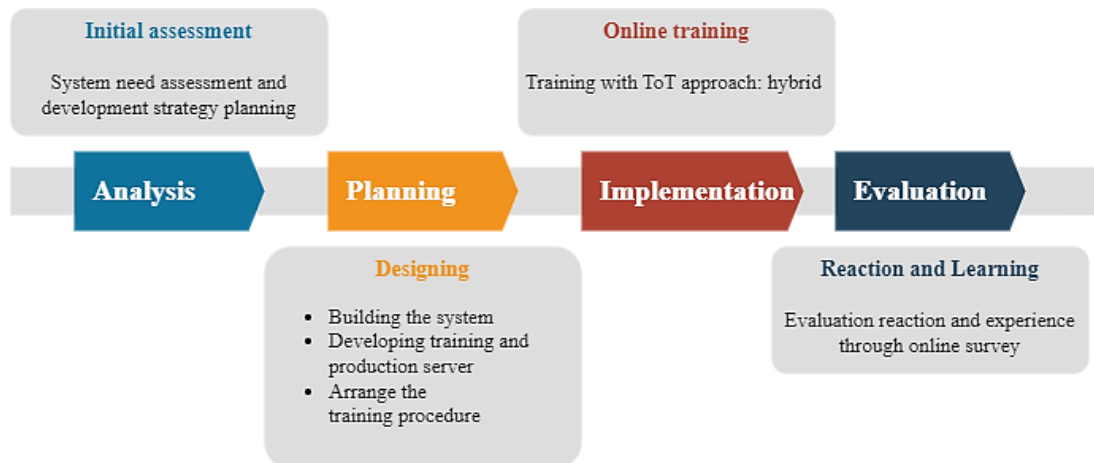
the Faculty of Medicine, Public Health and Nursing, Gadjah Mada University, and research permits from relevant authorities.

For sampling, purposive sampling was used, identifying 60 participants who met specific criteria. Inclusion criteria included participants who completed the entire zoonosis information system online training program, while exclusion criteria included participants who did not fully complete the evaluation. Key informants consisted of 8 individuals who participated in the training and implemented the zoonosis information system, including 2 district health office representatives and 6 primary healthcare center staff members. The study's variables included:

1. Independent variables: Learning experience, social presence, cognitive presence, and teaching presence.
2. Dependent variable: Knowledge.

## 2.2 Research Stages

Figure 2 provided the study process that combined with zoonosis national program. In the initial analysis phase, data were gathered from key stakeholders including the Ministry of Health (MoH), Ministry of Agriculture, and Ministry of Environment of the Republic of Indonesia at the national level. The collected data encompassed various aspects such as the requirements for learning channels, training topics and materials, training strategies, and evaluation methods. Stakeholder interviews guided the formulation of training objectives aimed at healthcare providers. This phase also identified variables essential for integrating digital zoonosis registries into the existing zoonosis information system. Developed using District Health Information Software 2 (DHIS2), a widely adopted platform in 80 countries worldwide, the zoonosis information system was a collaborative effort with stakeholders to address challenges and barriers specific to online training. Healthcare providers from 10 provinces across Indonesia were invited to participate, ensuring representation from diverse regions.



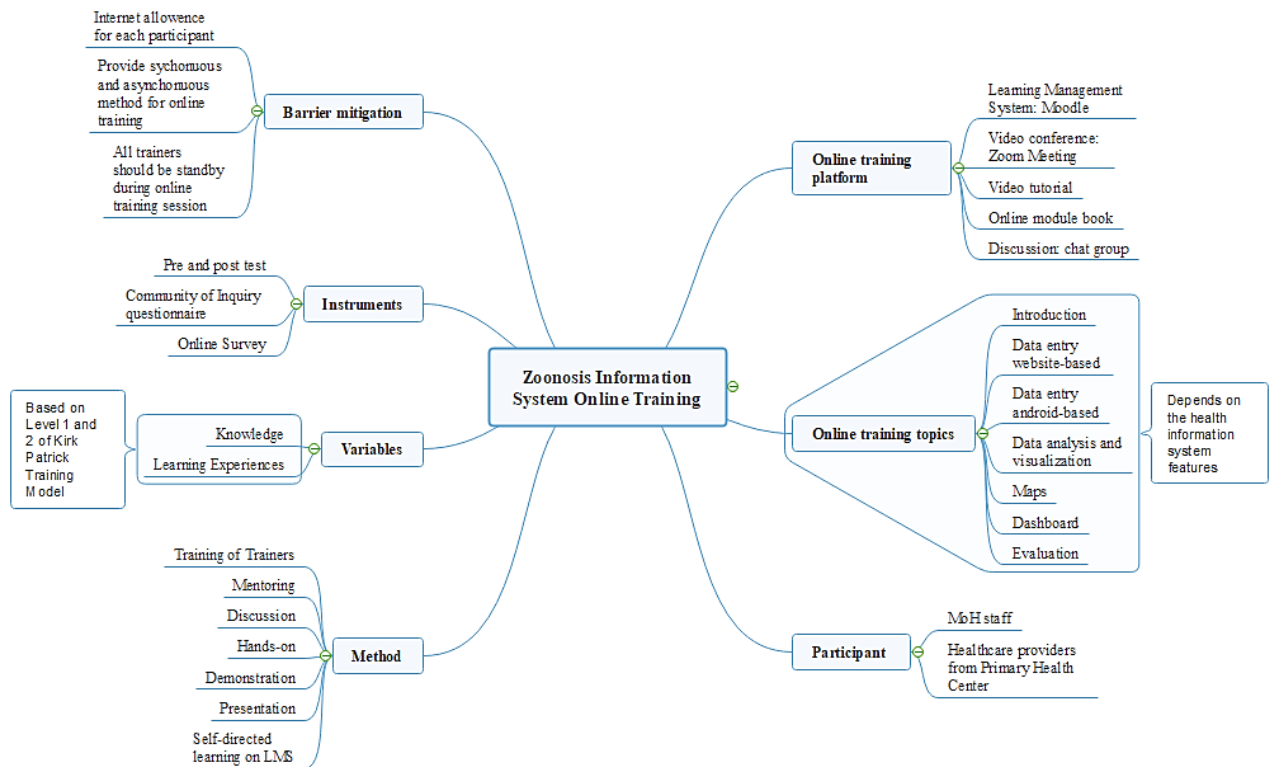
**Figure 2.** Online Training Development Process Regarding the Action Research Process

The planning stage involved synthesizing and refining the insights gathered during the analysis phase. Here, strategies for online training were devised and finalized. This included adapting the zoonosis information system for training purposes, configuring Learning Management System (LMS) layouts, developing module books detailing each system feature, designing evaluation methodologies, and preparing Zoom Meeting as the primary learning platform. Detailed mechanisms for the learning process were established to optimize engagement and effectiveness.

During the implementation phase, the formulated plans for online training were put into action. Training sessions were conducted according to the strategies outlined during the planning stage. The focus was on delivering comprehensive instruction on zoonosis diseases and practical usage of the zoonosis information system. The final evaluation phase encompassed both formative and summative assessments of the online training program. Formative evaluation utilized pretests and posttests to gauge the enhancement of trainees' knowledge in zoonosis concepts and system operations. Additionally, a Community of Inquiry (CoI) questionnaire assessed participants' learning experiences throughout the online sessions. A post-training survey provided further insights into the effectiveness and satisfaction with the training approach. The evaluation framework adhered to the Kirkpatrick Four Levels of Training, primarily focusing on level 1 and 2, namely reaction and learning outcomes, respectively.

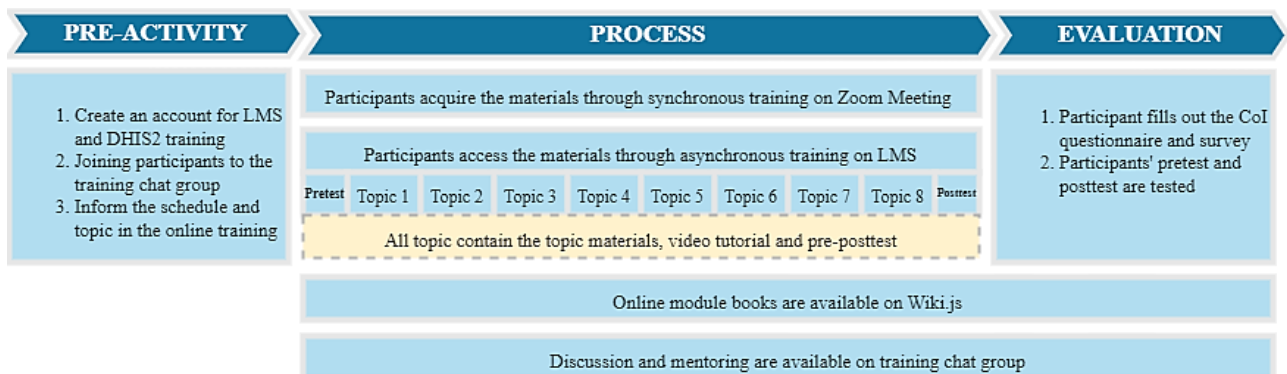
## 3. RESULTS AND DISCUSSION

To design a strategic online training, we included several stakeholders from different sectors, namely the Ministry of Health of the Republic of Indonesia, Ministry of Agriculture, and Ministry of Environment at the national level. Another stakeholder such as non-government and academicians were also collaborated in the zoonosis information system online training. Under the One Health concept umbrella, we designed the online training for zoonosis information system and did mapping for the needs of online training. The summary of our identification was drawn below:



**Figure 3.** Mapping for Zoonosis Information System Online Training Needs

Capacity building activities were designed hierarchically which our team was not become a main resource of trainers. We conducted training separately between the Zoonosis Substance from MoH of the Republic of Indonesia, as Training of Trainers participants, zoonosis program holders at District Health Offices, and healthcare providers at Primary Health Centers (Puskesmas) as the end-user of the zoonosis information system. The Training of Trainers (ToT) method for the Zoonosis Substance was carried out in a hybrid manner, while for zoonosis program holders at the regional level and healthcare providers it was conducted online. The training materials covered introduction to the zoonosis information system, refreshing DHIS2 Zoonosis platform installation and features, building blocks such as managing users, data set and program introductions, data entry into DHIS2 (web-based and event capture), metadata management with a demonstration of indicator creation, data analysis and visualization using tables and graphs, map features, dashboards, and reporting apps, as well as data quality. Training modules for zoonosis program holders at District Health Offices and Puskesmas were tailored to the needs and user authority of each institution. The training modules provided to participants included introduction to DHIS2 and Moodle platforms; data entry into DHIS2 (web-based and android-based data entry and event capture); aggregate data analysis and visualization; indicators and program indicators: pivot tables and data visualizers; maps; and dashboard creation. Preparation for training included module development, establishment of the Learning Management System (LMS) using Moodle platform, questionnaire design for evaluation, selection of training evaluation methods, and creation of user manuals using Wiki.js. The process of online training was explained on the picture below:



**Figure 4.** Online Training Framework based on Zoonosis Information System Experience

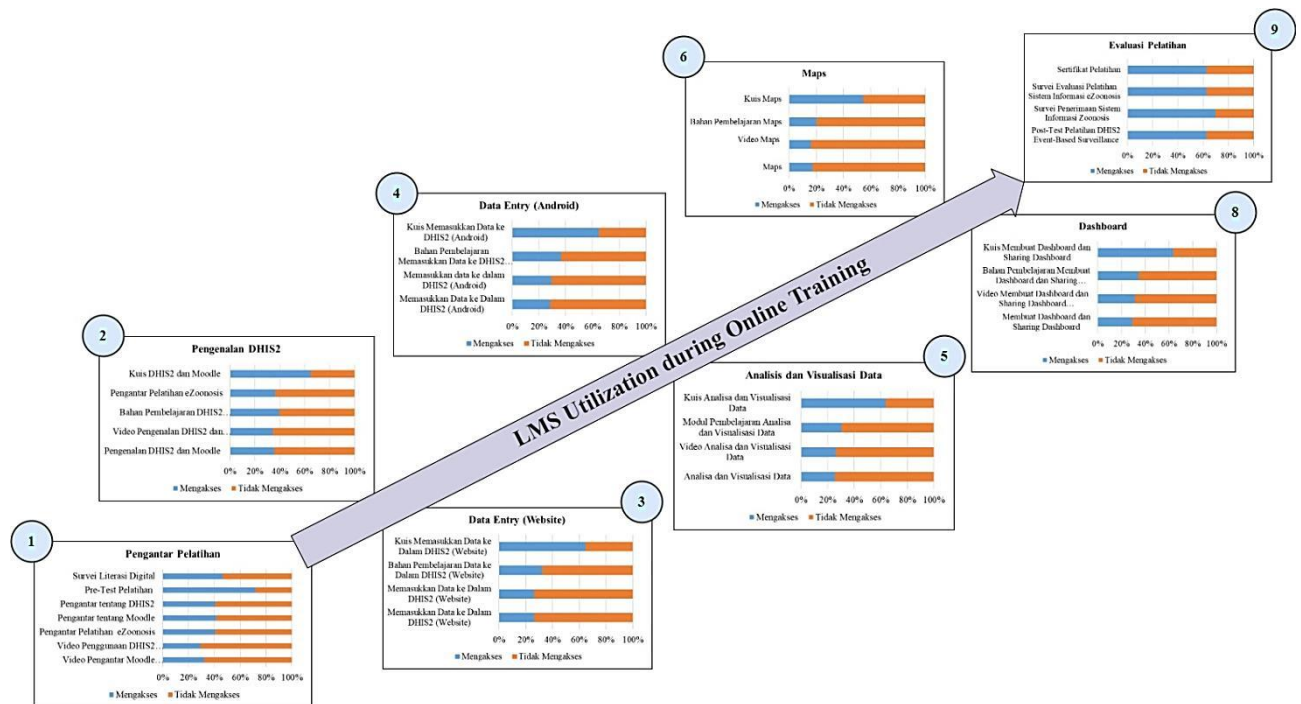
The online training activities were conducted using Zoom Meetings alongside a Learning Management System (LMS) to provide asynchronous support and maximize exposure to the zoonosis information system. A separate trial

platform, the DHIS2 training server, was set up distinct from the production zoonosis information system server to handle data entry by participants during the online training without affecting real data. Participants were required to complete a pretest provided in the LMS before starting the training. After completing the training, they were asked to take a posttest and fill out both a system acceptance survey and an evaluation survey for the online training, all of which were available in the LMS. Additionally, participants could access user manuals created by the team on the Wiki.js platform via this link: (<http://zoonosis.kemkes.go.id/>).

The training program was designed in a hierarchical manner, where participants could progress to subsequent modules only after successfully completing the preceding topics. This structured approach, facilitated by the Learning Management System (LMS), provided an organized and systematic training flow. It allowed participants to independently navigate through the material while adhering to a guided pathway. This method ensured that participants built their knowledge progressively, reinforcing their understanding as they moved through the course.

Following the completion of the training modules, participants were required to undergo post-training evaluations. These evaluations included tests and surveys that assessed both the effectiveness of the training content and the usability of the system. The insights gained from these evaluations were crucial for identifying areas for improvement in the training program and refining the system itself. This feedback mechanism enabled continuous enhancement of the training process, ensuring it remained effective and relevant for future participants.

The implementation of the zoonosis information system involved a series of coordinated activities, including system initiation and phased training tailored to user roles and associated institutions. A significant milestone was the Training of Trainers (ToT) conducted in late August 2021, using a hybrid model that accommodated both offline and online participants. For the online component, participants received usernames and passwords for the DHIS2 training server (<https://dhis.zoonosis.id/>) and the LMS (<https://learning.simkes.id/>). The training covered six modules, ranging from introductions to the DHIS2 and Moodle platforms, data entry methods, data analysis and visualization techniques, to creating dashboards. This comprehensive training ensured participants were well-equipped to effectively utilize the zoonosis information system. In the learning evaluation, participants were asked to complete pretests, posttests, and practice questions for each module provided during zoonosis information system system training. Additionally, in this phase, researchers identified participants' access to the Learning Management System (LMS) as a learning medium.

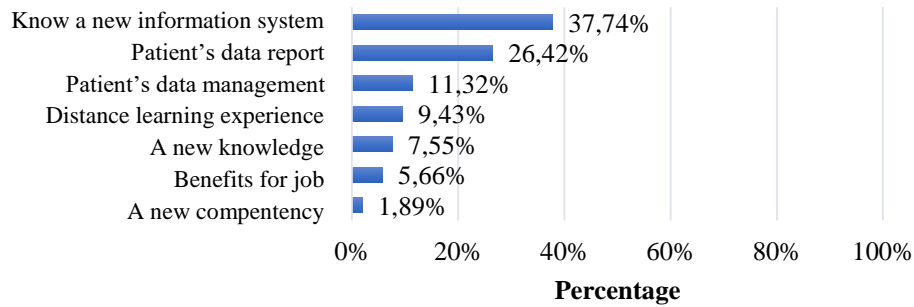


**Figure 5.** Percentage of Participants Accessing the Learning Management System (LMS) during Zoonosis Information System Training

Figure 4.3 shows the use of LMS by participants during zoonosis information system information system training. Evaluation of LMS access was based on how many participants accessed the LM and accessed the learning materials in each module available within the LMS. Evaluation of participant access to the LMS not only focused on the 60 respondents who met the criteria due to limitations in the LMS recording system and depicted LMS usage overall during the training process. Overall, participants accessing modules on the LMS did not yet reach 100% (99 registered accounts).

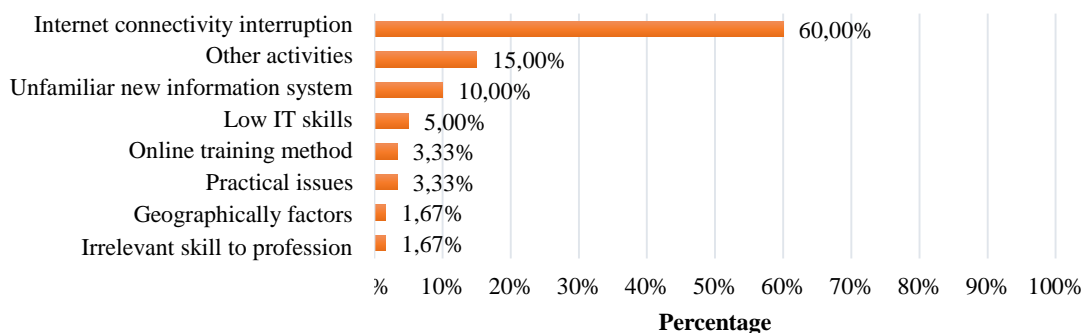
The image illustrated participants' evaluation of the new information system (IS) online training. It revealed that 37.74% of participants highlighted the introduction to the new IS from online training as the main benefit, followed by patient data reporting (26.42%) and patient data management (11.32%). The experience of remote training was

appreciated by 9.43% of participants, while 7.55% acknowledged gaining new knowledge. Only 5.66% saw direct benefits to their work, and 1.89% felt they developed new competencies. This indicated that the online training successfully introduced the new IS and patient data reporting, but had a more limited impact on skill enhancement or direct job benefits. In Figure 4.5, the average scores of quizzes for each module of the zoonosis information system training are presented. The highest average score was obtained in the quiz for the third module, which covers data analysis using DHIS2. Meanwhile, the second module on case recording in DHIS2 system via website and Android application obtained the lowest average score, which was 4.39.



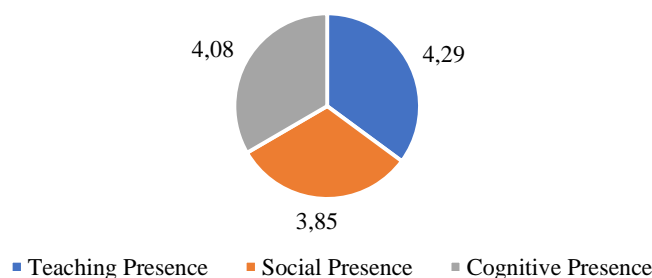
**Figure 6.** Participants' Perception of Benefits of Zoonosis Information System Training

The image shows participants' evaluation of the challenges faced during the training for a new information system (IS). The majority (60.00%) identified internet connectivity issues as the primary obstacle. Other challenges included interruptions from other activities (15.00%), lack of familiarity with the new IS (10.00%), and limited technological proficiency (5.00%). Additionally, 3.33% cited issues with the online training method, 3.33% mentioned difficulties in practicing, and 1.67% noted geographical factors and misalignment with their profession. These findings suggest that internet connectivity was the most significant barrier, with other factors playing a lesser role in affecting the train



**Figure 7.** Participants' Perception of Challenges in Zoonosis Information System

After completing the training sessions, participants were required to undertake a posttest and fill out both a system acceptance survey and an evaluation survey for the online training provided through the Learning Management System (LMS). To support their learning, user manuals created by the team were made available on the Wiki.js platform (<http://zoonosis.kemkes.go.id/>). Despite these resources, the online training for the zoonosis information system experienced a significant attrition rate. Of the 114 participants initially registered, only 62 remained until the end of the training. The participant demographic was predominantly female (75.40%) with an average age of 39 years, and 51.61% held a bachelor's degree (S1/D4). This attrition highlighted some underlying issues with participant engagement and retention throughout the course.



**Figure 8.** Distribution of Online Training Experience according to Community of Inquiry Framework



The descriptive statistics for Teaching Presence, Social Presence, Cognitive Presence, and Community of Inquiry reveal overall positive perceptions in an educational setting. Teaching Presence has a high average score of 4.29 (SD: 0.46) with ratings ranging from 3.33 to 5.00, indicating a strong and consistent perception of effective teaching. Similarly, Cognitive Presence shows a high mean score of 4.08 (SD: 0.47) with scores ranging from 3.00 to 5.00, suggesting strong cognitive engagement among participants. Social Presence, with a mean of 3.85 (SD: 0.51) and a broader range from 2.20 to 5.00, reflects slightly more varied perceptions of social interactions. The Community of Inquiry, averaging 4.07 (SD: 0.41) and ranging from 3.26 to 5.00, indicates a robust sense of overall community with the least variability. These data suggest that participants generally perceive a strong sense of teaching, social, and cognitive presence, contributing to a positive community of inquiry.

However, participants faced significant barriers during the training, the most notable being internet connectivity issues, which affected 60% of them. Other notable disruptions included concurrent activities (15%), which further impeded their ability to fully engage with the training content. These findings suggest that while the training was well-received overall, addressing technical and logistical challenges is crucial for improving participant retention and engagement in future sessions. Upon deeper investigation into participant access to each training module on the LMS, researchers found varied results for each module. Although overall LMS access was fairly good, participant access to the provided materials on the LMS did not exceed 50% per module. Participant LMS access was high in parts of the module that required participation to obtain training certification, such as initial surveys, final surveys, per-module quizzes, and pretests and posttests. This indicates that although many participants accessed the LMS, its use as a learning medium was not yet fully maximized. Participants' motivation to independently explore the materials provided on the LMS still falls short of expectations. Detailed results from the analysis of each training module on the LMS are presented in Figure 4.4.

### **3.1 Discussion**

#### **3.1.1 Positive Impacts of Training on Participants and Zoonosis Surveillance Activities**

Online training has become a pivotal strategy in overcoming the logistical challenges posed by the COVID-19 pandemic, allowing organizations like those involved in the zoonosis information system information system to effectively disseminate knowledge. This training initiative targeted zoonosis program managers across multiple Indonesian regions, employing a combination of synchronous and asynchronous virtual methods. The evaluation of its impact followed Kirkpatrick's training evaluation framework, focusing initially on participants' reactions and learning outcomes. The results from this evaluation highlighted two key benefits of the zoonosis information system training: improvements in participant knowledge and enhanced capabilities in conducting zoonosis surveillance. Participants' feedback regarding the zoonosis information system online training was largely positive, indicating a high level of satisfaction with the training experience. Particularly notable was the favorable reception of the teaching presence dimension, suggesting that participants found the training process engaging and the facilitators effective in conveying the material. This positive perception is consistent with findings from studies such as Ammenwerth et al., (2018), which emphasize the importance of effective teaching presence in fostering deeper cognitive engagement and knowledge retention among learners.

The zoonosis information system training not only aimed to enhance individual knowledge but also to bolster zoonosis surveillance efforts across Indonesia. By equipping participants with comprehensive understanding and practical skills in using the zoonosis information system information system, the training sought to improve data accuracy, timeliness, and the overall effectiveness of surveillance activities. This strategic approach not only addresses immediate training needs but also contributes to long-term public health outcomes by strengthening the capacity of health professionals to manage zoonotic diseases effectively (Raharjo et al., 2022). Albeit the social presence dimension in the evaluation of the zoonosis information system information system training was lower compared to other dimensions, these results also indicate that the training effectively facilitated relationships between facilitators and participants, as well as among participants themselves. Improving social presence in online training requires special attention in future training activities, as participant interaction is crucial in virtual training settings (Kaul et al., 2018). The evaluation results across these three dimensions may differ from other online training or learning activities due to various factors such as the training curriculum structure, participant workload, adequacy of facilitators, and cohesion within the training environment (Parrish et al., 2021). This evaluation of the zoonosis information system training demonstrates a significantly positive impact on participants' learning experiences. Furthermore, participants also perceived several benefits from the training, such as gaining familiarity with a new information system and the benefits related to zoonosis data management through the zoonosis information system information system introduced via remote training.

The zoonosis information system information system training also had a positive impact on zoonosis case surveillance activities by field personnel. While this study did not explicitly assess the quality of zoonosis case data, the data produced through the zoonosis information system was more comprehensive, directly processable, and easily visualized compared to manual case recording methods. At the district health department stakeholder level, monitoring activities also became easier due to the timelier zoonosis data generated. Participants who received training and routinely implemented the zoonosis information system information system entered zoonosis case data into the system. This finding aligns with previous research indicating that health workers find it easier to implement DHIS2 systems for



surveillance activities after receiving training. Health data quality improves because it is consistently available, and data analysis and dissemination are more effective (Sukums et al., 2021). Uba et al. also found that after training health workers on health information system usage, data completeness increased from 70% to 87%, while timely reporting accuracy increased from 67% to 87% (Uba et al., 2021). Training and pilot implementation activities are effective strategies when implementing health information systems nationwide (Sahay et al., 2020). Health information system training enhances user acceptance and serves as a model for other regions looking to implement similar systems (F. Martin et al., 2020). Through training, the intended benefits of using information systems can be more easily realized. DHIS2 implementation in Guinea also demonstrates that training provided during pilot activities, which are then expanded, can improve the completeness and timeliness of surveillance case reporting systems (Reynolds et al., 2022). Despite challenges and shortcomings in the training and implementation of the zoonosis information system, training can bridge the gap in improving the quality of zoonosis case surveillance by personnel. Therefore, remote training can be an alternative method to raise awareness of the benefits and capacities of using health information systems, especially in developing countries or regions with geographical conditions less conducive to face-to-face training.

### **3.1.2 Need for Training Quality Improvement and the Role of Each Actor in Achieving Online Training Goals**

Despite significant improvements in knowledge outcomes, the evaluation of online zoonosis information system training suggests that it has not fully met its expected targets. According to the Community of Inquiry (CoI) framework, while participants report positive experiences overall, the social dimension of the training consistently receives lower scores compared to other aspects. This social dimension is crucial as it reflects participant ownership, communication openness, and group cohesion in discussions with facilitators (Caskurlu, 2018; Stenbom, 2018). The absence of robust social interactions in online training settings can lead to participant discomfort, reduced engagement, and a reluctance to participate actively in discussions, thereby impacting the overall effectiveness of the training (Kaul et al., 2018).

Moreover, the challenges identified in the online training of the zoonosis information system highlight the difficulty participants face in fully grasping the material and applying it in practical settings. Many participants find the asynchronous nature of online learning challenging, particularly when combined with their existing work responsibilities. This can result in a superficial understanding of the zoonosis information system, limiting their ability to apply knowledge beyond basic recall tasks. Such limitations are critical as they affect the system's usability and the participants' confidence in adopting new surveillance methods (Armstrong, 2016; Krathwohl, 2002).

To address these challenges effectively, enhancing the role of facilitators becomes paramount. Facilitators play a crucial role in fostering interactive discussions and providing ongoing support to participants. By encouraging active engagement and facilitating meaningful interactions, facilitators can help bridge the gap between theoretical learning and practical application. Additionally, empowering stakeholders and leveraging their expertise can further enhance training outcomes. Collaborative efforts involving stakeholders can ensure that training programs are tailored to meet the diverse needs of participants and are aligned with organizational goals for improving zoonosis surveillance (Braa & Sahay, 2012; Castro, 2019). These strategies not only promote a deeper understanding of the zoonosis information system but also strengthen participants' confidence in utilizing the system effectively in their respective roles. The findings of this study indicate that some participants felt that online training was not ideal because it was challenging to follow the material and often interrupted by environmental factors. Suboptimal training processes resulted in superficial participant understanding of the zoonosis information system information system when applied in the field. This finding suggests that online training only facilitated user knowledge to the "know and remember" levels regarding the zoonosis information system and did not reach the "understand" or "apply" levels of Bloom's Taxonomy of learning (Armstrong, 2016; Krathwohl, 2002). This lack of understanding leads to inaccuracies in system usage, negative psychological responses from users, and a tendency for users to revert to old methods of recording zoonosis cases. This finding is consistent with previous research indicating that while training can improve some aspects of digital surveillance activities, participants still struggle with operating information systems (Nwankwo & Sambo, 2018).

Capacity building for information system use should not only focus on technical skills in software usage but should also address participant training processes and mindset changes in field activities post-training (Braa & Sahay, 2012). Facilitators' roles need to be enhanced to increase interaction intensity between participants and between facilitators and participants, thereby fostering active discussions (Castro Benavides et al., 2020). This intensive discussion aims to reduce dependence on the role of system developers when difficulties arise in operating the zoonosis information system information system and to improve participants' understanding of the system for work activities. Empowering stakeholders who have undergone Training of Trainers (ToT) is another strategy to build a discussion community in training and implementing the zoonosis information system information system. This approach can foster ownership of the information system among health workers and enhance the autonomy of monitoring and problem-solving. Discussion communities can vertically and horizontally share knowledge among zoonosis information system information system users (Bygholm, 2018; Dahal, 2019). Several studies also show that stakeholder roles can enhance user capacity and health information system implementation (Khobi et al., 2020; MEASURE Evaluation, 2018). Achieving good user system capabilities ensures the effective use of information systems for field activities. In formulating zoonosis information system information system training activities and goals, central-level stakeholders understand the various benefits that can be achieved from using the information system. Perceptions of these stakeholder benefits serve as a strong motivator that can be transferred to system users, representing a significant



potential role of stakeholders in training to enhance the benefits and implementation of information systems for users (Karuri et al., 2018). As external factors in training participants, stakeholders can provide relevant information, actively participate in the training and implementation process, and provide solutions to encountered challenges (Kuyo et al., 2018). Empowering stakeholders involves not only centralized policy but also coordination and cooperation with local stakeholders to promote, monitor, and evaluate health information system training and implementation (Manya et al., 2018).

### 3.1.3 Optimization of Learning Management System Use as a Vital Training Tool

The findings of this study indicate suboptimal utilization of training participants in instructional aids, especially the Learning Management System (LMS). This may be due to the short duration of the training and the technical nature of the new materials for participants. The dense synchronous virtual training activities and participants' outside training activities make participants feel that they have already acquired a lot of material from meetings with facilitators. Regmi & Jones identified four factors that hinder the use of e-learning in health profession education: low motivation and expectations, methods not suitable for all disciplines, requiring many resources, and lack of IT skills (Regmi & Jones, 2020). Low participant motivation in the zoonosis information system information system training may be due to internal and external factors. Internal factors include low participant attendance, perception and motivation towards training, high anxiety and stress during training, lack of discipline among participants, and poor interaction between participants and facilitators. This is consistent with findings in this study that overall perceptions of the online training process were low among participants in the social dimension. In addition, participant attendance decreased on the second day of training compared to the first day.

Regmi & Jones also mentioned external factors that can reduce e-learning usage related to issues such as limited time for learning, participant diversity in training, limited technology use in training, and lack of support. These findings were also evident in the evaluation of the zoonosis information system information system training, Internet network constraints, IT skills, and interruptions in work activities limited time allocation for training and accessing materials in the LMS (Regmi & Jones, 2020). Participant characteristics in this evaluation also showed diversity in backgrounds, particularly in terms of profession, institutional origin, and geographical location. Areas far from urban centers or outside Java Island have inadequate internet networks. Disparities in remote training infrastructure reduce participant continuity in e-learning training activities

## 4. CONCLUSION

The development and implementation of an online training program for a health information system could be represented by zoonosis information system online training process. The zoonosis information system online training involved collaboration with multiple stakeholders from various interconnected sectors. The training was structured hierarchically, with separate sessions for each level of users. Conducted through a combination of hybrid and fully online methods, the training encompassed comprehensive modules on health information system, including system installation, data management, analysis, visualization, and so on. The use of a Learning Management System (LMS) facilitated structured learning pathways, allowing participants to build their knowledge progressively through a guided training flow, with supplementary resources and evaluations accessible via the LMS. The online training faced several challenges, notably internet connectivity issues affecting 60% of participants, which impacted engagement and retention. Despite these hurdles, the program was positively received, with participants showing a high level of satisfaction in areas such as system introduction and data reporting, though there were areas for improvement in skill enhancement and direct job benefits. The descriptive statistics for the training indicated high mean scores across Teaching Presence, Social Presence, Cognitive Presence, and Community of Inquiry, suggesting an overall positive perception of the training environment. However, a significant attrition rate and varied engagement with LMS materials highlighted the need for addressing technical issues and enhancing participant motivation. The study concluded that the online training effectively built human capacity for health information system utilization, providing valuable insights into the effectiveness and areas for improvement in training healthcare practitioners for a health information system capacity building.

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