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Public Data Literacy and Integrated Statistical Services: A Case Study of Badan Pusat Statistik Bengkulu Province

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ABSTRACT

Data literacy has become an essential competency in the digital era, particularly in supporting evidence-based decision-making. However, public understanding and utilization of statistical data remain limited, especially at the local level. This study examines the role of Integrated Statistical Services (Pelayanan Statistik Terpadu/PST) at Badan Pusat Statistik Bengkulu Province in supporting public data literacy. A qualitative participatory approach was employed, involving internship-based community engagement through observation, service assistance, and user education activities. Data were collected through field observations and interactions with service users and were analyzed descriptively to identify patterns in user engagement and comprehension. The findings indicate that PST functions not only as a data access point but also as an informal learning space that facilitates users' understanding of statistical information. Student involvement in service assistance contributed to more interactive communication and improved user engagement with statistical data. However, the extent of literacy improvement remains context-dependent and requires further systematic measurement. This study highlights the potential of PST as a supportive platform for enhancing public data literacy, while emphasizing the need for more structured evaluation and standardized literacy indicators in future research.

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1. Introduction

The rapid advancement of information technology has significantly increased the production, distribution, and accessibility of data across various sectors. In the digital era, data has become a critical resource for supporting evidence-based decision-making in both public and private domains. However, the growing availability of data is not always accompanied by the public's ability to interpret and utilize it effectively, resulting in a gap between data access and data use.

Data literacy refers to the ability to read, understand, analyze, and critically use data within specific contexts (Schield, 2004; Prado & Marzal, 2013). This concept extends beyond technical skills to include critical thinking in evaluating data sources, interpreting statistical information, and applying data in decision-making processes. Low levels of data literacy may lead to misinterpretation of information, increased vulnerability to data-driven misinformation, and ineffective decision-making (Bhargava et al., 2015; OECD, 2023).

Globally, disparities in literacy and information-processing skills remain a significant challenge, particularly in developing countries. These disparities are not only related to unequal access to digital technologies but also to differences in users' ability to effectively utilize available data (Van Deursen & Van Dijk, 2014). Furthermore, many initiatives have focused on improving data availability through open data policies, while comparatively less attention has been given to strengthening users' data competencies (OECD, 2019; European Commission, 2022). This imbalance suggests that increasing data supply alone is insufficient without parallel efforts to enhance data literacy.

In the public sector, data literacy plays an essential role in improving governance quality and public service delivery. Citizens' ability to understand and use data can foster more meaningful participation in policymaking processes and enhance transparency and accountability (Gebre-Mariam et al., 2022). However, existing studies on data literacy have largely focused on formal educational settings, such as schools and universities, with limited attention given to informal learning environments within public service institutions (Wolff et al., 2016; Ridsdale et al., 2015).

In Indonesia, Badan Pusat Statistik (BPS) plays a strategic role as the official provider of statistical data. One of its service innovations is the Integrated Statistical Services (Pelayanan Statistik Terpadu/PST), which functions as a centralized platform for data access, consultation, and statistical assistance. Conceptually, PST represents a user-oriented public service model that has the potential to bridge the gap between data availability and data usability.

However, empirical observations indicate that many users still face difficulties in accessing, interpreting, and utilizing statistical data effectively. These challenges reflect not only technical barriers but also limitations in conceptual understanding. Although PST provides access and consultation services, its role as an educational medium for enhancing public data literacy has not been systematically examined. This condition highlights an empirical gap, particularly regarding how public statistical services contribute to user learning and engagement.

At the same time, there is a theoretical gap in the literature. Most studies conceptualize data literacy development within formal education systems, while the potential of public service institutions as informal learning spaces remains underexplored. In fact, experiential and practice-based learning in real service contexts may offer more contextual and applicable understanding for data users. Therefore, this study aims to examine the role of Integrated Statistical Services at Badan Pusat Statistik Bengkulu Province in supporting public data literacy. This research adopts a participatory approach through internship-based engagement, enabling direct interaction between students, service providers, and data users.

The novelty of this study lies in its integrative approach that combines public service delivery with data literacy development in a real-world context. Unlike previous studies that focus primarily on formal education or institutional performance, this research positions PST as an informal learning environment and highlights the role of students as intermediary actors in facilitating user understanding and engagement. This study also provides empirical insights into how service-based interactions can support the transformation of passive data users into more informed and critical users of data.

2. Method

This study employs a qualitative participatory approach to examine the role of Integrated Statistical Services (Pelayanan Statistik Terpadu/PST) in supporting public data literacy. The research was conducted through an internship program at Badan Pusat Statistik Bengkulu Province, enabling direct engagement with service processes and users in a real-world context.

2.1. Research Design

A qualitative case study design with participatory observation was adopted to explore how public data literacy is facilitated through service interactions. This approach allows for an in-depth understanding of user experiences and learning processes within the PST environment.

Participants

The study involved eight (8) service users selected through purposive sampling. Participants were chosen based on their direct interaction with PST services and their engagement in accessing or using statistical data. The selection aimed to capture diverse user backgrounds and levels of data understanding. Data collection was conducted until information saturation was reached, where no substantially new insights emerged from additional data.

2.2. Data Collection

Data were collected using multiple techniques to enhance credibility:

1. Observation
   Direct observations were conducted to examine service processes and interactions between staff and users. Field notes were systematically recorded to capture user behavior, types of requests, and communication patterns.
2. In-depth Interviews
   Semi-structured, in-depth interviews were conducted with the eight participants to explore their experiences, challenges, and understanding of statistical data. The interviews focused on users' ability to access, interpret, and utilize data, as well as their perceptions of PST services. Each interview was conducted face-to-face during the service interaction period.
3. Service Assistance (Participant Involvement)

As part of the internship role, the researcher actively assisted users in accessing data, navigating publications, and using the official BPS website. This participatory involvement provided real-time insights into users' difficulties and learning processes.

4. Documentation

Supporting data were collected through service records, user inquiries, and reflective field notes, which were used to complement observational and interview data.

2.3. Data Analysis

The data were analyzed using a thematic qualitative approach**.** Interview transcripts and field notes were coded and categorized to identify recurring themes related to data literacy, including user understanding, access challenges, and engagement with statistical information. The analysis focused on how PST functions as both a service provider and an informal learning environment.

2.4. Trustworthiness

To ensure credibility, this study applied data triangulation by combining observation, interviews, and documentation. In addition, reflective analysis was conducted to minimize researcher bias and enhance the consistency of interpretation.

2.5. Rationale for Method

The participatory qualitative approach was selected because it allows for an in-depth exploration of user experiences and captures the contextual dynamics of data literacy development within public service settings. This approach is particularly suitable for understanding experiential learning processes that cannot be fully captured through quantitative methods.

3. Results And Discussion

3.1. The Role of PST in Supporting Public Data Literacy

The findings of this study indicate that Integrated Statistical Services (Pelayanan Statistik Terpadu/PST) play an important role in supporting public data literacy. Based on observations and interactions during the internship program at Badan Pusat Statistik Bengkulu Province, PST functions not only as a data provider but also as an interactive platform that facilitates user understanding of statistical information.

The service structure of PST allows users to access official data, consult with staff, and receive direct assistance in interpreting statistical outputs. This multi-functional role positions PST as a bridge between data availability and data usability. Users who initially came with limited understanding of statistical data were able to gain clearer insights through guided interaction. One participant stated:

> *"At first, I only came to download data, but I did not really understand what the numbers meant. After being guided, I started to understand how to read the tables." (Participant 3)*

This finding suggests that access alone is insufficient without interpretive support. The presence of assistance transforms PST from a passive data repository into an active learning environment. This aligns with the notion that public data services should not only provide information but also enable users to interpret and apply data effectively.

3.2. Public Data Literacy Conditions

The results reveal that the level of data literacy among service users remains relatively low. This is evident from recurring patterns identified through both observation and in-depth interviews with eight participants.

Several key challenges were identified:

1. Difficulty in reading statistical tables
   Many users expressed confusion when encountering multi-dimensional tables and numerical indicators.
   "I often get confused when I see many numbers in one table. I don't know which one is important." (Participant 1)
2. Limited understanding of statistical indicators
   Users often lacked knowledge about definitions, units of measurement, and data interpretation.
   "I can see the data, but I don't really understand what the indicators mean." (Participant 5)
3. Lack of awareness of official data sources
   Some participants were unaware that reliable data could be accessed through official institutions.
   "Usually I just search on Google, I didn't know there is an official place like this." (Participant 7)
4. Dependence on non-verified data

Several users admitted relying on easily accessible but potentially unreliable sources.

These findings reflect a broader issue in public data literacy, where users may have access to data but lack the capacity to critically evaluate and utilize it. This supports the argument that data literacy involves not only technical skills but also contextual understanding and critical thinking (UNESCO, 2018).

Importantly, these challenges are not merely technical but also cognitive. Users struggle not only with accessing data but also with interpreting meaning and relevance. This highlights a gap between data availability and effective use.

3.3. The Role of Interaction and Assistance in Learning

One of the most significant findings of this study is the importance of direct interaction in improving user understanding. The participatory nature of PST services allows users to engage in real-time learning through dialogue and assistance.

Participants consistently reported that guidance played a crucial role in helping them understand statistical data.

"When someone explains it step by step, it becomes much easier to understand." (Participant 2)

"I learned more from asking directly than from reading the data myself." (Participant 6)

This suggests that learning occurs not only through exposure to data but also through guided interpretation. The presence of facilitators-whether staff or students-enables users to process information more effectively.

From an analytical perspective, this reflects the principles of experiential learning, where knowledge is constructed through direct engagement and practice. Rather than relying solely on theoretical explanations, users learn by doing, asking questions, and receiving immediate feedback.

3.4. Student Contribution as Intermediary Actors

The involvement of students in PST services emerged as a key factor in enhancing user experience and understanding. Students acted as intermediaries who bridged the gap between technical data systems and users with limited data literacy.

Their roles included: assisting users in locating relevant data, explaining statistical concepts in simpler terms, and guiding users in navigating digital platforms. Participants responded positively to this assistance:

"The students helped explain things in a simpler way, so it was easier to understand." (Participant 4)

"I felt more comfortable asking questions because they explained patiently." (Participant 8)

This indicates that students contribute not only technically but also communicatively. Their ability to translate complex statistical information into more accessible language enhances the effectiveness of the service.

From a broader perspective, this reflects the concept of collaborative governance, where multiple actors-including academic institutions-participate in improving public service delivery. The presence of students adds a human-centered dimension to service provision, making it more responsive to user needs.

3.5. Observed Changes in User Engagement and Understanding

Although this study does not employ quantitative measurement, qualitative findings suggest observable improvements in user engagement and understanding after receiving assistance.

These improvements include: increased confidence in accessing data, greater willingness to ask questions, improved ability to interpret statistical tables, and higher awareness of official data sources. For example:

"Now I know where to find official data and how to use it for my assignment." (Participant 2)

"Before, I just copied data. Now I try to understand what it means." (Participant 6)

These changes indicate a shift from passive to more active engagement with data. Users move from simply retrieving data to attempting to interpret and apply it.

However, it is important to note that these improvements are context-specific and incremental, rather than comprehensive transformations of data literacy. The findings should therefore be interpreted as indicative rather than conclusive.

The findings of this study provide important insights into the evolving role of public statistical services in fostering data literacy. While previous research has largely positioned data literacy as an outcome of formal education systems, the results of this study suggest that public service environments-specifically Integrated Statistical Services (PST)-can function as effective informal learning spaces. This expands the conventional understanding of data literacy development by highlighting the role of real-world interaction and service-based engagement.

First, this study demonstrates that access to data alone is insufficient to improve public data literacy. Although Badan Pusat Statistik provides open and reliable statistical data, users still experience significant difficulties in interpreting and applying such information. This finding reinforces existing arguments that data availability must be accompanied by interpretive support and user-centered service design. In this context, PST serves as a mediating platform that transforms data access into meaningful data use through interaction and guidance.

Second, the study contributes to the literature by emphasizing the importance of interaction-based learning in developing data literacy. The findings reveal that users gain better understanding when they engage directly with facilitators, ask questions, and receive immediate explanations. This supports the experiential learning perspective, which posits that knowledge is constructed through active participation and contextual experience rather than passive reception (Kitchin, 2014). Unlike classroom-based learning, the PST environment provides situational and problem-oriented learning opportunities that are directly relevant to users' needs.

Third, this study highlights the critical role of intermediary actors, particularly students, in bridging the gap between complex statistical data and users with limited literacy. Students act as knowledge translators who simplify technical information and facilitate user comprehension. This finding extends the concept of collaborative governance (Ansell & Gash, 2008) by demonstrating how academic actors can contribute to public service delivery not only at the policy level but also at the operational level. The involvement of students introduces a more human-centered and adaptive approach to

service provision, which is often lacking in purely institutional interactions.

Fourth, the study reveals that improvements in data literacy are incremental and context-dependent, rather than immediate or universal. While users showed increased confidence and engagement after receiving assistance, these changes were limited to specific interactions and did not necessarily indicate long-term transformation. This finding challenges overly optimistic assumptions about the effectiveness of short-term interventions and suggests that sustained and structured efforts are required to achieve broader impacts in public data literacy.

From a theoretical perspective, this study contributes by integrating three domains that are often treated separately: data literacy, public service delivery, and experiential learning. By positioning PST as an informal learning environment, this research provides a new analytical lens for understanding how data literacy can be developed outside formal educational institutions. It also highlights the need to move beyond a purely technical view of data literacy toward a more socio-interactive perspective that considers communication, guidance, and user experience.

From a practical perspective, the findings suggest that optimizing public statistical services requires more than improving data infrastructure. Institutions such as Badan Pusat Statistik need to integrate educational functions into their service design. This includes providing user-friendly explanations, interactive assistance, and continuous support for data users. Additionally, the involvement of students or other facilitators can enhance service effectiveness by making data more accessible and understandable.

However, several limitations must be acknowledged. The study is based on a small sample size (eight participants) and relies on qualitative methods, which limit the generalizability of the findings. Moreover, the absence of standardized measurement tools means that improvements in data literacy are inferred rather than quantitatively validated. Future research should address these limitations by incorporating mixed methods approaches, larger samples, and longitudinal designs to assess long-term impacts.

Despite these limitations, this study offers meaningful contributions by demonstrating that public statistical services can play a more active role in developing data-literate societies. Rather than functioning solely as data providers, institutions can act as facilitators of learning and engagement. This shift is particularly important in the digital era, where the ability to interpret and use data is as critical as access to the data itself.

4. Conclusion

This study examined the role of Integrated Statistical Services (Pelayanan Statistik Terpadu/PST) at Badan Pusat Statistik Bengkulu Province in supporting public data literacy through a participatory and practice-based approach. The findings indicate that PST functions not only as a provider of official statistical data but also as an interactive platform that facilitates user understanding through direct assistance, consultation, and engagement.

The study highlights that public data literacy remains limited, particularly in terms of interpreting statistical tables, understanding indicators, and identifying reliable data sources. However, the presence of guided interaction within PST services contributes to incremental improvements in user engagement and comprehension. These findings suggest that data literacy development is not solely dependent on data availability but also on the quality of interaction and support provided within public service environments.

A key contribution of this study lies in demonstrating the role of experiential and interaction-based learning in enhancing data literacy. The involvement of students as intermediary actors further strengthens this process by translating complex statistical information into more accessible forms for users. This indicates that collaborative and human-centered approaches can enhance the effectiveness of public service delivery.

From a practical perspective, the study suggests that optimizing PST services requires integrating educational functions into service delivery, including user assistance, interactive communication, and continuous guidance. Public institutions should not only focus on providing data but also on strengthening users' capacity to interpret and apply it effectively.

Nevertheless, this study has several limitations, including a small sample size and the use of qualitative methods, which limit the generalizability of the findings. Future research is recommended to employ mixed-method approaches, larger samples, and longitudinal designs to assess the long-term impact of public service-based data literacy interventions.

In conclusion, this study underscores the importance of positioning public statistical services as not only data providers but also facilitators of learning. Strengthening the integration between service delivery and user education represents a promising strategy for developing a more data-literate society in the digital era.

Declaration of Conflicting Interest

No potential conflict of interest was reported by the author(s).

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