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Information Technology-Based Library to Support Teaching Factory (TEFA) Learning Methods

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A B S T R A C T

The library is a supporting facility for the learning process that must adapt to developments in information technology. This study aims to analyze the library's role as an information source, including its services and features, in supporting the implementation of Teaching Factory (TEFA)-based learning. The method used in this study is a literature review, conducted to conceptually and comprehensively examine the role of information technology-based libraries in vocational education environments. The findings indicate that libraries play a crucial role in the effective implementation of TEFA learning. This includes ease of access to technology, the ability to search for collections aligned with the curriculum and industry needs, and the development of innovative services that can serve as platforms for publishing learning outcomes and fostering connectivity with the industrial sector. These results demonstrate that information technology-based libraries are essential in supporting TEFA-based learning and can be effectively integrated into the educational process.

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INTRODUCTION

The development of science and technology has a significant impact on the progress of the world of education, especially vocational education, so vocational education has become the primary learning center in preparing the younger generation to face every need in the growing business / industrial world (Yulia et al., 2024). The government's attention to vocational education is extraordinary; this can be indicated by the establishment of the Directorate General (Ditjen) of Vocational Education, which aims to prepare high-quality human resources and prepare to face the era of the Industrial Revolution 4.0. (*Peraturan Presiden Nomor 82 Tahun 2019 Tentang Kementerian Pendidikan Dan Kebudayaan*, 2019).

Vocational education institutions must implement practical learning through the Teaching Factory (TEFA). The application of this learning manifests the integration of learning based on the curriculum and the industrial world in improving skill competencies. Teaching Factory (TEFA) is one of the innovative production/service-based learning models that collaborate with the industry to produce competent graduates (Sudjimat, 2022). Industry collaboration in the field of education can be realized by improving the competence of graduates. In addition, the vocational learning system is characterized by a more significant percentage of practicum than theoretical, so adequate practicum facilities and infrastructure are needed.

The role of libraries in educational institutions is one of the supporting facilities in realizing quality education, including vocational education. The availability of a library that is adequate and follows learning needs will support the achievement of the quality of graduates following the needs of the business/industrial world. Currently, the library is no longer limited to collecting printed books, but it must follow the development of science and technology to become a center for managing and providing information in both printed and digital forms. The existence of the library is expected to develop following science and technology and focus on the vocational education system because, currently, the library is only general. In its development, libraries in educational institutions must pay attention to the curriculum and learning methods applied at each level of education, including TEFA-based learning methods.

TEFA-based learning can be realized with the support of various adequate facilities, including libraries as sources of information and learning resources. Libraries as sources of information and learning resources should currently be transformed into libraries based on information technology, and by carrying out this transformation, it is expected to provide many impacts and changes that can support learning methods in vocational education. The transformation that is currently being echoed is only conceptual because it has not been followed by good implementation, especially in vocational high school libraries and vocational education at the tertiary level. This can be seen from the condition of libraries in vocational high schools and vocational colleges, which still receive less attention, one of which is in terms of collections that are not up to date, services and access to information provided, and information systems used in

libraries that are not following current needs. Meanwhile, the development of collections, services, and access to information based on information technology and information systems in libraries is a primary need in realizing sources of information and learning resources that support the optimization of learning outcomes with the TEFA approach. Libraries that carry out transformations according to the needs of educational institutions can also become a publication medium for various innovations that have been developed by the academic community, together with the industrial world.

The realization of an information technology-based library that can support the TEFA learning method not only meets the learning needs of educational institutions but also meets the information needs of the industry, which is a partner in the implementation of vocational education, is a new thing in the scope of the library. The fulfillment of needs in creating learning outcomes products that follow industry needs appropriate and updated information sources so that to meet the needs of learning resources, information, and services needed in the library, it is necessary to conduct this research to realize an information technology-based library in the application of the TEFA learning method, especially in vocational education institutions including Vocational High Schools and Vocational Education Institutions in universities

THEORETICAL REVIEW

Teaching Factory Based Learning (TEFA)

Vocational education is a program organized for higher education with the aim of preparing expertise in work and skills in accordance with the industrial world (Sukoco et al., 2019). Learning in vocational education prioritizes practice to improve work skills by 70% compared to theoretical learning which is only 30% (Indadihayati & Hariyanto, 2023).In realizing a quality vocational education institution that has high expertise competencies, it is necessary to integrate the curriculum with the industrial world. The practical learning that can be applied is Teaching Factory-based learning (TEFA).

Teaching Factory is a Teaching Factory (TEFA) is a learning model that uses goods / services as a medium of learning through cooperation with industry to produce graduates who are competent and have standardized planning, marketable procedures (Fitrihana, 2018). The objectives of the TEFA learning model are (1) Creating synergy and integration of the planning process and implementation of activities so that learning runs normatively, adaptively and productively; (2) Increasing efficiency and effectiveness of soft skills and hard skills; (3) Increasing collaboration with the business world / industry; (4) Increasing the competence of educators and education personnel through interaction with the business world / industrial world (Muttaqien, 2019).

Teaching Factory-based learning (TEFA) uses a dual system learning method. Where, Dual System or Technical and Vocational Education and Training aims to place learning like a real situation in the business/industrial world (Sudiyono, 2019). This dual system learning has played a role in improving the quality of education, especially vocational education. This model of learning

has a good impact on oneself and the future in social life, economy, arts, culture, technology, and maintenance of the natural environment (Pradipta et al., 2021).

Digital Library

Advances in information technology have shifted conventional libraries towards digital libraries. The development has resulted in a computer-based library, where the formerly conventional system goes digital (Tjiptasari, 2022). Digital libraries provide convenience for users to access information sources available on communication devices (Mulyadi, 2016).

A digital library is a library system that has various services and information objects that support access to information objects through digital devices. Digital libraries are collections of digital objects, including text, video, audio stored in electronic media formats equipped with ways to access and download, as well as selection, organization and maintenance of these collections (Rivalina & Anwas, 2013). In addition, digital libraries are defined as storing, retrieving, and disseminating scientific information in digital formats that apply information technology. Digital libraries have provided various kinds of electronic-based collections so that users can access the information anywhere and anytime.

In supporting digital libraries, it is necessary to have a digital library automation and management system that can develop according to technological changes and is always guided by procedures regarding library management. The system is like in a conventional library but along with the development of technology the system is adopted into digital, to make it easier for librarians and users. The rapid movement of technology will have a positive impact on all users of technology, without exception the library. Users who have used digital libraries will feel the positive impact in the form of speed of information search and all access in the library. Digital library can provide benefits for users such as (1) faster addition of collections with better quality; (2) can be accessed anywhere and anytime; (3) the information is easy to update; (4) the information can be used together.

Library Automation System

Automation system is defined as the utilization of information technology to facilitate repetitive work, so that work becomes faster and more efficient (Anggun A et al., 2019). The development of automation systems in the current technological era has been applied to the library development process. Automation in the library is the process of managing the library using the help of information technology with the aim of accelerating the work process so that librarians can do other work oriented towards providing information services to users (Tjiptasari, 2022).

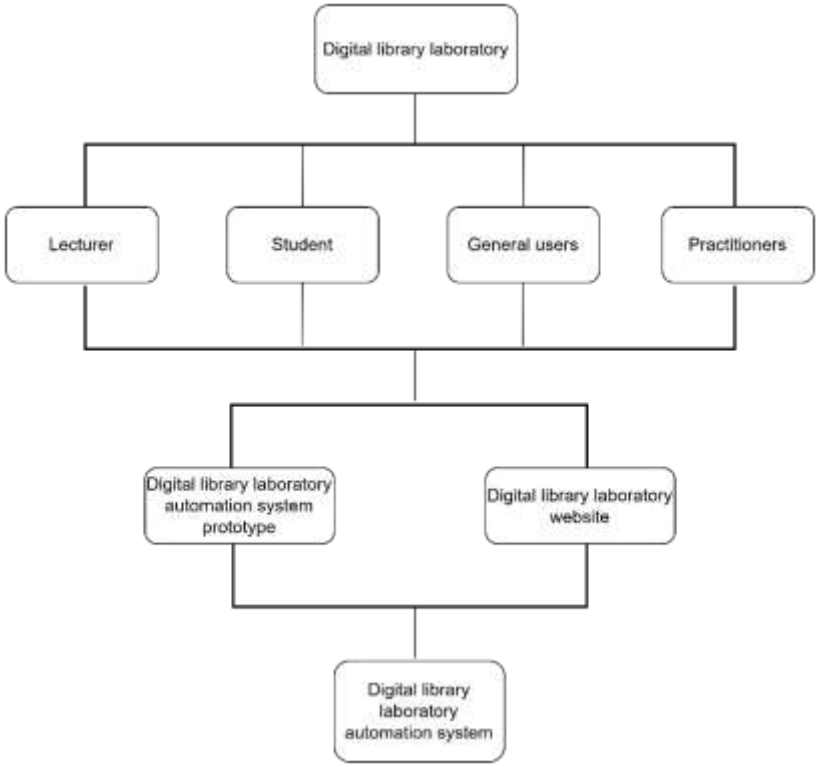
The automation system in the library can be used for all librarians and users in accessing information and services. There are several scopes in library service activities that can be carried out by library automation systems such as procurement management, collection search services, library material processing management, membership management, circulation, inventory to serial publications. Library automation systems have goals and benefits that can be

useful for libraries such as (1) can ease the burden on librarians; (2) save time and energy; (3) provide accurate work results. The preparation of a system or software must be standardized and in accordance with the provisions of testing on the system. The system in the library must also be tested, so that the system can be used optimally. One of the software testing standards uses the ISO / IEC 25010 model. This model is a standard model for measuring the quality and evaluation of software used (Asis et al., 2023).

ISO/IEC 25010 has eight criteria in testing, namely, Functional suitability in this model serves to measure whether the system has features that match the needs and functions properly. Furthermore, the work efficiency characteristic is a characteristic to measure performance relative to the resources used in a system under certain conditions. Compatibility is a characteristic that is needed in measuring software standards that have been developed, compatibility serves to measure the extent to which the system works with what has been developed. The next characteristic is usability, usability in this model serves to measure the extent to which the system can meet user needs to achieve goals by assessing effectiveness, efficiency, and user satisfaction (Andikasari et al., 2024).

Reliability in software measurement serves to measure the system's ability to function properly within a certain period of time without failing. In addition to reliability, in measuring software using this model there are security characteristics. Security characteristics serve to measure the security of a system in protecting data and information so that the level of data access owned by the system is in accordance with the type and level of authorization. Furthermore, maintenance characteristics serve to measure the level of efficiency and effectiveness in the modification process for system updates or improvements according to the needs of the operational environment. The last characteristic in the ISO/IEC 25010 model software measurement is portability which serves to measure the level of efficiency and effectiveness of the system in transferring data or information from one device to another (Rahmawan et al., 2023).

This research was developed based on a framework of thinking which is the data from the results of the needs analysis from the point of view of lecturers, students of the Digital Library study program, library users, and practitioners, namely librarians. it is intended that the products resulting from this development research are in accordance with the needs of all parties both as a supporter of the Digital Library D4 Study Program learning laboratory and as a supporter of the Library as a learning facility for the Faculty of Vocational Studies, State University of Malang. The following is a framework for thinking in this development research.



Source: Processed by researcher

Figure 1. Conceptual Framework

METHODOLOGY

This study uses a literature review method to conceptually and comprehensively examine the role of information technology-based libraries in supporting the implementation of the Teaching Factory (TEFA) learning method in vocational education environments, both at the Vocational College and Vocational High School levels. This study was conducted by reviewing various relevant library sources, such as scientific journals, academic books, research reports, and policy documents related to the development of digital libraries and the implementation of TEFA in Indonesia, especially in Malang City. Data were collected through a systematic literature search process available in national and international scientific databases. Furthermore, the information was analyzed using a content analysis approach, which includes the process of identifying themes, synthesizing findings, and drawing conclusions based on theoretical and practical tendencies that emerge from the literature reviewed.

RESULT AND DISCUSSION

The role of information technology-based libraries to support the implementation of Teaching Factory (TEFA) learning methods

The development of science and technology today has brought many changes to various activities, including libraries. Along with advances in information technology, libraries have experienced a significant change in outlook. The application of information technology can overcome the old paradigm of libraries and various complexities in management (Sa'diyah & Adli,

2019). The need for information technology is related to the realization of the duties and functions of the library as a center and source of information. The application of information technology in libraries today has become a benchmark for the library's progress (Kholidah, 2021).

Information technology in libraries is a way to carry out information processing activities using technology in information provider organizations and can be utilized by users (Prasetya, 2021). Information technology in libraries can improve the quality of existing services. Information technology's ease of access and use has made library work more effective and efficient. The development of information technology in libraries can be seen in the changing types of libraries. We are starting from manual (conventional), automated, and digital (Ernawati, 2018).

The library's management information system is evidence that information technology is regularly applied (Sa'diyah & Adli, 2019). Information technology with Management Information Systems can integrate all areas of library services. As an information technology application, SIM can change the paradigm in library services from conventional to digital. The availability of information technology in the library has positively impacted librarians and users in providing various activities optimally (Vitriana & Hermansyah, 2021). Information technology can be involved in libraries by integrating databases, using electronic equipment, and computerized operational processes, a process called library automation. The automation process then presents two concepts of library information systems: desktop-based library information systems and web-based library information systems (Prastika, 2017).

The use of information technology in libraries can improve the service system. Various forms of convenience, such as easy access to digital collections, digital circulation systems, and services, are provided to users (Wojcik, 2021). Information technology also expands users' reach in finding information. Faster and broader access and management in optimal service provide significant added value for users. Through information technology, libraries easily manage and provide online information resources that can be accessed anytime and anywhere.

Libraries have played an essential role in education. Education as a learning center is closely related to the library. The library is used as a learning tool that provides various information according to the needs of its users. Applying information technology in the library will make it easier for users to find information sources. Libraries have an essential role in improving the quality of education, especially vocational education. Vocational education is closely related to education and training needed in the world of work (Daryanto et al., 2022). The rapid development of technology encourages educational institutions, especially vocational ones, to transform following the development of the 4.0 revolution.

Teaching Factory Learning (TEFA) is one of the learning methods used in vocational education. TEFA learning is learning by combining the education curriculum with the business world/industrial world (Suwandi et al., 2023). The

TEFA concept adapts Dual System learning that has been applied in learning in Germany and Switzerland. A dual System of Technical and Vocational Education and Training aims to place learning like an actual situation in the business/industrial world (Sudiyono, 2019). The general objectives of TEFA are in line with current vocational education institutions, namely: (1) integrating the industrial world curriculum into the curriculum of educational institutions, (2) learning synergies between the business/industrial world and educational institutions, (3) learning patterns are changed to the business/industrial world, (4) the quality of human resources, the educational environment, and DU/DI must support (Sudiyono, 2019).

The TEFA learning strategy was developed by considering the carrying capacity of available resources. The critical impact of TEFA learning is the formation of a person's professional identity or expertise and the formation of a person's vocational or work capacity needed in work and society (Rusmulyani, 2021). TEFA, as a learning method applied in vocational education, is often seen as a combination of competency-based learning approaches and production-based learning, where the learning process is adapted to the concept of the natural world of work (Sudjimat, 2022). There are fundamental things in TEFA learning, namely: (1) ordinary learning is not enough, (2) benefits are obtained from direct practical experience, and (3) team-based learning experiences involving industry participation (Sudiyono, 2019). This dual system learning has played a role in improving the quality of education, especially vocational education. This learning model has a good impact on oneself and the future in social life, economy, arts, culture, technology, and maintenance of the natural environment (Pradipta et al., 2021). TEFA learning has become practical today because it follows technological developments.

The implementation of TEFA-based learning that has been applied to educational institutions, especially vocational education, has changed the mindset in learning development. Vocational education has produced various innovations in all aspects, including one's skills in producing work. TEFA is a vocational education learning method that produces the best graduates with the skills to create a product according to industry needs (Hartanto et al., 2019). In creating a product or work, a person needs skills and knowledge periodically following current developments in science and technology. The creation of these products can be tailored to industry needs or collaboration between educational institutions and the business world/industrial world. TEFA learning can increase skills and create a more dynamic mindset to support the current global challenges of the 4.0 revolution era.

TEFA-based learning can be realized with adequate facilities, including the library as a learning resource. The library's involvement as a learning tool, especially TEFA, requires it to follow the development of science and technology. Libraries in educational institutions must pay attention to the curriculum and learning methods applied at each level of education, including TEFA-based learning methods. Information technology-based libraries have an essential role in the implementation of TEFA learning. Information technology-based libraries are a crucial resource in helping TEFA learning methods to be more effective and

efficient. The transformation of libraries to information technology called digital libraries, has brought many changes, such as collections, services, and access to information provided. The application of information technology in every library service has positively impacted TEFA learning.

Implementing information technology in each service will affect library performance and user satisfaction. Technology-based libraries have been adapted to the development of science and technology, and various systems have been adopted in the library's activities. Developing an automation system that is easy to use for all users is the first step for the library as a source of information. A precise and accurate source of information will make it easier for users to find the information. Information technology-based libraries have provided information retrieval systems or catalog searches according to users' needs. Developing an automation system that makes it easier for users to find information will be helpful in an appropriate manner. A catalog search system called OPAC (Open Public Access Catalog) is one of the automation system developments that make it easier for users (Jannah et al., 2022). This system can be used as an online catalog search that can be used anywhere and anytime.

OPAC can be used optimally by users when searching for the desired collection. By entering keywords, OPAC will work according to needs. Users can find the desired collection quickly and accurately because OPAC contains various information about the required collection. The availability of digital-based information sources can make accessing the latest information relevant to TEFA easier. Libraries implementing information technology can use OPAC as a more effective system in searching for information needs (Tasbih & Syahidah, 2024).

Library services based on information technology have also been adjusted to technological developments, making it easier for users to meet their information needs. Information technology-based services in libraries are currently in great demand because they provide faster and more efficient access. TEFA learning often requires finding practical solutions based on data and information. Technology-based services in libraries are carried out practically and precisely. Service innovation with self-services or self-service has been used in technology-based libraries. The library has developed a system that makes it easier for users to provide services. The system was developed according to users' needs, prioritizing practicality and time efficiency. In this system, users can provide their services without needing assistance from librarians.

Technology-based library service activities can be carried out simultaneously because the system developed is compatible. Technology-based services in the library are carried out, such as borrowing collections, returning collections, extending collections, and making collection reservations. These activities are carried out independently by the user to facilitate circulation services. Reservations in digital or technology-based libraries can be used for laboratory collection reservations. The laboratory in the library can be used as a means of fulfilling information needs and a place to carry out learning activities, especially TEFA learning. TEFA learning that prioritizes skills is very much in

line with the existence of a library laboratory based on information technology. The existence of a service system that is integrated with the laboratory makes it easier for users to find sources of information in print or digital form.

Implementing TEFA learning in vocational educational institutions has appropriately resulted in various projects and product development (Yahya & Mahande, 2023). As a learning facility, the library has provided research and product development facilities integrated with the business world/industrial world. All educational institutions, including vocational ones, need the library as a container that provides information sources. Digital-based library innovation in supporting TEFA learning can also be developed into a system that provides a container or publication media containing works or products that have been created. These products will be inputted into the system according to their type, which their users can then access. The publication media contains products produced in collaboration with industry or industry needs. The creation of this system can make it easier for someone to continue to innovate and create work without feeling afraid and at a loss. The system will work as a container and publish products that have been created, as well as various information about the product.

Information technology-based libraries greatly encourage educational institutions, especially vocational ones, to continue to innovate in all developments and adjust to the needs of the industry. Collaboration between the business and industry worlds and libraries has created relevant innovation as a learning resource in implementing TEFA learning appropriately. The role of information technology-based libraries in the implementation of TEFA learning is greatly needed in providing quality resources and superior facilities and creating an environment that is very relevant to the needs of the industry.

The realization of collaboration between information technology-based libraries and TEFA learning not only meets the needs of educational institutions but also meets the information needs of the industry, which acts as a partner in organizing education, primarily vocational. With information technology, libraries have become innovative learning centers that create skills and knowledge that follow the needs of the current business world/industry. As mentioned above, the role of technology-based libraries in TEFA learning is expected to continue because, along with the development of science and technology, the needs of the business world/industry world also continue to develop and innovate.

CONCLUSIONS AND RECOMMENDATIONS

Based on the results of this study, information technology-based libraries have an important role in supporting the implementation of TEFA learning appropriately. Ease of collection search, use of digital-based services, media publication of products created, and ease of access to information. This convenience can be developed in a technology-based library system that is appropriate and easy for users. In addition, the library can strengthen the relationship between the world of education and industry, which ultimately contributes to the successful implementation of TEFA learning. Information technology-based libraries can work together to continue to integrate learning

resources that are more relevant to industry standards. The suggestions from researchers are to optimize the implementation of information technology systems in libraries so that they can support the provision of information sources and become learning resources, so that TEFA-based learning can increase student competence and production in synergy with industry.

FURTHER STUDY

This study is still limited to research that examines various published literature related to information technology-based libraries, learning methods with a teaching factory approach and other related topics so that the results provided are still very limited, for this reason further research is needed to develop a library system that can strengthen the relationship between the world of education and the world of industry.

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