AN IMPROVED CYBER SECURITY FRAMEWORK FOR EDUCATION INSTITUTIONS IN INDONESIA

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Abstract

One of the trends in the world of Education is Education technology. The COVID-19 pandemic forces us to accelerate using educational technology to keep the learning process in educational institutions around the world running. However, in adapting and using educational technology, it turns out that there is a factor of concern, namely cyber security. Because almost all educational technology platforms use the internet, cyber security is something that we inevitably have to deal with. Moreover, it turns out that during this covid19 pandemic, cybersecurity attacks have also increased along with the increase in the use of educational technology. Due to the high number of attacks and a large number of security holes in the Education technology platform adopted by educational institutions, So in this study, the authors will evaluate existing standards, models, and frameworks, identify fundamental and critical cybersecurity problems in several educational institutions in Indonesia, and propose a better security framework to address cybersecurity problems in educational technology in institutions.

Keywords: ***cyber security, educational technology, Security Framework***

INTRODUCTION

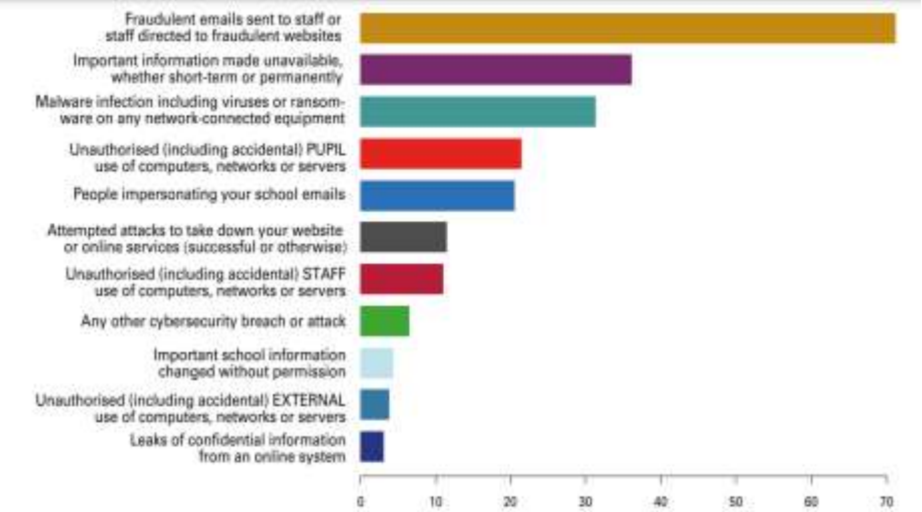
The public and the world of education were shocked by the emergence of the COVID-19 pandemic, which made technological developments change so fast. A tremendous impact was felt in the field of Education, which at the same time gave rise to several trends and issues. For education to continue to run well as it should, the world of education must adapt quickly to various factors that affect learning. Because by understanding trends and issues in the world of education can help educational institutions create learning environments, systems, and tools to support learning effectiveness.

At the beginning of 2020, it was reported that the development of internet use in Indonesia was very rapid. There were recorded active smartphone users connected to the internet, twice the number of internet users, which shows that the average Indonesian has two smartphones. In addition, the number of active social media users is 160 million, with a population increase of 1.1% from the previous year, followed by an increase in the number of internet users, smartphone users, and social media users (Kemp, 2020).

In this year of covid19, internet penetration and the use of information technology have increased compared to the previous year, increasing the potential for cyber-attacks. Educational institutions are one of the targets of cyber attacks because educational institutions contain valuable data that can be exploited. However, many educational institutions are currently not ready to face cyber-attacks because of the lack of awareness of educational institutions on cyber security, such as not understanding the procedures for dealing with various cyber attacks. Several critical issues on cyber security in educational institutions (Wijayanto & Kom, 2020) that is:

1. The high use of information technology and computers in universities increases the risk of cybercrime occurring in educational institutions.
2. Lack of knowledge of the importance of information data security and digital forensics in educational institutions.
3. Many educational institutions have not implemented Cyber Security Management Standards.

2017 to 2018 Joint Information Systems Committee (JISC) survey concluded that staff and students played a significant role in various cybercrime incidents (Goud, 2018). This happens because staff and students are direct users of technology in their respective educational institutions. In addition, Internet users are the most dangerous group in cybersecurity because they have access to various internal services that are less security concern than security from external cyber threats (Centre, 2019).



Source : (Centre, 2019)

LGfL (London Grid for Learning), in collaboration with NCSC (National Cyber Security Center), researched cyber security in 432 schools in the UK and produced several findings, namely (Centre, 2019) :

1. 97 percent of schools stated that losing access to IT services was a significant nuisance.
2. 35 percent of schools train their staff in cybersecurity.
3. 92 percent are aware of and welcome to support their non-IT staff with cybersecurity skills.
4. 83 percent of schools have experienced at least one cybersecurity incident. For example, 69 percent experienced phishing attacks and 35 percent experienced inaccessibility.
5. All schools have some security technology.
6. 98 percent of schools have antivirus and firewall protection.
7. Vigorous use of cybersecurity, such as mobile device management and two-factor authentication, is relatively infrequent.
8. 85 percent of schools have cybersecurity development rules and plans.
9. Less than 49 percent of schools stated that they were ready to accept cyber attacks.

Due to the high number of attacks and a large number of security holes in the Education technology platform adopted by educational institutions, So in this study, the authors will evaluate existing standards, models, and frameworks, identify fundamental and critical cybersecurity problems in several educational institutions in Indonesia, and propose a better framework to address cybersecurity problems in educational technology in institutions.

LITERATURE REVIEW

An essential aspect of the application of information systems is the development of security-related issues in information systems (Chaudhry et al., 2012). Helping network administrators perform their duties efficiently is a constantly researched and investigated problem along with technological developments. In addition, various security issues that need to be known and addressed at the technical and managerial level are a challenge in security issues in information systems (Sadowsky et al., 2003). One of the essential things in information system security is addressing a problem with appropriate precautions as early as possible.

Educational institutions, companies, and government bodies rely heavily on information systems to carry out daily activities in providing their products and services. With the increase in constraints on the information system, it will be a complex problem because it is in the essential system. Thus, the security of information systems is an essential function. This function must be managed and appropriately managed for the maintenance of various services. Good governance is one of them by implementing a proactive system when low costs also accompany problems. Thus, the governance of information system security has its own set of requirements, challenges, activities, and different types of rules (Bowen et al., 2006)

Security becomes a priority when information systems have been tampered with and hacked. Various forms of system destruction, such as spreading viruses, are carried out automatically in the system, while those responsible for information system security must take precautions manually. This is a form of weakness also in security governance (Oriyano, 2017). It all makes the world have to be more focused on securing information systems. Security measures should be taken appropriately to ensure there is no data leak. A comprehensive security framework must be created (Patil, 2008)

In the industrial sector, the blueprint of the company's architecture is a long-term strategy needed to develop information systems. It also serves to balance business and information technology and to add value to the company. One of its essential dimensions is security (Shen et al., 2009)

One example is the modern banking sector is a company increasingly dependent on the internet and information technology to operate its business and interact in its market. Threats, violations, and attacks on the banking world have increased in recent years. Attacks from inside and out have cost trillions of dollars a year to the business. Therefore, a proper framework is needed to organize and secure information systems. Furthermore, it is necessary to examine and compare general and specialized elements to design an optimal and efficient framework (Ula et al., 2011)

Security becomes even more attractive because it is a strategic issue that is even advisable to be removed from the IT domain and aligned with the corporate governance approach with the aim of a security framework designed to be appropriate and following their respective companies (A.A, 2013) IBM's IBM security framework and IBM Security Blueprint explore fears of threats to business systems and information technology. IBM's framework governs risk and cost governance, as well as compliance with business policies. It further demonstrates how these drivers can be translated into security capabilities and needs represented within the framework, enabling better enterprise security. Over the past few decades, industry groups and standards bodies developed frameworks that served as the basis for specific security aspects, and this IBM framework represents many frameworks in detail. To help organizations with their security challenges, IBM created a bridge to address the communication gap between business and security technical perspectives to enable simplification of thoughts and processes (Buecker et al., 2013)

Furthermore, one of the developments in the internet world is an information system based on cloud computing, and this architecture is trendy these days because it has many advantages. Cloud computing architecture is utilized primarily by colleges because, generally, colleges are limited to server resources. In addition, there are already several recommended frameworks for cloud computing such as the European Network and Information Security Agency (ENISA), Cloud Security Alliance (CSA), National Institute of Standards and Technology (NIST) (Negara & Andryani, 2014), Because of the crucial security issues of this information system, in addition to the framework, Intel formed a Security group that is a new business unit that collaborates with McAfee. This Emiratization focuses on accelerating the security of businesses and organizations from various security risks (Framework & Clear, 2014)

Securing sensitive data is becoming increasingly important for educational institutions. Information Security Management System (ISMS) is a systematic approach to establishing, implementing, operating, monitoring, reviewing, maintaining, and improving information security (Haufe et al., 2016). Although ISMS is formed from various existing security standards, it still has many shortcomings because it is considered not mature enough.

NIST and COBIT are commonly used as security references and even become the primary reference for designing new security (Stewart, 2016). In one of its publications, NIST states that organizational risks include many types of risks, such as program management risk, investment risk, legal liability risk, safety risk, inventory risk, supply chain risk, and security risk. Security risks associated with the operation and use of information systems are just one of the many components of an organization's risks handled by those responsible for the management of risks in an organization or company (Calumpang & Dilan, 2016)

The executive order assigns NIST to develop a framework for improving security in critical sectors to produce common standards that can be used by a variety of critical sector organizations and are critical to assessing and managing their security risks. This framework is designed to complement the organization's risk management processes and security programs. This framework applies broadly, regardless of size, industry, or security sophistication (Department of Defense, 2019)

Information security (IS) should be integrated into the governance of institutions and considered a governance challenge that includes adequate reporting, accountability, and risk management. The implementation of good information security governance (ISG) provides strategic alignment, risk management, resource management, performance measurement, and value delivery. Several publications have discussed this area. However, there has been no identified success determinant that ensures improvement across areas of effective governance. We need a framework of best practices across areas of effective IS governance that supports institutions to survive and thrive (Gashgari et al., 2017)

Most organizations recognize that security is essential to information system development, but business costs and performance often take precedence over security. Although security awareness is growing, most organizations focus on implementing security only at the commissioning stage of system development and trying to incorporate system security by force into the final design, resulting in the ineffective implementation of system security (CSA Singapore, 2017)

Research in security approaches, both technical and non-technical, continues. Due to the growing need for security, an alternative approach combines technical and non-technical methods. In this way, it is expected to find new, better ways to use (Koskosas, 2013)

Given the increasing and seriousness of cyberattacks, we must be aware of the need to stay one step ahead. The issuance of security frameworks aims to support regulated entities to have proper security governance and build a robust infrastructure together with the necessary controls and prevention. A framework that articulates proper control and provides guidance on how to assess maturity levels. The adoption and implementation of this framework is expected to enhance security (Saudi Arabian Monetary Authority (SAMA), 2017)

LITERATURE REVIEW

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METHOD

This chapter describes the design of research in this research for the achievement of research objectives. It starts by identifying the vital variables that affect cybersecurity in educational institutions obtained from previous research. Then the selected variables are made questionnaires containing questions to be given to respondents in educational institutions in Indonesia to find new variables or maybe even eliminate existing variables with quantitative methods, descriptive statistical data analysis. Vital variables are included in the next stage, namely verification, clarification, and validation by experts with qualitative methods to get recommendations in solving cybersecurity problems in educational institutions. The recommendations of these experts become the basis in the formulation of a model of improvement of cybersecurity frameworks in educational institutions to be made.

RESULTS AND DISCUSSION

The increasing access to various digital services in educational institutions will also increase the number of security vulnerabilities (Aldheleai et al., 2015; Salimovna, 2019). Furthermore, because of the COVID-19 pandemic, many educational institutions have just switched to using various technology services for education. However, they do not understand how important the safety factor is in the various technologies they adopt (Shivshankar & Paul, 2016). In addition, the main challenge of cybersecurity in various educational service technologies is the lack of attention to security itself (Adetoba B. T., 2016) and the security factor being something that is often overlooked (Besimi et al., 2009). Furthermore, although this cybersecurity issue is considered very important, the literature and references to research and investigate it are still insufficient (Savulescu et al., 2015). One of the success factors in implementing technology in educational institutions lies in cyber security itself (Abdul Majid et al., 2015). Not to mention that many systems, services, and technology for education are generally powerless when exposed to cyber-attacks (Derawi, 2015). This makes it a unique and significant challenge to research (Bandara et al., 2014; Jianming, 2007). Currently, cybersecurity in educational institutions is highly dependent on the role of humans. In addition, there is no systematic mechanism for testing cybersecurity vulnerabilities (Violettas et al., 2013), so specific techniques or mechanisms are needed to improve cybersecurity in educational institutions (Bhatia et al., 2018). This research will try to find the critical factors in cyber security in educational institutions from various technical and non-technical perspectives to formulate a framework for improving cyber security in educational institutions in Indonesia.

CLOSING

Conclusion

The phenomena in the field and the visible research gaps are very relevant to be explored further. The limitations of previous research on educational technology cybersecurity in educational institutions are the main background of this research. Because at this time, when humanity is preoccupied with handling the COVID-19 pandemic, it turns out that cyber security in educational institutions is one of the objects that are widely exploited for various purposes that are detrimental to educational institutions.

The massive increase in the exploitation of cybersecurity during the COVID-19 pandemic has become an exciting phenomenon. This phenomenon will be observed to obtain several essential factors for designing and formulating a new cybersecurity framework in Educational Institutions.

Research and testing will be carried out in several educational institutions in Indonesia that have adopted various educational technologies in their educational institutions. The initial stage of the research is to identify and validate various cyber security factors from previous research and from the survey results to be conducted. Furthermore, it was followed by conducting a follow-up survey to experts in the field of cyber security.

This research is expected to obtain new findings theoretically and practically, which can be implemented in the framework of proposed improvements, and ends with a brief discussion about the importance of this research to provide input for further research.

The contents of the bibliography are written in Times New Roman 12 font and written with 1.15 spaces. The bibliography is a source of reference/reference which is used as a reference for manuscript writing. Writing a bibliography is a source of reference/reference that is used as material for citations to writing manuscripts. Writing a bibliography uses the rules of The Chicago Manual of Style (CMS). The number of reference sources used as a manuscript bibliography is at least 10 titles of scientific literature (80% primary references, and 20% secondary references). Primary reference sources, such as: journals, research reports, theses, teris, dissertations, and proceeding papers. Secondary reference sources, such as: books and internet sources. We recommend writing citations using the Mandeley reference manager application

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