

Use of the CodeIgniter Framework in Developing Online Registration and Pre/PostTest Education and Training Applications at BKA Aceh

Widya Almaira^{1*}, Nurul Hamdi²

^{1,2} Program Studi S-1 Informatika, Universitas Ubudiyah Indonesia, Indonesia

¹widyaalmaira@gmail.com, ²nurulhamdi@uui.ac.id



*Corresponding Author

Article History:

Submitted: 21-10-2023

Accepted: 24-10-2023

Published: 27-10-2023

Keywords:

Codeigniter framework; online registration and test application; training; Aceh Personnel Agency; information system.

Brilliance: Research of

Artificial Intelligence is licensed under a Creative Commons

Attribution-NonCommercial 4.0

International (CC BY-NC 4.0).

ABSTRACT

This study analyses the use of the Codeigniter Framework in developing an online training registration and pre/posttest application at the Aceh Civil Service Agency (BKA). The purpose of this research is to build an information system that can provide general information about training, as well as facilitate registration and pre/posttest online and real-time. This research uses the method of needs analysis and system design analysis. The results of this study indicate that the system developed can provide easy access to prospective participants to find out the training schedule. Admin can access data related to training schedules, participants, and committees, while the committee can manage pre/post test questions and exam results. The system allows participants to access modules and pre/posttests after registering. Exam result data can be used as a reference in decision-making related to job promotions that require training qualifications. In conclusion, the use of the Codeigniter Framework is effective in developing online registration and pre/posttest training applications at BKA Aceh.

INTRODUCTION

Increasing the capability and competence of the state civil apparatus (ASN) through training is very important in supporting the effectiveness and quality of public services. Training or Education and Training is a teaching and learning process carried out with the aim of improving the capabilities of the State Civil Apparatus (ASN) [1]. Specifically for ASN, Training aims to [2]:

1. Improve the knowledge, skills, abilities, and attitudes of employees in carrying out their job duties professionally based on the nature and ethics of the position which is in line with the agency's needs.
2. Developing a state apparatus that can act as a reformer and cement national unity.
3. Strengthen various attitudes and spirit of service focused on service, protection, and community empowerment.
4. Developing a shared vision and dynamic mindset among employees in carrying out general government and development tasks, to realize good governance.

Training carried out by ASNs can be grouped into pre-service education and training, and in-service training. Pre-service education and training are carried out to shape the national insight, personality, and ethics of the State Civil Service as well as provide basic knowledge about the state government administration system. Three levels of in-service training need to be taken, including leadership training (PIM Training), functional training, and technical training [3].

In this context, the Aceh Civil Service Agency (BKA) is responsible for organizing training for ASNs in the Aceh Province region. However, the registration process, carrying out pre/posttests, and presenting information related to training are still carried out manually, causing limitations in access to information and process efficiency.

This obstacle raises challenges in presenting training that is modern, interactive, and provides better accessibility and efficiency. Therefore, this research focuses on developing a registration information system and online training tests using the CodeIgniter Framework at BKA Aceh.

MySQL (My Structure Query Language) is a database management system (DBMS) that is a system for accessing databases that use the SQL language [4]. According to Enterprise, MySQL is an RDBMS (Relational Database Management System) that is easy and fast to use and is widely used for various needs [5]. MySQL is widely used for database handling purposes because apart from being reliable it is also open source, this software can be used by anyone without paying and the source code can be downloaded by anyone.

PHP scripts integrate applications into HTML, turning static web pages into dynamic ones. Operating on the server side, scripts are processed on the server before being sent to the browser. PHP scripts are embedded as tags in the HTML language, by web page creation standards. The PHP model operates by starting with a browser request for a web page, retrieving the required address from the web server, identifying the desired content, and passing all the necessary information to the web server.



These concepts play an important role in the world of modern technology and have been applied in various industries to improve organizational efficiency, effectiveness, and performance. Understanding these concepts and their application can make a major contribution to the development of effective systems and applications in various domains. This system aims to overcome existing limitations, including limited information, difficulties in registration, and delays in reporting exam results. It is hoped that the development of a web-based information system will be able to provide solutions to the problems faced by BKA Aceh.

The purpose of this research is to design and develop a web-based application that allows prospective training participants to register online, take the pre/post-test digitally, and provide access to information related to training to all related parties. The main aim is to increase the efficiency of the registration process and test implementation, as well as provide access to more accurate and real-time information to prospective participants, committee members, and BKA Aceh admins.

Thus, it is hoped that this research can make a positive contribution to improving the quality and efficiency of training at BKA Aceh, as well as providing a basis and guide for the development of similar systems in similar institutions.

LITERATURE REVIEW

HTML is an abbreviation of Hypertext Markup Language and is a script for compiling web documents [6]. HTML has a role in arranging the structure of website pages which places each element of the desired website layout [7]. Command markers in the HTML programming language are called tags which are used to display HTML documents [8]. HTML documents are saved in regular text format and contain tags that instruct the web browser to execute specified commands. PHP, which stands for PHP Hypertext Preprocessor, is a server-side programming language added to HTML [9]. The PHP working system begins with a request originating from a website page by the browser. Based on the URL or website address on the internet network, the browser will find an address from the web server, identify the desired page, and convey all the information needed by the web server [10]. This script will allow an application to be integrated into HTML so that a web page is no longer static, but dynamic. The server-side nature means that the script is executed on the server, and then the results are sent to the browser.

A framework can be understood as a framework of functions, procedures, and classes intended for a specific purpose, which has been pre-constructed to facilitate and speed up website development, so there is no need to build functions or classes from scratch [11]. A framework is a software that helps programmers create applications or websites by offering various functions, plugins, and concepts, which ultimately form a particular system. CodeIgniter is an open-source application in the form of a PHP framework, utilizing the MVC (Model, View, Controller) development method to build dynamic websites [12]. The advantage of the framework is that it can carry out application development in a uniform manner [13].

The Model View Controller (MVC) concept is very popular in web application development. MVC separates the creation of code logic from the template or appearance of the website [11]. In MVC there is a division of the program into three large parts which aims to separate the focus of attention, responsibility, and logic into each part [13]. Using MVC can produce website projects that are more organized and simplified. CodeIgniter is one of several PHP frameworks available, developed by Rick Ellis. PHP, short for PHP Hypertext Preprocessor, is a server-side programming language integrated into HTML [14]. CodeIgniter is a PHP framework that can help developers speed up the development of PHP-based web applications compared to writing all the program code from scratch [15].

METHOD

This research aims to develop a web-based information system that manages online registration and tests for the implementation of Diklat (Education and Training) at the Aceh Civil Service Agency (BKA). This research uses a methodology consisting of requirements analysis and system design analysis. Needs analysis was carried out by collecting data from previous final assignment studies, literature studies related to web-based programming, and the data collection process from BKA. The details of this research include several aspects:

1. Subject/Material Study: This research focuses on developing an online registration and test information system for training at BKA. The main objective is to facilitate participant registration, carry out online pre-tests and post-tests, as well as manage information related to training.
2. Tools Used: In this research, the tools used are web development software, specifically the PHP Framework CodeIgniter to build an online registration and test information system.

The flowchart for the proposed system for the online training registration and test information system for managing web-based training participants is as follows:

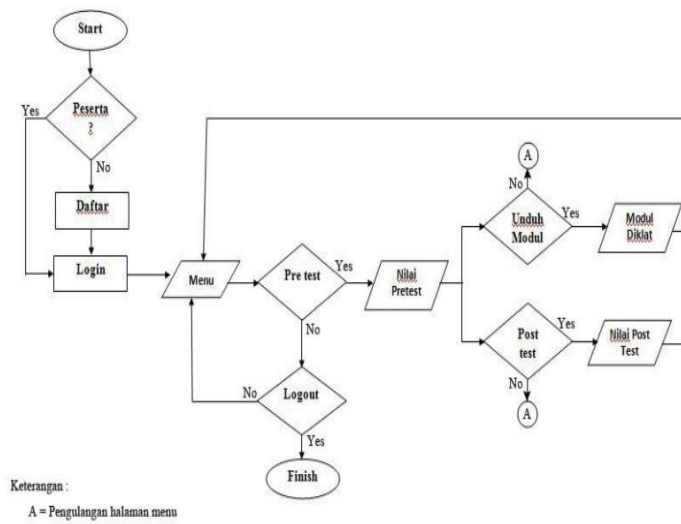


Figure 1. Flow diagram of the registration information system and online training tests

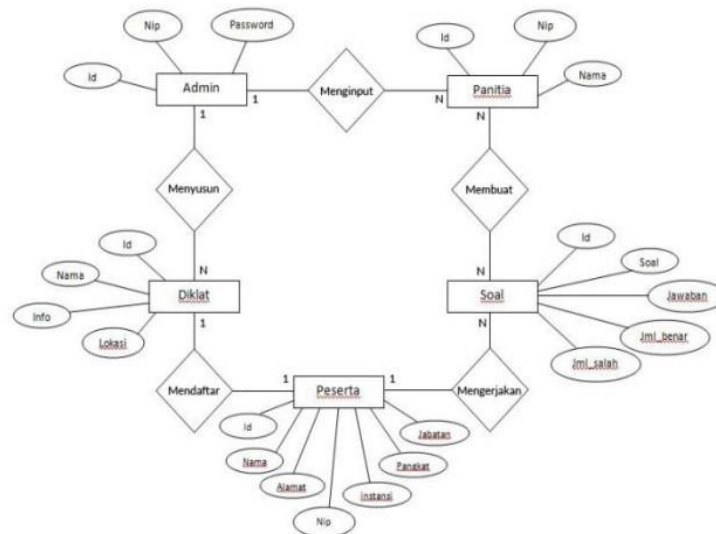


Figure 2. Entity Relationship Diagram

Experimental Design/Design Used: There were no physical experiments in this study. The design used is the design of an online registration and test information system for training, by identifying the data flow, functionality, and access required by various users (admin, committee, and participants).

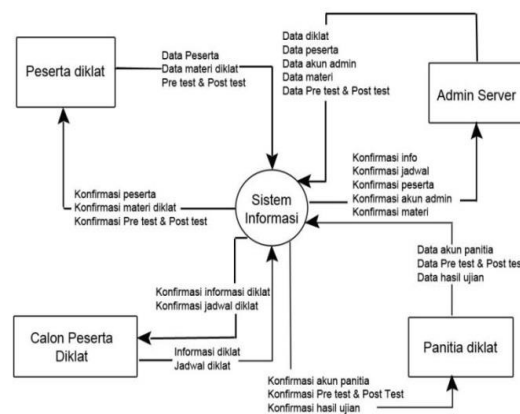


Figure 3. Data Flow Diagram

1. Sampling Technique: This research does not use sampling techniques because the focus is more on developing information systems and not on collecting data from the population.
2. Variables to be Measured: The variables to be measured include interactions between users (admin, committee, and participants) with the information system, such as participant registration, data input, management of pre-test and post-test questions, and exam results.
3. Data Collection Techniques: Data is collected through the development of the information system itself, including participant data, training schedule data, question data, and exam results data (pre-test and post-test).

The following is the m_participant table to store data on participants who will take part in training organized by the Aceh Civil Service Agency.

Table 1. Participant Data

Attribute	Type
Id	Int
Name	Vanchar
Address	Vanchar
Gender	Enum
Phone number	Vanchar
Nip	Vanchar
Institution	Vanchar
Rank	Vanchar
Position	Vanchar
Work unit	Vanchar

The following is the m_berita table to store data in the form of complete information regarding training and training news.

Table 2. Training Information Module

Attribute Table	Type
Material_id	Int
Training Name	Vanchar
Information	Vanchar
Place of execution	Vanchar
Dob	Vanchar
Module	Vanchar
Status	Enum

1. Statistical Analysis and Models Used: This research is more directed at information system development and does not involve statistical analysis. Therefore, no statistical model was used in this study.
2. Research Results: The results of this research are the implementation of an online registration and test information system for the implementation of training at BKA. This system can help participants register and take exams online, as well as assist BKA in managing participant data and information related to training.
3. Overall, this research is an effort to present an effective and efficient information technology solution for managing the training process at the Aceh Civil Service Agency. By utilizing the development of a web-based information system, it is hoped that the registration process, exam implementation, and training participant data management can be carried out better.

RESULT

Implementation of a system using the CodeIgniter framework in developing registration applications and online training pre/post test at BKA Aceh.

1. The process of registration and implementation of training through an information system carried out by the client:
 - a. The State Civil Apparatus accesses all training information on the Online Training Registration and Test Information System.
 - b. State civil servants as clients register for online training which will be held on the online training registration and test information system.
 - c. If prospective participants successfully register for online training which is held on the online training registration and test information system, they can take part in the training as training participants.
 - d. Participants carry out an online pretest before carrying out the training.
 - e. Training participants carry out the training learning modules provided by the admin.

- f. Training participants carry out a posttest by filling out an online and real-time questionnaire given by BKA as the committee.
2. The process carried out by BKA as server and committee
 - a. BKA logs in as admin or on the Education and Training Online Test and Registration Information System committee.
 - b. Admin inputs all information regarding training.
 - c. Admin inputs the training schedule to be held.
 - d. The committee provides online and real-time questionnaires for the training pretest.
 - e. Admin provides training learning modules.
 - f. The committee provides online and real-time questionnaires for the training posttest.
3. Basics of creating applications
 - a. Determine the type of application
 - b. Select the programming language for the application
 - c. Create a data flow
 - d. Prepare the software used
 - e. Application implementation
4. Online Education and Training Registration and Test Information System
The Registration and Online Training Test Information System is an information system based on the PHP Framework CodeIgniter which aims to present information relating to general information, and registration for online and real-time training. This information system functions to make it easier for BKA to make promotion decisions. This information system is also able to assess training participants through several stages of online questionnaires in the form of pretest and posttest. This information system has 3 user levels, namely admin, committee, and participants. Admin has access rights, namely participant data, committee data, training schedule data, and training information. The committee has access rights to pretest and posttest question data, exam data, and exam results. Participants have access rights, namely to carry out pretests, posttest, and download training modules.



Figure 4. Main page

The image above shows the main page of the registration information system and online training tests. In this information system display, there is a navbar menu consisting of Home, Guide, Admin, Gallery, Contact, and Training Test which has a sub-menu in the form of Training Schedule and Login.

The following is a menu display to display training information such as training regulations, the importance of training for ASN (State Civil Servants), and training groups which will display explanations of the types of training and access to training tests.



Figure 5. Display of the training information menu

The following is a display of the guide menu for learning how to use online training tests for participants. The guide menu consists of Register and Login, Pretest, Module, and Post Test.



Figure 6. Guide menu display

The following is a guide information display that will display information in the form of a guide on how to access the training test.



Figure 7. Guide information display

The following image shows the training schedule page that will be held by the Aceh Civil Service Agency (BKA). Participants can register for the training by accessing the register button.

Info	Nama Diklat	Tempat Pelaksanaan	Waktu Pelaksanaan	Aksi
+	Diklat Mind Setting	Badan Pengembangan Sumber Daya Manusia	20 Mei - 10 Juni	Daftar
+	Diklat Penguatan Kompetensi Public Speaking	Badan Pengembangan Sumber Daya Manusia	26 September - 25 September	Daftar
+	Diklat Microsoft Office Project	Badan Pengembangan Sumber Daya Manusia	3 Oktober - 15 Oktober	Daftar
+	Diklat & Sertifikasi Asesor Kompetensi	Badan Pengembangan Sumber Daya Manusia	10 Mei - 10 Juni	Daftar
+	Diklat Penyusunan Standar Kompetensi	Badan Pengembangan Sumber Daya Manusia	13 Januari - 20 Januari	Daftar
+	Pengembangan Microsoft Office	Badan Pengembangan Sumber Daya Manusia	14 Oktober - 20 Oktober	Daftar
+	Diklat Pelayanan Publik	Badan Pengembangan Sumber Daya Manusia	18 Mei - 20 Juni	Daftar
+	Diklat Penyusunan Standard Operating Procedures (SOP)	Badan Pengembangan Sumber Daya Manusia	13 Januari - 15 Februari	Daftar
+	Diklat Perencanaan Strategis	Badan Pengembangan Sumber Daya Manusia	16 November - 23 Desember	Daftar
+	Diklat Pengembangan Kompetensi PPTK	Badan Pengembangan Sumber Daya Manusia	23 Juli - 28 Juni	Daftar

Figure 8. Display of training schedule

The following is a display of the crud (create, read, update, and delete) training schedule. Admin can input training schedule data, change training schedules, and delete training schedules.

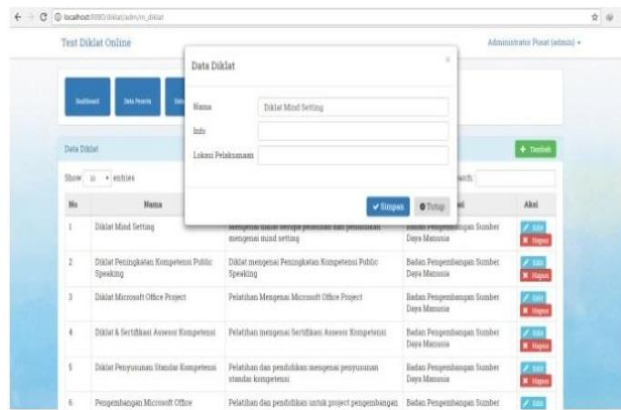


Figure 9. Training schedule

The following is a display of the crud for training participants which can be accessed by the admin. Admin can edit participant biodata and enter test scores in the participant table.

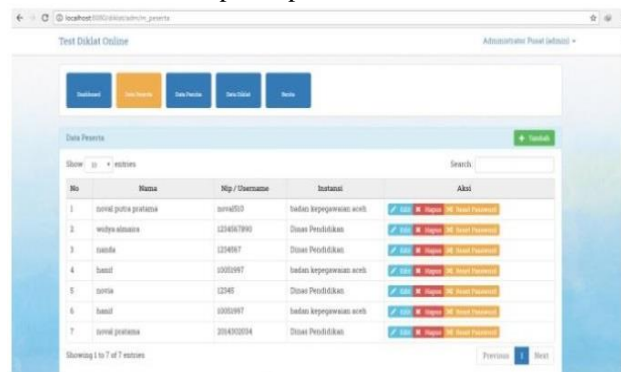


Figure 10. Training participants

The following is a display of the online training test. On the page, there is a question form and answer choices. This page also uses a timer when taking the pretest and posttest.

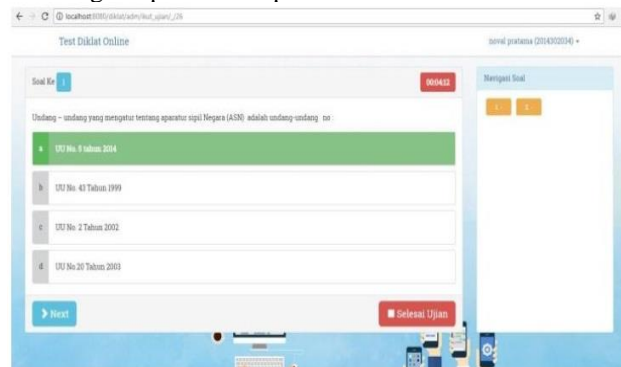


Figure 11. Online test display

DISCUSSION

Using this framework provides several significant impacts and benefits in the application development process. This system allows training participants to register online, take pre-tests and post-tests, and access information related to training schedules and materials. Admin and committee can also manage participant data, training schedules, and exam questions through the system.

The CodeIgniter framework is a framework built in the PHP programming language. The goal is to help web application development become more structured, organized, and efficient. CodeIgniter has the Model-View-Controller (MVC) principle, where the code in the application is divided into three main components: Model (data management), View (display appearance), and Controller (business logic management).

Benefits of Using the CodeIgniter Framework in Developing Registration Applications and Online Training Pre/Post-Tests

1. **Organized and Structured Structure:** The CodeIgniter framework provides a well-organized folder and file structure. This helps developers in separating business logic from views and makes project management easier.
2. **Fast Development:** By providing many ready-to-use components such as libraries, helpers, and plugins, CodeIgniter speeds up the development process. Developers don't need to start from scratch and can focus on the unique features of the app.
3. **Model-View-Controller (MVC):** The MVC concept helps in separating business logic, views, and data management. This makes it easier to manage code, fix bugs, and improve application maintenance.
4. **Security:** CodeIgniter has built-in security mechanisms such as form validation and protection against attacks such as SQL injection and Cross-Site Scripting (XSS).
5. **Complete Documentation:** CodeIgniter provides complete and easy-to-understand documentation, helping developers understand and use its features well.
6. **Active Community:** CodeIgniter has an active community, which means developers can easily find help and solutions to problems they face.

Implementation of CodeIgniter in the Registration Application and Online Training Pre/Post-Test at BKA Aceh

1. **Folder Structure:** Using CodeIgniter's built-in folder structure helps in organizing application components separately, such as controllers, models, and views.
2. **Routing:** CodeIgniter has a flexible routing system, allowing developers to set more user-friendly URLs.
3. **Controller:** Controller is used to manage the flow of business logic. In this application, the controller is used to manage registration, exams, and data access.
4. **Model:** Models are used to manage data, such as retrieving data from a database. In this application, the model is used to manage participant data, exam questions, and exam results.
5. **View:** View is used to set the page display. In this application, views are used to display registration, exam, and information pages.
6. **Libraries and Helpers:** CodeIgniter provides libraries and helpers that help in validating data, sending emails, and various other tasks.
7. **Database Interaction:** CodeIgniter has a Query Builder feature which makes it easier to interact with the database. This helps avoid SQL injection and makes it easier to create queries.

The development of an Online Education and Training Registration and Test Information System has several implications and advantages:

1. **Ease of Access and Online Registration** This system makes it easy for training participants to register online. Participants can access the system from anywhere and at any time without needing to come directly to the BKA office. This increases time and cost efficiency for participants.
2. **Carrying out online pre-tests and post-tests.** With pre-tests and post-tests carried out online, participants can measure their understanding before and after taking part in the training. This provides a more accurate picture of the extent to which participants understand the material being taught.
3. **Management of participant data and training schedules.** Admin and committee can easily manage participant data and training schedules through the system. Information regarding participants, schedules, and training information is available on one platform, which makes decision-making and planning easier.
4. **Multi-Level User Model** This system uses a multi-level user model, namely admin, committee, and participants. Each level of user has different access rights according to their role. This ensures data security and privacy and avoids misuse of access.
5. **Improved Training Management** With this system, BKA can improve overall training management. Information related to schedules, participants, materials, and exam results can be accessed more easily and quickly. This can support better decision-making in training planning and implementation.
6. **Challenges and Obstacles** Although this system has many advantages, several challenges need to be overcome. One of the challenges is ensuring the availability of stable and fast internet access for participants, especially for those in areas that are less accessible by internet networks.
7. **Future Development** This system can be further developed by adding features such as automatic notifications to participants regarding schedules, exam results, and other training-related information. Integration with other personnel systems can also be considered to increase efficiency in data management.

CONCLUSION

In this research, the Registration Information System and Online Training Tests were successfully developed at the Aceh Civil Service Agency. This system provides easy access, implementation of online exams, management of participant data, and training schedules. Although it has several challenges, this system has the potential to increase the efficiency and effectiveness of training management at BKA. With this platform, it is hoped that BKA can optimize the implementation of training and improve the quality of human resources within the agency.

The use of the CodeIgniter Framework in developing the Registration Application and Online Training Pre/Post-Test at BKA Aceh has several significant benefits. From an organized structure to built-in security features, CodeIgniter helps in developing efficient, maintainable, and reliable applications. Thus, using CodeIgniter can be a good choice for developing web-based applications in the BKA Aceh environment.

This research investigates the use of the CodeIgniter Framework in developing the Registration Application and Online Training Pre/Post-Test at the Aceh Civil Service Agency (BKA). Based on the results and discussion that have been presented, several important conclusions can be drawn:

1. Advantages of CodeIgniter: The CodeIgniter framework has advantages in developing PHP-based web applications. Organized structure, Model-View-Controller (MVC) concept, development speed, and built-in security features are some of the many benefits offered by CodeIgniter.
2. Development Efficiency: Using CodeIgniter helps in developing applications more quickly and efficiently. Ready-to-use components such as libraries and helpers help developers focus on the unique features of the application without having to build all the elements from scratch.
3. Separation of Logic: The Model-View-Controller (MVC) concept helps to separate business logic, views, and data management. This makes the code easier to maintain, debug, and modify.
4. Security Management: CodeIgniter has built-in security mechanisms that help protect applications from attacks such as SQL injection and Cross-Site Scripting (XSS).
5. Documentation and Community Support: CodeIgniter provides comprehensive documentation and an active community. This makes it easier for developers to understand and solve problems that may arise during development.
6. Recommendations for Use: Based on the advantages above, CodeIgniter is recommended for use in developing Online Training Registration and Pre/Post-Test Applications at BKA Aceh. This framework can provide reliable, efficient, and high-quality solutions for web application development needs.

In conclusion, the use of the CodeIgniter Framework has proven itself to be a good choice for developing Online Training Registration and Pre/Post-Test Applications at BKA Aceh. With an organized structure, development efficiency, and strong security features, CodeIgniter can improve the quality and performance of applications and make them easier to maintain. It is hoped that the use of this framework will make a positive contribution to the implementation of training at BKA Aceh.

REFERENCES

- [1]. Republik Indonesia, *Undang-Undang Nomor 5 Tahun 2014 tentang Aparatur Sipil Negara*. Indonesia, 2014.
- [2]. Kementerian Pendayagunaan Aparatur Negara dan Reformasi Birokrasi, *Peraturan Menteri Pendayagunaan Aparatur Negara dan Reformasi Birokrasi Nomor 20 Tahun 2019 tentang Perubahan atas Peraturan Menteri Pendayagunaan Aparatur Negara dan Reformasi Birokrasi Nomor 34 Tahun 2018 Tentang Jabatan Fungsional Peneliti*. Indonesia: BN.2019/NO.1160, jdih.menpan.go.id : 11 hlm., 2019.
- [3]. Sudiman, *Bahan Diklat Prajabatan Golongan III Kepegawaian*. Jakarta: Lembaga Administrasi Negara - Republik Indonesia, 1998.
- [4]. Kadir dan Abdul, *Mudah mempelajari Database MySQL*. Yogyakarta: ANDI, 2010.
- [5]. A. Hidayat, A. Yani, Rusidi, dan Saadulloh, "Membangun Website SMA PGRI Gunung Raya Ranau Menggunakan PHP dan MySQL," *JTIM : Jurnal Teknik Informatika Mahakarya*, vol. 2, no. 2, hlm. 41–52, 2019.
- [6]. Asnawi dan Chaerun, *Modul Matakuliah Web Dasar*. Yogyakarta: STMIK Jenderal Achmad Yani, 2012.
- [7]. A. P. S. Sari, "Rancang Bangun Sistem Informasi Pengelolaan Talent Film Berbasis Aplikasi Web," *Jurnal Informatika Terpadu*, vol. 6, no. 1, hlm. 29–37, 2020.
- [8]. S. Mariko, "Aplikasi Website Berbasis HTML dan JavaScript untuk Menyelesaikan Fungsi Integral Pada Mata Kuliah Kalkulus," *Jurnal Inovasi Teknologi Pendidikan*, vol. 6, no. 1, hlm. 80–91, 2019.
- [9]. Desrizal, *Panduan lengkap, PHP, Ajax dan JQuery*. Codingwear.com, 2013.
- [10]. A. Firman, H. F. Wowor, dan X. Najoan, "Sistem Informasi Perpustakaan Online Berbasis Web," *E-Journal Teknik Elektro dan Komputer*, vol. 5, no. 2, hlm. 29–36, 2016.
- [11]. CodeIgniter Foundation, "CodeIgniter User Guide," CodeIgniter. [Daring]. Tersedia pada: <https://www.codeigniter.com/userguide3/>

-
- [12]. L. Welling dan L. Thomson, *PHP and MySQL Web Development*. New York: Pearson Education Inc., 2016.
- [13]. Y. R. L. Kelen dan B. J. Belalawe, "Implementasi Model-View-Controller (MVC) Pada Ujian Online Melalui Penerapan Framework Codeigniter," *Jurnal Pendidikan Teknologi Informasi (JUKANTI)*, vol. 1, no. 1, hlm. 10–16, 2018.
- [14]. R. Elmasri dan S. B. Navathe, *Fundamentals of Database Systems*. New York: Pearson Education Inc., 2016.
- [15]. A. Sahi, "Aplikasi Test Potensi Akademik Seleksi Saringan Masuk LP3I Berbasis Web Online Menggunakan Framework Codeigniter," *TEMATIK : Jurnal Teknologi Informasi dan Komunikasi*, vol. 7, no. 1, hlm. 120–129, 2020.