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Redesigning Website to Support Teacher Professional Development through Empowered Community

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ABSTRACT

Objective: This study aims to identify effective Teacher Professional Development (TPD) activities facilitated by LPTK and to design a supportive website to host these activities. **Method:** The research was conducted using an agile development method, encompassing iterative stages, including initiation, requirement gathering, design, development, testing, deployment, and review. **Results:** The findings revealed that three main categories of TPD activities integrated into the platform: (1) comprehensive training programs, both structured and user-tailored; (2) interactive features such as forums, symposiums, research collaborations, and continuous support through empowered communities; and (3) certification and publication modules for training outcomes and scholarly work. The website design features essential components such as user dashboards, program access, user-contributed work, community forums, certification tools, and news sections. Functional testing showed that all features operated as intended during user experience (UX), particularly in ensuring seamless access to TPD programs and sustained peer interaction. However, improvements in user interface (UI) remains necessary to enhance visual appeal and user engagement. **Novelty:** This study contributes a sustainable digital platform for teacher professional development. It highlights key values such as empowerment, collaboration, and accessible participation among teachers, academics, and practitioners

INTRODUCTION

Challenges in Teacher Professional Development (TPD) in Indonesia

One of the issues concerning teacher professionalism in Indonesia is the lack of continuous Teacher professional development (TPD) (Kholis, 2019). TPD faces numerous issues that persist to this day. Several lecturers conducted a focus group discussion with vocational high school teachers in DIY regarding classroom learning and graduates' work readiness. Some of the results of the FGD indicated the need for continuous assistance from LPTK academics in providing updates on effective learning strategies, as well as broader and more flexible communication access between teachers, lecturers, and practitioners. Recognizing these challenges and opportunities, this study was initiated to address the gaps in teacher professional development. TPD can be related to the knowledge aspect which includes subject matter and teaching methods, and the community aspect which provide an environment that supports teacher professional development (Bagno et al., 2006). TPD is a continuous process that helps teachers acquire new skills and enhance their expertise. It starts with the initial training they receive and continues until after they leave the workforce (Van Raalte et al., 2012). TPD programs must be implemented on an ongoing basis to bring about meaningful improvements in teachers' beliefs, knowledge, and practices. Inadequate continuous TPD is one of the critical issues associated with teacher professionalism in Indonesia (Rahayu et al., 2023).

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Communities play a significant role in shaping teacher professionalism. A sense of connection with others has been acknowledged as a key factor in achieving goals in both online and offline learning settings (Keyser, 2019). Teachers could enhance the TPD within such communities. Acquiring knowledge and information from fellow educators is essential for enhancing teaching proficiency, as it serves as a platform for teachers to share their expertise and experiences (Muhammadiah et al., 2022). "Care for the profession" by teachers can serve as a source of encouragement and as evidence of professional dedication, reflecting a commitment to continuous TPD activities undertaken voluntarily through socially progressive initiatives discussed in teacher forums (Diamond & Bulfin, 2023). Teachers must continually enhance their competencies by participating in seminars or training, conducting research, and publishing scientific papers.

The identified issues associated with traditional PCD requiring attention are (a) absence of sustainable development; (b) lack of autonomy; (c) no need analysis conducted at the beginning of the implementation procedure; (d) no intention for customization or personalization of the TPD system; (e) lack of flexibility to reflect on teacher's work; and (f) no evaluation of the effects on teacher achievement (Mirici & Pulatsü, 2022). The school-based teacher development (SBTD) framework includes the following principles: (a) ensuring policymaker support; (b) prioritizing strategic skills that influence teaching and learning outcomes; (c) strengthening teacher capacity; (d) fostering communities of teachers that support TPD; (e) increasing instructors' proficiency in the use of diverse technologies for teaching and learning (Junaid et al., 2019). To foster collaboration and knowledge exchange, teachers may engage in social media, online communities, and instructional videos (Djafri et al., 2024). Based on the issues in traditional PCD and the SBTD framework, it is evident that teachers need to be part of a community that supports TPD. However, existing teacher's forum are considered not to be fully optimized by teachers. An in-depth analysis of this matter must be conducted, particulary regarding the need for LPTK support and the use of technology as a connecting medium between LPTK and teachers.

The Role and Limitations of Teacher Forums (MGMP, KKG, PGRI)

To strengthen TPD in 21st-century education, several approaches might be applied: Peer mentorship, fostering collaboration, collaborative study, teacher organizations, incorporating ICT teaching, and formal training courses (AbdulRab, 2023). TPD can be classified into three contextual classifications: individual, limited group, and organizational (Mirici & Pulatsü, 2022). Limited group TPD involves cooperative or collegial development, peer assessments, action research, the cascade approach, mentoring, and coaching. Individual TPD includes self-directed, self-monitored instructional portfolios and action research. The teacher working group program (KKG) and the subject teacher forum (MGMP) are the formal platforms for teacher development communities in Indonesia. PGRI is one of the teacher organizations dedicated to promoting continuous TPD and excellent teaching (Sri, 2022). KKG and MGMP could be an environment for exchanging knowledge, assistance, addressing common learning difficulties, ongoing professional growth, and other activities that foster a professional teacher network. However, multiple research studies remain suggesting that KKG, MGMP, and other teacher organizations' roles for TPD still require strengthening (Neina et al., 2023). Teachers' actual needs are not sufficiently addressed in MGMP (Rahman,

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2021). Since MGMP places significant emphasis on preparing teaching materials such as syllabuses, instructional plans, and student assignments, teachers require additional TPD content, including instructional techniques or strategies. Furthermore, only representatives are allowed to engage in MGMP, which means not all teachers are eligible (Rahman, 2021). This indicates that the effectiveness of these teacher forums remains inadequate in strengthening and updating TPD. PGRI has also not conducted many initiatives aimed at enhancing teaching methods, improving teacher knowledge and skills, upgrading teacher qualifications, or conducting scientific studies on professional challenges faced by teachers (Haq Aidi et al., 2023).

Strengthening LPTK's Role in TPD

There are several approaches to promoting TPD, including traditional methods and various digital tools such as websites. Teachers may engage independently or collaboratively within their professional communities. In this context, the role of LPTK as a teacher-preparation institution becomes vital (Jati, 2023), (Ghassani & Sugandi, 2023a), (Syahria et al., 2024). The community feature that LPTK may offer through the organization for TPD has additional significance. The significance lies in the existence of a network that includes not only fellow teachers but also lecturers and practitioners. Through the involvement of both peer teachers and academic professionals facilitated by LPTK, TPD can be strengthened with practical insights and conceptual mentoring, forming an empowered learning community. As part of its efforts to participate in the digitalization era, LPTK may aim to implement TPD schemes through websites. Considering the variety of websites that can be used for TPD, it is essential to analyze the existing design of web-based TPD. The objectives include optimizing website features, describing TPD delivery methods, and highlighting the community's participation. Based on these analyses, a redesign was conducted. This redesign resulted in an optimal UI/UX for website-based TPD that fulfills teachers' needs, with no potential TPD activities omitted.

Table 1. TPD's Current Needs, Teacher Forums and LPTK can accommodate.

Aspect	KKG	MGMP	LPTK
Strengthening standards for qualified teachers (Rahayu et al., 2023)			√
Teacher certification and equalization programs (Rahayu et al., 2023)			√
Integrated training program based on competencies (Rahayu et al., 2023)			√
Educational supervisory program (Rahayu et al., 2023)	√		
Teacher symposium (Rahayu et al., 2023)	√	√	√
Actively engage with professional groups (Rahayu et al., 2023)	√	√	
Acquiring survival expertise (AbdulRab, 2023)			√
Mastering the fundamental skills for teaching (AbdulRab, 2023)			√
Increasing one's adaptability in the classroom (AbdulRab, 2023)			√
Developing teaching proficiency (AbdulRab, 2023)			√
Assisting colleagues advance their professional achievements (AbdulRab, 2023)			
Taking the lead and contributing to the decision-making process (AbdulRab, 2023)	√		
Instructional techniques or strategies (Rahman, 2021)		√	√
Open access opportunities for all teachers (not representatives) (Rahman, 2021)			√

A gap exists due to the inadequacies in incorporating programs established based on actual requirements (Rahayu et al., 2023). To integrate current TPD programs while also

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considering the needs of each teacher, an organizer is required. Existing research has examined the elements that determine the success of teacher organizations in the context of government regulation, principal of-school leadership, and parental involvement (Winingsih et al., 2019). Another equally essential aspect is the role of LPTK. LPTK plays a crucial role not only in giving qualifications and the title "Bachelor of Education" to teachers but also in ensuring their professionalism (Rokhman et al., 2017). As a Pre-Service Teacher Training Institution, LPTK can serve as a valuable collaborator in organizing workshops and continuous mentoring programs (Purwoko et al., 2017). A TPD system consists of context, teachers, programs, and facilitators (Mirici & Pulatsü, 2022). Teachers, programs, and facilitators interact within specific contexts. Table 1 presents the gap between actual TPD needs and activities provided by the existing teacher forum.

Technology-Based Solutions for TPD

Additional exploration is required to incorporate aspects that are currently not facilitated. In terms of active participation in the professional community, LPTK can be further engaged. This is because LPTK provide lecturer groups with the necessary competence for TPD, as well as a large network of professional teachers and practitioners. An approach must be developed for LPTK to work comprehensively in ensuring sustainable TPD. A website serves as one of those methods to accomplish the task.

Enhanced TPD is essential in line with the current advancements regarding technology integration in education. Some of the technologies used in TPD: MOOC (Jati, 2023), web-based (Ghassani & Sugandi, 2023a), Online professional learning communities (PLC) (Syahria et al., 2024). Teachers can participate in web-based training sessions at any time and from any location, thereby reducing the cost of TPD activities. Web-based TPD employs synchronous communication, which allows learners and facilitators to communicate simultaneously but from various locations. The Indonesian government's web-based TPD strategy allows for both online and blended learning (Ghassani & Sugandi, 2023b). The utilization of ICT to serve TPD is mainly employed for pre-service teacher training (Ghassani & Sugandi, 2023b). PLCs are often organized in a top-down structure that is not focused on teacher demands (Syahria et al., 2024). Utilizing websites for professional development programs plays a role in upgrading simultaneously teacher understanding as well as skills in a subject, along with teaching strategies to implement into their teaching settings to help students' achievement (Van Raalte et al., 2012). The community on the website promotes connection, which may assist teacher professional development (Keyser, 2019). Table 2 summarizes several existing websites for the TPD program.

Table 2. Existing online mode for The TPD Program

Features	MOOC	Web-based	PLC	Proposed website
Developing standards for qualified teachers (by research collaboration)				√
Teacher certification				√
Teacher training (by actual needs, request from teacher, by structured program): Survival expertise, fundamental skills for teaching, one's adaptability in the classroom, teaching proficiency	√	√	√	√

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Features	MOOC	Web-based	PLC	Proposed website
Teacher symposium			√	√
Community			√	√
Open access opportunities for all teachers (not representatives)	√	√		√

(Ghassani & Sugandi, 2023a; Jati, 2023; Syahria et al., 2024)

Table 2 highlights the limitations of existing online TPD platforms. The proposed website seeks to address these issues by ensuring open access and strengthening community engagement. It provides equitable access to all teachers who require knowledge and support. However, current forums have not fully maximized the potential of community-based TPD. In this context, the role of LPTK is crucial in facilitating networks that involve teachers, lecturers, and practitioners, thereby enabling more impactful collaboration and support.

Most existing TPD-compatible websites are currently based outside of Indonesia, such as waterford.org, learningforjustice.org, teachingchannel.com, scilearn.com, nea.org, ascd.org, simplek12.com, loc.gov, teachersfirst.com, teach.kqed.org, edweek.org, sharemylesson.com, coursera.org, and others. Specific needs, particularly those related to local wisdom and context-specific challenges in Indonesia, still need to be accommodated. Existing websites vary in design, features, and delivery methods. However, in-depth analysis is the key differentiator carried out in this study. In this study, several TPD websites were compared to determine the website redesign that aligns with the needs analysis related to potential TPD programs. Beyond addressing the identified issues associated with traditional PCD, the proposed website is not merely a digital repository but a thoughtfully designed professional development ecosystem that tackles the systemic weaknesses of traditional TPD. It incorporates a diagnostic-driven personalization engine, supports independent and reflective learning, enables sustainable scalability through asynchronous delivery, and incorporates measurable indicators for assessing learning outcomes. With these integrated features, the platform provides a transformative alternative to conventional, rigid TPD practices.

Based on the description above, Indonesia's current teacher-professional development (TPD) approach remains inadequate. These approaches often neglect actual teacher needs and overlook the potential of community-based empowerment. Existing teacher forums, such as KKG and MGMP, frequently limit participation and focus primarily on administrative tasks, thereby neglecting important pedagogical strategies and ongoing guidance. This study investigates these specific research questions: (a) What kinds of TPD activities can LPTK prepare to organize? and (b) What website designs are appropriate for TPD programs? This study aims to produce a redesigned website that can offer TPD programs by empowering community elements from various academics. This study contributes by integrating community-based approaches into the design of TPD platforms.

RESEARCH METHOD

Figure 1 depicts the research framework for this study. The study is based on several considerations, including the results of FGD lecturers and vocational school teachers, the contribution of the existing teacher community, such as KKG and MGMP, and existing

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online modes and websites that promote TPD. Website development is required to optimize TPD. The redesigns of websites were carried out to achieve comparative outcomes from several existing website designs. By analyzing the characteristics and benefits of each website, this study developed conceptual features for the TPD website. Current websites were repeatedly analyzed, and recommendations for improvement were formulated to address TPD concerns. Target users were involved in website development during the FGD and website usage survey. In addition to the first FGD, which served as the starting point for the research, a second FGD, was carried out to confirm the proposed website's features to target users. The TPD website development evaluation survey also included target users. A focus group discussion (FGD) was conducted to create content that supports the continuous professional development of teachers. The steps taken to compile a list of needs during the FGD included the following: a) Identifying Teacher Challenges: The results indicated that resources for teacher professional development (TPD) were limited, there was a lack of access to the latest teaching strategies, and there were few communication opportunities between teachers, lecturers, and practitioners. This information was used as a basis for including a forum feature, termed an "empowered community," to facilitate discussion and collaboration among these groups. This feature aims to bridge communication gaps and support direct problem-solving; b) Ongoing Mentoring: Discussions revealed that teachers required ongoing mentoring and greater flexibility in accessing resources to improve their skills. This feedback informed the design of a training program menu on the website, allowing teachers to participate in training sessions as needed; c) Analyzing Community and Access Limitations: Existing teacher forums, such as KKG and MGMP, limit document access to their members or designated representatives, resulting in restricted information access for many educators. To address this issue, the developed website implemented an open-access forum to ensure inclusivity for all teachers; d) Designing Required Training Programs: Teachers expressed the need for flexible training programs that could address actual classroom needs and customizable options based on individual or group requests. This feedback guided the creation of a training menu feature that allows teachers to select, register for, and participate in training programs tailored to their needs. Certificates are issued upon completion; e) Emphasizing an Empowered Community: FGD participants recommended creating a collaborative environment where teachers, lecturers, and practitioners can jointly develop solutions to educational challenges. This includes activities such as creating shared teaching materials and organizing symposiums for collective learning. To facilitate this, the website incorporates a collaborative forum feature that enables users to publish their work, such as journals and lesson materials.

This study adopted the Agile Software Engineering (ASE) model to support iterative and user-focused development. The process included initiation, requirement gathering, design, prototyping, testing, deployment, and review. These stages were repeated when necessary to refine website's functionality based on user feedback (Omonije, 2024).

ASE refers to a set of iterative and incremental development methodologies, including FDD, Crystal, Scrum, DSDM, XP, and Kanban (Shastri et al., 2021); Agile RUP, LSD, ASD [28]. Scrum is the current method for the majority of software development (Fagarasan et al., 2021). Dynamic changes in website demands arise throughout the website development process. ASE is an adequate approach to addressing changes in the needs of websites (Alsharari et al., 2023). Changes in website features and functions occur due

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to repetitive user target interaction, specifically the first FGD, the second FGD, and preliminary website testing. Client engagement in the ASE approach is high (Krishna & Gopinath, 2024). The four essential values of the Agile method are simplicity, communication, courage, and feedback (Liu & Lu, 2012). The potential of the agile method to enhance website quality lies in its iterative process and reliance on consumer feedback (Rico, 2008). Agile offers greater flexibility, relatively lower costs, and a more mature planning scale than traditional models (Al-Saqqa et al., 2020). Following the ASE concept, website development in this study involves multiple repeated stages (iterative process) and confirmation processes for target users (customer-oriented). This ensures not only the website's quality but also its acceptability and usefulness to them.

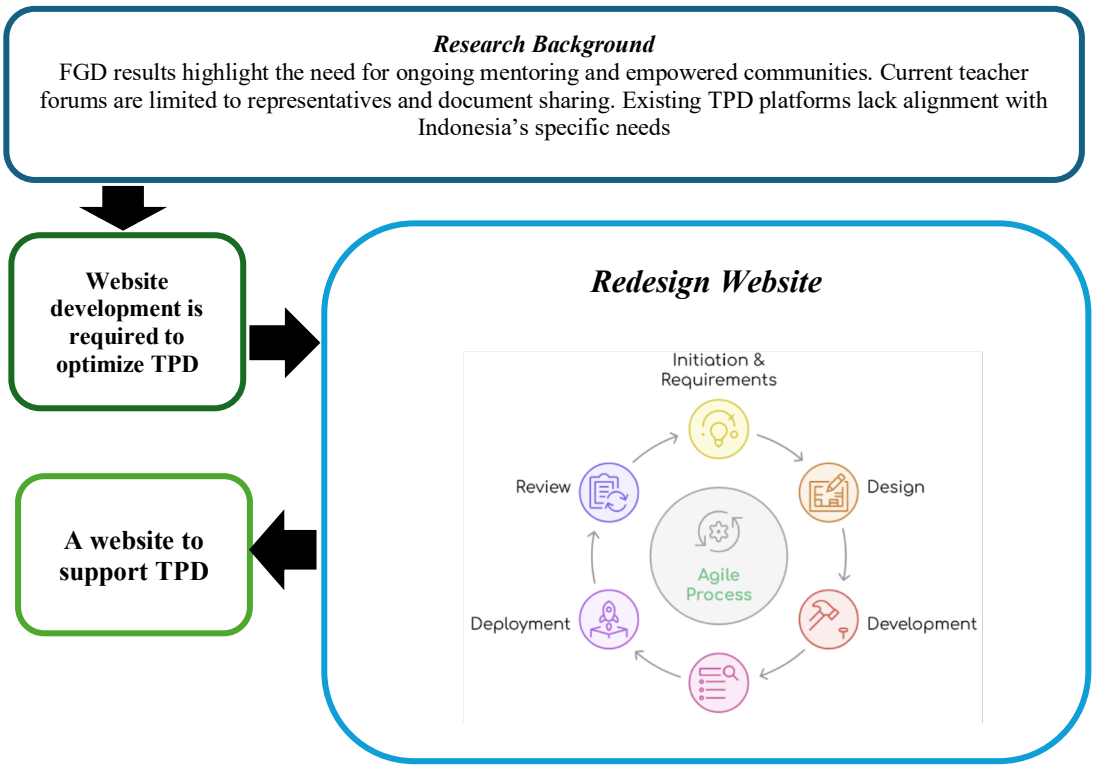

Figure 1. Research Framework: Agile procedure adapted from (Fagarasan et al., 2021; Harahap, 2023; Latifah et al., 2023; Omonije, 2024).

The website was developed using standard full-stack web technologies, comprising frontend, backend, and database components. The frontend prioritized an accessible user interface, while backend processes supported logic and data management. A relational database system was used to handle user data efficiently (Pramanik et al., 2024). The aspects influencing website quality consist of customer service, fulfillment and reliability, privacy and security, and website design (Das & Khan, 2021); web accessibility (Miranda, 2021a); content, design, organization, user friendly (Aggarwal, 2022). Table 3 shows the website quality aspects used in this study. Website development involves various technologies and methodologies to create effective, interactive, and user-friendly websites. This process requires a good understanding of front-end and back-end technologies, as well as the ability to manage databases and use development tools effectively. Combining all these components is necessary to create a website that meets the users' needs and serves its functional purpose effectively.

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Table 3. Website quality aspects
adapted from (Aggarwal, 2022; Das & Khan, 2021; Miranda, 2021a).

Quality aspects	Measurable indicators
Content	In-depth information, Relevant, accuracy
Design	Attractive, colour, multimedia elements, efficiency
Organization	Consistency, Links
User friendly	Usability, reliability, interactive, privacy and security, customer services, accessibility

RESULTS AND DISCUSSION

Results

Initiation and Requirements

In the Initiation and requirements stage, the research team must identify the needs in developing the project. This stage is important because it forms the initial foundation for building a project. The initiating stage involves problem and needs analysis based on FGD. The developer team, stakeholders, and target users undertake FGD. Various combinations of relevant stakeholder perspectives provide essential input for the research team to consider.

Re-investigations were conducted to determine the most suitable mode for implementing TPD activities flexibly. Online delivery modes were considered appropriate as they align with these demands and current digitalization trends. During the initiation process, the team reviewed the initial project document containing the project description, project scope, and project objectives. The outcome of this stage, the study's focus has been determined to be the development of a website that promotes teacher TPD through empowered communities and accessible teacher access. The website's primary users are vocational high school teachers as well as others who want to improve TPD through empowered communities. The development process involved a dedicated team with clear task specifications and activity divisions. The needs and requirements of the existing platform for the TPD website are identified. A thorough analysis by the team is required to map the needs of the target users to the website's features. Table 4 shows the features of the websites analysed from existing websites. The comparison website serves as a reference for selecting the features that will be included on the TPD website to suit user needs. Furthermore, the table compares differences in similar features across reference websites to guide feature selection for the TPD website.

The project team used Table 4 as a reference while developing key features that can be accessed after logging in, such as the user dashboard, programs, user work, forums (empowered communities), and certificates. Every user can access features including home, program offers, and news. To ensure the redesigned platform addresses the specific needs of Indonesian teachers, the project team analyzed features from several benchmark websites. Table 4 summarizes the main user needs and how the new platform responds to them differently from existing solutions. One key priority was to enable flexible access to programs, achieved through a simplified user dashboard inspired by platforms like *cakap.com*. Unlike the reference, the new design focuses on quick access and easy navigation by reducing top-bar complexity, ensuring usability for teachers with different levels of digital literacy. To deliver up-to-date information, the platform features a news section that curates relevant updates rather than overwhelming users with a

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continuous feed. Inspired by *mojok.co*, the team added numbered pagination and extra metadata like editor and publication date, which improves content credibility and traceability. The need for publishing user-created content, especially training outputs and journals, is addressed through a dedicated journal feature.

Table 4. Website feature analysis.

User needs	Features	Reference source	Differences between the developed and reference websites
Flexible user access to programs	User Dashboard	https://cakap.com/	Simplifying the top bar
Information update	News	https://mojok.co/	The latest news is replaced with selected news, and the pagination of news data changes from a slider to a numbered form. Adding news information data (author, editor, date)
Collection of user-published training results (including journals)	Journal	https://sinta.kemdikbud.go.id/journals	Developed media has simpler journal information than the comparison source.
Empowered community	Forum	https://www.quora.com/	Highlights the top contributors and there is a button to filter forum discussions.
TPD programs	Program (include Course, Certificate, Quiz, Task)	https://kelas.work/ https://www.coursera.org/ https://kahoot.com/ https://sites.google.com/view/classroom-workspace/	Simplicity and different layout

Compared to *https://sinta.kemdikbud.go.id/journals*, this component has been simplified to focus on accessibility and contribution rather than formality. This design choice aims to lower barriers for teachers seeking to share their work. To foster an empowered teacher community, the forum feature incorporates best practices from *quora.com*. Additionally, the newly designed forum emphasizes local relevance by including contributor highlights and topic filters, supporting more meaningful professional discussions.

The TPD program includes features such as courses, certifications, quizzes, and tasks that incorporate elements from various platforms like *coursera.org*, *kelas.work*, and *kahoot.com*. Although inspired by these references, the final design emphasizes visual simplicity and a modular structure, enabling personalized learning paths that are easily accessible across multiple devices. By aligning these features with genuine user feedback and carefully adapting established industry practices, the platform provides a more contextual and purpose-driven solution for the professional development of teachers in Indonesia.

Figure 2 shows the use case diagram as a follow-up. User needs must be aligned with technical requirements (Subhiyakto & Astuti, 2023). The team then creates a user story and product backlog document. User stories are used so that the development team can understand the user's perspectives in using a system that will be developed, this can make the development team more aware of what users need when accessing the product. Table 5 shows the user story. In addition, the product backlog aims to assess the priority features in the project. This is important when the project has a short deadline: in such

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cases, high-priority features are built and released first. High priority features include the following pages: landing page; news; add news; news details; login and register; user dashboard; training data; training registration form; training payment; training (e-learning); certificate claim; submission of Work; Work upload form; Work data; forum; forum details; journal data; journal data; Work dashboard; user account registration approval; work registration approval; journal data; upload and update journal data; upload, update, detail, delete training data; CRUD training material data; CRUD news data; CRUD all data. Mid-priority features include About us; News update; and Forgot Password. Every product backlog item is developed through a design sprint.

Table 5. User Story

No	User story
1	As user, I want to Register an account. So that I can Have an account on the website
2	As user, I want to login an account. So that I can Access features
3	As user, I want to give comments on the forum. So that I can give my opinion about the discussion.
4	As user, I want to View and register for available training. So that I can Follow the available training
5	As user, I want to Pay the training fee. So that I can Access paid training materials
6	As user, I want to Take a training test. So that I can Complete training
7	As user, I want to Claim a training certificate. So that I can Certificate access
8	As user, I want to Create a forum. So that I can View forum discussions
9	As user, I want to Give comments on the forum. So that I can Give feedback in forum
10	As user, I want to Publish user work. So that I can Reference for other users
11	As user, I want to View user work. So that I can User work access
12	As an organizer, I want to Login account. So that I can Access features on the Website
13	As an organizer, I want to View and respond to user account registration. So that I can User registration agreement
14	As an organizer, I want to CRUD journal data. So that I can Manage journal data
15	As an organizer, I want to CRUD training data. So that I can manage training data
16	As an organizer, I want to View and respond to user work. So that I can Evaluate user work

Table 6 illustrates an example of the scope of tasks, responsible persons, and estimated completion time set by the team during a design sprint.

Table 6. Design sprint

No	Product Backlog	The scope of tasks	Responsible persons	Estimated completion time
1	Login	Click login button	Person 1	1 days
…	…	…	…	…
32	Logout	Click logout button	Person 3	1 days

Table 6 provides an overview of the task management strategy employed during the design sprint stage of development. Each product backlog item, such as login and logout functionalities, was broken down into clear and measurable tasks. For example, tasks included actions like "click login button" and "click logout button."

By assigning specific responsibilities to team members (e.g., Person 1, Person 3), the sprint planning ensured accountability and made progress easily traceable. The

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estimated completion time for each task was kept concise and realistic, typically around one working day per feature. This approach aligned with the iterative nature of Agile development, facilitating rapid feedback and adjustment.

Although the table only displays the first and last entries to save space, it represents a total of 32 detailed backlog items addressed during the sprint. This structure allowed the development team to maintain high levels of clarity and coordination, ensuring that each component of the platform was systematically built and evaluated before integration. Incorporating such design sprints not only enhanced development efficiency but also supported quality assurance and alignment with user needs, particularly in creating intuitive user experiences and smooth navigation throughout the platform.

A use case helps identify the system's functions and the authorized users(Yanuarsyah et al., 2024). The next step is analyzing the user flow/use case material. The use case document is intended to map the user flow from authorization to logout. The use case document consists of description, actors (user), preconditions, postconditions, flow (take training programs, upload work training programs, discuss in forums with empowered communities), alternative flows, exceptions, and requirements. This use case involves users when accessing the website. The expected outcome of this use case is the successful use of the system for training, certification, uploading work, and engaging in discussions or mentoring with other users or experts through the forum.

Design

The design stage involved three main steps: website flow design, database design, and UI/UX design. Website flow design was required to assess the user flow when accessing the website, and the system's response every time it receives certain conditions. Website flow consists of user flow and organizer flow. Figure 2 shows the user flow user case diagram. Once the website flow design was completed, the next step was database design, which examined the structure of the database, the data to be collected, and the relationships among tables.

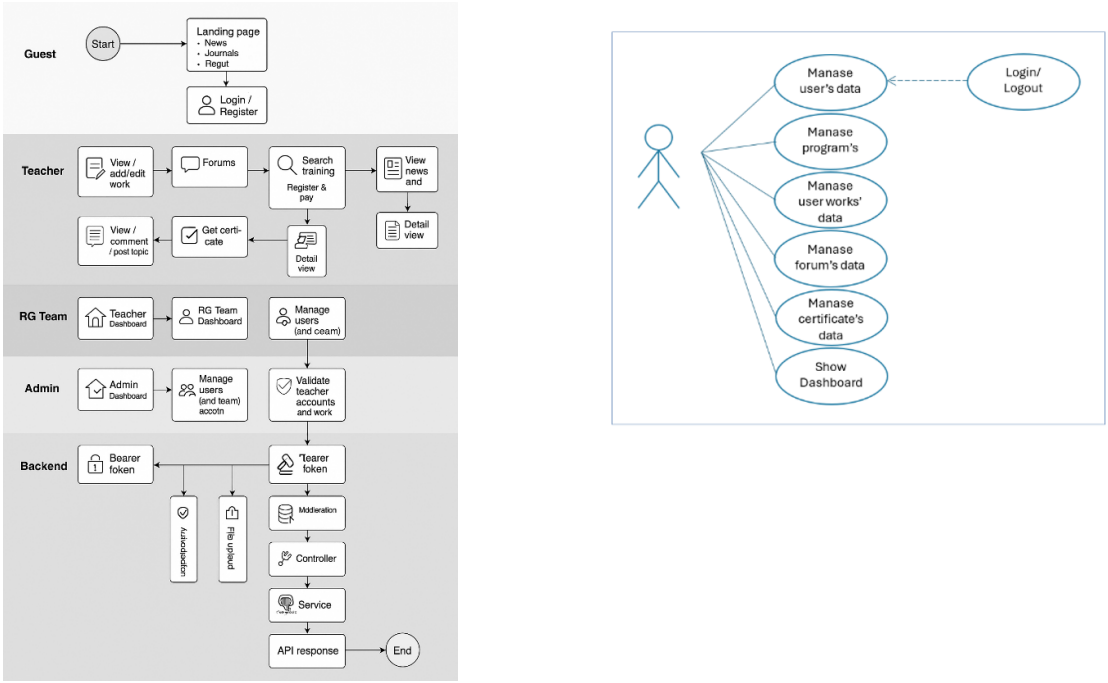

Figure 2. User Flow and User Case Diagram

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Figure 3 presents the database architecture. Following the completion of the database design, the UI/UX design was developed in two stages. The process began with a low-fidelity wireframe, which was then refined into a high-fidelity UI/UX prototype. Both low-fidelity and high-fidelity designs are effective at identifying usability problems (Walker et al., 2002). Figure 4 illustrates the low- and high-fidelity designs created for the forum page.

Figure 3. part of database architecture

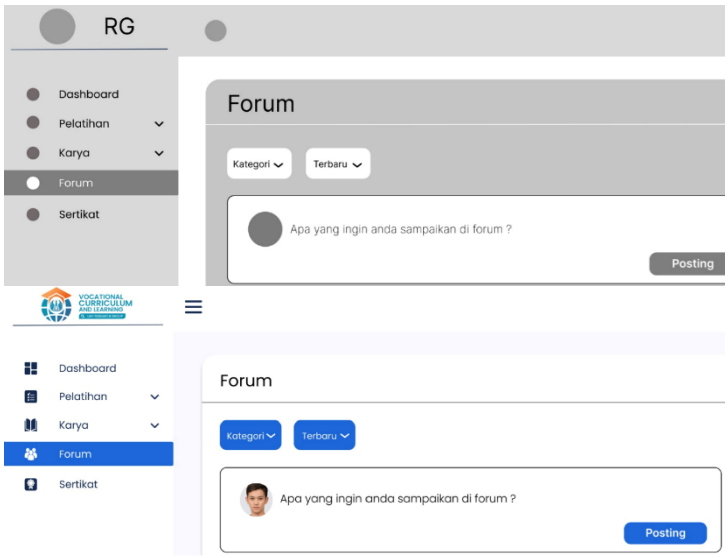

Figure 4. Low-fidelity (above) and high-fidelity (below) designs example

Development

The TPD website was developed using vue.js technology on the frontend and express.js technology on the backend which provides an API connected with a PostgreSQL database. All source code was stored on the GitHub platform to ensure proper version control and prevent data loss in the event of system failures. The overall software process is illustrated in Figure 5.

Testing

The testing process involved both frontend and backend testing, with each page or API feature examined separately. The testing step is carried out to reduce faults after the project is delivered to the public. Furthermore, testing is conducted to ensure the project is functioning smoothly and effectively. Black box testing is carried out to verify that the software produces the expected outcomes, followed by functional testing is the next step to confirm that all features can be executed successfullyin line with the objectives or scope of tasks designed using the design sprint methodology. The success rate for performing cases on available features was 100%. To enhance user-centered design, qualitative user feedback was also collected. A summary of the feedback can be seen in Table 7. Thus, it can be concluded that the website developed was effective in resolving the identified issues. In addition to internal team testing, a survey was distributed to 20 potential users as part of requirement validation, in which users conducted acceptance testing (De Lucia & Qusef, 2010).

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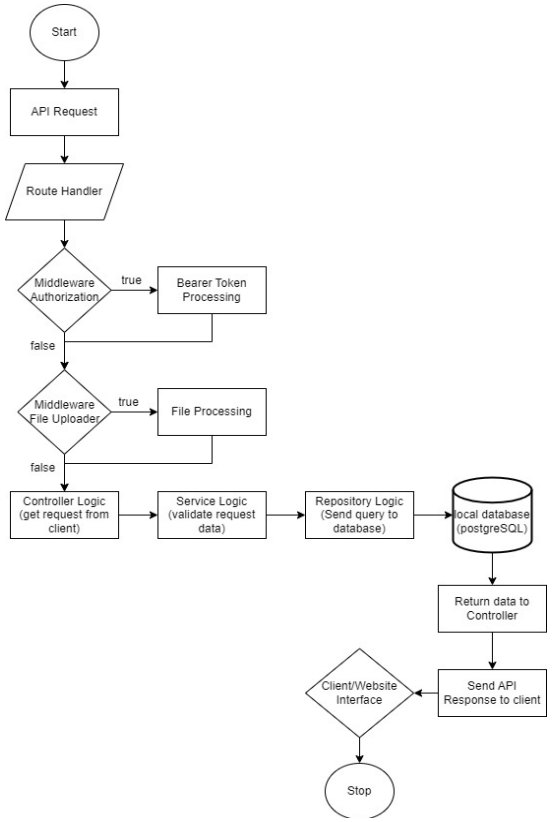

Figure 5. Software process diagram

Table 7. The Qualitative Result Testing

Website Quality	Description
Content	a. A description of the organizer team's credibility is required, as well as the addition of content digitalization or other types of training. b. Existing programs and features are applicable (adequately meet the demand for an empowered community for continuous mentoring and access at any time). c. Add editor information, particularly for news articles and lecturer profiles, to confirm the material's validity.
Design	a. Sufficiently Attractive b. Colours are less varied; In certain cases, the colour combination is excessively contrasting. c. Multimedia Elements: On one page, there is an excessive amount of content displayed. d. Execution time is quite efficient
Organization	a. Sufficiently consistent b. Links execute correctly and appropriately; Flow is too complicated, add a flowchart of the usage flow for users.
User friendly	a. In response to needs; task flow simplification; The quiz format appears less interesting. b. Sufficiently reliable c. Sufficiently interactive d. Ensures users' privacy and security. e. There should be a Customer Services contact or a Q&A section for any difficulties or questions that may arise. f. It is easily accessible since it is website-based.

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The qualitative results of the survey can be seen in Table 7. Open-ended questions were employed to capture diverse user perspectives on the website's quality. The feedback indicated the need for several design improvements and additional sections to enhance feature quality. Responses across the four assessed aspects of website quality generated new requirements during the testing stage. This aligns with the Agile development approach, which accommodates evolving requirements at any stage in order to meet actual user demands (Al-Saqqa et al., 2020).

In line with the Agile methodology, which emphasizes adaptive planning, iterative development, and continuous improvement through user feedback, each qualitative insight from Table 7 led to concrete revisions in the website. Table 8 outlines how specific user feedback was translated into actionable design improvements during the iterative development process.

Table 8. Mapping of Qualitative Feedback to Design Improvements (Agile Iteration)

Website Quality	Implemented Design Improvement (Solution)
Content	a. An "About Us" page was added with team profiles, institutional affiliations, and activity portfolios. A new content category was also added to provide digital training materials and video tutorials. b. A discussion forum, mentoring group system, and live Q&A sessions with lecturers and experts were integrated to support peer and expert mentoring. c. Author/editor names, institutional affiliations, and contact links were added below each article or learning module.
Design	a. Visual consistency was improved using a unified style guide, including standardized headers and icons. b. The color palette was revised following Web Content Accessibility Guidelines (WCAG) accessibility standards to ensure visual comfort and inclusivity. c. Multimedia elements (videos, images, infographics) were separated into dedicated pages or reorganized using an accordion layout. d. Website loading speed was improved through image compression, lazy loading, and minimizing heavy animations.
Organization	a. Page layouts were standardized across all content types, with consistent use of header, sidebar, and footer elements. b. An infographic titled "How to Use This Platform" was added to the homepage and help section to guide users step by step.
User Friendly	a. The quiz feature was redesigned with gamification, instant feedback, and reward badges/certificates to enhance engagement. b. Cross-device and cross-browser functionality was tested. Reported bugs and errors were gradually fixed. c. Interactive features such as weekly polls, content ratings, and in-line comments were introduced. d. HTTPS encryption, email verification login, and a dedicated privacy policy page were implemented. e. A Q&A Center, chatbot, and direct contact form were added for user assistance and inquiries. c. The platform was made fully responsive for all devices (mobile-first design), and key content can be downloaded for offline use.

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The iterative revisions of the TPD platform were guided by open-ended survey data and followed the Agile development cycle. User-centered feedback was not only collected but also actively integrated to shape the platform's evolving design. This responsive approach ensured that the final product aligns closely with teachers' actual needs, expectations, and usage contexts.

Deployment, Review and Launch

During the deployment stage, each project built from the frontend and backend is deployed via Virtual Private Server (VPS). The VPS is obtained from a reliable hosting service provider. Figure 6 shows the schematic at the deployment stage. The deployment process consists of three steps: deployment, iterative improvement, and feedback (Pikkarainen et al., 2005). These steps align with the next stage, the review stage.

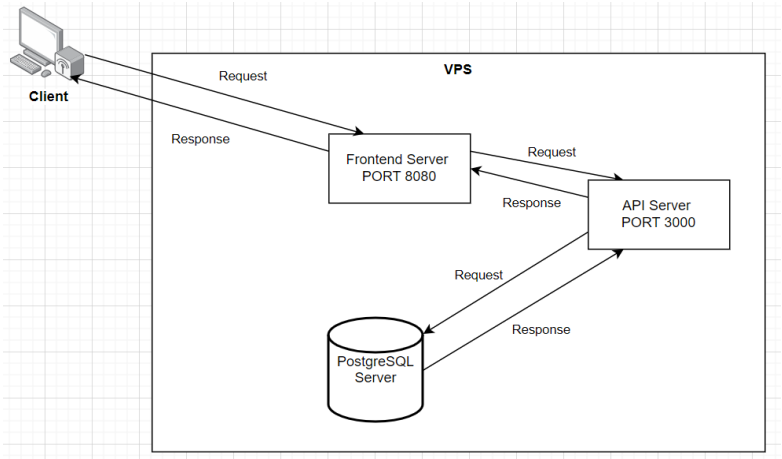

Figure 6. The deployment stage schematic

Iterative steps involve re-testing four areas of the webste quality with potential target users. This aims to verify that the results of the website's development at this stage correspond with the objectives. The review was conducted by involving various stakeholders (including target users) who accessed the TPD website publicly. The stakeholders assessed that the quality of the website has been running well according to the needs and requirements defined at the beginning of development. The review results showed that some improvements to the appearance were needed. However, in terms of function, it performed well and was appropriate for enhancing TPD through training programs (there is ongoing assistance), discussion forums within empowered communities and easy access by users at any time.

Discussion

The findings from the FGD indicate the necessity for a more sustainable and inclusive approach to TPD in Indonesia, emphasizing mentorship and active community engagement. Existing platforms were found to be limited in scope and did not adequately address the localized needs of Indonesian teachers. This reinforces the need for LPTKs to serve as strategic hubs, connecting teachers with relevant communities and digital resources. This redesigned website, developed using Agile, functions not only as a content repository but also an integrated ecosystem to foster sustainable and empowered teacher development. The Agile methodology builds requirements iteratively and incrementally (AL-Ta'ani & Razali, 2013).

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The review of the website development indicates that the functionalities meet user requirements. In the Agile methodology, acquiring, assessing, documenting, and verifying requirements are crucial processes (De Lucia & Qusef, 2010). These requirements are derived from discussions and open-ended feedback related to strengthening TPD through continuous mentorship and empowered communities with flexible access. This website bridges the needs of users to improve TPD by providing activities such as comprehensive training, both structured and adapted to user requests, on topics such as teacher administration documentation, teaching strategies, and other essential skill upgrades. It also provides a forum consisting for an empowered community in which diverse stakeholders can engage in discussions about certain topics. The forum can be organized on a regular or as-needed base in response to issues identified by forum participants. Users come from a variety of backgrounds, including teachers, others in the community, lecturers, and practitioners. In this situation, the organizers, who are LPTK lecturers, might invite these users to the discussion forum. The forum can also be used to establish symposiums or other training programs, either online or offline, based on agreements. In addition, the forum may investigate recommendations for establishing criteria for qualified teachers or other relevant topics through a research collaboration scheme. In concept, the forum can be used to address a variety of issues by gathering viewpoints from multiple important stakeholders who are registered and engaged in the forum. Users receive appreciation with certificates for their participation in training assignments as well as for their publication in journal papers or news. The results of user publications go through an editorial stage to ensure that the content is relevant and follows scientific principles. As organizers, LPTK lecturers also serve as editors. Accessibility is an essential qualitative attribute in website development (Miranda, 2021b; Miranda et al., 2024). All TPD activities are easily accessible to all users.

The community discussion forum feature is designed to support Teacher Professional Development (TPD), but to maintain user engagement, a structured strategy is necessary. The strategies include: a) Regular Content Updates: Every month, discussion topics in the forum will be updated based on current education trends, challenges identified through user feedback, and recommendations from LPTK lecturers and practitioners; b) Gamification Features: We will introduce awards for active users, such as a points system where accumulated points can be redeemed for training participation; c) Community Support Features: The forum will provide assistance and support to users in order to help them address technical or other challenges.

However, various practical challenges may arise during the implementation of these engagement strategies. First, maintaining consistent and relevant content updates each month requires a well-coordinated editorial workflow and a dedicated team. To address this, we will implement a structured content calendar managed by LPTK facilitators and supported by volunteer contributors, such as teacher ambassadors. Second, while gamification can enhance motivation, it may become monotonous or lose its effectiveness if rewards are perceived as unbalanced. To counter this, we will rotate challenge themes monthly and involve the community in nominating outstanding contributors, thereby promoting peer-driven recognition. Third, providing effective community support can be hindered by varying levels of digital literacy among users. We will tackle this by integrating a user-friendly help center, offering guided tutorials, and recruiting trained moderators to assist users in real-time. These practical measures reflect the adaptive

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nature of Agile methodology and aim to ensure the long-term sustainability and inclusiveness of the community forum.

By implementing these strategies, the community forum will not only remain active but also continue to make meaningful and impactful contributions to TPD. This structured plan is designed to ensure long-term user engagement, regular content updates, and demonstrable success.

The website design was developed based on a comparison of several similar platforms to provide solutions tailored to the needs of target users, particularly in enhancing TPD through continuous assistance within empowered communities and flexible access. The investigation yielded numerous primary elements, including user dashboards, programs, user work, forums (empowered communities), certifications, and news. Unregistered users can only access limited content, such as home, programs, and news. However, registered users get access to all functions. This is to protect users' privacy and guarantee that the website is only used by those who are sincerely concerned about increasing TPD. The review results confirmed that the release is feasible, enabling all eligible users to access the developed website.

CONCLUSION

Fundamental Finding: This study concludes that a website-based Teacher Professional Development (TPD) platform that integrates empowered communities with agile development offers a strategic solution to the challenges in teacher education in Indonesia. Involvement from LPTKs (Institutes for Teacher Training and Education) and vocational teachers addresses key needs: accessible training ooportunities, continuous mentoring, and collaborative networks among teachers, lecturers, and practitioners. The developed prototype includes essential features such as user dashboards, training modules, certification systems, collaborative forums, and user-contributed content publication. Functional testing confirms that the platform supports usability and user interaction with a 100% success rate. More importantly, the empowered community design promotes continuous dialogue, mentoring, and knowledge-sharing, positioning TPD as an ongoing process rather than a one-time activity. **Implication:** The research underscores the importance of bridging formal teacher education institutions (LPTKs) with in-service teacher communities through inclusive and sustainable digital ecosystems. A well-designed TPD platform supported by empowered communities can enhance collaboration, ensure knowledge sustainability, and close the gap between teacher needs and institutional support. These findings act as a reference for educational policymakers, LPTKs, and school leaders. They support the creation of TPD ecosystems that are more adaptable and responsive to teachers' needs. **Limitation:** This study is limited by its participant scope, involving only 20 vocational high school teachers from the Yogyakarta region. The findings may not fully represent capture the diversity of school contexts or general educational levels across Indonesia. Moreover, the platform's effectiveness was measured only through functionality testing and initial user feedback, without long-term tracking of learning impact or user retention. **Future Research:** Further research should expand on a broader and more diverse range of school regions and subject domains. Longitudinal research is also recommended to assess how participation in the redesigned platform affects teaching practices, professional growth, and student learning outcomes over time. In addition, integrating adaptive technologies

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such as AI-powered feedback and personalized learning pathways could significantly enhance the scalability and depth of TPD interventions.

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