**Chapter 3**

**Research Methodology**

**3.0 Introduction**

This chapter presents the research methodology adopted for the design and implementation of a web-based distance learning system for the National Vocational Training Institute (Kanda). It outlines the research design, data collection methods, tools, and techniques employed to achieve the objectives of the study. The chapter also describes the sample population, data analysis procedures, and ethical considerations.

**3.1 Research Methodology of Data Collection Instruments**

**3.1.1 Quantitative, Qualitative, and Mixed Methods**

In this study, a mixed-methods research design was utilized to gather a comprehensive understanding of the web-based distance learning system's design and implementation. The mixed-methods approach combines quantitative and qualitative methods to collect and analyze data.

Quantitative methods involve the collection and analysis of numerical data to measure the effectiveness, efficiency, and usage patterns of the web-based distance learning system. This includes gathering statistical information, such as completion rates, usage statistics, and user satisfaction ratings. Surveys and questionnaires were employed to collect quantitative data from a representative sample of students, instructors, and administrators.

Qualitative methods were used to explore and understand the subjective experiences, perceptions, and opinions of users regarding the web-based distance learning system. Interviews, focus groups, and observations provided rich and in-depth insights into user satisfaction, engagement, usability, challenges, and expectations. These qualitative methods allowed for a deeper understanding of the system's impact on the stakeholders.

Mixed methods involved integrating the quantitative and qualitative data to obtain a comprehensive understanding of the research objectives. Triangulation of data from multiple sources ensured a more robust and holistic analysis.

**3.1.2 Build CS Approach**

The research approach applied in this study is the Build CS approach, which combines research principles with practical software development processes. The Build CS approach emphasizes the iterative and incremental development of the web-based distance learning system, incorporating research goals and evaluation processes throughout the implementation.

The Build CS approach involves the following key steps:

* Design and Requirements Gathering: The first phase focuses on analyzing the requirements, needs, and expectations of the stakeholders. This includes understanding the learning objectives, technical infrastructure, content delivery mechanisms, and user interface preferences. Design specifications, such as wireframes, flowcharts, and system architecture diagrams, are created to outline the system's structure and functionality.
* Prototyping and Development: Based on the design specifications and requirements, a prototype or minimum viable product (MVP) is developed. This prototype serves as a working model that can be iteratively refined and enhanced. Appropriate programming languages, frameworks, and tools are employed to ensure the system's compatibility, scalability, and security.
* Testing and Evaluation: Thorough testing and evaluation of the developed prototype are conducted to assess its functionality, usability, and performance. User acceptance testing (UAT) sessions are organized to gather feedback from users. Data on system performance, reliability, and user satisfaction are collected. This feedback is crucial in identifying shortcomings, bugs, or areas for improvement in the system.
* Iterative Refinement: Based on the feedback and evaluation results, the prototype is refined and improved iteratively. Adjustments to the user interface, enhancements to functionality, performance optimization, and bug fixes are implemented. Continual feedback from users guides the iterative refinement process, ensuring that the system meets the desired requirements and objectives.
* Deployment and Evaluation: Once the web-based distance learning system is deemed ready, it is deployed in the production environment or made available to a selected group of users. The system's performance, user engagement, and overall effectiveness are monitored during the deployment phase. Data on system usage, user satisfaction, and learning outcomes are collected to evaluate the success of the implemented system.

**3.2 Population and Sample Study**

The population for this study consists of students, instructors, and administrators affiliated with the National Vocational Training Institute (Kanda). A purposive sampling technique was employed to select participants based on their involvement in the distance learning system. The sample size was determined based on the principle of data saturation to ensure sufficient data for meaningful analysis.

**3.3 Data Collection and Analysis**

Data collection involved a combination of surveys, interviews, focus groups, and observations. Surveys and questionnaires were used to collect quantitative data, while interviews and focus groups captured qualitative insights. Observations provided additional contextual information about system usability and user behavior.

The collected data underwent thorough analysis using appropriate statistical techniques and qualitative analysis methods. Quantitative data were analyzed using descriptive statistics, such as frequencies, means, and percentages. Qualitative data were subjected to thematic analysis to identify patterns and themes. The findings from both quantitative and qualitative analyses were then integrated to provide a comprehensive understanding of the research objectives.

**3.4 Results of the Study**

The results of the study encompass the findings from the data analysis, highlighting key insights related to the effectiveness, efficiency, and user experiences of the web-based distance learning system. These results provide valuable information on system performance, user satisfaction, engagement levels, and areas for improvement. The results also shed light on the impact of the system on the National Vocational Training Institute (Kanda) and its stakeholders.

|  |  |  |  |
| --- | --- | --- | --- |
| Questions | Response | Number | Percentage |
| Gender | Male |  |  |
|  | Female |  |  |
| Do you agree with the web design of the learning management in system? | Yes  No |  |  |
| How do you feel overall about distance education? | Category Excellent  Very Good|  Good  Fair  Poor |  |  |
| Do you have access to a device for learning online? | Yes  No |  |  |
| How beneficial has digital learning been for you? | Category  Ineffective  Slightly effective  Moderately effective  Very effective  Extremely effective |  |  |
| Do you like studying from a considerable distance? | Yes  No |  |  |
| Suggest some of the problems with the traditional system. |  |  |  |

**3.5 Application of the Build CS Approach**

The application of the Build CS approach in this study ensured that the design and implementation of the web-based distance learning system were aligned with research goals and objectives. The iterative and incremental nature of the Build CS approach allowed for continuous feedback and refinement, resulting in a system that meets the specific requirements of the National Vocational Training Institute (Kanda). By combining research principles with practical software development processes, the Build CS approach facilitated the creation of an effective and user-friendly web-based distance learning system.