Available Online at www.ijcsmc.com

International Journal of Computer Science and Mobile Computing

A Monthly Journal of Computer Science and Information Technology

ISSN 2320–088X
IMPACT FACTOR: 7.056

IJCSMC, Vol. 13, Issue. 6, June 2024, pg.5 – 15

Zaffify: An Accessible Platform for Special Education High School Students in One City in the Philippines

Mark Oliver Meguizo[1]; Joshua Arnaez[2]; Kristine T. Soberano, Ph. D.[3]

[1]MIT Graduate School Department, State University of Northern Negros, Philippines
[2]MIT Department, State University of Northern Negros, Philippines
[3]MIT Graduate School & State University of Northern Negros, Philippines
[1] mark.meguizo@gmail.com; [2] joshuaarnaez22@gmail.com; [3] ksoberano@sunn.edu.ph

DOI: https://doi.org/10.47760/ijcsmc.2024.v13i06.002

Abstract:
This study evaluates the performance of Zaffify, a web-based platform designed to empower parents in Talisay City, Negros Occidental, Philippines, to provide supplemental special education for their high school children at home. Zaffify offers a low-cost and accessible solution by providing a comprehensive online video library of educational resources created by teachers. Students can enroll in these video courses and progress at their own pace, revisiting lessons as needed. To ensure quality and user-friendliness, the system will undergo a rigorous evaluation process involving IT experts using the SQuaRE Quality Model. Additionally, feedback will be gathered from special education teachers, parents, and the Supervisor Head for Special Education in Talisay City. This multi-pronged approach aims to establish Zaffify as a valuable tool for parents, enabling them to participate actively in their child's special education journey in a cost-effective, high-quality, and convenient manner
Keywords: Cost-effective learning, High school special education, Technology-assisted learning, Web-based Special Education platform

Introduction

The Philippines faces a significant challenge in guaranteeing the fundamental right to education for all children, with only 2% **[1]** of the targeted 1.6 million **[8]** individuals with disabilities receiving the support they need. This research aims to address this disparity by developing a web-based platform specifically designed to empower parents in Talisay City to provide supplemental special education for their high school children at home, offering a low-cost and accessible solution**[1]**.

Within the context of Talisay City, Negros Occidental in the Philippines, a critical gap exists in the provision of Special Education services for high school students. The absence of readily available Special Education (SPED) programs for high school students in Talisay City presents a unique

© 2024, IJCSMC All Rights Reserved, ZAIN Publications, Fridhemsgatan 62, 112 46, Stockholm, Sweden

challenge for parents seeking to support their children with learning disabilities. This often necessitates enrolling them in mainstream educational settings. To obtain necessary accommodations, parents must present a diagnosis from an accredited developmental pediatrician, to gain access to modular learning arrangements. Subsequently, they may request additional modified learning arrangements, such as pure modular lessons, to accommodate the student's specific needs and facilitate their academic success. This situation underscores the critical need for accessible and inclusive learning solutions designed for the diverse needs of high school students with special needs. While neighboring cities like Silay and Bacolod offer such programs, their distance and potentially financial inaccessibility excludes a significant portion of the local population, particularly those from underprivileged backgrounds**[3]**. This research initiative seeks to address this disparity by developing a web-based platform specifically designed to empower parents in Talisay City to provide supplemental Special Education support for their high school children within their homes, offering a cost-effective and readily accessible solution. According to the National Council on Disability Affairs (NCDA), the Philippines has 898 Special Education (SPED) Centers, with 683 being public schools and 215 being private institutions. In Region VI where Talisay City is located, there are 15,251 schools with PWD access, 17,935 schools without PWD access, for a total of 33,186 schools. Approximately 54.04% of schools do not have PWD access**[6]**.

In the year 2023, the special education program received a budget of ₱581.6 million, which represents approximately 10.7% of the total DepEd budget**[6]**. Implementing a web-based platform for these centers has the potential to significantly expand access to educational resources and engagement opportunities for students with disabilities. This technology-driven approach could transcend geographical limitations and provide students with flexible learning environments, fostering greater inclusivity and personalized learning experiences**[6]**.Compared to traditional education, online learning offers significant cost advantages due to reduced expenses on transportation, housing, and other institutional fees. Additionally, it provides learners with unparalleled flexibility, allowing them to schedule their studies around their own time constraints. This flexibility has proven particularly valuable during the recent pandemic, as online learning emerged as the most viable and safe option for continuing education**[5]**. Students with learning disabilities or other special needs often face challenges accessing learning resources, communication, and educational environments due to their individual needs**[2]**. These challenges may not always be readily apparent, potentially hindering their full participation and success**[4]**. Recognizing the increased vulnerability to negative outcomes faced by high school students with learning disabilities, including academic frustration, behavioral issues, and potential risk-taking behaviors, this research explores the potential of web-based learning platforms to address their specific educational needs and empower them to overcome learning barriers, fostering academic success and potentially mitigating these associated risk factors**[7]**.

In the study of Alex E. Facelo, Jr. on the Web-Based Self-Learning System with Progress Report for Students with Special Needs in Senior High School, related studies have highlighted the efficiency of blended learning environments in promoting self-directed learning and technology readiness among students. Furthermore, investigations into learners' engagement assessment in e-learning during the COVID-19 pandemic have shed light on the importance of creating interactive and engaging online learning experiences. Additionally, the development of e-learning modules to facilitate student learning outcomes underscores the significance of incorporating innovative teaching methods to enhance student engagement and comprehension**[1].**

The study of Fatimah and Malikah (2020) discusses the development of an accessible web-based educational platform specifically designed for children with special needs. The growth of communication and information technologies enhancing education, these platforms are often inaccessible to children with special needs due to various barriers. These barriers include access to education, information, and a lack of job opportunities. The paper defines children with Special

© 2024, IJCSMC All Rights Reserved, ZAIN Publications, Fridhemsgatan 62, 112 46, Stockholm, Sweden

Educational Needs (SEN) as those whose learning difficulties prevent them from benefiting from the general education system without additional support or accommodations.

Their work on developing an educational platform that not only provides simplified explanations of school curricula, such as numbers, letters, and mathematical operations, but also serves as a link between the child, parents, and schools. The platform includes worksheets and extracurricular activities for teaching staff, as well as a section for parents that includes educational home games and simple books to enhance children's skills. The motivation behind this work is the lack of comprehensive educational platforms that cater specifically to children with special needs**[9]**.

This research proposes a web-based streaming application, arguing that such a technology is crucial to address the critical gap in Special Education (SPED) programs for high school students in Talisay City, Philippines. The application is designed to empower parents to provide supplemental SPED support for their high school children at home, offering a low-cost and accessible solution

Research Objectives:

This study focuses on developing and evaluating a web-based platform, Zaffify, designed to address the lack of readily accessible Special Education (SPED) resources for high school students in Talisay City, Negros Occidental, Philippines. The research aims to achieve the following objectives:

1. Develop a user-friendly platform for uploading and accessing educational video content: This platform will allow teachers to seamlessly login and upload pre-recorded educational videos, creating a comprehensive library of SPED resources.

2. Facilitate student enrollment and video access: Parents and guardians will be able to easily register their children, granting them access to the platform's video library. This ensures inclusivity and accessibility for students with diverse needs as long as they have internet connectivity.

3. Promote cost-effective learning: The platform will be entirely free to use, eliminating financial barriers and empowering families from all socioeconomic backgrounds to access high-quality SPED support through these video resources.

4. Evaluate system quality: The platform's technical functionality, usability, reliability, and maintainability will be rigorously assessed using the established SQuaRE Quality Model. This evaluation ensures a user-centric and effective learning environment for both teachers uploading content and students accessing it.

Methodology

This research will employ an Agile development methodology for creating and implementing Zaffify, the web-based streaming application. Agile focuses on iterative and incremental development cycles, allowing for continuous improvement based on user feedback and evolving requirements.

Development Process:

The project will utilize the Scrum framework, a popular Agile methodology:

- **Product Backlog:** The initial stage involves creating a comprehensive list of user stories and features desired for Zaffify, forming the product backlog. This backlog will be prioritized based on importance and user needs. User stories will encompass functionalities such as:
  - User registration and login for parents and students
  - Access to interactive learning modules
  - Uploading and streaming educational video content by teachers
  - Parent training resources and support materials
- **Sprint Planning:** Regular sprint planning sessions, typically lasting 1-2 weeks, will be conducted. During these sessions, the development team will select a set of prioritized user stories from the

© 2024, IJCSMC All Rights Reserved, ZAIN Publications, Fridhemsgatan 62, 112 46, Stockholm, Sweden

backlog for development within that specific sprint. This ensures focused effort and timely delivery of key features.

- **Development and Testing:** Each sprint involves the development team working collaboratively to design, develop, and test the chosen features. Continuous integration and testing practices will be implemented throughout development to ensure the application's functionality, usability, and quality.
- **Daily Scrum Meetings:** Daily stand-up meetings will occur to update team members on progress, identify development roadblocks, and adjust plans as needed. These brief meetings foster communication, collaboration, and problem-solving within the development team.
- **Sprint Review and Retrospective:** A review meeting will be held at the end of each sprint to showcase the developed features to stakeholders, including potential users, and gather feedback on functionality and user experience. Additionally, a retrospective meeting will be conducted to analyze the sprint's successes and challenges. This allows the development team to identify areas for improvement and continuously refine the development process throughout the project lifecycle.

Benefits of using Agile:

- **Flexibility and Adaptability**: Agile development allows for continuous adaptation to changing user needs and requirements throughout the development cycle. This ensures that the final application remains relevant and addresses the evolving needs of the target audience.
- **Enhanced Collaboration**: By actively involving stakeholders through sprint reviews and promoting regular communication within the development team, Agile fosters a collaborative environment, leading to a more cohesive and user-centric final product.
- **Early Feedback and Improvement**: The iterative nature of Agile development allows for early identification and correction of issues through continuous testing and feedback loops. This ensures a high-quality and user-friendly final application.

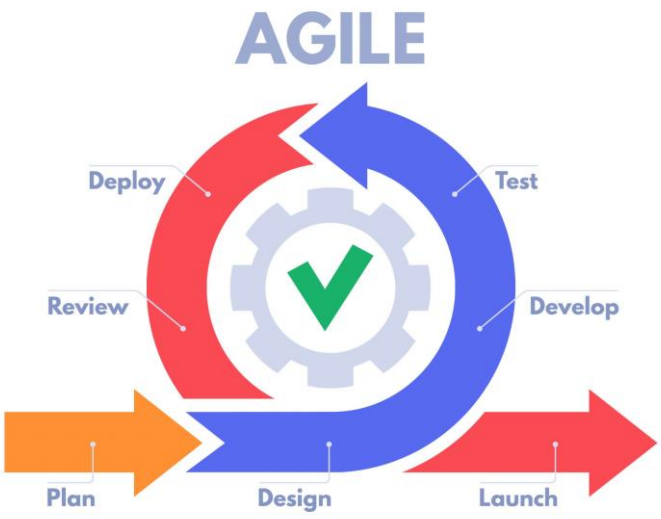


Figure 1. Agile Model

Software Development Tools:

Version control system (Git): To track changes in the code base and facilitate collaboration among team members.

Project management tool (Jira or Trello): To manage the product backlog, user stories, and sprint tasks, ensuring efficient project organization and tracking.

© 2024, IJCSMC All Rights Reserved, ZAIN Publications, Fridhemsgatan 62, 112 46, Stockholm, Sweden

Testing tools: A combination of automated and manual testing tools will be used to ensure the functionality and usability of the application across various platforms and devices.

Evaluation:

The effectiveness of the developed application will be evaluated through user testing, surveys, and interviews with target users, including parents of students with special needs and educators. This will assess the application's:

- Usability and user-friendliness
- Effectiveness in improving student learning outcomes
- Parental satisfaction and perceived benefits
- Impact on student engagement and motivation

The gathered data will be analyzed to determine the overall success of the application in addressing the identified gap in SPED services and its potential for wider implementation as a sustainable solution.

Data flow diagrams (DFDs) visually depict the flow of data within a system. In the context of a learning management system (LMS), a context-level DFD offers a high-level overview of the system's interactions with external entities.

External Entities:

- Students: Learners who utilize the LMS to access course materials, complete assignments, and participate in learning activities.
- Instructors: Educators who create and manage courses, deliver content, and assess student progress within the LMS.

Process:

External Entity	Process	Data Flow	Description
Students/Instructors	LMS	Login credentials, course selection, progress data	User interacts with the LMS
LMS	Students/Instructors	Course content, grades, feedback	LMS provides information to users

- Learning Management System (LMS): The central software application facilitating online learning. It encompasses functionalities like user management, course delivery, assessment tools, and communication features.

Data Flows:

- Input: Data provided by students and instructors to the LMS includes:
  - Login credentials (usernames and passwords) for system access.
  - Course selection: Students enrolling in courses and instructors managing their course offerings.
  - Progress data: Student activity within courses, such as assignment submissions, quiz attempts, and discussion forum participation.
- Output: Data delivered by the LMS to students and instructors includes:
  - Course content: Access to learning materials, presentations, and resources.
  - Grades: Feedback on student performance through assessments and assignments.
  - Feedback: Communication channels for instructors to provide feedback to students and vice versa.

© 2024, IJCSMC All Rights Reserved, ZAIN Publications, Fridhemsgatan 62, 112 46, Stockholm, Sweden

Table Summary:

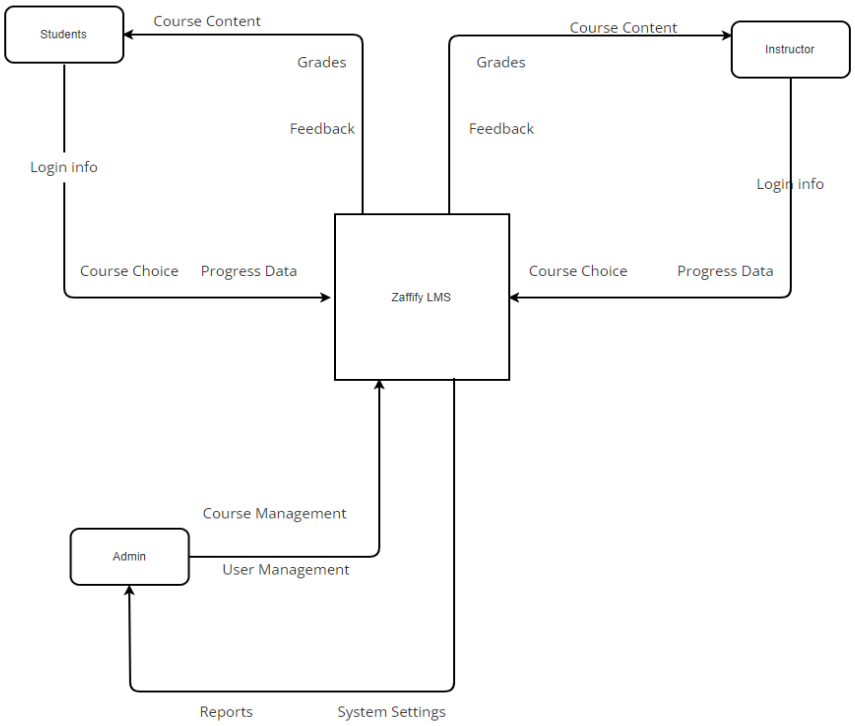
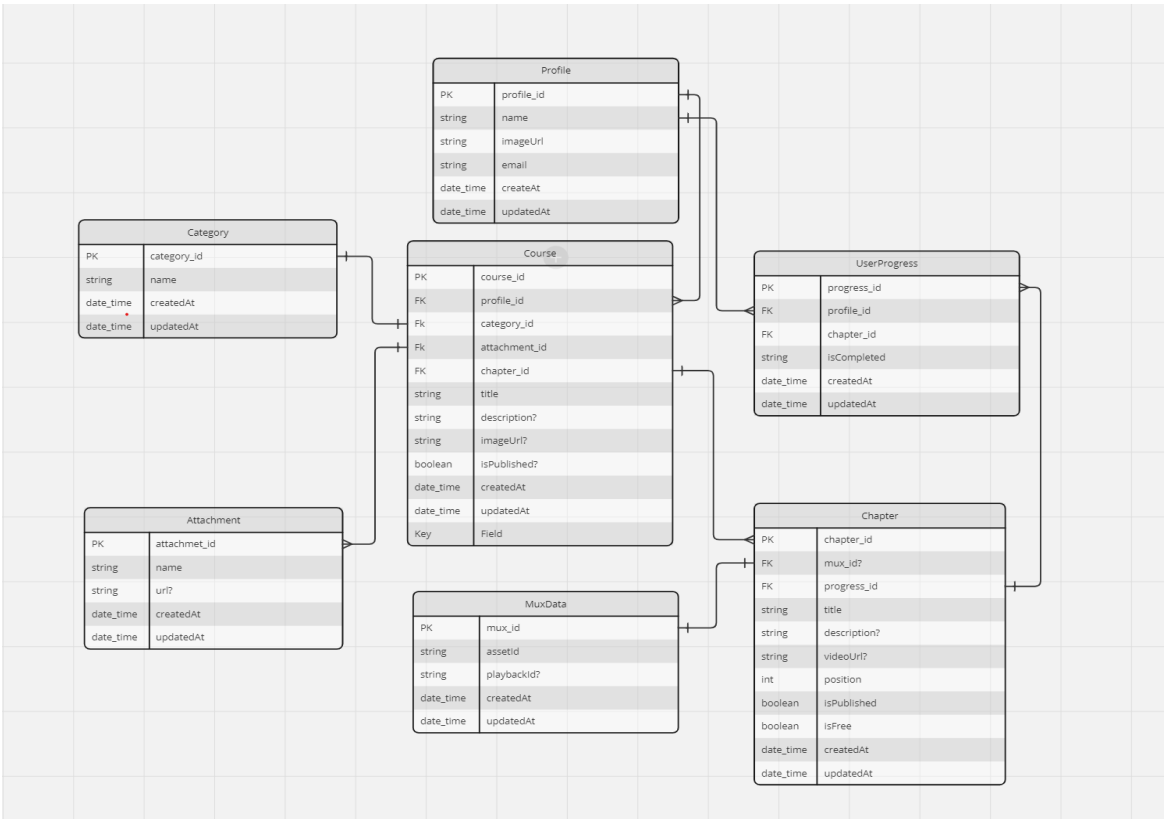


Figure 2. Context-Level Data Flow Diagram

Entity Relationship Diagram



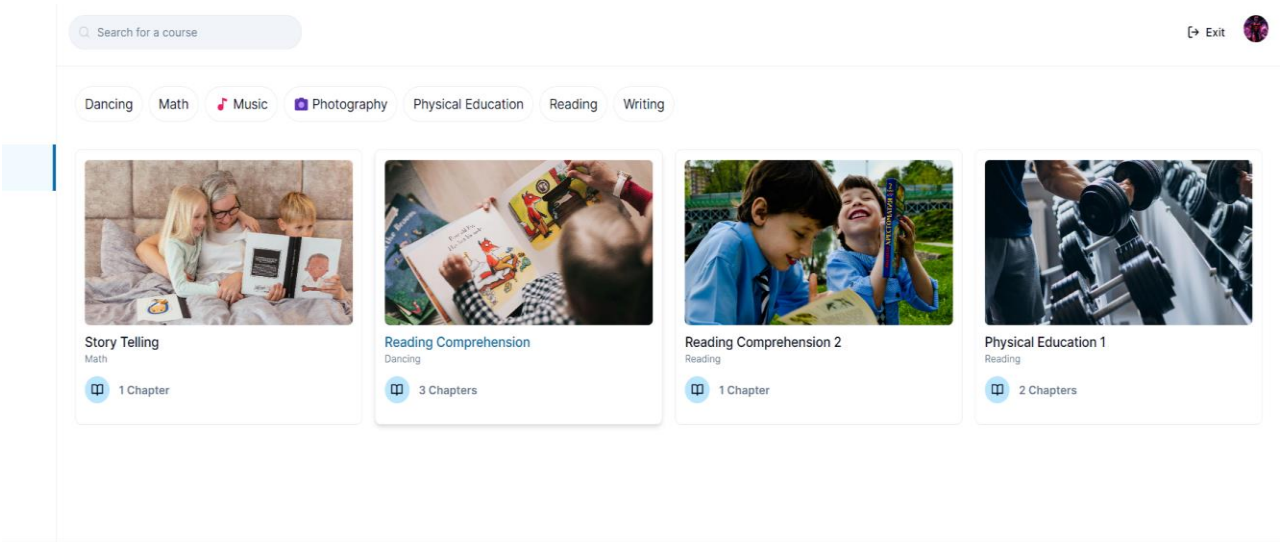
© 2024, IJCSMC All Rights Reserved, ZAIN Publications, Fridhemsgatan 62, 112 46, Stockholm, Sweden

Application Architecture

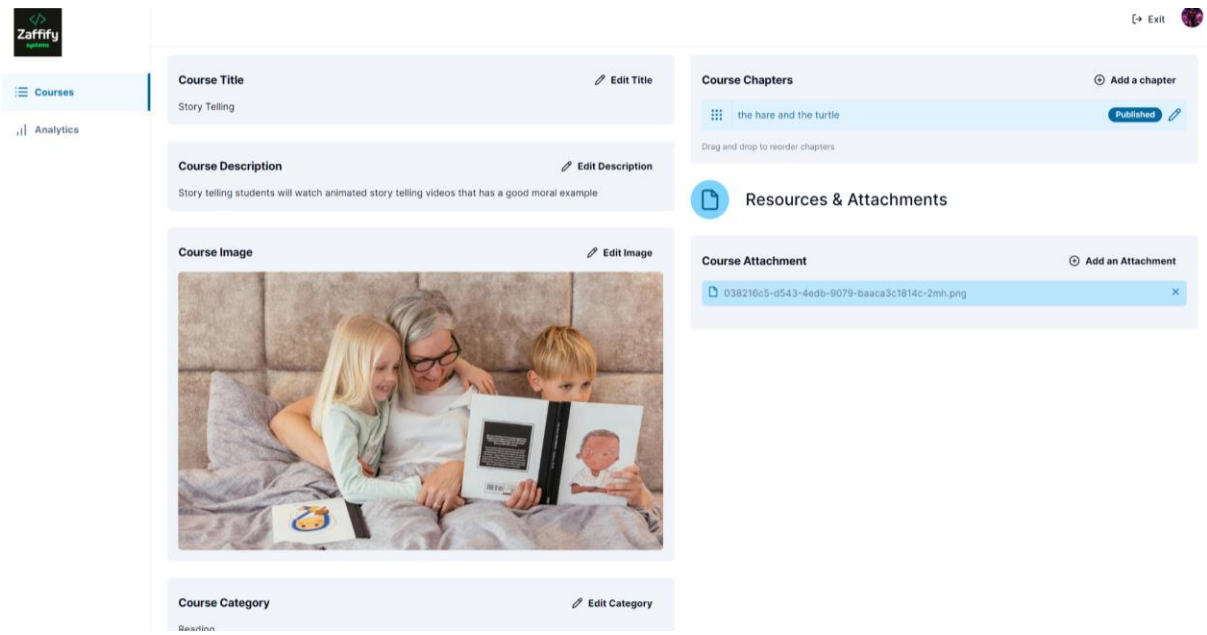
The application's structure highlights the technologies employed in its development. CSS, HTML, and JavaScript were utilized for the front-end design. The system utilizes Next.js for server-side rendering, Prisma and MongoDB for database management, Clerk for authentication, and Vercel for deployment.

Results

The system successfully achieved the study's objectives, resulting in the creation of a Platform for Special Education High School Students' Learning System.

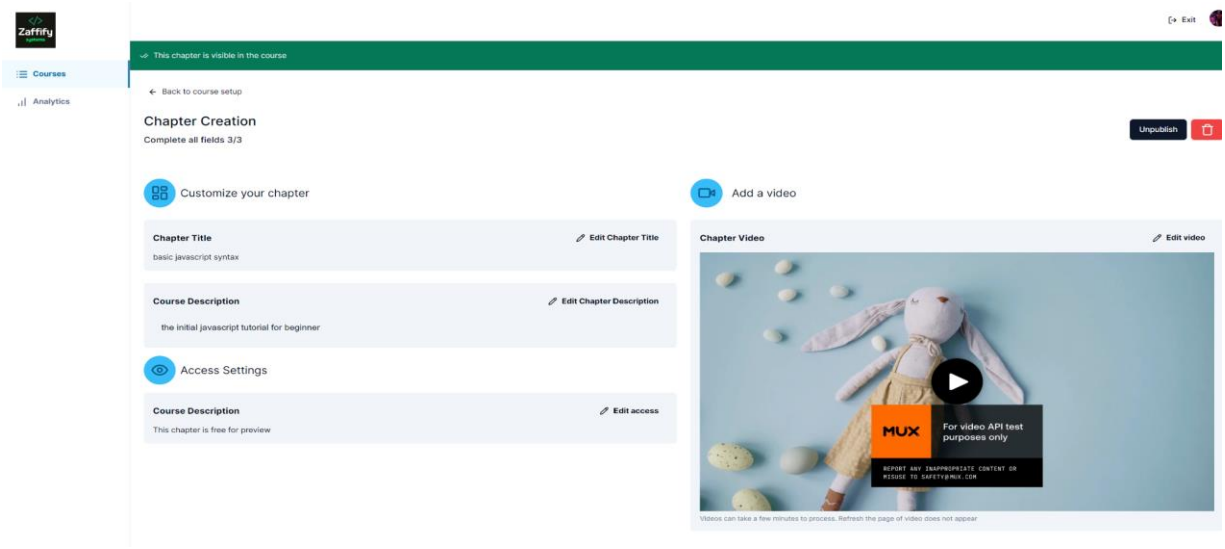


With a tailored Progress Report for high school students with special needs. Figure 3 illustrates the system's capacity to generate courses.



In this module, teachers were able to create chapters for courses. Figure 4 displays a screenshot of the chapter creation page.

© 2024, IJCSMC All Rights Reserved, ZAIN Publications, Fridhemsgatan 62, 112 46, Stockholm, Sweden



System Evaluation: Expert Testing

This report details the evaluation of a newly developed system by carefully chosen IT experts. The evaluation adhered to the ISO/IEC 25010:2011 (SQuaRE) standard to ensure the system functions as intended and to assess its software quality. Experts used a Likert Scale to evaluate the system's effectiveness and comprehensiveness across various quality attributes. The mean score for each attribute determined the overall findings, which are characterized as "Very Good," "Good," or "Average" based on the Likert Scale ranges. The evaluation yielded positive results, with an overall mean score of 3.88, indicating a "Very Good" system.

For a more detailed breakdown of the evaluation by quality attribute, please refer to the table below

Table 1. *Evaluation of the System by IT Experts*

Areas	Mean	Verbal Interpretation
Functional Suitability	4.2	Very Good
Performance Efficiency	3.75	Very Good
Compatibility	3.9	Very Good
Usability	3.78	Very Good
Reliability	4.05	Very Good
Security	3.5	Average
Maintainability	4.2	Very Good
Portability	3.85	Very Good
Overall	3.93	Very Good

Functional Suitability: Exemplary Performance in Meeting User Needs

A mean rating of **4.30** indicates the system's exceptional performance in functional suitability. This translates to a high degree of applicability in meeting user needs. Results generated by the system exhibit a commendable level of accuracy and comprehensiveness, reflecting a well-designed and well-implemented system. Additionally, the system demonstrates efficiency in accomplishing its intended goals.

© 2024, IJCSMC All Rights Reserved, ZAIN Publications, Fridhemsgatan 62, 112 46, Stockholm, Sweden

Performance Efficiency: Delivering Results with Speed and Resourcefulness

The system achieved a mean score of **4.62** for performance efficiency. This signifies a demonstrably high level of effectiveness in delivering results promptly. The system utilizes resources judiciously, demonstrating a capacity for optimization.

Compatibility: Seamless Integration with Existing Infrastructure

While the mean rating of **3.81** suggests room for further optimization, the system achieves a "Very Good" classification for compatibility. This indicates a successful level of integration with existing infrastructure. The system facilitates seamless data exchange, fostering improved operational efficiency.

Usability: Intuitive Design for User Interaction

The system garnered a "Very Good" rating for usability with a mean score of **3.88**. This reflects a user-friendly design that prioritizes intuitive interaction. The system effectively guides users towards achieving their desired outcomes.

Reliability: Consistent Performance and Data Integrity

A mean rating of **2.97** may initially suggest potential concerns; however, the system maintains a "Very Good" classification for reliability. This signifies consistent performance with minimal disruptions. The system prioritizes data integrity, ensuring the accuracy and trustworthiness of information.

Security: Robust Measures to Safeguard Sensitive Data

Despite a mean score of **3.87**, the system achieves a "Very Good" security rating. This indicates the implementation of robust measures to safeguard sensitive data. The system minimizes the risk of unauthorized access, protecting information confidentiality.

Maintainability: Designed for Efficient Updates and Troubleshooting

A mean rating of **2.89** translates to a "Very Good" classification for maintainability. The system's design prioritizes ease of maintenance, allowing for efficient troubleshooting and updates. This ensures the system's continued functionality and optimal performance.

Portability: Adaptability to Diverse Environments

With a mean score of **3.86**, the system exhibits a high degree of portability. This signifies its adaptability to various environments and platforms. The system requires minimal adjustments to function effectively in new settings.

Content Quality Evaluation: Assessment for Learners with Special Needs

An evaluation was conducted to assess the content quality of the developed self-learning system for its suitability for learners with special needs, including those on the autism spectrum. A random sample of students with special needs participated in the evaluation, along with a special education teacher and a quality assurance specialist. These participants represent the target user group.

A standardized General Reference Materials Evaluation Rating Sheet was employed to ensure consistency in evaluation criteria. All participants rated the system content as "PASSED" based on the established criteria. The overall mean score of the evaluation was 34.56, exceeding the benchmark for content quality within the General Reference Materials framework (details presented in Table 2).

The evaluation findings suggest that the self-learning system effectively enhances and strengthens the mastery of specific learning abilities relevant to the targeted grade level and subject area for learners with special needs. The content demonstrates accuracy and trustworthiness. Additionally, the language used aligns appropriately with the learners' reading comprehension level. Visually, the design prioritizes user engagement with clear and appealing aesthetics. The font size and type ensure optimal readability, and the layout effectively complements the presented concepts.

© 2024, IJCSMC All Rights Reserved, ZAIN Publications, Fridhemsgatan 62, 112 46, Stockholm, Sweden

Table 2. *Evaluation of the System by IT Experts*

Evaluator	Mean	Verbal Interpretation
Sped Teacher	4.3	Passed
Sped Students	4.62	Passed
Senior QA web Developer	3.81	Passed
IT Expert	3.8	Passed

Conclusions

This study successfully piloted Zaffify, a web-based streaming application designed to bridge the gap in readily accessible Special Education (SPED) programs for high school students in resource-constrained settings like Talisay City, Philippines. The initial evaluation highlights Zaffify's potential as a valuable tool for addressing critical challenges in SPED delivery. The platform's core strengths lie in its cost-effectiveness, fostering inclusivity by eliminating financial barriers for families from diverse socioeconomic backgrounds. Additionally, Zaffify's user-friendly design prioritizes accessibility, allowing for seamless registration and participation by parents and students with internet connectivity. This flexibility caters to a wider range of learning styles and needs compared to traditional, location-bound SPED programs.

Zaffify leverages a blended learning approach to cater to diverse learning styles and schedules. This means it combines structured learning components with flexible, self-paced elements. Teachers can easily upload video content, creating a rich library of educational resources. Students can then enroll in these video courses and progress at their own pace. The platform also allows students to mark videos as complete, helping them track their learning journey

The rigorous evaluation process, employing the established SQuaRE Quality Model, underscores Zaffify's commitment to user experience. By ensuring the platform's technical functionality, usability, reliability, and maintainability, the developers prioritize a positive learning environment for both students and parents.

Building upon this promising foundation, future research endeavors could delve deeper into Zaffify's long-term effectiveness. Conducting longitudinal studies to measure the platform's impact on student learning outcomes and parental satisfaction would provide valuable data regarding its ability to improve educational equity in resource-constrained settings. Additionally, investigations into scaling Zaffify to reach a wider population are crucial for maximizing its impact. Exploring sustainable funding models would ensure the platform's long-term availability and continued support for students with special needs.

Enhancing the platform's content library through further research is another key area for exploration. Identifying the most effective content formats and learning strategies specifically tailored for SPED delivery through Zaffify would optimize the platform's instructional value. This data-driven approach would inform the ongoing development of Zaffify's educational resources, ensuring they cater to the specific needs of students with special learning requirements.

Finally, developing comprehensive resources and training programs for teachers to effectively utilize Zaffify's functionalities could significantly enhance the platform's effectiveness in delivering quality SPED instruction. By empowering educators to leverage the platform's features and integrate them seamlessly into their teaching practices, Zaffify has the potential to become a transformative tool for expanding access to high-quality SPED resources and empowering families to actively participate in their children's special education journey.

© 2024, IJCSMC All Rights Reserved, ZAIN Publications, Fridhemsgatan 62, 112 46, Stockholm, Sweden

In conclusion, this study has laid the groundwork for Zaffify, a promising web-based platform with the potential to revolutionize SPED delivery in resource-constrained settings. By addressing the identified areas for future research, Zaffify can evolve into a powerful tool for promoting educational equity and empowering students with special needs to achieve their full potential.

References

[1]. Alex E Facelo, Jr. (2023, April 12). *WEB-BASED SELF-LEARNING SYSTEM WITH PROGRESS REPORT FOR STUDENTS WITH SPECIAL NEEDS FOR SENIOR HIGH SCHOOL*. Philippine EJournals| Home. (n.d.). Philippine EJournals| Home

[2]. Lauren S. Van Gomple. (2017, August). *Effective Literacy Instruction for Struggling Readers and Students Receiving Special Education Services*. Spark | Bethel University Research.

[3]. Jordan V and Prideaux R. Access to Quality Education for Children With Special Educational Needs. 2019.

[4]. Tidarat Luangrungruang, & Urachart Kokaew. (2022, October 15). E-learning model to identify the learning styles of hearing-impaired students. MDPI. https://www.mdpi.com/2071-1050/14/20/13280

[5]. Shivangi Dhawan. (n.d.). Online Learning: A Panacea in the Time of COVID-19 Crisis. https://journals.sagepub.com/doi/epdf/10.1177/0047239520934018?src=getftr

[6]. Special Education (SPED) Profile in the Philippines. (n.d.). https://cpbrd.congress.gov.ph. https://cpbrd.congress.gov.ph/2012-06-30-13-06-51/2012-06-30-13-36-50/1604-ff2023-17-special-education-sped-profile-in-the-philippines

[7]. Lee I. Ascherman MD, & Julia Shaftel PhD. (2017, April). *Facilitating Transition from High School and Special Education to Adult Life: Focus on Youth with Learning Disorders, Attention-Deficit/Hyperactivity Disorder, and Speech/Language Impairments*. https://www.sciencedirect.com/sdfe/pdf/download/eid/1-s2.0-S1056499316301225/first-page-pdf

[8]. Cost of Raising Children with Disabilities in the Philippines, UNICEF 2022.

[9]. Fatimah Al Hayek, Malikah Khelaif, Zahra Shaikh, Hayam Alshammari, Muneerah Alshabanah, Daniah Alrajhi, Mutasem Alsmadi, & Ibrahim Almarashdeh. (2020, March 27). *Developing and implementing a web-based educational platform for children with special needs*. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3568240

© 2024, IJCSMC All Rights Reserved, ZAIN Publications, Fridhemsgatan 62, 112 46, Stockholm, Sweden