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Research Article

Kikeva App: An Interactive Edutainment Tool for GCC Education

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Abstract

Education plays a crucial role in addressing health challenges faced by industrial workers. To enhance health literacy and promote healthier lifestyles among this demographic, our project utilizes a mobile application, blending education with entertainment—an approach we term edutainment. The Kikeva mobile application was developed to deliver health education through engaging videos, accessible on both iOS and Android devices. The backend of the application was built using the FastAPI framework in Python, deployed as a web service on the cloud. For the frontend, React Native was employed to ensure cross-platform compatibility. PostgreSQL was selected for data storage due to its reliability and open-source nature. Deployment on Heroku Cloud facilitated easy monitoring and version control integration via Git, enabling efficient team collaboration and continuous improvement. Our interdisciplinary team collaborated on design and content, continuously testing and refining the application to enhance user experience and effectiveness. This paper details the development process, motivation, and anticipated impact of the Kikeva mobile application on health education for industrial workers.

Keywords: Health Education, Edutainment, Global Climate Crisis, Mobile Application, Health Literacy

Kikeva: Küresel İklim Krizi Eğitimi İçin Etkileşimli Bir Eğitici Eğlence Aracı

Öz

Endüstriyel işçilerin sağlık sorunları, iş ortamlarındaki zorluklardan kaynaklanmaktadır ve bu sorunların çözümünde eğitim önemli bir rol oynamaktadır. Sağlık okuryazarlığını artırmak ve daha sağlıklı yaşam tarzlarını teşvik etmek amacıyla, Kikeva adlı bir mobil uygulama geliştirdik. Bu uygulama hem iOS hem de Android cihazlarda erişilebilen eğitici videolar sunarak, işçilerin sağlık konularında bilinçlenmesini sağlamaktadır. Uygulamanın arka planı, Python ile yazılmış FastAPI framework'ü kullanılarak geliştirilmiştir ve bulut üzerinde bir web hizmeti olarak çalışmaktadır. Ön yüz ise hem iOS hem de Android cihazlarla uyumlu olması için React Native kullanılarak oluşturulmuştur. Verilerin depolanması ve işlenmesi için güvenilir ve açık kaynaklı PostgreSQL veritabanı tercih edilmiştir. Heroku Cloud kullanılarak dağıtım yapılmış, bu sayede dağıtım ve izleme süreçleri kolaylaştırılmıştır. Git sürüm kontrol sistemi ile entegrasyon, takım çalışmasını ve sürekli iyileştirmeyi mümkün kılmıştır. Projede yer alan ekip, tasarım ve içerik konusunda iş birliği yapmış ve uygulamayı sürekli olarak test ederek kullanıcı deneyimini geliştirmiştir. Bu makale, Kikeva mobil uygulamasının geliştirme sürecini, motivasyonunu ve endüstriyel işçilerin sağlık eğitimi üzerindeki potansiyel etkisini ayrıntılı olarak ele almaktadır.

Anahtar Kelimeler: Sağlık Eğitimi, Eğitici Eğlence, Mobil Uygulama, Sağlık Okuryazarlığı

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Introduction

Background

Industrial workers are a vital part of the global economy [1], contributing significantly to the manufacturing and production sectors. However, they often face unique health challenges due to their work environment. Common health issues among industrial workers include respiratory problems from exposure to dust and chemicals, musculoskeletal disorders from repetitive tasks and heavy lifting, and high levels of stress due to demanding work conditions. Addressing these health challenges is critical to improving the well-being and productivity of this workforce.

A World Bank study explores how climate change disrupts labor markets in developing countries. Key impacts include reduced labor productivity due to extreme heat, shifting demand for skills, and the geographic redistribution of jobs. The study highlights the vulnerability of informal sectors, where many industrial workers lack access to social protections [2].

Labor movements have a crucial role in addressing climate challenges. This paper discusses how unions and worker organizations can drive climate action by advocating for a "just transition" that balances economic growth with environmental sustainability. It underscores the importance of integrating workers' rights into climate policies to ensure fair treatment during transitions to green economies [3].

The International Labour Organization (ILO) highlights how climate change directly impacts jobs. The report emphasizes the need for comprehensive climate adaptation strategies to protect jobs and promote sustainable economic practices. For industrial workers, this involves transitioning to environmentally friendly processes while ensuring job security and decent working conditions [4].

Another study emphasizes the necessity for comprehensive research and policy development to address the challenges posed by climate change to the labor force. It highlights those industrial workers, especially those in sectors like construction and agriculture, are increasingly vulnerable to heat stress, reduced productivity, and health risks due to rising temperatures [5].

Despite the critical need for health education in these settings, traditional methods such as in-person workshops, printed materials, and seminars often fall short. These methods can be logistically challenging to organize and may not effectively engage workers or provide them with the necessary information in an accessible manner. Moreover, the dispersed nature of industrial zones means that reaching all workers consistently is a significant hurdle.

Objectives of the Study

This study aims to develop and implement the Kikeva mobile application, a tool designed to deliver health education through engaging and informative videos tailored specifically for industrial workers. The primary objectives of the study are:

- To create a mobile application that provides accessible health education content to industrial workers.
- To evaluate the effectiveness of educational videos in increasing health literacy and promoting healthier behaviors among the target population.
- To assess user engagement and satisfaction with the mobile application.

Significance of the Study

Environmental health is a critical component of public health, focusing on the interactions between the environment and human health. Industrial workers, who are often exposed to various environmental hazards, face significant health risks that can impact their well-being and productivity. Addressing these health challenges through effective education is essential for promoting a healthier workforce.

The Global Climate Crisis (GCC) exacerbates these challenges by introducing additional environmental stressors. Industrial activities contribute significantly to GCC, leading to increased pollution and adverse health effects. Educating industrial workers about the health impacts of their environment and sustainable practices is crucial in mitigating these effects and promoting long-term health.

An effective health education program is vital in this context. It not only raises awareness about environmental health risks but also empowers workers with the knowledge to adopt healthier and more sustainable practices. Traditional education methods, however, often fail to engage workers and deliver the information effectively.

This is where the concept of edutainment—combining education with entertainment—comes into play. By making learning enjoyable and engaging, edutainment can significantly enhance the retention and application of health information. Videos, interactive quizzes, and other engaging formats can make health education more appealing and effective.

Given the widespread use of smartphones, a mobile app is an ideal medium for delivering this type of education. It ensures accessibility, allows for interactive learning, and can reach a large audience efficiently. The Kikeva app aims to meet these needs, providing an innovative solution to improve health literacy and promote healthier lifestyles among industrial workers.

The multidisciplinary nature of the Kikeva project adds to its significance. It brings together expertise from public health, environmental engineering, communication sciences, and software engineering. This collaboration is invaluable, as it integrates diverse perspectives and skills, leading to a more comprehensive and effective educational tool. Frequent meetings were held with the project team at every stage of the app development process, ensuring that the innovative training techniques were closely aligned with the project's goals and objectives. The contribution of software and computer engineering in developing the app demonstrates the potential of technological solutions in addressing complex public health challenges.

Motivation

Industrial workers often face significant health risks, including:

- **Respiratory Problems:** Exposure to dust and chemicals leading to conditions like asthma and bronchitis.
- **Musculoskeletal Disorders:** Repetitive tasks and heavy lifting causing back pain and joint issues.
- **Mental Health Concerns:** High stress levels contributing to anxiety and depression.

Industrialization is a major contributor to the Global Climate Crisis (GCC), causing environmental and health issues. Effective health education for industrial workers can help mitigate these impacts by promoting healthier and more sustainable practices.

Traditional health education methods have limitations:

- **Logistical Barriers:** Difficulties in organizing in-person sessions due to workers' schedules and locations.
- **Engagement Issues:** Printed materials often fail to capture workers' attention and retention.
- **Scalability:** Reaching a large, dispersed workforce is challenging with conventional methods.

A mobile app offers a solution:

- **Accessibility:** Enables workers to access health education anytime, anywhere.
- **Engagement:** Educational videos and interactive features increase learning retention.
- **Confidentiality:** Secure management of educational materials, ensuring controlled access.

The Kikeva mobile application aims to:

- Provide accessible health education content for industrial workers.
- Use engaging edutainment videos to enhance learning.
- Scale effectively to reach a broad audience.
- Measure and continuously improve education effectiveness.

By achieving these goals, the Kikeva app seeks to improve health literacy and behaviors among industrial workers, contributing to better health outcomes and productivity.

Design and Development of the Mobile Application

Conceptualization and Planning

The development of the Kikeva mobile application began with a comprehensive needs assessment to identify the specific health education requirements of industrial workers. Consultations, including discussions with health experts and industrial managers, helped define

the app's scope and objectives. The goal was to create a user-friendly app that delivers engaging and informative health education content.

Content Development

Creating the educational content involved several key steps:

- Topic Selection: Relevant health topics such as ergonomics, respiratory health, mental health, and nutrition were selected based on the identified needs of industrial workers.
- Expert Collaboration: Healthcare professionals were consulted to develop accurate and engaging video scripts.
- Video Production: High-quality educational videos were produced, combining information with entertainment (edutainment) to enhance engagement and retention.

Technical Development

The technical development of the Kikeva app was divided into backend and frontend components, incorporating various tools and technologies to ensure robustness, scalability, and a user-friendly experience.

Backend Development:

The backend was developed using FastAPI [6], a modern, fast web framework for building APIs with Python 3.6+ based on standard Python type hints. FastAPI was chosen for its speed, ease of use, and automatic interactive API documentation. PostgreSQL [8], an open-source, highly stable, and reliable database system, was selected for data storage due to its support for complex queries, large databases, and robust performance.

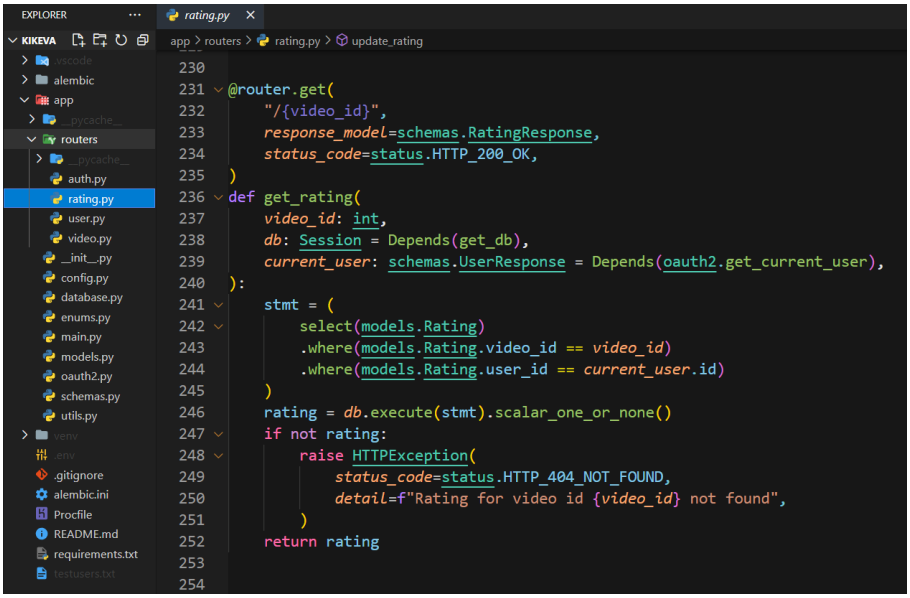

Figure 1. Method implementation with FastAPI

During the needs analysis phase, it was identified that the app would need to handle videos and their ratings by users, with an admin panel to manage these functionalities. There are three main data tables: Users Table, Videos Table, and Ratings Table. The Users Table stores information about users, including their roles (admin or regular user). The Videos Table contains details about each video, which can be managed by the admin. The Ratings Table records user ratings and answers to questions about the videos. These tables and entities were created using SQLAlchemy [12], an Object Relational Mapper (ORM) that allows for easy database manipulation using Python code.

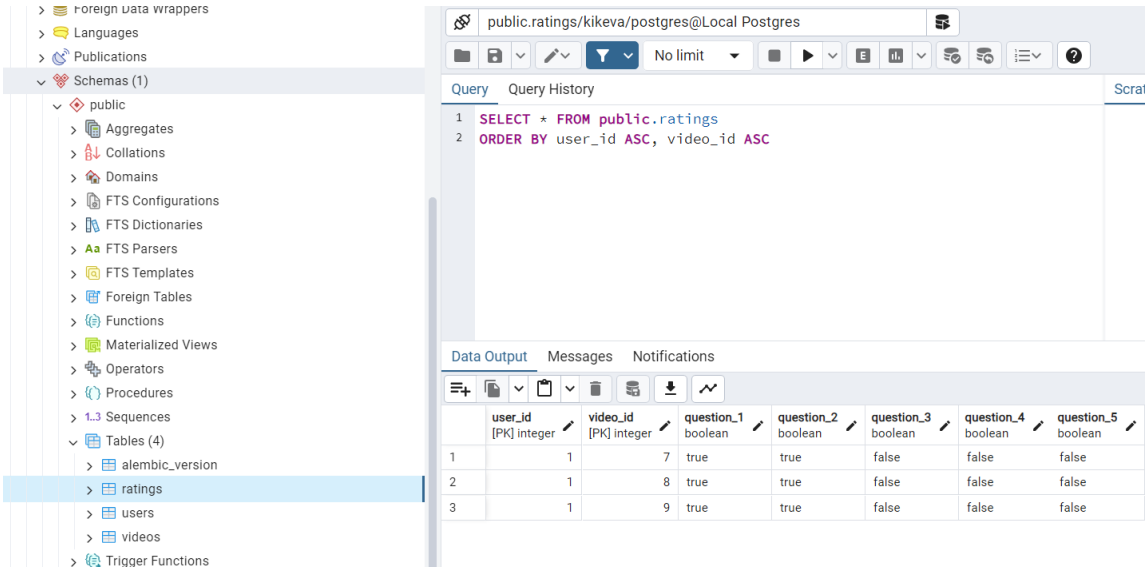

Figure 2. Postgres database tables

The backend includes several CRUD operations. For user management, there are methods to add, delete, update users, and get the list of users and active users. For video management, there

are methods to create, delete, and update videos. For rating management, there are methods to add and update ratings. An admin panel with an authentication mechanism allows admins to manage users and videos, making them active or passive and adding or deleting users. Pydantic [14] was used for data validation and settings management, ensuring user inputs are properly checked on the backend. Alembic [13], a database migration tool for SQLAlchemy, was used to handle schema changes over time.

Deployment was done using Heroku Cloud [9], chosen for its simplicity and seamless integration with Git [10,11] for version control. Heroku offers easy monitoring, scalability, and fast deployment capabilities. GitHub [10,11] was used for version control, enabling collaborative development, code reviews, and tracking of changes.

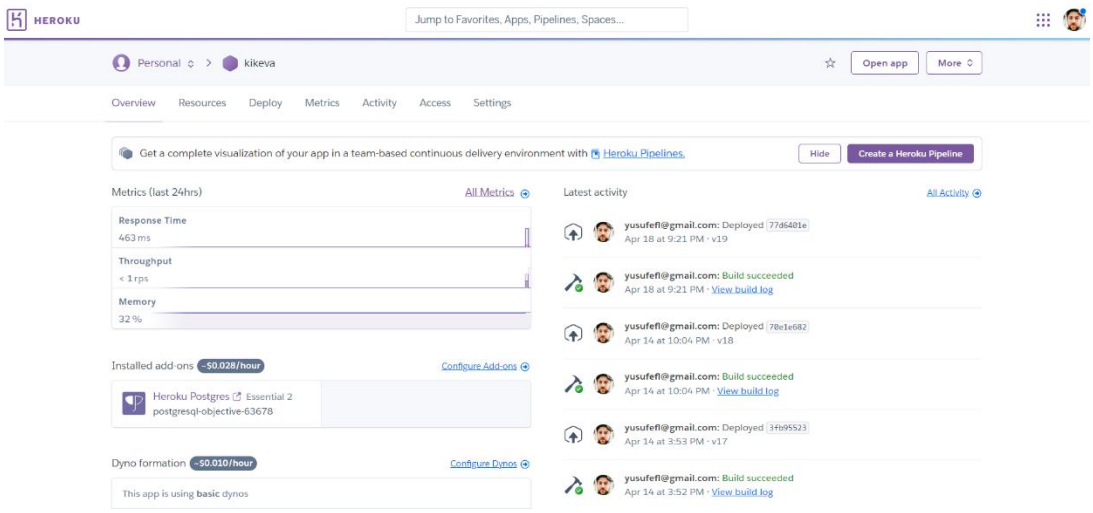

Figure 3. Heroku dashboard

Frontend Development:

The frontend was developed using React Native [7], a popular framework for building native apps using React, ensuring compatibility with both iOS and Android devices. The user interface was designed to be intuitive and user-friendly, with responsive design to ensure the app works well on various device sizes and orientations. Key features include easy-to-use navigation menus and buttons to access different sections of the app, such as educational videos, quizzes, and presentations. Interactive elements like quizzes and feedback forms were integrated to engage users and assess their understanding of the material.

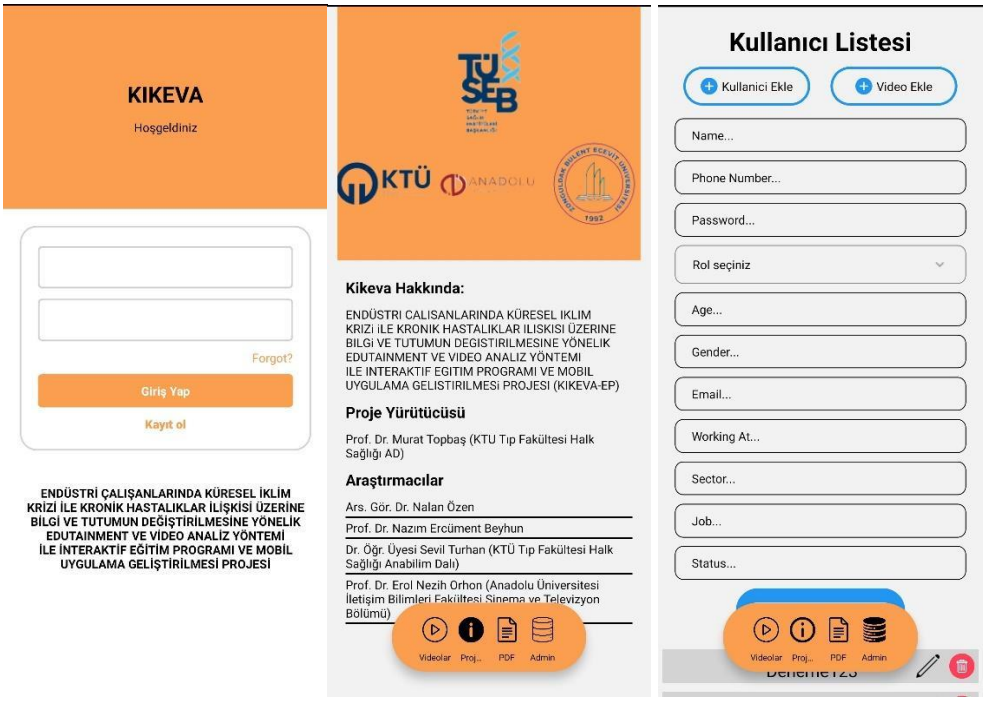

Figure 4. Frontend user screens. Left to right: Loging screen, main screen, add user screen

Testing and Refinement

The app underwent extensive internal testing to ensure functionality and user satisfaction:

- Internal Testing: The development team rigorously tested the app for usability, functionality, and content effectiveness.
- Iterative Improvement: Based on internal testing feedback, iterative improvements were made to address any issues and enhance the overall user experience.
- Continuous Updates: The app is continuously tested for bugs and potential enhancements, with periodic updates to ensure it remains effective and user-friendly.

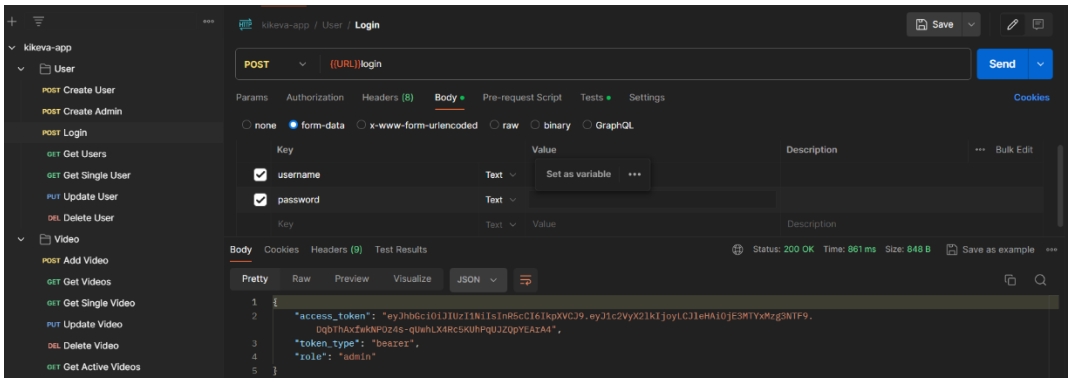

Figure 5. Testing with Postman

Postman [15] was extensively used for testing all backend methods, ensuring the app's functionality and reliability.

Implementation and Rollout

The app is prepared for deployment in selected industrial zones. This phase will involve close monitoring to gather initial user feedback and evaluate the app's effectiveness in real-world settings. Detailed strategies have been developed to scale up the deployment, aiming to reach a broader audience across multiple industrial zones. To ensure successful adoption and effective use of the app, comprehensive training sessions and support will be provided to workers. These sessions will cover the app's features and functionalities, ensuring users are comfortable and proficient in navigating and utilizing the app.

Evaluation and Feedback

Methods were implemented to assess the impact of the app on workers' health literacy and behavior changes, including interactive quizzes and presentations. Continuous feedback loops were established to incorporate user suggestions and enhance the app's features and content.

By following these steps, the Kikeva app aims to provide accessible, engaging, and effective health education to industrial workers, improving their health literacy and contributing to better health outcomes.

Discussion

The development of the Kikeva mobile application shows promising potential for enhancing health education among industrial workers. The educational videos, interactive quizzes, and presentations are designed to increase user engagement and retention of health information. Initial feedback from pilot testing indicated high levels of satisfaction with the content and usability, suggesting that the app could effectively overcome logistical barriers inherent in traditional methods of health education. Workers will be able to access the content at their convenience, integrating learning into their daily routines more seamlessly.

Several challenges were encountered during the development phase. Technical issues related to app functionality and server performance required significant troubleshooting and refinement. Ensuring seamless integration between the backend and frontend components was crucial to maintaining a smooth user experience. Tailoring the educational content to meet the diverse needs of industrial workers also posed a challenge, as workers have varying levels of prior knowledge and learning preferences. This necessitated the creation of a range of content types and difficulty levels. Additionally, encouraging workers to adopt the new technology and integrate it into their routines may require continuous effort, including training sessions and ongoing support to address potential resistance and technical difficulties.

The Kikeva mobile application includes tools to evaluate the effectiveness of the health education provided. Interactive quizzes and presentations are integrated to assess users' understanding and retention of the material. These tools will enable continuous monitoring and improvement of the educational content based on user performance and feedback. This

approach not only ensures that the content remains relevant and effective but also provides valuable data on the app's impact on health literacy and behavior.

The Kikeva mobile application has the potential to make a substantial impact on health education for industrial workers. If successful, it could lead to significant improvements in workers' understanding of key health topics. The engaging and accessible format of the videos, combined with interactive quizzes, is expected to contribute to better retention and application of health information. Potential positive behavioral changes among users, such as increased adherence to safety protocols and healthier lifestyle choices, may be attributed to the increased awareness and understanding fostered by the app. Compared to traditional health education methods, the Kikeva app offers greater flexibility, engagement, and scalability. Workers are likely to prefer the mobile app over printed materials and in-person workshops, highlighting its potential effectiveness in delivering health education.

Looking forward, several future directions are proposed for the Kikeva mobile application. Expanding the range of health topics covered by the app and incorporating more interactive elements, such as additional quizzes and feedback mechanisms, can further enhance user engagement and learning outcomes. Implementing personalized learning pathways based on users' prior knowledge, preferences, and progress can improve the effectiveness of the educational content. Adaptive learning technologies can be explored to tailor content to individual needs. Additionally, integrating the app with other health services, such as telemedicine and health tracking tools, can provide a more comprehensive approach to worker health, offering additional support and resources to users and further promoting healthy behaviors. Conducting long-term studies to evaluate the sustained impact of the app on health literacy and behavior will be essential. Continuous monitoring and feedback loops, facilitated by the app's built-in evaluation tools, will ensure the app remains relevant and effective in meeting the evolving needs of industrial workers.

By addressing these future directions, the Kikeva app has the potential to significantly enhance health education for industrial workers and contribute to better health outcomes and productivity.

Conclusion

The Kikeva mobile application represents a significant step forward in providing health education to industrial workers. By leveraging modern technology, the app offers a scalable, engaging, and accessible solution to address the unique health challenges faced by this workforce. The app's development involved a thorough needs assessment, careful content creation, and rigorous internal testing to ensure a high-quality user experience.

Moving forward, the planned implementation and rollout phases will be crucial in evaluating the app's real-world impact and effectiveness. With well-developed strategies for scalability and user support, the Kikeva app is poised to make a substantial contribution to improving health literacy and promoting healthier lifestyles among industrial workers. As the app reaches more users, continuous feedback and updates will help maintain its relevance and effectiveness.

By providing a user-friendly platform for health education, the Kikeva app has the potential to enhance the well-being and productivity of industrial workers, ultimately contributing to better health outcomes and a more informed workforce.

Acknowledgment

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Ethics in Publishing

There are no ethical issues regarding the publication of this study.

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