



CyberAware 1.0: The Cutting Edge of Web Development and Mental Health



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ABSTRACT

Objective - Cyberbullying among adolescents poses severe mental health risks, highlighting the need for innovative digital interventions. This study introduced CyberAware 1.0, a digital platform developed through a user-centered design approach to address cyberbullying and to provide comprehensive mental health support.

Methodology/Technique - The platform integrates interactive quizzes, educational videos, informative posters, helpline resources, and a live chat feature to deliver real-time support and awareness.

Findings - Preliminary pilot testing, which involved 247 adolescents from Sabah and Sarawak, revealed that 25.9% had experienced cyberbullying, with moderate levels of depression (26%), anxiety (19%), and stress (17%) reported.

Novelty - CyberAware 1.0 demonstrated a promising potential as a digital innovation for promoting adolescent mental well-being and resilience against cyberbullying. Future research will focus on validating its effectiveness and expanding its implementation.

Type of Paper: Empirical

JEL Classification: O32, O33, M15.

Keywords: Cyberbullying, Mental Health, Web Development, Adolescents, Digital Interventions

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1. Introduction

The proliferation of digital communication has transformed the way adolescents interact, but it has also given rise to significant challenges, particularly in the form of cyberbullying. Unlike traditional bullying, cyberbullying can occur 24/7, with the potential to reach a vast audience quickly and anonymously, exacerbating the emotional and psychological toll on victims. Research consistently demonstrates the severe impact of cyberbullying on adolescent mental health (Kim et al., 2019) (Quintana-Orts & Rey, 2018) leading to issues such as anxiety, depression, and, in extreme cases, suicidal ideation (Extremera et al., 2018). Despite the growing recognition of the detrimental effects of cyberbullying, existing digital interventions often fall short in addressing both prevention and mental health support cohesively.

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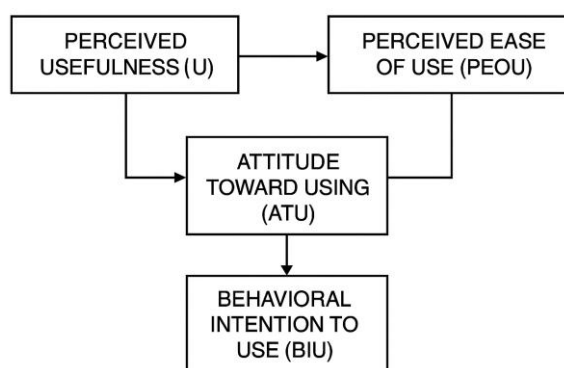
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Many platforms offer either general anti-bullying information or standalone mental health resources, with limited integration between the two domains (Merrill & Hanson, 2016) (Cassidy et al., 2013). Anchored in the Technology Acceptance Model (TAM), the present study conceptualizes CyberAware 1.0 as a theoretically informed digital innovation that emphasizes perceived usefulness and ease of use to enhance user engagement and adoption. The platform integrates interactive quizzes, educational videos, and real-time support features to foster adolescent acceptance of digital mental health tools as well as promote behavioral change and resilience against cyberbullying (Edwards et al., 2016) (Abreu & Kenny, 2018).

Within the TAM framework, the design and evaluation of CyberAware 1.0 prioritize accessibility, relevance, and user satisfaction to enhance perceived usefulness and ease of use. The interactive learning components and scenario-based modules enhance practical understanding of cyberbullying and mental health, while user-friendly navigation and visual infographics encourage continuous engagement. The current innovation aims to embed TAM principles into digital mental health interventions to effectively increase adolescents' intention to use these tools, ultimately fostering digital literacy, psychological empowerment, and resilience in managing online risks.



CONCEPTUAL FRAMEWORK OF CYBERAWARE 1.0

Research indicates that effective cyberbullying interventions should adopt a systematic, whole-school approach that encompasses education on cyberbullying, coping skills, empathy training, and digital citizenship (Doumas & Midgett, 2020) (Chaux et al., 2016). However, many existing programs have failed to implement these comprehensive strategies, often resulting in fragmented support that does not adequately meet the needs of adolescents who are facing cyberbullying (Mitchell & Štulhofer, 2021) (Zhu et al., 2021). Lack of integration between mental health support and cyberbullying prevention highlights the necessity for platforms that can simultaneously address both aspects, thereby fostering a more holistic approach to adolescents' well-being (Balakrishnan, 2015) (Udris, 2015). Moreover, the role of family support and community involvement is critical in enhancing the effectiveness of cyberbullying prevention programs. Studies suggest that public awareness campaigns and training for parents, teachers, and school counsellors can significantly contribute to creating a supportive environment for adolescents (Rodriguez-Rivas et al., 2022) (Barkoukis et al., 2016). By equipping these stakeholders with the knowledge and tools to recognize and address cyberbullying, we can better empower adolescents to navigate the challenges of online interactions and seek help when needed (Fakir, 2023) (Martín-Criado et al., 2021).

In response to this critical need, CyberAware 1.0 was developed as a comprehensive platform designed specifically for adolescents. By leveraging advancements in web development, CyberAware 1.0 aims to create a safe online environment that provides real-time assistance through live chat with the experts, tailored educational resources, and robust security measures to protect user privacy (Schodt et al., 2021) (Yosep et al.,

2023). The platform's innovative features are designed to address gaps in digital interventions, fostering awareness and mental well-being among young users. Initial user feedback and ongoing evaluations will be crucial for assessing the platform's impact and effectiveness in mitigating the negative consequences of cyberbullying (Rey et al., 2020).

This study outlines the development and potential impact of CyberAware 1.0, examining its innovative features and its capacity to address gaps in existing digital interventions. CyberAware 1.0 aims to equip adolescents with the tools needed to navigate the complexities of digital life, fostering both awareness and mental health. The subsequent sections will detail the platform's development process and the broader implications for mental health interventions in the digital age.

Method

Platform Design and Development

CyberAware 1.0 was developed using a user-centered design approach to ensure it meets the needs of adolescents experiencing cyberbullying. The design process involved multiple stages.

Table 1.1. Stages of the user-centered design approach.

Table 1.1: Stages of User-Centered Design Approach

No.	Criteria	Explanation
1.	Needs Assessment	Initial research involved consultations with stakeholders, including mental health professionals, educators, and adolescents. A survey was conducted to identify specific needs and preferences related to cyberbullying prevention and mental health support.
2.	Prototype Development	Based on the needs assessment, a prototype was developed. This phase included designing the user interface (UI) and user experience (UX) with an emphasis on accessibility and engagement. Features were incorporated to enhance usability, including intuitive navigation and interactive elements.
3	Security and Privacy	To protect user data and ensure privacy, CyberAware 1.0 employs robust security measures: a) Data Encryption: All user data is encrypted both in transit and at rest to prevent unauthorized access. b) Anonymous Profiles: Users are encouraged to interact anonymously to protect their identity. c) Secure Storage: Sensitive information is stored using secure, compliant data management practices.

Preliminary Design of CyberAware 1.0

A strategic approach was employed to develop the CyberAware prototype, selecting Next.js as the foundational framework due to its growing popularity and robust ecosystem. Next.js was chosen for its technical capabilities and for the free-tier web hosting provided by Vercel, which integrates seamlessly with PostgreSQL. This setup was particularly advantageous given the project's scalability and ease of deployment. Although not originally designed as a mobile application, the application was subsequently made mobile-first.

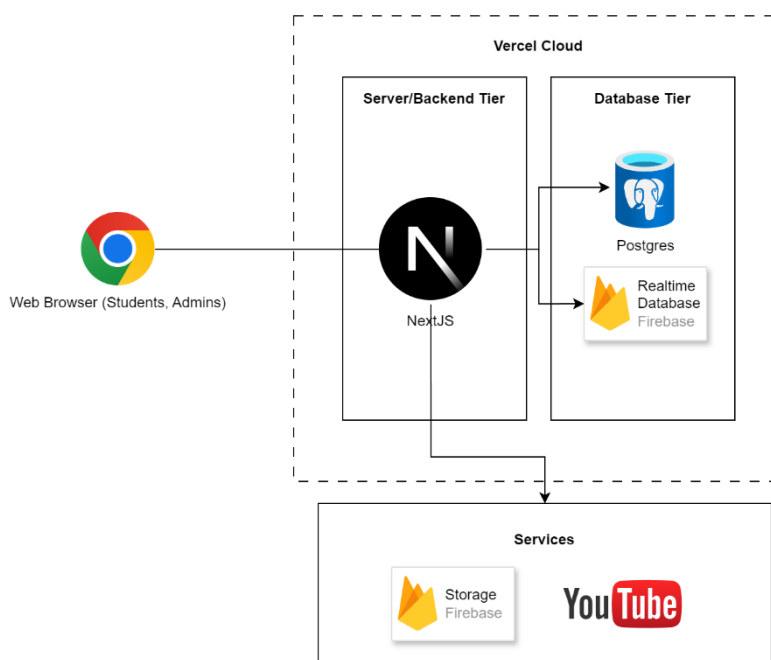


Figure 1: Architecture Diagram of CyberAware's

To cater to a more diverse audience, the application was designed to be bilingual, supporting both English and Malay. This decision reflected the commitment to accessibility and inclusivity, ensuring that the platform is usable by a broad spectrum of regional users.

The creation of educational materials, including resource and question videos, involved the use of advanced AI tools to streamline content generation and localization. ChatGPT assisted with the initial content generation and translation tasks, producing and refining draft materials in both English and Malay. These drafts were subsequently reviewed and refined to ensure accuracy and cultural relevance.

Once the text was finalized, it was converted to audio using Play.ht for English and TTSFree.com for Malay. Then, the generated audio files were integrated into video content through Adobe Express's "Animate from Audio" tool (Figure 2). To enhance comprehension, subtitles were added to the videos by using Adobe Express "Caption Video" feature for the English version and Nova.ai for the Malay version. This multi-step process ensured that the final educational materials were both engaging and accessible to the target audience.

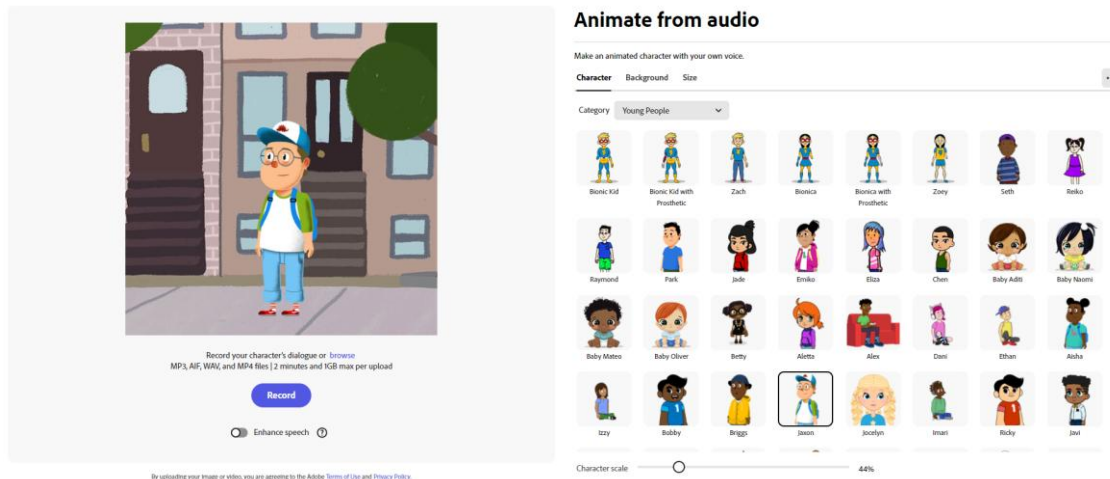


Figure 2: Adobe Express's “Animate from Audio”

The CyberAware application was designed with two primary user roles: Students and Admins. Students are further categorized as either Victims or Bullies based on their role in cyberbullying incidents, allowing the application to deliver role-specific content. Students can browse curated video resources, consult with administrators, and participate in a weekly quiz to assess their understanding and reflection on cyberbullying (Figure 3). Conversely, Admins are responsible for overseeing the platform, providing support to students, and serving as trusted adults with whom students can confide. During the research phase, the application operates in a closed environment, requiring Admins to approve and assign user roles based on incoming registrations. This controlled setup ensures that the application is used safely and securely, aligning with the overarching goals of education, project support, and the context of cyberbullying.

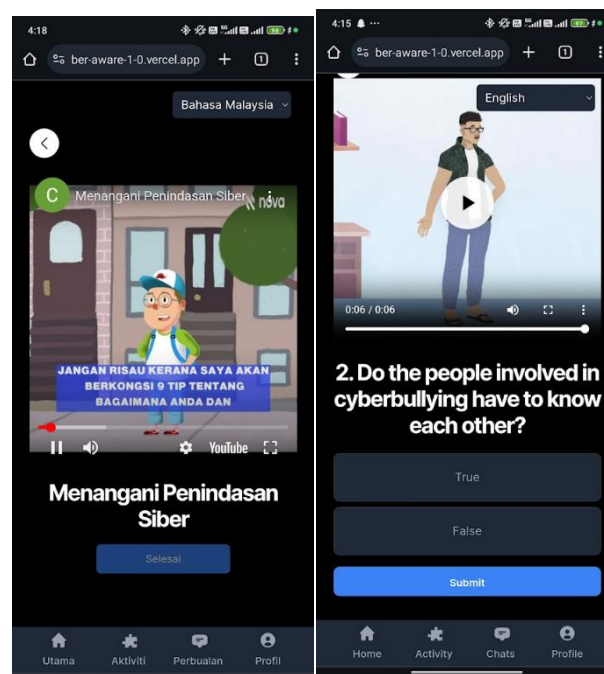


Figure 3: Video and Quiz Resources

Participants and Location

Preliminary pilot testing was conducted with 247 adolescents aged 13–14 years from Sabah and Sarawak. A total of four secondary schools from Sabah and four from Sarawak participated in the study. The inclusion criteria required participants to be active social media users and not to be undergoing any medical treatment for illness. Additionally, all pilot testing sessions were conducted in the schools' computer laboratories.

Ethical Compliance

This study was conducted in accordance with ethical standards for research involving human participants. Ethical approval was obtained from the University Malaysia Sabah under reference number JKEtika 4/24(11). Informed consent was obtained from all participants prior to data collection. Privacy and confidentiality were maintained through anonymized profiles, encrypted data storage, and secure communication protocols.

Procedures

Students are required to complete the questionnaires for the screening process, which aims to identify both perpetrators and victims of cyberbullying. Those who obtain moderate or high scores will be selected for the CyberAware 1.0 testing. After parental consent is obtained, the selected students will be enrolled on the website and will participate in weekly activities for five weeks. Student feedback is summarized in the results section.

Results

Thematic analysis of participants' feedback on CyberAware 1.0 revealed four themes: 1. Usability and accessibility, 2. Knowledge gain, 3. Emotional awareness, and 4. Empathy as well as responsibility.

Usability and Accessibility

Participants consistently emphasized that the website was easy to use and understand. They appreciated the simple and interactive design, describing it as “easy to understand,” “clear,” and “very effective to overcome cyberbullying.” This indicated that the platform's user-friendly layout enhanced engagement and accessibility for a wide range of users.

Knowledge Gain

The interactive quizzes and informative content were identified as valuable learning tools. Several users reported that the quizzes helped them better comprehend cyberbullying; one participant (B2) noted that the activities helped him “better understand what cyberbullying is and how to avoid being disturbed.” Others (B4) highlighted that the platform provided “clear and interactive information,” which enhanced their awareness about online safety.

Emotional Awareness

The feedback also reflected heightened emotional awareness. Users reported that they had learned about the severe impact of cyberbullying, both physically and mentally. Participant (T4) reflected, “I have learned that cyberbullying is very bad and can hurt someone physically and mentally.” Others shared personal experiences of being cyberbullying victims and described how the website helped them recognize harmful behaviors and ways to respond effectively.

Empathy and Responsibility

A recurring theme was the development of empathy and a sense of collective responsibility. Some participants expressed awareness about the importance of not spreading hate, reporting perpetrators, and supporting victims. Participant (T10) reported that individuals have a duty “to stop the culture of cyberbullying and support victims.” This suggested that the platform not only fosters knowledge but also promotes pro-social attitudes and behaviors.

Discussion

Comparison with Existing Solutions

One of the notable features of CyberAware 1.0 is its integration of cyberbullying prevention with mental health support. This holistic approach recognizes that cyberbullying is often linked to mental health issues, such as depression and anxiety (Bansal et al., 2024). By providing both preventive strategies and support resources, CyberAware 1.0 offers users a robust toolkit for effectively managing cyberbullying incidents. The platform's educational resources enhance users' ability to recognize and respond to cyberbullying, empowering them to take proactive steps to maintain their online safety and mental well-being.

CyberAware 1.0's user-friendly design and robust security measures are critical components of its success. Many existing interventions fail to adequately address privacy concerns, which can discourage victims from seeking help due to fear of exposure or retaliation. CyberAware 1.0 is designed with robust security measures, including encrypted communications and anonymized interactions, ensuring that users can access support without compromising their privacy. This approach is particularly crucial for adolescents, who may be reluctant to report cyberbullying due to social stigma or fear of further victimization (Doumas & Midgett, 2020). By ensuring that users feel secure and supported, CyberAware 1.0 fosters engagement and trust, which are essential to the platform's effectiveness in helping adolescents manage cyberbullying.

Beyond individual support, CyberAware 1.0 holds a substantial potential for educational, familial, and policy integration. Schools could adopt the platform within digital citizenship or social-emotional learning programs, enabling teachers and counselors to monitor trends and intervene early. Parents can also use the platform to better understand cyberbullying dynamics and guide their children in developing healthy online habits. At a broader level, policymakers could integrate CyberAware 1.0 into national digital literacy or youth mental health campaigns to promote safer online ecosystems. Looking ahead, the roadmap for CyberAware 1.0 includes scaling the platform across multiple devices and integrating multilingual support to ensure inclusivity. Continuous user feedback and data-driven updates will inform future iterations, reinforcing the platform's adaptability and long-term relevance in combating cyberbullying.

The design platform developed in this study suggests that the CyberAware 1.0 prototype could significantly improve adolescents' navigation and management of cyberbullying. The integration of educational resources with real-time, interactive support (Fakir, 2023) enhances users' ability to recognize, respond to, and prevent cyberbullying. This proactive approach not only empowers victims but also educates potential perpetrators on the consequences of their actions, potentially reducing harmful online behaviors over time. Furthermore, the structured yet flexible platform design ensures accessibility for a broad audience, including parents, educators, and mental health professionals, who can use it as an intervention and awareness-building tool. Unlike traditional interventions that focus on reactive measures (Chaux et al., 2016), this platform emphasizes proactive engagement, fostering resilience and digital well-being among users. Future iterations of CyberAware 1.0 could further refine these features through user feedback and additional

testing, thereby ensuring that it continues to evolve into an effective and adaptable resource for combating cyberbullying.

Limitations and Future Research

While the results are encouraging, the study has limitations that should be considered. The beta-testing sample, while diverse, remains small and may not fully represent the broader adolescent population. Additionally, the preliminary impact analysis was based on early feedback and may not capture long-term effects or variations in user experiences.

Future research should involve larger, more diverse samples to validate the findings and assess the platform's long-term effectiveness. Further studies could also explore the impact of additional features, such as peer support forums, and examine the scalability of CyberAware 1.0 in different contexts and regions. Additionally, ongoing refinement of the AI algorithms and security measures will be essential to address emerging challenges and ensure that the platform remains effective and secure.

Conclusion

CyberAware 1.0 represents a significant advance in integrating technology into mental health support for adolescents. Developed in response to the growing prevalence and severity of cyberbullying, this platform leverages cutting-edge, real-time AI capabilities to provide immediate emotional assistance, personalized guidance, and safe reporting mechanisms for young users. By combining these AI-driven support features with a rich suite of educational materials, including interactive modules, evidence-based coping strategies, and awareness-building resources, CyberAware 1.0 provides a holistic and proactive approach to mitigating online harassment.

The platform's emphasis on early intervention and digital resilience not only empowers adolescents to navigate online spaces more confidently but also equips educators, parents, and counsellors with valuable insights into youth online behaviour. Findings from the beta testing phase, which reported high levels of user satisfaction, usability, and perceived effectiveness, further highlight the strong potential of CyberAware 1.0 to create meaningful, lasting improvements in adolescent mental health and well-being. Through its innovative design and measurable impact, CyberAware 1.0 is a promising tool for fostering safer and more supportive digital environments for young people.

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