

# ACADEMATES – YOUR PATH TO PERSONALIZED LEARNING

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**Abstract**—Academates is an innovative online education platform designed to bridge the gap between teachers and students. With a user-friendly interface built on React, teachers can register, create detailed profiles, and specify their expertise in subjects and topics. Students, in turn, can search for teachers based on their learning needs, viewing a curated list complete with teacher ratings. The platform facilitates seamless appointment scheduling with integrated video meetings featuring a whiteboard and screen-sharing options. Payment transactions are securely processed through the platform, with a percentage allocated as the platform's service fee. Academates prioritizes user security and data privacy, implementing encryption and compliance with relevant regulations. The scalability and responsive design of the platform ensure a seamless experience across devices. Marketing strategies will be employed to attract a diverse user base, establishing Academates as a leading hub for quality online education. With a robust rating and review system, Academates aims to foster a thriving educational community, offering a dynamic, secure, and personalized learning experience for both teachers and students.

**Keywords**— Collaboration, Digital Transformation, E-Learning, Innovation, Online Education, Payment Processing, Personalized Learning, Platforms, Security, Virtual Classroom

## I. INTRODUCTION

In an era where digital connectivity is shaping the future of education, Academates emerges as a pioneering online platform designed to bridge the gap between passionate educators and eager learners. This innovative platform redefines the educational experience, offering a seamless avenue for teachers to showcase their expertise and for students to discover the perfect mentor for their learning journey. Academates envisions a dynamic learning environment that transcends geographical boundaries, bringing together a global community of educators and learners in pursuit of knowledge. At the heart of Academates lies a commitment to revolutionize virtual learning. By integrating state-of-the-art video conferencing technology with collaborative features like a virtual whiteboard and screen sharing, we aim to create an immersive and interactive learning space. This ensures that lessons are not only informative but also engaging, allowing students to actively

participate in their educational journey. With these tools, Academates seeks to empower both teachers and students, facilitating a more effective and enriching learning experience. Moreover, Academates places a premium on transparency and trust. Through a robust rating and review system, students can make informed decisions when selecting their educators, while teachers have the opportunity to showcase their proficiency and dedication. Secure payment processing further reinforces the platform's commitment to integrity, ensuring that financial transactions are conducted smoothly and reliably. As we embark on this educational journey, Academates envisions a future where quality education is accessible to all, irrespective of geographical or economic constraints, redefining the way we learn and grow in the digital age.

The contribution of this research paper is summarized as follows:

- I. Development of a web application designed for both teachers and students.
- II. Empower students to easily book teaching schedules for the available teachers for certain topics using the application.
- III. Allow teachers to teach students from different parts of the world and to generate a side income.

## II. LITERATURE SURVEY

The literature survey encompasses a comprehensive review of existing research and resources pertinent to the development of Academates, an innovative online education platform. It delves into key areas such as online education evolution, user interface design, payment systems, data privacy, and marketing strategies, providing a solid foundation for the project's implementation.

The focus of "Smart Education Platform to Enhance Student Learning Experience during COVID-19 by Naidu et al." is on putting Smart Education into practice in response to the rising need for cutting-edge teaching strategies, particularly in the wake of pandemics like COVID-19[1]. It emphasizes how important Smart Cities are to these advancements in education and how widely Zoom and other online learning tools are used. Although the practice has been found to have positive effects in terms of flexibility,

accessibility, and innovation, the paper notes that learner engagement still needs to be improved.

In today's globalized tertiary education landscape, the paper by Truong & Diep emphasizes the critical role of digital transformation and advocates for educational institutions to adopt creative, economical approaches through recent technological advancements [2]. The paper, employing a PRISMA-compliant systematic review, identifies literature on technology's impact on postsecondary education. While it highlights major trends like blockchain and AI, it suggests the need for deeper exploration of their practical applications and guidance for educators.

In response to the COVID-19 pandemic, the education sector implemented innovation through a comparative study conducted by Rai et al. [3]. The study underscores the importance of innovation adaptability to new technologies, such as video meetings and online teaching, in driving online education growth. While it primarily discusses conceptual and historical aspects, it could enhance its impact with specific case studies or empirical data and explore challenges from rapid digital transformation.

The concept by Wang & Wang acknowledges the heterogeneous nature of online information in the Internet era as it investigates the dynamic terrain of e-learning [4]. The study highlights integrating Kolb's experiential learning cycle into e-learning platforms to enhance user intention and learning performance through contemporary interface design. It prioritizes usability and user experience to lower learning barriers and promote interdisciplinary learning. However, lacking implementation details and empirical evidence may limit its effectiveness in improving learning outcomes.

Lei et al. employ a front-end and back-end separation scheme using React and Nginx to introduce a unified experimental framework for control education[5]. Enhancing user experience with single-page applications, facilitates online algorithm design, parameter tuning, and real-time control via remote and virtual labs. While technically detailed, it lacks specific implementation examples and detailed insights into user experience.

Darvin et al. investigate technology integration in education, particularly focusing on Learning Management Systems (LMS) [6]. Stressing the vital role of effective UI/UX design, the study examines common evaluation methods like usability measurement and heuristic evaluation. It highlights key LMS features like discussion forums but lacks specific examples or insights into evaluation methods and challenges in LMS development.

The paper "Attaining 21st Century Skills in a Virtual Classroom" focuses on fostering communication, collaboration, critical thinking, problem-solving, and creativity in online learning environments [7]. It argues that digital resources offer unique opportunities for skill development. However, it overlooks challenges in technology integration and ensuring equitable access. Additionally, it lacks discussion on the nuances of in-person

feedback and the potential for reduced personal interaction, integral aspects of the learning experience.

"The Importance of Interaction Mechanisms in Blended Learning Courses Involving Problem-Solving E-activities" focuses on enhancing cooperative problem-solving in blended learning using tools like GitHub and Learning Management Systems (LMS) [8]. It demonstrates positive impacts on student engagement and project quality in a specific course. However, its specificity to the course setup and platforms may hinder universal application. Additionally, it may not sufficiently address potential learning curve challenges, impacting generalizability to other educational contexts.

Liu et al. designed a virtual reality classroom using WebXR technology, aiming for an immersive experience via the OMO concept[9]. Positive feedback from university students and instructors is reported for two simulated scenes. However, the study lacks specific details on implementation challenges or potential drawbacks, limiting insights into the virtual classroom's limitations.

The paper by Kostoski & Apostolova highlights the importance of secure online payment systems like "Payatron" for e-commerce businesses [10]. Payatron aims to expedite transactions and improve customer satisfaction. It emphasizes the role of secure payment procedures in building customer loyalty. Academates can integrate insights from the paper to enhance their platform's user experience by implementing secure payment features. This ensures trustworthiness and efficiency, vital for any online platform's success [11].

Baibhav et al. present the Payment Tracking System (PTS), offering efficient vendor payment management through a centralized platform [12]. PTS ensures timely payments by incorporating advanced features like Invoice Generation and Payment Reminders. Academates can enhance financial procedures by adopting PTS-inspired strategies to optimize payment workflows and provide users with visibility and control over transactions. This ensures a dependable and seamless financial experience for educators and students.

Gochhwal's paper explores the Unified Payment Interface (UPI), a mobile-centric interbank payment system revolutionizing digital transactions in India [13]. It highlights UPI's technological advancements, emphasizing its security and efficiency. UPI's widespread adoption underscores its benefits in cost, consumer ease, and settlement times [14]. Academates can leverage UPI insights to enhance their payment infrastructure, offering efficient, real-time transactions for educators and students, aligning with financial inclusion goals.

The paper by Mohammed A. et. al. addresses the escalating risk of cybercrime and data theft in educational institutions due to increased information systems usage [15]. It emphasizes the need for robust data security measures to safeguard sensitive academic and financial information. Through empirical research, it advocates for a comprehensive

security model to prevent illegal access and manipulation of data. Additionally, it recommends awareness initiatives among faculty and staff to mitigate risks associated with online interactions.

The paper examines data privacy protection on the SHCneo E-Learning Platform through compliance with the General Data Protection Regulation (GDPR).[16] It analyzes GDPR's data privacy features in the context of SHCneo, addressing concerns about privacy breaches in E-Learning platforms. The study outlines strategies to enhance data privacy security and underscores the importance of stringent data security policies in educational institutions to prevent cybercrimes and unauthorized access to private data.

The article "Securing e-learning platforms" underscores the criticality of security in the expanding realm of e-learning. It emphasizes key security elements such as access control, authentication, and data integrity, advocating for information security tools like cryptography [17]. Investigating an open-source e-learning system, the paper delves into security challenges in development and usage, highlighting the complexity of security management in safeguarding content, services, and personal data for both external and internal users.

The study investigates the impact of user rating behavior on the helpfulness of online reviews, proposing a user-centric approach for review selection and enhancing features for both reviewers and businesses [18]. Analyzing a Yelp dataset, identifies changes in user choice patterns and business reputation, with a significant portion of reviewers exhibiting irregular rating behavior. The research underscores attributes like reviewer popularity and diverse user behaviors in determining review helpfulness, providing valuable insights for web app academies to develop platforms that improve the relevance and usefulness of teacher reviews.

The paper addresses student churn in EdTech courses during the COVID-19 pandemic, proposing the use of machine learning algorithms like K-Nearest Neighbor (KNN) and Support Vector Machines (SVM) to predict churn based on course-end survey feedback [19]. Utilizing real-time data from Zikshaa, the model identifies dissatisfied students, allowing for tailored interventions to improve course quality. This methodology enables web app academies to anticipate and mitigate student dissatisfaction, enhancing course quality and customization while prioritizing user experience and promoting client retention.

Birari et al. analyzed 600 reviews from MouthShut.com to gauge user perceptions of three major EdTech platforms during the COVID-19 pandemic [20]. Positive sentiments towards faculty expertise, user-friendliness, syllabus, and pricing models are revealed. The study offers insights for EdTech providers to refine their strategies and offerings, attracting and retaining consumers. Web app academies can leverage these findings to optimize user experiences and strategically position themselves in the competitive EdTech market, fostering increased satisfaction and engagement.

### III. PROPOSED METHODOLOGY

In addressing the challenges identified in the dynamic landscape of online education, Academates proposes a comprehensive methodology to revolutionize teacher-student interaction. Following the project introduction, Academates aims to overcome obstacles by creating an intuitive and transparent platform for educators and learners. The platform will seamlessly connect teachers and students, providing a personalized and interactive virtual classroom experience. Through the integration of cutting-edge video conferencing tools, a collaborative virtual whiteboard, and secure payment gateways, Academates ensures an efficient and secure learning environment. A robust rating system enhances transparency, and future developments, including AI-driven matching and multi-language support, further position Academates to evolve with the ever-changing needs of the education sector. By prioritizing user experience, security, and innovation, Academates aspires to redefine online education, making quality learning accessible to a global audience.

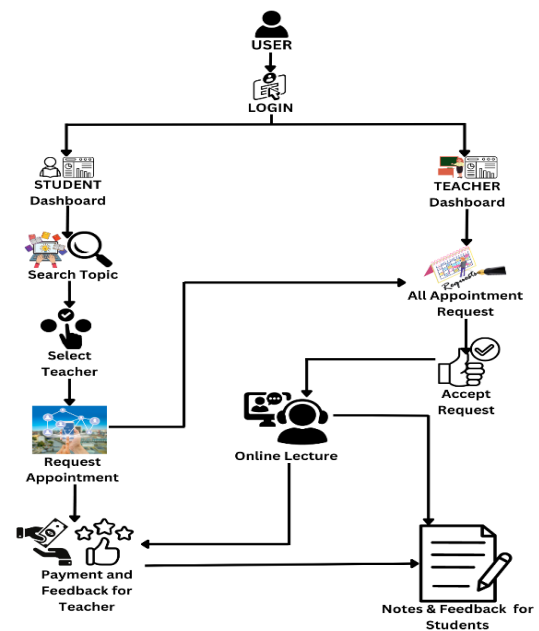


Fig 1. Academics Architecture Diagram

In Fig. 2.3.1, The diagram depicts the workflow for the Academates project, illustrating the user journey from login to post-lecture activities. Users, categorized as students or teachers, log in to their respective dashboards. Students can search for topics and select teachers based on their preferences, proceeding to request appointments. Teachers view all appointment requests on their dashboard and accept them as appropriate. Once an appointment is accepted, an online lecture takes place. After the lecture, students can make payments and provide feedback to the teacher. Additionally, teachers can provide notes and feedback for the students, closing the loop of an interactive educational session.

### IV. IMPLEMENTATION

#### Web App components

The components of the Academates app, as outlined in the provided materials, would likely include the following:

- **User Authentication System:** To handle user login and maintain secure access.
- **User Profiles:** For both students and teachers, with details like qualifications, subjects, availability for teachers, and learning preferences for students.
- **Search and Matching Engine:** Allowing students to search for teachers by topic and other criteria.
- **Appointment Scheduling:** For students to request and teachers to manage appointments.
- **Virtual Classroom Environment:** With video conferencing, interactive whiteboards, and screen sharing capabilities.
- **Payment Gateway:** To process payments from students to teachers.
- **Rating and Feedback System:** For students to rate teachers and vice versa, along with leaving feedback.
- **Content Management System:** For teachers to upload notes and resources.
- **Data Storage and Security:** To securely store user data, session records, and other pertinent information.

These components come together to create a robust virtual learning platform designed to facilitate and streamline the online educational experience for both students and teachers.

### Steps and Flowchart

The steps for an online personalized learning system are as follows:

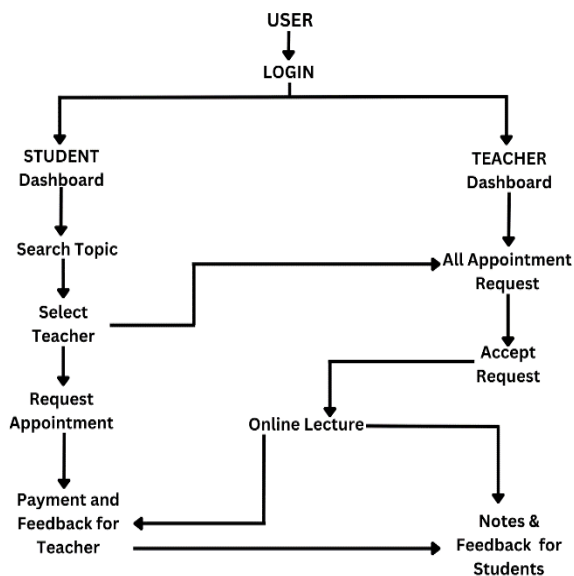


Figure 2: Flowchart of Academates

Here, Figure 2 shows the flowchart of the application Academates.

### Teacher Side

Step 1: Teacher Login

Step 2: The teacher opens his profile.

step 3: The teacher checks the lecture requests.

step 4: If the lecture request is there, the teacher accepts or declines the request.

step 5: After accepting, the teacher can come back at the accepted time and take the class.

step 6: Add feedback about the students.

step 7: Get the payment.

### Student Side

Step 1: Student Login

Step 2: Search for the desired lecture from the available teachers

Step 3: Submit a lecture request to the teacher.

Step 4: Wait for the teacher to accept or decline the request.

Step 5: If the request is accepted, be present at the scheduled time for the class.

Step 6: Participate actively in the class and take notes.

Step 7: After the class, review the feedback provided by the teacher, if any, and provide feedback to the teacher for the overall studying experience.

Step 8: Make the payment for the attended class.

Step 9: Check your profile for the progress.

ACADEMATES

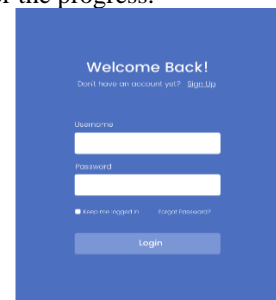
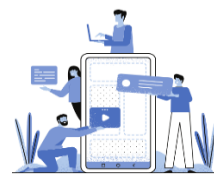


Figure 2.1: welcome and login page

This login page in Figure 2.1 is the gateway to the Academates platform, featuring a clean and user-friendly design. On the right, existing users are greeted with a straightforward interface to enter their username and password, with options to stay logged in or recover a forgotten password. A prominent 'Login' button initiates access to the system. A 'Sign Up' link is available for new users to create an account. The left side of the page showcases an illustration that reflects the collaborative and interactive nature of the platform, emphasizing education and technology.

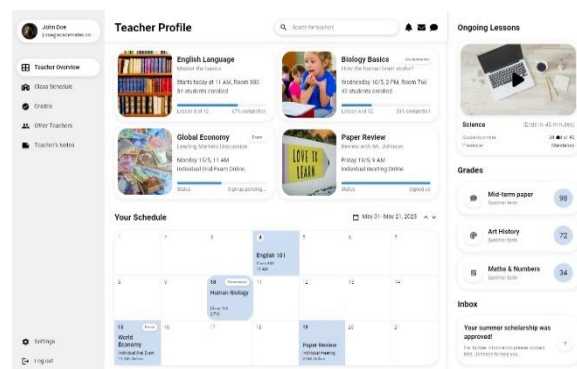


Figure 2.2: Teacher Profile Page

The teacher profile page (figure 2.2) within Academates serves as a personalized dashboard, providing an overview of a teacher's activities and interactions. It features sections for upcoming classes and assignments, a schedule calendar, ongoing lessons, and student grades. The sidebar allows



navigation through different functionalities such as class schedules, grading, and accessing teaching materials. There's also a space for the latest updates, like approved scholarships, ensuring teachers stay informed. This interface streamlines the teaching process by keeping all relevant information and teaching tools in one accessible location, optimizing the educator's experience on the platform.

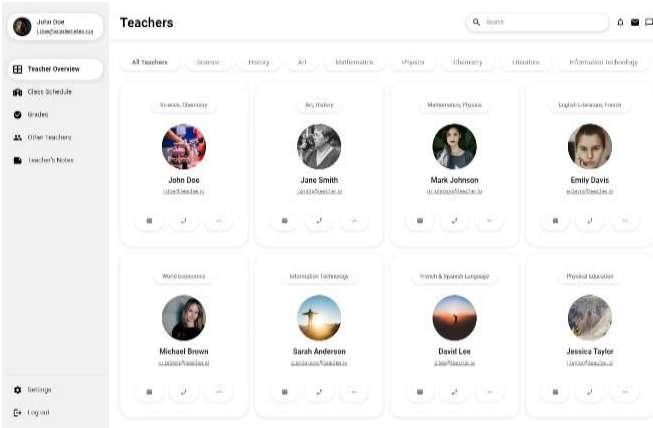


Figure 2.3: Teacher Search Page

This page (Figure 2.3) on Academates is a directory for students to search and overview teachers available on the platform. It displays profiles of teachers with their names, subject expertise, and contact information, allowing for easy navigation and connection. The top bar categorizes teachers by subjects and topics for a more refined search, and individual cards provide quick links to more details or direct communication options. This setup facilitates the student's ability to find and interact with the right educators to suit their academic needs within the Academates ecosystem.

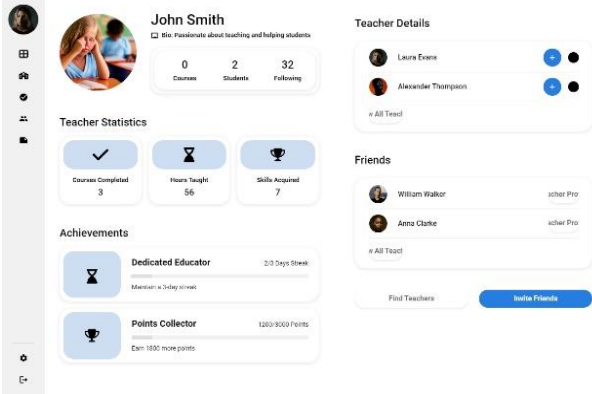


Figure 2.4: Student overview profile page

In Figure 2.4, the profile overview page for Academates displays a student's educational engagement, featuring key statistics like courses completed, hours taught, and skills acquired. It provides a snapshot of the student's achievements and progress, with badges like "Dedicated Educator" rewarding consistent effort. A bio section allows personalization and a sidebar for easy navigation between different sections is present. Teacher details and a friends list encourage a community feel, fostering connections within the platform. This interface helps students track their academic

journey and build a network, enhancing the learning experience on Academates.

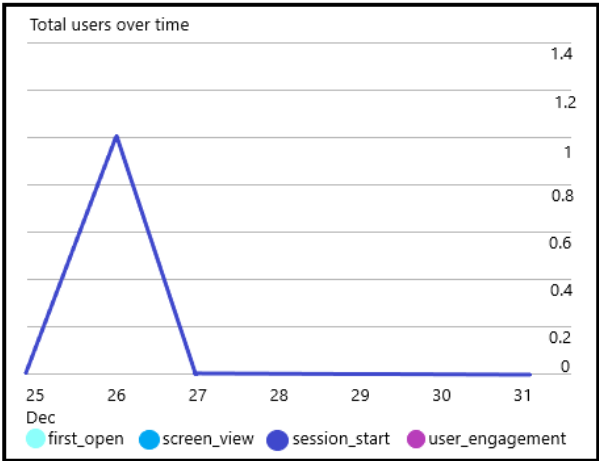


Figure 3.1: Performance Validation Table

Figure 3.1 provides real-time usage data and the load time of Academates. It is an essential tool for performance analysis and finding areas that can be improved. A complete grasp of the dynamics of the platform is made possible by the analysis of real-time user interactions, which offers vital insights into user behavior and usage patterns. Because long load times can turn off users, load time is a crucial metric that affects user experience and is constantly monitored. For developers, this information acts as a compass, helping them identify areas of performance bottlenecks and maximize platform efficiency. In the end, these numbers provide very useful data that allows developers to evaluate Academates' performance thoroughly and identify areas for improvement so that all users can benefit from a smooth and efficient learning experience.

V. RESULT

The Academates project has successfully developed a robust and comprehensive online educational platform. It has achieved its goal of creating an interactive, user-friendly environment where students can easily find and engage with qualified teachers across various subjects. With features like live class streaming, interactive tools, and a secure payment system, the platform has enhanced the learning and teaching experience. Feedback from users has been positive, indicating high satisfaction with the platform's ease of use and the quality of educational content. Overall, Academates stands as a testament to the effectiveness of blending technology with education to foster an engaging virtual learning community.

VI. CONCLUSION

In conclusion, Academates represents a transformative leap in the realm of online education, addressing the prevailing challenges and reshaping the dynamics of teacher-student interactions. By establishing a user-centric platform that emphasizes transparency, security, and innovation, Academates not only connects educators and learners seamlessly but also enriches their experience through advanced tools like video conferencing and collaborative whiteboards. The robust rating system fosters a culture of trust and accountability, while future-oriented features such as AI-driven matching and multi-language support

underscore our commitment to staying at the forefront of educational technology. As we propel into the future, Academates envisions becoming a cornerstone in the digital education landscape, offering a dynamic, accessible, and personalized learning journey for students worldwide, and providing a platform for passionate educators to share their expertise with an eager audience.

## REFERENCES

- [1] V. R. Naidu, S. Bhatia, R. Hasan, B. Singh, K. Jesrani, and A. Agarwal, "Smart Education Platform to Enhance Student Learning Experience during COVID-19," in *2021 9th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions), ICRITO 2021*, Institute of Electrical and Electronics Engineers Inc., 2021. doi: 10.1109/ICRITO51393.2021.9596433.
- [2] T. C. Truong and Q. B. Diep, "Technological Spotlights of Digital Transformation in Tertiary Education," *IEEE Access*, vol. 11, pp. 40954–40966, 2023, doi: 10.1109/ACCESS.2023.3270340.
- [3] J. Rai, R. C. Tripathi, and N. Gulati, "A comparative study of implementing innovation in education sector due to COVID-19," in *Proceedings of the 2020 9th International Conference on System Modeling and Advancement in Research Trends, SMART 2020*, Institute of Electrical and Electronics Engineers Inc., Dec. 2020, pp. 94–97. doi: 10.1109/SMART50582.2020.9337148.
- [4] C. H. Wang and T. Y. Wang, "E-learning platform of STEAM aesthetic course materials based on user experience," in *Proceedings - 2018 1st International Cognitive Cities Conference, IC3 2018*, Institute of Electrical and Electronics Engineers Inc., Dec. 2018, pp. 123–128. doi: 10.1109/IC3.2018.00-46.
- [5] Z. Lei, H. Zhou, W. Hu, and G. P. Liu, "Unified and Flexible Online Experimental Framework for Control Engineering Education," *IEEE Transactions on Industrial Electronics*, vol. 69, no. 1, pp. 835–844, Jan. 2022, doi: 10.1109/TIE.2021.3053903.
- [6] A. Darvin, J. Kosasih, Stefanus, and N. Hanafiah, "Usability Evaluation of Learning Management System," in *Proceedings of 2021 1st International Conference on Computer Science and Artificial Intelligence, ICCSAI 2021*, Institute of Electrical and Electronics Engineers Inc., 2021, pp. 269–272. doi: 10.1109/ICCSAI53272.2021.9609730.
- [7] C. Riegel and A. Kozen, "ATTAINING 21ST CENTURY SKILLS IN A VIRTUAL CLASSROOM," 2016.
- [8] A. Venditti, F. Fasano, M. Risi, and G. Tortora, "The importance of interaction mechanisms in blended learning courses involving problem solving e-tivities," in *2018 Thirteenth International Conference on Digital Information Management (ICDIM)*, 2018, pp. 124–129. doi: 10.1109/ICDIM.2018.8847104.
- [9] Y. T. Liu, P. Y. Cheng, S. P. Shih, and T. Y. Huang, "MetaClassroom: A WebXR-Based Hybrid Virtual Reality Classroom," in *Proceedings - 2023 IEEE International Conference on Advanced Learning Technologies, ICALT 2023*, Institute of Electrical and Electronics Engineers Inc., 2023, pp. 280–281. doi: 10.1109/ICALT58122.2023.00088.
- [10] S. Kostoski and M. Apostolova, "Payatron - Secure electronic transaction processing system," in *2021 10th Mediterranean Conference on Embedded Computing, MECO 2021*, Institute of Electrical and Electronics Engineers Inc., Jun. 2021. doi: 10.1109/MECO52532.2021.9459722.
- [11] E. A. Hanushek and S. G. Rivkin, "Chapter 18 Teacher Quality," in *Handbook of the Economics of Education*, vol. 2, E. Hanushek and F. Welch, Eds., Elsevier, 2006, pp. 1051–1078. doi: [https://doi.org/10.1016/S1574-0692\(06\)02018-6](https://doi.org/10.1016/S1574-0692(06)02018-6).
- [12] J. Baibhav, J. Ghatak, and J. A. Mayan, "Web based Payment Tracking and Accounting Application," in *Proceedings of the 7th International Conference on Intelligent Computing and Control Systems, ICICCS 2023*, Institute of Electrical and Electronics Engineers Inc., 2023, pp. 1018–1022. doi: 10.1109/ICICCS56967.2023.10142894.
- [13] R. Gochhwal, "Unified Payment Interface—An Advancement in Payment Systems," *American Journal of Industrial and Business Management*, vol. 07, no. 10, pp. 1174–1191, 2017, doi: 10.4236/ajbm.2017.710084.
- [14] A. S. George, A. s George, D. Baskar, and A. Martin, "An Overview of India's Unified Payments Interface (UPI): Benefits, Challenges, and Opportunities," vol. 02, pp. 16–23, Mar. 2023, doi: 10.5281/zenodo.7723154.
- [15] A. Mohammed *et al.*, "Data Security and Protection: A Mechanism for Managing Data Theft and Cybercrime in Online Platforms of Educational Institutions," in *2022 International Conference on Machine Learning, Big Data, Cloud and Parallel Computing, COM-IT-CON 2022*, Institute of Electrical and Electronics Engineers Inc., 2022, pp. 758–761. doi: 10.1109/COM-IT-CON54601.2022.9850702.
- [16] M. A. J. Chen and J. Xu, "Data Privacy Protection from the Perspective of GDPR - A Case Study on E-learning Platform 'SHCneo,'" in *Proceedings - 2022 15th International Congress on Image and Signal Processing, BioMedical Engineering and Informatics, CISP-BMEI 2022*, Institute of Electrical and Electronics Engineers Inc., 2022. doi: 10.1109/CISP-BMEI56279.2022.9980175.
- [17] M. Derawi, "Securing e-learning platforms," in *2014 International Conference on Web and Open Access to Learning (ICWOAL)*, 2014, pp. 1–4. doi: 10.1109/ICWOAL.2014.7009237.
- [18] M. Bilal, M. Marjani, M. I. Lali, N. Malik, A. Gani, and I. A. T. Hashem, "Profiling users' behavior, and identifying important features of review 'helpfulness,'" *IEEE Access*, vol. 8, pp. 77227–77244, 2020, doi: 10.1109/ACCESS.2020.2989463.
- [19] R. Paul and M. R. Rashmi, "Student Satisfaction and Churn Predicting using Machine Learning Algorithms for EdTech course," in *2022 10th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions), ICRITO 2022*, Institute of Electrical and Electronics Engineers Inc., 2022. doi: 10.1109/ICRITO56286.2022.9965116.
- [20] A. Birari, P. Yawalkar, R. Janardanan, L. Subramani, and R. Sharma, "Perception and Practices of EdTech Platform: A Sentiment Analysis," in *2022 International Conference on Trends in Quantum Computing and Emerging Business Technologies, TQCEBT 2022*, Institute of Electrical and Electronics Engineers Inc., 2022. doi: 10.1109/TQCEBT54229.2022.10041491.