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REVIEW

Development of an Adaptive and Inclusive Zoom Learning Model (AIZLM) to Enhance Student Engagement in Online Communities

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Abstract: The Zoom platform has emerged as a dominant tool in online education; however, meeting the diverse needs of students with varying learning styles and abilities, as well as enhancing student engagement, remains a significant challenge. This project aimed to develop an inclusive and flexible learning approach using Zoom to foster greater participation in online learning communities. A literature review was employed as one of the research methods to identify student needs and effective instructional strategies. The findings highlighted the efficacy of inclusive and adaptive development models in increasing student engagement, demonstrating their potential to enhance learners' skills and overall educational outcomes. The study concludes that it is essential to continue developing learning models that accommodate students' needs and learning preferences while remaining adaptable to evolving technologies and contemporary educational demands.

Keywords: Adaptive and Inclusive Learning Model, Zoom learning model development, student engagement, online education, digital pedagogy

1 Introduction

Education has undergone a significant transformation with the shift to online learning platforms in response to the COVID-19 pandemic (Karakose et al., 2022; Lavidas et al., 2022). Zoom, a widely used video conferencing platform, offers many advantages for the learning environment. Zoom facilitates distance learning by enabling real-time interaction between instructors and students, thereby increasing engagement and participation (Assaly, 2023; Jaya, 2023). Its features such as screen sharing, break rooms, and dialogue functions support collaborative activities, encouraging active learning and a sense of community among learners (Candiasa & Dantes, 2023). Zoom recordings allow for flexible lecture review, improving self-paced learning and knowledge retention (Rojabi, 2023). Zoom's accessibility and compatibility with a variety of devices is beneficial for diverse learners, including those with disabilities or geographic constraints (Em, 2023).

Zoom's learning model stands out because of the wide range of features it provides. These features include annotation tools, polls, breakout rooms, and video and screen sharing (Kohnke & Moorhouse, 2020) Zoom also has features such as screen sharing, raise hand icons, chat comments, screen recording, and a variety of other potential features that support the learning process (Agustin & Lina, 2022). Additionally, Zoom allows users to actively participate in topic discussions with annotation and hand raising features (Wlodarczyk et al., 2021).

In the context of inclusivity, this learning model can support diverse learning needs by identifying and addressing the needs of students early (Smit et al., 2020). In addition, a collaborative culture between teachers, parents, and other stakeholders also supports inclusive education (Opoku-Nkoom & Ackah-Jnr, 2023). From a psychological point of view, it is important for instructors to have professionalism, adaptability, collaboration skills, empathy, and patience that are more important than just good physical features or external appearance design (Jabali et al., 2022). In the context of adaptability, Zoom's learning model also allows users to customize settings and features according to their learning needs (Kohnke & Moorhouse, 2020).

Zoom's learning steps involve using an online platform like Zoom for educational purposes. To improve the learning experience, steps such as providing materials, conducting pre-tests and post-tests, and offering counseling sessions are essential (Setiawati et al., 2022). In the

field of mobile computing and perceptual systems, a method called "learning to expand" has been developed to efficiently process high-resolution image inputs for tasks such as object detection and semantic segmentation (Thavamani et al., 2023). The novel approach combines block matching and neural networks to produce a magnified image by capturing scenes with a telephoto lens and short focus simultaneously, extracting features, and reconstructing the magnified image (Huajun et al., 2019). Furthermore, in photography, utilizing real data sensors to train machine learning models improves the accuracy of digital zoom, with the creation of datasets such as SR-RAW contributing to improved computational zoom capabilities (Zhang et al., 2019).

As such, zoom not only provides the necessary tools to support diverse learning, but also facilitates collaboration, active participation, and flexibility in learning settings. This sudden change poses various challenges for teachers and students, such as communication problems and understanding of the audience (Muslimin & Harintama, 2020; Tülübaş et al., 2023). But the questions that arise in the field are as follows:

(1) **Zoom has not been able to be a communicative teaching process.** Educators struggled to face challenges during this period of online learning. Teachers have difficulty communicating with students and adapting their teaching methods to the changing learning environment.

(2) **Zoom as a learning model that has not been able to go through the process of nonverbal interaction to the maximum.** Bailenson, said that there are several shortcomings that need to be considered in the use of Zoom as a learning model. One of them is Zoom fatigue, which is fatigue caused by the excess of nonverbal interaction in the platform (Bailenson, 2021). Learning through zoom is very problematic, especially related to the effectiveness of transmitting knowledge to students. The results obtained by students in absorbing the knowledge conveyed by the teacher tend to be minimal. For example, in remote learning through platforms such as Zoom, digital systems equipped with AI technology can combine students' facial expressions and concentration levels to detect signs of confusion. Based on this data, Dwivedi said that the system can automatically provide help or advice to students to help them overcome learning difficulties (Dwivedi et al., 2021). Therefore, further efforts are needed to identify gaps in the literature regarding online learning, especially in terms of learning model design that can improve students' adaptability and inclusivity. For Utami, Kresnawati, and Rismadewi, the problems faced by students are due to students' psychological factors, such as the inability to interact directly with lecturers and classmates, as well as the lack of feedback from lecturers (Utami et al., 2022) Dube revealed that online learning in rural areas, faces challenges in the accessibility of the internet and devices, which results in the exclusion of a number of students from the learning process (Dube, 2020) Aboagye, Yawson, and Appiah highlight accessibility issues as a major challenge for students in online learning (Aboagye et al., 2020) Yuwono, Mirnawati, Kusumastuti, and Ramli discuss the challenge of the geographical distance between students' homes and volunteers that are quite far away (Yuwono et al., 2022).

(3) **Zoom has not been able to be a supervisory function for students in the classroom.** Sadikin & Hamidah said that weak supervision of students, weak internet signals in certain areas, and expensive internet quota fees (Sadikin & Hamidah, 2020). Some studies have also highlighted that Zoom has limitations in handling large numbers of participants, which can affect the quality of learning in large groups.

(4) **Zoom as a source of an unconducive learning environment.** Nyika said that some students may experience difficulties in overcoming technical challenges, such as limited internet access and limited interaction between fellow students (Nyika, 2022). Barrot, Llenares, and Rosario said that some students have difficulty in creating a conducive learning environment at home because of technological literacy skills, which while challenging, are not the most significant (Barrot et al., 2021). However, students' adaptation to online learning is also influenced by psychological factors, such as emotional, cognitive, and behavioral involvement (Sanfriska et al., 2022). Zhang said that although students' adaptability plays an important role in increasing student engagement during online learning (Zhang et al., 2021), students cannot focus on learning.

(5) **Zoom cannot stand alone and requires assistance tools in the maximum learning process.** Kuntarto said that in the context of the Zoom learning model, there are a number of advantages and disadvantages that need to be considered. The advantages of using Zoom in learning include the ability of teachers to display material directly and explain it to students interactively (Kuntarto et al., 2021). Zoom allows for bold learning mentoring that can improve the quality of learning (Noge & Ita, 2022). The use of Zoom can also provide hard work in managing learning activities and increasing student learning motivation (Widiyono et al., 2022).

Chung, Subramaniam, and Dass discussed the readiness of online learning for students in Malaysia during the COVID-19 pandemic. There are several dimensions of online learning readiness, namely: independent learning ability, learning control, computer and internet efficacy, self-efficacy in online communication, and learning motivation (Chung et al., 2020). Sebrero and Alamin explore student perceptions and experiences at La Salle University regarding the shift to a distance learning system during the COVID-19 pandemic. The study highlights students' ability to retain information and lesson content, as well as the effectiveness of using online platforms as a tool to achieve quality education (Sebrero & Alamin, 2022). Ramoshaba and Kgarose analyzed the coping strategies used by students in facing the challenges of online learning during the COVID-19 pandemic. The study revealed that some students use positive strategies such as seeking support, while others use adverse coping mechanisms such as drug and alcohol use (Ramoshaba & Kgarose, 2022). Yang et al. highlighting the importance of supporting inclusive online education in developing countries, with a focus on the student experience during the closure of universities in Sri Lanka. The study explores the support or lack of support students experienced during university closures that may facilitate or hinder inclusive online learning (Yang et al., 2022). Lodo and Ajito discuss the challenges of online learning faced EFL students at the University of San Pedro during the COVID-19 pandemic. The study highlights the difficulties in improving the online learning experience without addressing the perception that face-to-face learning is preferable to online learning (Lodo & Ajito, 2022).

Related to the above, Qadriani said that in this context, it is important to consider various strategies to improve the online learning experience. For example: (1) the blended learning approach can be an effective solution to combine online and face-to-face learning, thereby creating a more holistic learning experience (Qadriani, 2022). (2) it is necessary to pay attention to aspects of students' mental well-being and their psychological readiness in facing the challenges of online learning (Miraja, 2022).

The purpose of this research is to find solutions to develop a new model for adaptive and inclusive Zoom-based learning to optimize student involvement in online communities. The question that arises is: What is the Adaptive and Inclusive Zoom-Based Learning Model? How is the Zoom Learning Model Adaptive and Inclusive to Increase Student Engagement? How to Develop an Adaptive and Inclusive Zoom-Based Learning Model to Optimize Student Engagement in Online Communities?

2 Methodology

This study employed a qualitative integrative literature review method to explore and synthesize various strategies that support student engagement in Zoom-based online learning environments (Petousi & Sifaki, 2020). The purpose of the review was to develop a conceptual model for an adaptive and inclusive online learning approach using Zoom. A qualitative method centered on literature observation is used in the study on the creation of the Adaptive and Inclusive Zoom Learning Model in order to analyze the model. Purposive sampling, which especially targeted students with prior experience using online learning platforms, was used to choose study participants from online communities. The study starts with a survey of the pertinent literature on Zoom use, adaptive learning, and inclusiveness. Next, the syntax and methodology employed in the literature are examined. In this study, media integration is crucial because it makes it easier to analyze patterns and trends in linked literature, which enhances comprehension of pertinent data and supports syntactic analysis. Through the use of categorization, synthesis, and interpretation procedures on data gleaned from pertinent literature, data analysis is accomplished through literature reviews. By combining knowledge from the body of current research, this methodological approach enables a thorough understanding of the evolution of the Adaptive and Inclusive Zoom Learning Model. Purposive sampling increases the findings' legitimacy and applicability by guaranteeing that students with relevant experiences are included in online learning environments (Krismayoni, 2020). Purposive sampling, literature observation, and the qualitative character of the study offer a solid basis for investigating the intricacy of developing an inclusive and adaptive Zoom learning model. In what ways does the Zoom Learning Model enhance student engagement via adaptability and inclusivity?

3 Results and Discussion

3.1 Zoom Based on Adaptive and Inclusive Learning Model

The foundation of the Adaptive and Inclusive Zoom-based Learning Model lies in the evolution of educational technology and pedagogy. The concept of adaptive in learning models

has become increasingly prominent in recent years, driven by the need to cater to diverse learning styles and abilities (Papadakis, 2023). This leads to the development of an adaptive learning system that adapts to individual student needs, improving the overall learning experience (Sumarlin, 2021). Integrating technologies like Zoom into these models has changed the educational landscape even further, providing opportunities for personalized and inclusive learning environments (Wang, 2022). The Zoom Adaptive and Inclusive Learning Model signifies a significant change in education, leveraging technology to create a personalized learning experience that is accessible to all students. For example, in Fridayati's research which explored adaptive physical education learning strategies in inclusive schools SDN 20 Mataram. This study provides an in-depth understanding of the implementation of adaptive learning in an inclusive environment (Fridayati et al., 2022). Vai and Lorenza conducted research on the implementation of Adaptive Penjas learning on the needs of special children in inclusive elementary schools. This study provides insight into how adaptive learning can be adapted to meet the needs of children with special needs in an inclusive environment (Vai & Lorenza, 2019).

Dewantara and Kusumastuti proposed that the inclusive education program policy at SDN Betet 1 Kediri City is also relevant in the context of inclusive learning (Dewantara & Kusumastuti, 2020). Wang said that the development of a hybrid learning model in learning in schools providing inclusive education is relevant in the context of inclusive learning. So it is very feasible to develop a learning model that combines various applications such as Google Classroom, Zoom, and face-to-face learning (Wang, 2022).

The adaptive and inclusive learning model is an approach that pays attention to the diversity of learners and ensures that all students can learn effectively. This approach involves a variety of strategies and practices to ensure that each individual, including those with special needs, can access learning that suits them (Skuratovskaya, 2020).

One of the key characteristics of the adaptive and inclusive learning model is the use of various differentiation strategies that allow teachers to tailor their teaching according to the needs and learning styles of each student (Majoko, 2019). This involves the use of educational technology, such as assistive technology, adaptive education cases, and universal design of virtual spaces, to support the diversity of learners (Loya, 2021).

The model also emphasizes the importance of teacher competence in using various teaching strategies, such as multilevel instruction, differentiation instruction, activity-based learning, and individualized instruction, to facilitate the learning of all students in regular classrooms (Golub et al., 2018) Teachers also need to engage in reflection on their teaching to produce inclusive and intentional teaching views and practices (Haegele et al., 2016).

Adaptive learning models aim to adapt educational materials and assessment methods to meet students' characteristics, often by detecting their learning styles such as VAK (Visual, Auditory, Kinesthetic) (Mansur, 2021). The inclusive learning model, on the other hand, focuses on creating an environment that promotes active participation and a sense of belonging for all students, the pressure of pollution and cooperation (Dapa, 2018). To measure the effectiveness of these models, assessment needs to consider various factors such as identifying special needs, modifying the curriculum, providing the necessary human resources, and adapting the assessment process to the characteristics of students and the culture of the community.

The success of adaptive learning in inclusive schools depends on teachers' ability to implement adaptive strategies tailored to students' needs, with support from professionals such as special educators and school supervisors.

3.2 Student Engagement in Online Communities

Student involvement in online communities is an important aspect in ensuring the success of the online learning process. Student involvement not only includes active participation in learning activities, but also involves the energy, time, thoughts, effort, and feelings given during the learning process (Azkia & Susandari, 2023). Student involvement in online communities can be an important predictor to encourage positive behavior to maintain the effectiveness and success of the learning process (Qonita et al., 2021).

Student involvement in online learning can also increase satisfaction and motivation to learn, reduce a sense of alienation, and improve student academic performance (Ismayanti & Wahyuddin, 2021). Student involvement in online learning activities shows that the learning process is effective and provides a meaningful learning experience for students (Rahmania & Royanto, 2021).

The importance of student involvement in online communities is also reflected in research that shows that student involvement can contribute to increased resilience, sense of community, and participation in community activities (Kinanthi et al., 2020; Rahma et al., 2021). Student involvement can also influence the success of communities, such as community radio, through the active participation of members in community activities (Gustavito, 2021; Karakose et al., 2023). Ridanti & Sutarso said that the process of student involvement in online communities involves interaction between students to interact with each other and connect to achieve certain goals (Ridanti & Sutarso, 2022). In the context of online learning, students can access learning materials from anywhere and gain flexibility in learning, which encourages the emergence of learning independence and motivation to be more active in the learning process. The online learning process can also minimize student crowds and encourage social distancing behavior (Firman & Rahayu, 2020).

Student involvement in online learning can also be influenced by factors such as the intensity of use of information and communication technology, which plays a role in motivating students and contributing to their learning and development (Mutiara & Kusumawardhani, 2020). Student involvement in online learning can also be seen from the time, energy, and skills they devote to learning the material, building meaningful interactions, and enjoying the learning process (Purba et al., 2021). The process of student involvement in online communities can also affect student learning satisfaction, where accessibility, ease of obtaining materials, interactivity, accuracy/usability, and learning independence are factors that affect student satisfaction in distance learning (Swastika, 2022). In addition, student involvement in online learning can also increase resilience, sense of community, and participation in community activities.

Thus, student involvement in online communities not only affects their learning experience, but also impacts the success of the learning process, increased resilience, and overall community success.

3.3 Development of an Adaptive and Inclusive Zoom-Based Learning Model to Optimize Student Engagement in Online Communities

The development of an Adaptive and Inclusive-based zoom Learning Model to Optimize Student Involvement in the Online Community can be done by: (1) Adaptive and Inclusive Learning Model as a zoom learning assistance. (2) Potential Development of an Adaptive and Inclusive Zoom Learning Model. (3) Zoom Learning Model based on Adaptive and Inclusive as communicative teaching. (4) Adaptive and Inclusive Zoom Learning Model as a learning model with nonverbal interaction. (5) Adaptive and Inclusive Zoom Learning Model as a Source of a conducive learning environment. (6) Adaptive and Inclusive Zoom Learning Model as a Supervisory Function.

3.3.1 Adaptive and Inclusive Zoom-Based Learning Model (AIZLM)

The integration of the Adaptive and Inclusive Zoom Learning Model can significantly increase student engagement in online learning (Iriani & Nugraheni, 2023). By utilizing active learning techniques and incorporating synchronous and asynchronous learning methods, such as the proposed Zoom Sandwich model, students can benefit from increased attendance and social interaction (Muheidat & Tawalbeh, 2020). Additionally, designing an adaptive e-learning environment based on students' learning styles can personalize the process and increase engagement rates, as demonstrated in research on adaptive e-learning environments (Assaly, 2023). However, it is crucial to consider factors such as social attendance, social interaction, and satisfaction when comparing Zoom learning with face-to-face learning to ensure a balanced approach that maximizes student satisfaction and learning outcomes (El-Sabagh & El-Sabagh, 2021). Implementing a comprehensive approach that leverages the power of Zoom technology and adaptive learning strategies can create a more engaging and effective online learning environment for students.

In the development of the Adaptive and Inclusive Zoom Learning Model, there are several key components to consider: adaptive teaching techniques, strategies for inclusive education, and the use of Zoom features to increase student engagement. The use of the Zoom application provides a new experience in bold learning, makes it easier for students to operate the application's features, and supports bold learning activities (Khasanah & Syarifah, 2021).

The new experience is for example: (1) Ng and Fang reviewed the use of Zoom in mathematics education research. The study explores the possibility of using Zoom to collect data in educational research, demonstrating the potential of this platform in supporting data collection

and students' math learning experiences (Ng & Fang, 2023). (2) Developing students' emotional experiences and social interactions in using Zoom to be able to meet student expectations (Nurwijayanti et al., 2022) and (3) being able to improve skills (Abriati et al., 2022).

Zoom's Adaptive and Inclusive Learning Model can be based on the positive student experience, the ease of operation of Zoom's features, and the platform's potential to increase student engagement in the online learning process.

3.3.2 Skills Development from the Adaptive and Inclusive Zoom-Based Learning Model

The development of the Adaptive and Inclusive Zoom Learning Model is significant because it considers the impact skills of the model on student learning outcomes, satisfaction, and a sense of belonging in the online community. Ismawati and Prasetyo showed that learning using video conferences, such as Zoom, is effective and interactive in supporting distance learning. The results of this study show that the use of Zoom can make it easier for students to absorb the learning materials delivered by educators because of its real-time nature (Ismawati & Prasetyo, 2020).

Devianandа and Mawardi reviewed the effectiveness of bold learning media using Google Meet and Zoom in improving students' critical thinking skills. This study highlights the rampant use of Zoom and Google Meet in educational courage and the desire of stakeholders to increase their effectiveness in learning (Devianandа & Mawardi, 2022). Traxler & Smith says that successful and appropriate informal digital learning can help individuals and communities build sustainable and meaningful livelihoods, strengthen social cohesion and resilience, preserve and enhance cultural traditions, and engage constructively and powerfully with the wider world (Traxler & Smith, 2020). Vhalery, Setyastanto, and Alfilail saw that students' awareness of Zoom Fatigue became a symptom of physical, psychological, and lifestyle experienced by students during learning to dare to use Zoom (Vhalery et al., 2021). For example, Kuswandi showed that the use of the Zoom Meeting application in distance learning in universities showed positive results (Kuswandi, 2021).

So the development of an Adaptive and Inclusive Zoom Learning Model can be carried out optimally because it increases student learning outcomes, satisfaction, and a sense of belonging in the online community. This can be the foundation for the development of a more effective and inclusive learning model in the context of bold learning.

3.3.3 Zoom Based on Adaptive and Inclusive Learning Model as Communicative Teaching

The zoom Learning Model is based on Adaptive and Inclusive as a concept of an emotional training program to improve peer relationships in elementary school students (Jeong & Son, 2023). Parrish said that emotional intelligence influences student learning and engagement, aligning with the goal of developing effective learning models that meet individual needs, increase engagement, and encourage communication in educational settings (Pilgrim, 2023). By integrating adaptive, inclusive, and communicative elements with aspects of emotional intelligence can lay a solid foundation for creating an impactful learning environment.

3.3.4 Addressing Emerging Challenges: AI Integration in Online Learning

AIZLM can evolve by integrating AI responsibly (Table 1).

Table 1 AI Integration in Online Learning

AI-Enhanced Feature	AIZLM Role
Emotion & Engagement Detection	Tailors support based on signs of confusion or fatigue.
Automated Feedback Systems	Offers instant responses to quizzes or submissions.
Learning Analytics Dashboards	Instructors adapt based on students' engagement and attendance data.
Voice-to-Text + Auto-Translation	Increases accessibility for hearing-impaired or ESL students.

3.3.5 Adaptive and Inclusive Zoom-Based Learning Model as a Nonverbal Interactive Learning Model

The Adaptive and Inclusive Learning Model as a learning model is a nonverbal social norm in an online virtual environment can provide insight into how nonverbal communication norms can be maintained in an online learning environment (Yee et al., 2007). Allmendinger said that social presence in synchronous virtual learning situations can provide an understanding of how social

presence can affect nonverbal interactions in the context of online learning (Allmendinger, 2010). By combining the adaptive and inclusive concept of Zoom's learning model with nonverbal interaction aspects as a solid foundation to develop a learning model that pays attention to the individual needs of students, increases engagement, and strengthens nonverbal communication in a brave community.

The rapid change of times makes the Adaptive and Inclusive Zoom Learning Model ready for self-development. Bambang, Ginting, Sudarno, and Infante said that many factors affect student satisfaction and loyalty to learning, which can be the foundation for radiating the power of the Zoom learning model in meeting student needs (Bambang et al., 2022).

The factors for developing the model are: students' rigor and patience during learning (Susanti & Suripah, 2021), student activeness (Nafi'iyah & Sari, 2021), students' courage to integrate with various sciences they have (Oktavian & Aldya, 2020), and mastery of technology (Hasan, 2020). These factors are a challenge for Zoom Learning Model practitioners to develop in empirical thinking and existing theoretical frameworks. This can be the foundation for the development of a more effective and inclusive learning model in the context of bold learning.

Thus, the importance of online learning as a solution to improve academic institutions in facing the challenges of online learning (Dhawan, 2020). Best practices in online education are to develop effective online teaching and learning strategies and the challenges faced (Orozco et al., 2023). Gopal, Singh, and Aggarwal revealed that the impact of online classes on student satisfaction and performance is the issue of instructor quality, course design, quick feedback, and student expectations (Gopal et al., 2021). Claro and Munar say that adaptation to key areas of competence in the online teaching model by: focusing on preparation, pandemic, improving strategies (Claro & Munar, 2022) and complementing the necessary learning and management media facilities (Okyere et al., 2022). Competency factors by Edelhauser and Lupu–Dima have been researched during one year of online education during the COVID-19 era as a challenge for the education system, by spreading the adaptability, effect, and efficiency of online education. The result is that zoom media will always undergo the most modern changes and zoom actors must be ready to learn and complete their falsity (Edelhauser & Lupu-Dima, 2021).

3.3.6 Adaptive and Inclusive Zoom-Based Learning Model as a Source of a Conducive Learning Environment

Adaptive e-learning environments, such as those designed based on students' learning styles, El-Sabagh and El-Sabagh (2021) can significantly increase student engagement (Papadakis et al., 2023). The use of immersive technology in virtual classrooms has been viewed positively by health professions students, demonstrating potential benefits for student engagement. Acosta-Gonzaga & Ruiz-Ledesma said that in the midst of the COVID-19 pandemic, the application of adaptive blended learning methods has shown effectiveness in maintaining student engagement (Acosta-Gonzaga & Ruiz-Ledesma, 2022).

Nathaniel said that an online learning engagement analysis model has been developed to explore the relationship between student engagement and performance, highlighting the importance of cognitive, behavioral, emotional, and social engagement dimensions in improving learning outcomes (Nathaniel et al., 2021). So that Zoom's adaptive and inclusive learning model that is tailored to students' needs and preferences can indeed create a conducive learning environment to increase student engagement.

3.3.7 Adaptive and Inclusive Zoom-Based Learning Model as a Supervisory Function

Zoom's adaptive and inclusive learning model incorporates a supervisory mechanism to enhance student engagement by synergizing the advantages of synchronous and asynchronous learning (McCallum et al., 2023). Termed the "Zoom Sandwich," this framework systematically integrates three core components: (1) active learning techniques, (2) online conceptual instruction, and (3) hands-on application through interactive group activities and structured discussions (Muheidat & Tawalbeh, 2020).

Moreover, adaptive pedagogical models such as differentiated instruction and the SAVI (Somatic, Auditory, Visual, Intellectual) approach demonstrate particular efficacy in inclusive educational settings. These strategies address diverse learning needs – including students with academic challenges – by personalizing content delivery and thereby improving both engagement and conceptual mastery (Elamvazuthi et al., 2010). Furthermore, inclusive supervisory practices in education have shown strong alignment with universal design principles, specifically through instructional adaptations that accommodate student variability and cultivate equitable

learning environments (Dapa, 2018). Collectively, this multi-tiered approach optimizes cognitive participation and measurable academic outcomes.

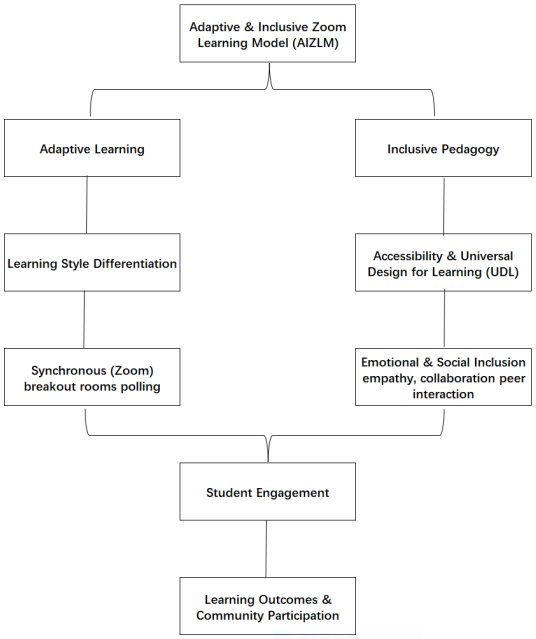

Figure 1 AIZLM Schematic Overview as a Supervisory Function

4 Conclusion

The emergence of the Zoom Learning Model as an adaptive and inclusive approach results from the evolution of educational technology and pedagogy. This model addresses the need to accommodate diverse learning styles and abilities by integrating adaptive learning systems, ultimately enhancing the overall learning experience (Papadakis et al., 2023).

The Adaptive and Inclusive Zoom-Based Learning Model fosters student engagement, helps students realize their potential, and improves their skill development. As a result, students experience enhanced learning outcomes, increased satisfaction, and a stronger sense of belonging in the online community. To remain effective, this model must continuously evolve and adapt to technological advancements and changing educational landscapes.

Key factors influencing the development of this model include students' perseverance and patience during learning, active participation, willingness to integrate knowledge across disciplines, and proficiency in digital technology. These elements contribute to a more inclusive and engaging online learning environment, ensuring that students can maximize their academic potential and actively participate in digital education spaces.

Conflicts of interest

The authors declare that they have no conflict of interest.

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