A Critical Review of Essential Components of Multilingual Schools of the Future

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Abstract

A number of studies have pointed out the prominence of multilingual schools for the future; thus, this research article presents a critical review of the essential components that the schools need to have. It aims to 1) identify the facilities that future multilingual schools should possess, 2) discuss the types of teachers that will be appropriate for the multilingual schools of the future, 3) explore the types of activities to be adopted in the multilingual schools of the future, and 4) identify the types of appropriate assessment formats to be developed in future multilingual schools. Data were collected from six reviewed papers to find out the essential components for future multilingual schools. In addition, semi-structured interviews were conducted to collect qualitative data from eight teachers through purposive sampling. They were all teachers in bilingual schools. The findings from both document research and the interviews revealed five emerging issues. For facilities, the focus should be on technology and AI in future multilingual schools. The school should offer multilingual education and cultivate cultural understanding. The teachers in future multilingual schools have more complex roles. They must have knowledge and skills as well as maintain high-level ethics and morality. Student-centered learning must be adopted with well-designed activities. Assessment with a focus on formative assessment should be newly designed for desirable student development.

Keywords: *Future Multilingual Schools, AI And VR, Assessment For Student Development, Teachers With Newly-Assigned Roles, Teaching Ethics And Morality*

1. Introduction

Globalization has become a defining feature of modern society (Giddens, 1990; Held et al., 1999). Economic systems, cultural exchanges, and educational policies are increasingly interconnected across national borders (Appadurai, 1996; Rizvi & Lingard, 2010). In this context, multilingual ability has become an important advantage, supporting career mobility, intercultural communication, and global participation (Bialystok, 2011; Cenoz & Gorter, 2015). Recent research further indicates that maintaining multilingual repertoires is associated with academic achievement, psychological well-being, and cognitive flexibility among immigrant and multilingual learners (Hoff et al., 2012; De Costa & Norton, 2017; Warschauer & Matuchniak, 2010; Saini et al., 2025). Education systems are therefore expected to prepare learners to function effectively in linguistically and culturally diverse contexts (Organisation for Economic Co-operation and Development (OECD), 2018, 2023; Cenoz & Gorter, 2015).

Schools have continuously evolved in response to social and economic change (Tyack & Cuban, 1995). Earlier schooling models emphasized literacy, discipline, and moral education (Durkheim, 1956). Over time, subject specialization expanded as societies industrialized and knowledge systems grew (Young, 2008). In Thailand, early schools were temple-based and focused on character formation and foundational learning (Fry, 2002). These historical developments show that education adapts to societal needs (Biesta, 2016). In recent decades, increasing migration and demographic diversity have further reshaped school environments, particularly in multilingual classrooms (Darling-Hammond et al., 2020).

Technological advancement has also transformed educational environments (Selwyn, 2016; Selwyn, 2019). Classrooms that once relied on textbooks and blackboards now integrate digital platforms, multimedia resources, and online learning systems (Cuban, 2001). Emerging technologies such as artificial intelligence (AI), extended reality (XR), and learning analytics are expected to make future classrooms more immersive, data-informed, and personalized (Luckin et al., 2016; Radianti et al., 2020; Swargiary, 2024). At the same time,

scholars emphasize that technology integration must be guided by pedagogical purpose rather than technological enthusiasm alone (Selwyn, 2019; Organisation for Economic Co-operation and Development (OECD), 2021).

Teacher roles have similarly changed. Traditionally, teachers focused on content delivery within relatively fixed curricula (Darling-Hammond, 2006). Today, teachers are expected to integrate digital tools, support linguistically diverse learners, and engage in continuous professional development (Day, 2007; Mishra & Koehler, 2006). Recent research highlights that future educators require multilingual competence, culturally sustaining pedagogy, and assessment literacy in order to respond to increasingly diverse classrooms (Darling-Hammond et al., 2020). This shift suggests that teacher preparation programs must also evolve.

Teaching approaches have gradually moved from teacher-centered instruction toward student-centered learning. Earlier models such as PPP (Presentation–Practice–Production) emphasized structured knowledge transmission. In contrast, contemporary approaches such as Project-Based Learning, CLIL, inquiry-based learning, and translanguaging practices promote collaboration, autonomy, and real-world problem solving (Thomas, 2000; Coyle et al., 2010; García & Wei, 2014). Asset-based and culturally sustaining pedagogies further position students' linguistic and cultural backgrounds as strengths rather than deficits (Paris & Alim, 2017; Ladison-Billings, 2014; Soto, 2023). These pedagogical shifts align with the broader goal of preparing learners for complex global challenges.

Assessment practices have also evolved. Traditional examinations primarily measured knowledge recall (Assessment of Learning). Later, Assessment for Learning emphasized formative feedback and instructional adjustment, while Assessment as Learning highlighted students' reflection and self-regulation (Black & Wiliam, 1998; Black & Wiliam, 2009; Earl, 2013). In multilingual contexts, dynamic assessment and dialogic feedback models are increasingly recognized as supportive approaches (Poehner & Lantolf, 2005). With the integration of AI and learning analytics, assessment may become more continuous and personalized (Ifenthaler & Yau, 2020).

Despite these innovations, concerns remain regarding ethics, equity, data privacy, and sustainability (Floridi, 2014; Williamson, 2017; Biesta, 2016). Understanding how future multilingual schools can balance technological advancement with human-centered educational values is therefore essential. This study explores pre-service teachers' perspectives on future multilingual schools, focusing on facilities, teacher roles, learning activities, and assessment practices.

1.1 Statement of the Problem

Globalization has been strongly supported by rapid technological development. Digital tools, artificial intelligence, and data-driven systems have transformed how people work, communicate, and learn (Castells, 2010; Selwyn, 2019). While these technologies provide greater access to knowledge and new forms of collaboration, they also raise concerns related to environmental sustainability, misinformation, algorithmic bias, and personal data privacy (Floridi, 2014; Williamson, 2017). These interconnected challenges contribute to an increasingly uncertain future.

In response, international organizations have emphasized the importance of "21st century skills," including critical thinking, creativity, collaboration, adaptability, and responsibility (OECD, 2018, 2023; World Economic Forum, 2016). However, an important question remains: how can schools meaningfully support the development of these abilities in a rapidly changing world? More specifically, what might future multilingual schools look like, and how can emerging technologies such as AI and XR support sustainable and inclusive learning environments?

Future schools should move beyond the transmission of fixed knowledge. Instead, they should support learners in developing the capacity to respond to uncertainty, work across languages and cultures, and act responsibly in society (Biesta, 2016; UNESCO, 2017). Recent multilingual education research suggests that translanguaging, culturally sustaining pedagogy, asset-based approaches, and dynamic assessment can strengthen students' academic engagement and identity development (García & Wei, 2014). At the same time, technology-enhanced environments may offer immersive learning experiences and real-time feedback (Radianti et al., 2020; Ifenthaler & Yau, 2020). Yet technology alone cannot ensure meaningful learning without clear educational vision and ethical considerations (Selwyn, 2019).

Therefore, it is important to examine how future multilingual schools might be envisioned from the perspective of pre-service teachers. As individuals who experience education both as learners and as future educators, pre-service teachers provide valuable insights into how school facilities, teacher roles, learning activities, and assessment practices may evolve to support sustainable and future-oriented education.

1.2. Research Objectives

The objectives of the study are as follows:

1) To identify the facilities that future multilingual schools should possess
2) To discuss the types of teachers that will be appropriate for the multilingual schools of the future
3) To explore the types of activities to be adopted in the multilingual schools of the future
4) To identify the types of appropriate assessment formats to be developed in future multilingual schools

1.3 Research Questions

The research questions of the study are as follows:

1) What will be the facilities in the multilingual schools of the future?
2) What type of teachers will be appropriate for the multilingual schools of the future?
3) What activities should be organized in the multilingual schools of the future?
4) What type of assessment should be used in the multilingual schools of the future?

1.4 Conceptual Framework

This study aims to identify the characteristics that future multilingual schools should possess and to explore teachers' understanding of these four key factors.

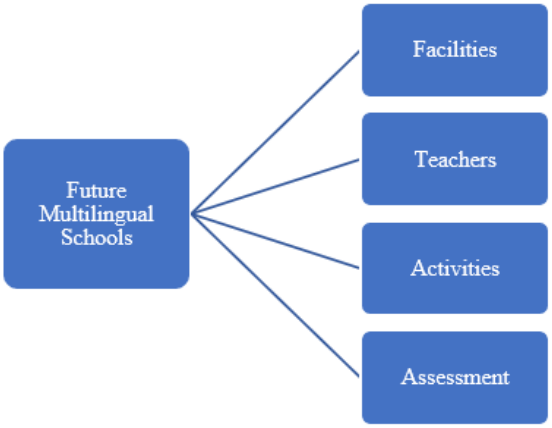

Figure 1 Conceptual Framework of Essential Components of Future Multilingual Schools

2. Literature Review

2.1 Facilities and Environment

Educational facilities are important in supporting effective teaching and learning. Traditional schools focused on basic infrastructure such as classrooms and libraries designed for teacher-centered instruction. However, future multilingual schools are expected to become flexible and technology-rich environments that support global and digital learning (Organisation for Economic Co-operation and Development (OECD), 2019).

Research shows that school environments influence students' achievement, motivation, and well-being. Factors such as lighting, temperature, and classroom design affect learning performance (Barrett et al., 2015). Sustainability is also a key focus. Future schools may adopt renewable energy systems and eco-friendly

infrastructure (UNESCO, 2021; International Energy Agency (IEA), 2021). Smart technologies and green spaces can further improve comfort and student interaction (World Green Building Council, 2020; Dadvand et al., 2015).

Advanced classroom technologies such as AI translation tools, AR smartboards, and VR laboratories will support multilingual communication and immersive learning (Radianti et al., 2020). Libraries and communication studios will also become digital and globally connected (Voogt & Roblin, 2012). Overall, facilities will integrate technology, sustainability, and collaboration.

2.2 Teachers in Multilingual Schools

Teachers in multilingual schools play roles that extend beyond language instruction. Instead of focusing only on teaching linguistic forms, they support students' cultural identities and help create an inclusive learning environment (García & Wei, 2014). In this context, teachers act as facilitators and cultural mediators who encourage intercultural understanding among learners from different backgrounds (UNESCO, 2021).

To perform these responsibilities, teachers need more than pedagogical competence. They also require emotional support skills and technological knowledge to respond to diverse learners (Darling-Hammond et al., 2020; OECD, 2019). Although artificial intelligence can assist teaching through data and feedback, it cannot replace human interaction and professional judgement in classroom practice (Holmes et al., 2019). Therefore, continuous professional development remains essential for teachers working in multilingual education.

These changes suggest that professionalism is no longer defined only by teaching ability, but also by ethical decision-making in diverse classrooms. However, limited research explains how teachers themselves interpret professionalism and ethics in multilingual school settings. Therefore, this study explores teachers' perspectives on professionalism and ethics within a multilingual educational context.

2.3 Learning Activities

Learning activities in future multilingual schools will emphasize 21st-century skills such as creativity, collaboration, and critical thinking (International Society for Technology in Education (ISTE), 2007; Silva, 2009). Student-centered and technology-supported approaches will dominate.

Problem-based learning, CLIL, and task-based instruction support both language and content development (Coyle et al., 2010; Ellis, 2003). Project-based and collaborative learning enhance communication and intercultural competence (Johnson & Johnson, 2009). Recent meta-analyses demonstrate CLIL's effectiveness for foreign language development at the primary school level (Lee et al., 2025).

Immersive simulations and AI-supported systems further promote experiential and personalized learning (Dede, 2014; Luckin et al., 2016). A systematic literature review exploring the integration of artificial intelligence (AI) and extended reality (XR) technologies in language education shows that AI and XR technologies enrich engagement and tailored language experiences (Yan et al., 2025).

2.4 Assessment

Assessment in modern education has undergone a fundamental transformation, shifting from a traditional focus on high-stakes testing toward a model that actively supports student growth. While summative assessment remains necessary for institutional accountability, contemporary scholars argue that it often fails to prepare learners for the complexities of the future. Consequently, there is a growing movement toward authentic assessment, which emphasizes the development of students' self-identity and their ability to apply knowledge in real-world contexts (McArthur, 2023).

A central element of this shift is the concept of Assessment as Learning (AaL). In this framework, students are no longer passive recipients of grades but active agents who monitor and regulate their own learning. Recent research highlights the importance of feedback literacy, defined as the capacity of students to seek, interpret, and use feedback to improve their work (Nieminen & Carless, 2023). By engaging in reflective practices and self-assessment, learners develop the metacognitive skills necessary for lifelong learning (Leenknecht & Carless, 2023; Panadero et al., 2022). The integration of digital technology, particularly Generative AI, further accelerates this transition. AI-driven systems now allow for highly personalized feedback and adaptive learning pathways that were previously difficult to achieve in traditional classrooms (Zawacki-Richter et al., 2019). These

tools are especially beneficial in multilingual settings, where they can provide immediate linguistic support tailored to each student's proficiency level. However, the rise of AI also brings significant challenges. Recent research highlights ethical concerns related to AI technologies, including data privacy, algorithmic bias, and academic integrity (Floridi et al., 2018). Therefore, the future of assessment requires not only technological innovation but also a robust framework for ethical governance to ensure fairness and transparency for all learners.

3. Methodology

3.1 Research Design

This study collected data from two sources of information: 1) documents in the field (six studies: Coyle et al., 2010; Earl, 2013; García & Wei, 2014; Barrett et al., 2015; Radianti et al., 2020; Darling-Hammond et al., 2020) and 2) interview data of eight research participants.

3.2 Research Setting

The study was conducted in bilingual school contexts where multilingual education practices were already partially implemented. These school environments provided a relevant foundation for participants to reflect on future multilingual developments. Bilingual schools were selected because they represent transitional spaces between monolingual and multilingual education systems.

3.3 Research Participants

Participants were teachers currently working in bilingual schools. They were selected through purposive sampling based on their professional experience in linguistically diverse classrooms. Teachers from different subject areas were included to ensure varied perspectives on multilingual education.

3.4 Sampling Technique

This study used random sampling to select the interviewees. Teachers were chosen randomly from the target bilingual school population to ensure fairness and to reduce selection bias. Random sampling gave all eligible teachers an equal chance of being selected to participate in the interviews. This method helped increase the credibility of the data by avoiding researcher preference in participant selection.

3.5 Research Instruments

In the initial stage, the data were collected from six studies on multilingual schools. They are shown in Table 2. The selected studies included Barrett et al. (2015), Radianti (2020), Darling-Hammond (2020), García and Wei (2014), Coyle et al. (2010), and Earl (2013).

Then, qualitative data were collected from semi-structured interviews that lasted approximately 20 minutes each. Interview questions covered visions of future schools, multilingual teaching, teacher roles, student characteristics, facilities, activities, and assessment methods.

3.6 Data Collection Procedures

Data collection was conducted in stages: 1) Document Search followed by a critical review of the content of the chosen studies, 2) Interviewing Stage including the preparation of interview questions, scheduling interviews, conducting one-on-one interviews, audio recording with consent, and verbatim transcription for analysis.

3.7 Data Analysis

For documents used in the study, keywords that suggested components of multilingual schools were collected and categorized. For the interview, this study adopted Lichtman's (2013) Three C's approach—Coding, Categorizing, and Concepts—to analyze qualitative data collected through semi-structured interviews with eight multilingual teachers.

3.8 Coding

In the first stage, all interview recordings were transcribed verbatim. The transcripts were read repeatedly to gain a comprehensive understanding of the data. Meaningful words, phrases, and sentences related to teachers' views on future multilingual schools were identified and coded. Initial codes were generated directly from participants' responses and reflected recurring ideas such as technology-rich learning environments, artificial intelligence in education, multilingual communication, teacher roles, student-centered learning, assessment methods, and student well-being. To ensure analytic consistency, codes were continuously compared across all eight interviews. Similar codes were refined, clarified, and merged when overlapping meanings were identified.

3.9 Categorizing

In the second stage, related codes were systematically grouped into broader categories through a process of comparison and abstraction. Codes related to AI, AR/VR, digital tools, and technology efficiency were grouped under the category of Technology and AI in Future Schools. Codes referring to emotional support, facilitation, guidance, and human connection were grouped under the category of the Role of Teachers. Codes associated with multiple languages, cultural understanding, and global communication were categorized as Multilingual Education. Additional categories included Teaching and Learning Approaches, Assessment Practices, and Student Development and Well-being.

3.10 Concept Formation

In the final stage, the categories were synthesized into overarching concepts that represented the core meanings of teachers' collective perspectives. Six key concepts emerged: Technology and AI in Future Schools, Role of Teachers, Multilingual Education, Teaching and Learning Approaches, Assessment Practices, and Student Development and Well-being. These concepts reflect teachers' shared visions of future multilingual schools as technology-supported yet human-centered learning environments, emphasizing multilingual competence, student-centered pedagogy, holistic assessment, and whole-person development.

Table 1 Lichtman's 3Cs Cycle Data Analysis

Codes	Categories	Concepts
Teachers viewed future schools as technology-rich. AI can support learning, but overreliance may reduce students' independent thinking.	AI, AR/VR, digital tools, efficiency, overreliance	Technology and AI in Future Schools
All teachers emphasized that AI cannot replace teachers' emotional support, motivation, and guidance.	Facilitator, emotional support, guidance, human connection	Role of Teachers
Teachers strongly supported multilingual education for cultural awareness and global readiness, while noting language challenges.	Multiple languages, cultural understanding, global communication	Multilingual Education
Teachers highlighted a shift toward student-centered and project-based learning to improve engagement and understanding.	Student-centered, project-based, inquiry-based learning	Teaching and Learning Approaches
Participants preferred holistic assessment methods rather than exam-only evaluation.	Observation, projects, rubrics, formative assessment	Assessment Practices
Teachers emphasized holistic education focusing on students' emotional well-being and personal growth.	Mental health, emotional development, cooperation	Student Development and Well-being

4. Results

Based on the review of the literature, several important findings were identified. Barrett et al. (2015) explain that classroom design, lighting, temperature, and learning space influence students' achievement,

motivation, and well-being. Research by Radianti et al. (2020) shows that immersive technologies such as AR and VR can enhance engagement and experiential learning. In terms of teachers, Darling-Hammond et al. (2020) highlight that future teachers require both technological competence and emotional support skills. Studies on multilingual pedagogy by García and Wei (2014) emphasize the role of teachers as facilitators who support flexible language use and intercultural understanding. Furthermore, Coyle et al. (2010) demonstrate that integrating content and language learning improves both subject knowledge and language development. Finally, Earl (2013) stresses the importance of self-assessment and reflection in developing students' independent learning and metacognitive skills.

4.1 Findings from Semi-Structured Interviewed with Eight Participants Who Were Bilingual Teachers

The following figure shows the essential components of multilingual schools in participation.

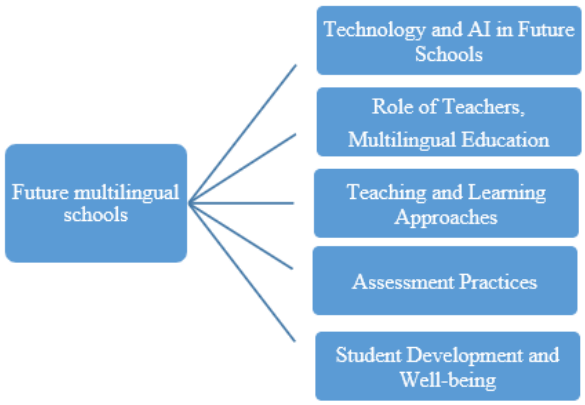

Figure 2 Essential Components of Future Multilingual Schools Based on Teacher Interviews

Based on an inductive analysis of interview excerpts from eight multilingual teachers, this study identified a set of interconnected themes that together construct participants' visions of future multilingual schools. The findings point out five essential components of a future multilingual school as follows:

4.2 Language as a Foundational and Integrated Element of Schooling

A key finding from the interviews is that future multilingual schools will emphasize language integration rather than separation. Teachers viewed language not as an isolated subject but as a foundational competence embedded across all learning areas.

Participants highlighted strategic multilingual structures involving students' mother tongues, English as a global language, and an additional international language such as Chinese or Japanese. They stressed that multilingual education should begin early, particularly at the kindergarten or primary level, through immersion and meaningful communication instead of memorization.

Overall, teachers perceived multilingualism as essential for academic participation, global communication, and future professional collaboration.

4.3 Technology-Enhanced yet Human-Centered Learning Environments

Another major theme was the growing role of educational technology. Teachers described future classrooms supported by AI, AR/VR, digital platforms, and data-driven systems that enhance personalization and learning efficiency.

However, participants also emphasized technology's limitations. They noted that AI cannot provide emotional support, ethical judgment, or meaningful human relationships. Face-to-face interaction and shared

physical learning spaces were still considered essential. Thus, future multilingual schools are expected to be technologically advanced but fundamentally human-centered.

4.4 Transformation of Teacher Roles in Multilingual Schools

Interview findings indicate a shift in teacher roles from knowledge transmitters to facilitators and guides. Teachers are expected to support students emotionally, academically, and culturally.

Future educators must combine technological competence with communication skills, psychological awareness, and the ability to nurture individual strengths. They play a crucial role in helping students apply knowledge, navigate uncertainty, and build confidence in multilingual contexts.

4.5 Project-Based, Authentic, and Globally Connected Learning Practices

Participants strongly emphasized project-based learning as the core pedagogical approach in future multilingual schools. Learning activities were described as real-world tasks, simulations, games, and collaborative projects requiring active language use.

Such practices often extend beyond classrooms, allowing students to collaborate internationally and engage in authentic problem-solving. Learning is therefore shifting from knowledge memorization to socially relevant and globally connected experiences.

4.6 Rethinking Assessment and Student Development

Teachers supported assessment practices focused on continuous feedback, reflection, and project participation rather than exam-only evaluation. Assessment was viewed as a tool to support learning rather than to rank performance.

Student development was described holistically, including emotional resilience, moral values, communication skills, and adaptability. Future multilingual schools therefore prioritize whole-person development and recognize diverse talents.

5. Discussion

This section discusses the emerging issues derived from the findings. The discussion focuses on technology and AI, multilingual education, the role of teachers, learning activities, and assessment practices.

5.1 Technology and AI in Future Multilingual Schools

The findings show that teachers view technology and artificial intelligence (AI) as important parts of future multilingual schools. Participants described future classrooms as digital learning environments supported by AI tools, AR/VR technologies, online platforms, and intelligent learning systems. The findings of this study are similar to those reported by Radianti et al. (2020), who stated that immersive technologies such as AR and VR can improve student engagement and learning experiences. However, teachers also shared concerns that students may become too dependent on AI, especially in relation to independent thinking and emotional development. This suggests that technology should support teaching and learning, but not replace the role of teachers.

5.2 Multilingual Education and Cultural Understanding

The findings also highlight that multilingual education is both a language and cultural practice. Teachers explained that learning multiple languages helps students communicate globally and work with people from different backgrounds. Cultural understanding was also viewed as an important outcome. The findings of this study are similar to those reported by García and Wei (2014), who explained that multilingual learning supports flexible language use, inclusion, and intercultural awareness in classrooms.

5.3 The Role of Teachers in Future Multilingual Schools

Despite rapid technological development, participants believed that teachers will continue to play an essential role in future multilingual schools. Teachers were described as facilitators, emotional supporters, guides,

and cultural mediators. The findings of this study are similar to those reported by Darling-Hammond et al. (2020), who emphasized that future teachers need technological knowledge together with emotional and pedagogical skills. This indicates that human connection and professional judgment remain important in multilingual learning environments.

5.4 Student-Centered Learning and Teaching Activities

The findings further show a shift toward student-centered, project-based, and inquiry-based learning. Teachers described activities that encourage collaboration, problem-solving, and real-world application of knowledge. The findings of this study are similar to those reported by Coyle et al. (2010), who reported that Content and Language Integrated Learning (CLIL) improves both subject understanding and language development through meaningful learning activities.

5.5 Assessment Practices and Assessment as Learning

In terms of assessment, teachers expressed dissatisfaction with traditional examination-focused methods. They supported more holistic and formative approaches such as observation, project work, and reflective learning. The findings of this study are similar to those reported by Earl (2013), who stated that assessment as learning helps students develop self-reflection and independent learning skills. Teachers also agreed that AI-supported assessment can be useful if ethical considerations and teacher judgment remain central.

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