Learning Without Walls: A Capability Approach to VR Schooling and Educational Equity in Japan

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The Asian Conference on Education & International Development 2026
Official Conference Proceedings

Abstract

In recent years, Japan has implemented VR-based schooling as an alternative for students. Government-accredited schools like N High School enable students to attend classes, interact via avatars, and join digital campuses simulating real-life learning. This model has expanded in response to social isolation, such as bullying, school refusal, or geographic barriers, offering a pathway for those unable or unwilling to attend traditional schools. While praised for its innovation, VR schooling must be meaningfully assessed for its contribution to educational equity. Without attention to how it expands real opportunities and freedoms, digital transformation risks replicating existing inequalities. Through a qualitative method grounded in Amartya Sen's Capability Framework, this research evaluates how Japan's VR schooling enhances students' substantive freedoms, particularly in relation to learning access and life choices. Using document analysis and a review of institutional policies, the study explores how such education systems foster not only access to learning, but also sustained engagement and expanded opportunities for students to pursue educational and career pathways. This offers an important model for other countries grappling with educational exclusion, especially in Southeast Asia, where remote communities, disaster-prone areas, and limited school infrastructure persist. The study suggests that VR-based education, when integrated into national systems and supported through ICT cooperation, can contribute to SDG 4 by restoring educational capabilities to those excluded from mainstream pathways. By framing technology not as an end in itself but as a means to expand freedom and inclusion, this research provides policy-relevant insights into sustainable, student-centered digital transformation.

Keywords: VR schooling, Japan, educational equity, SDG 4

Introduction

Education has long been regarded as a fundamental condition for human dignity, social participation, and sustainable development. It enables individuals to acquire knowledge, imagine future possibilities, participate in society, and develop the capacity to judge, choose, and act within changing social environments. Educational development therefore involves more than the expansion of formal schooling. It requires the creation of learning opportunities through which individuals can build confidence, pursue life goals, and participate more fully in their communities. This perspective is closely connected to the global commitment to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all under Sustainable Development Goal 4 (United Nations, 2015).

The global education agenda has shifted significantly from the Millennium Development Goals to the Sustainable Development Goals. While the MDGs largely emphasized access to primary education and enrollment, SDG 4 places stronger emphasis on quality, equity, inclusion, and lifelong learning across different levels and forms of education. Educational exclusion can occur even when students remain formally enrolled in school, particularly when they lack safe, meaningful, and sustained learning environments due to social, psychological, geographic, or institutional barriers. The contemporary challenge of educational development is therefore to create flexible and inclusive systems that allow diverse learners to continue learning under different life conditions (UNESCO, 2000; United Nations, 2015).

In this context, information and communication technology has become increasingly relevant to debates on educational development and inclusion. Rather than functioning only as a set of digital tools, ICT in education can support communication, connectivity, flexible participation, and access to learning beyond conventional classroom boundaries. Online platforms, digital materials, distance learning systems, and interactive learning environments are especially significant when students face geographic, economic, or social barriers to schooling. From this perspective, the educational value of ICT lies in its ability to connect learners to institutions, teachers, peers, and learning resources in ways that conventional school structures may not always allow (Asian Development Bank, 2003; UNESCO Institute for Statistics, 2009; World Bank Group, 2003).

The importance of ICT has become more apparent as the digital divide increasingly overlaps with broader forms of educational and social inequality. Earlier development debates often placed greater emphasis on physical infrastructure such as roads, hospitals, or clean water. Contemporary education systems, however, show that digital access is closely tied to learning continuity, educational quality, and social participation. ICT has been recognized as a tool for expanding educational access, improving learning quality, and reducing development gaps by connecting learners to information, communication, and educational resources (UNESCO Institute for Statistics, 2009; World Bank Group, 2003). Unequal access to digital tools can also reinforce wider social and economic inequalities, making digital inclusion a central issue in contemporary development (World Economic Forum, 2024).

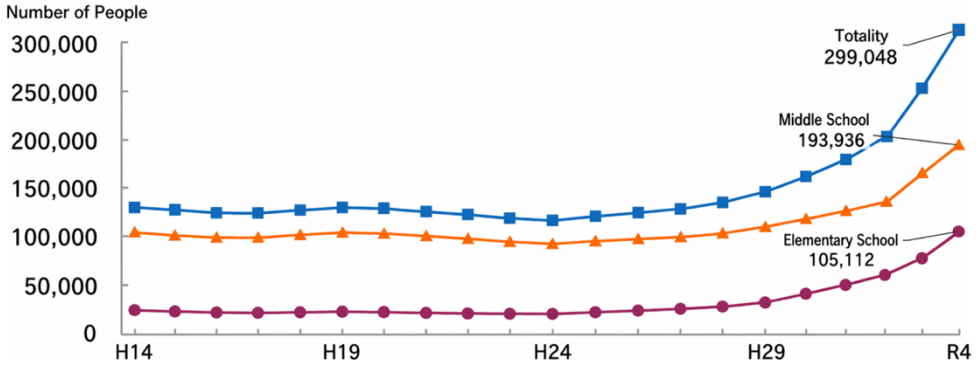
Japan provides a significant case for examining the relationship between ICT, alternative schooling, and educational equity. The country has developed advanced digital education policies, including the GIGA School Program, which aims to provide digital devices and online learning environments for students as part of preparing them for a digital society (The Japan Times, 2021). Japan has also developed remote learning systems in response to natural disasters and educational disruptions, including the 2011 Great East Japan Earthquake and the COVID-

19 pandemic. These experiences have positioned ICT-based education as part of a broader strategy for maintaining educational continuity under crisis conditions.

Japan also faces serious educational challenges related to school refusal, bullying, and social isolation. Official MEXT data show that school non-attendance and bullying have become urgent issues in the Japanese education system, with approximately 299,000 elementary and junior high school students categorized as not attending school and approximately 682,000 recognized cases of bullying reported across schools (MEXT, 2023). These figures indicate that educational exclusion in Japan extends beyond physical access to schools. It is also shaped by social experiences within schooling itself, including bullying, anxiety, isolation, and the inability of some students to remain in conventional educational environments. Alternative forms of education have consequently become important institutional pathways for protecting the right to learn.

Figure 1

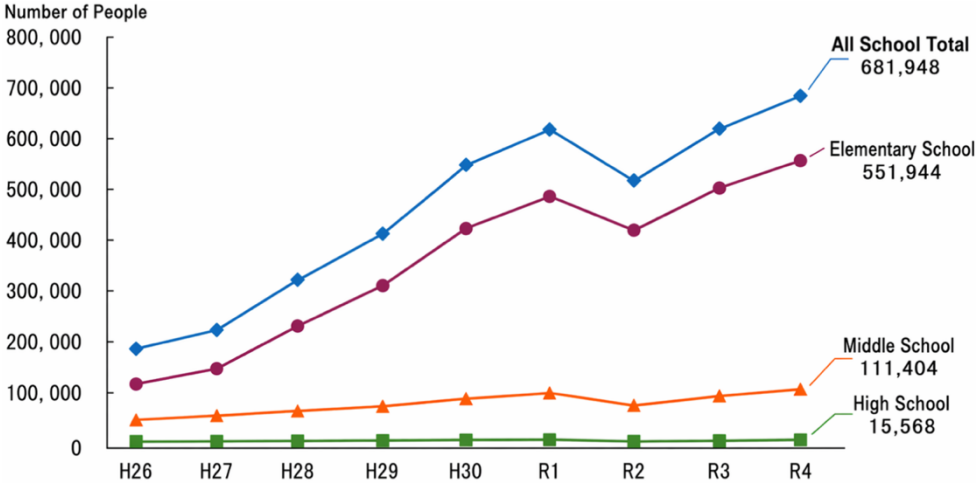
Changes in the Number of Students Not Attending School in Japan



Note. From MEXT, 2023

Figure 2

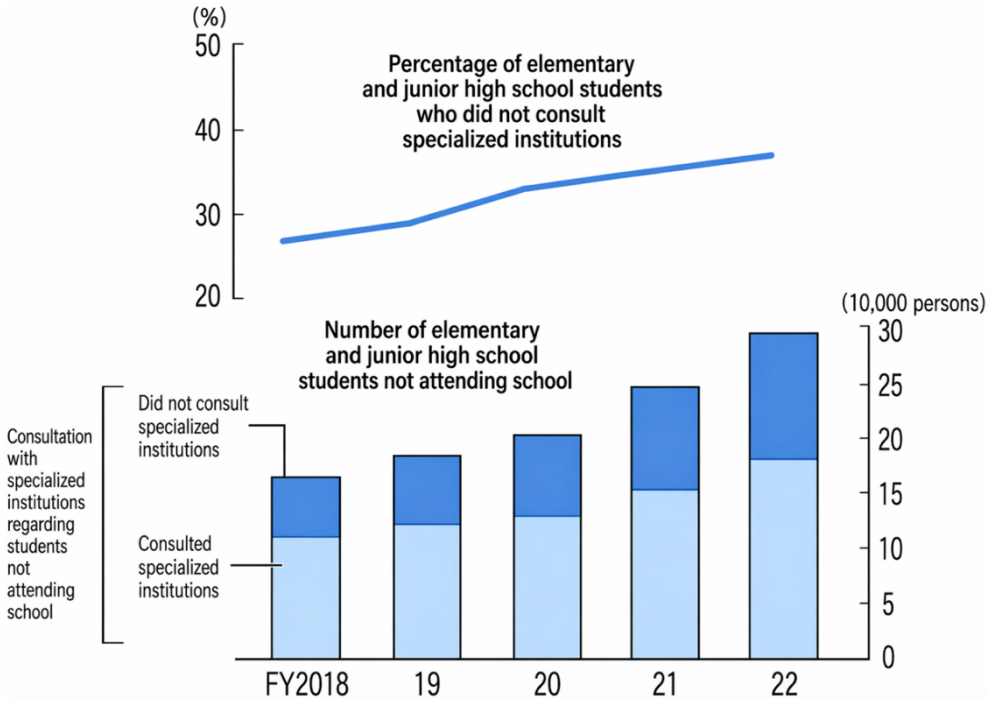
Trends in the Number of Recognized Cases of Bullying in Japan



Note. From MEXT, 2023

Figure 3

Number of Elementary and Junior High School Students Not Attending School and Percentage Who Did Not Consult Specialized Institutions in Japan



Note. From MEXT, 2023

VR-based schooling has emerged as one such alternative pathway. Government-accredited distance learning and virtual schooling models such as N High School provide online and ICT-based learning environments where students can attend classes, complete coursework, and participate in school life through digital tools. Recent discussions of Japan's alternative schooling system show that correspondence and online high schools have expanded as students increasingly struggle to attend conventional schools, while policy attention has grown around the institutional maintenance of such systems (Park, 2023). Reports on VR and metaverse-based learning further suggest that virtual spaces are increasingly used as environments for class participation, communication, and school life, rather than only as supplementary educational tools (Ko, 2020; Shin, 2022). The case of virtual schooling for students who refuse to attend school illustrates how these digital environments are being positioned as alternative educational spaces in Japan (KBS World News, 2024). VR schooling in Japan can therefore be understood as part of a broader institutional effort to create flexible educational pathways for students who may not fit into traditional school structures.

The educational value of VR schooling requires careful assessment. Although VR-based education is often praised for innovation, digital transformation can reproduce existing inequalities when it provides technical access without expanding students' real opportunities. A student may have access to an online platform but still lack meaningful participation, recognition, continuity, or future pathways. The central question of this study therefore concerns whether VR schooling expands the substantive freedoms of students who have been excluded from mainstream education. This question is examined through Amartya Sen's Capability Approach, which evaluates development in terms of what people are actually able to do and be, rather than only in terms of resources, institutions, or formal opportunities (Sen, 1999).

Through this framework, VR schooling can be examined as a potential means of restoring educational capabilities. For students affected by bullying, school refusal, social isolation, or geographic barriers, VR-based schooling may provide safer spaces for participation, sustained engagement with learning, and alternative educational and career pathways. VR schooling thus connects ICT, educational equity, and human freedom through a student-centered form of digital transformation. This paper examines how Japan's VR-based schooling contributes to educational equity by expanding learning access, continuity, and life choices for marginalized students. By analyzing this case through document analysis and a review of institutional policies, the study explores how technology can become a means of inclusion when it is embedded in recognized education systems and guided by equity-centered principles.

The implications of this study extend beyond the Japanese context. Many countries, particularly in Southeast Asia, continue to face educational exclusion caused by remote geography, disaster-prone environments, and limited school infrastructure. Japan's VR schooling model offers a useful reference for designing ICT-based alternative education that can restore learning opportunities for excluded students. Direct replication across borders is impractical, but the Japanese case shows how virtual learning environments may contribute to SDG 4 when they are integrated into recognized national education systems and supported through ICT cooperation. By conceptualizing technology as a means of expanding freedom and inclusion, this research positions VR-based education as a policy-relevant approach for dismantling educational barriers and building more inclusive futures for marginalized learners.

Methodology

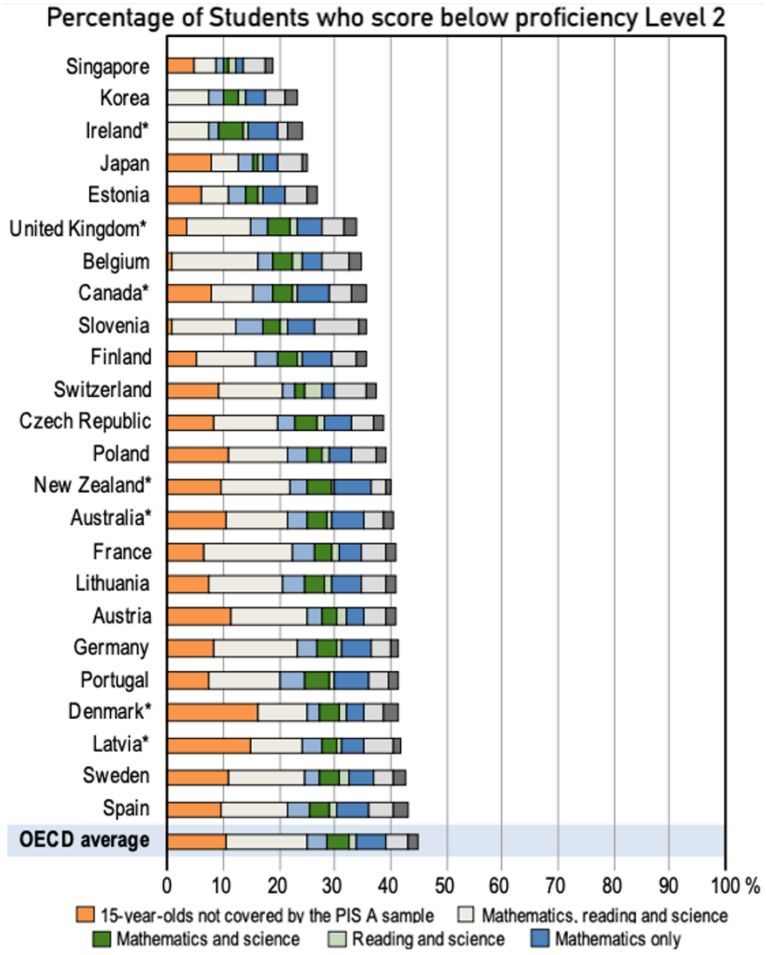
This study employs a qualitative case study design to examine Japan's VR-based schooling as an alternative educational pathway for students experiencing educational exclusion. The focus is not on measuring the statistical effects of VR education, but on interpreting how a specific institutional model operates within a broader social, policy, and educational context. Case study research is particularly useful for examining contemporary phenomena embedded in real-world settings, especially when the boundaries between the phenomenon and its surrounding context are closely connected (Yin, 2018).

The case selected for this study is Japan's VR-based schooling model, with particular attention to N High School and related virtual schooling initiatives. Japan offers a distinctive context in which advanced ICT-based educational infrastructure coexists with persistent challenges such as school refusal, bullying, social isolation, and geographic barriers. This combination allows the study to examine whether digital schooling can function as a meaningful response to educational inequality rather than remain a form of technological innovation alone. N High School is treated as a representative case because it has become part of Japan's expanding alternative and virtual schooling landscape for students who refuse or struggle to attend conventional schools (KBS World News, 2024; Park, 2023).

Japan's relevance as a case is further supported by its position in international educational comparisons. OECD PISA 2022 data show that Japan belongs to a group of education systems with relatively strong academic performance, while still having a measurable share of students who fall below proficiency Level 2 in mathematics, reading, and science. The case is therefore analytically significant because it illustrates how even high-performing education systems may contain vulnerable learners who require alternative pathways to sustain educational participation (OECD, 2023).

Figure 4

Overlap of Low Performers in Mathematics, Reading, and Science Among 15-Year-Olds



Note. From OECD, 2023

This study relies on document analysis and a review of institutional policies. The analysis focuses on official policies, institutional models, public reports, and educational programs related to ICT-based education, VR schooling, school refusal, bullying, and alternative education in Japan. Rather than using interviews or survey data, the study examines how public documents and institutional materials frame VR-based schooling as a response to educational exclusion. Document analysis is appropriate for this purpose because documents reveal policy intentions, institutional language, program design, and the social meanings attached to educational practices (Bowen, 2009).

The data sources include public reports and policy discussions related to school refusal and bullying in Japan, materials on N High School and virtual schooling, international education policy documents related to SDG 4, and institutional materials on ICT-based education. These sources are read together to trace the relationship between educational exclusion, digital schooling, and recognized alternative pathways. Materials on school absenteeism and bullying provide the social and policy background of exclusion, while sources on virtual schooling show how VR-based and online learning environments are positioned as institutional responses. International policy documents connect the Japanese case to broader debates on inclusive and equitable quality education under SDG 4 (High School Graduation Support Association, 2023; MEXT, 2023; Tatsuya, 2024; UNESCO, 2000; United Nations, 2015).

The analytical framework is grounded in Amartya Sen's Capability Approach. This framework allows VR schooling to be evaluated in terms of students' real opportunities to learn, participate, and pursue future educational and life pathways. Sen's approach understands development as the expansion of substantive freedoms, or what individuals are actually able to do and become in their lives (Sen, 1999). In this study, the Capability Approach serves as the evaluative lens for assessing whether VR schooling expands educational capabilities beyond formal access to schooling.

This framework is operationalized through several interrelated dimensions of educational capability. The analysis examines whether VR schooling expands access to learning, supports continuity of education, enables safer participation, encourages social inclusion, provides institutional recognition, and opens future educational or career pathways. These dimensions are treated not as isolated categories, but as connected elements of students' substantive freedom. Access and continuity address whether students can begin and sustain learning despite social or geographic barriers. Safety and inclusion address whether students can participate without fear of bullying, anxiety, or stigma. Institutional recognition and future pathways address whether alternative learning leads to legitimate educational status and broader opportunities for social participation.

This methodology decenters VR technology as a standalone artifact and instead examines how VR becomes educationally meaningful within an institutional system that recognizes students' right to learn. The study therefore focuses on the relationship between technology, recognition, participation, and educational freedom. This distinction is important because digital transformation can reproduce existing inequalities when technology is introduced without attention to equity, access, and real opportunity. In this study, VR schooling is analyzed as an educational arrangement that may restore capabilities for students excluded from traditional schooling.

SDG 4 is used as a policy-oriented interpretive frame throughout the analysis. Its emphasis on inclusive and equitable quality education and lifelong learning opportunities for all is directly relevant to students who are unable or unwilling to attend traditional schools. By situating Japan's VR schooling model within SDG 4, the study examines how ICT-based alternative education may contribute to global educational goals by expanding access, reducing exclusion, and supporting sustained learning. This connection allows the Japanese case to be interpreted within broader international discussions on digital education, equity, and sustainable development (UNESCO, 2000; United Nations, 2015).

The study does not claim to measure students' learning outcomes, emotional experiences, or long-term transitions into higher education and employment. Its purpose is to interpret the policy and institutional significance of VR-based schooling as an emerging educational model. The findings should therefore be understood as an analytical interpretation of how VR schooling is framed, justified, and positioned within Japan's education system. Future research could extend this analysis through interviews with students, teachers, school administrators, and policymakers in order to examine how these institutional claims are experienced in practice.

Taken together, the methodology integrates case study analysis, document analysis, and the Capability Approach into a single interpretive framework. The Japanese case provides the institutional focus, the documents provide the empirical basis, and the Capability Approach provides the normative lens for evaluating educational freedom. Through this combined approach, the study examines whether VR schooling in Japan can be understood as a student-

centered form of digital transformation that expands educational capabilities for marginalized learners.

Results and Findings

Japan's VR-based schooling model responds to educational exclusion by creating an alternative institutional pathway for students who experience difficulty remaining in conventional schools. In the Japanese case, exclusion is shaped by multiple and overlapping barriers, including school refusal, bullying, social isolation, and geographic limitations. Recent Japanese education policy discussions and reports identify school absenteeism and bullying as urgent issues in the education system, particularly as increasing numbers of students struggle to remain in conventional schooling (High School Graduation Support Association, 2023; MEXT, 2023; Tatsuya, 2024). These developments reveal a central problem in educational equity, as access to school enrollment does not necessarily guarantee safe, continuous, or meaningful participation in learning environments.

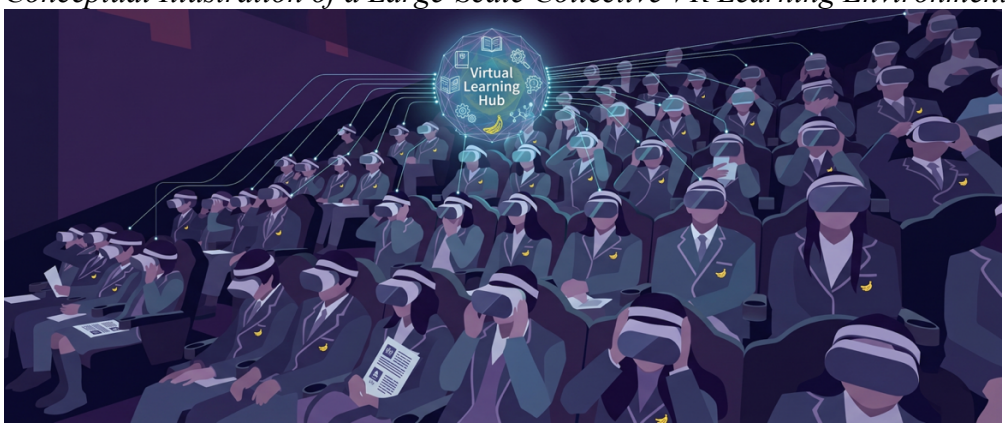
VR-based schooling first redefines access to learning for students who are unable or unwilling to attend traditional schools. In conventional schooling, access is often equated with physical attendance in classrooms. The Japanese case broadens this understanding by showing how learning from home, participation through digital platforms, and formal educational status through recognized distance learning systems can become part of educational access. Reports on Japan's expansion of correspondence high schools indicate that alternative schooling has become increasingly relevant as more students refuse or struggle to attend conventional schools (Park, 2023). Access to education is therefore shifting from physical presence in school toward participation in a flexible and institutionally recognized learning environment.

Building on this expanded access, VR schooling contributes to educational continuity. Japan has long recognized the importance of remote education in response to natural disasters, school closures, and other forms of disruption. The GIGA School Program reflects this national policy direction by promoting digital learning environments and preparing students for a digital society (The Japan Times, 2021). Within this policy environment, VR-based schooling extends Japan's broader effort to maintain learning beyond the limits of physical classrooms. Digital education in this context functions as part of a long-term strategy for sustaining learning continuity, rather than as a temporary emergency response.

Beyond access and continuity, VR-based environments may reduce the social risks associated with conventional schooling. For students affected by bullying, school refusal, or social anxiety, the physical school environment itself may become a source of exclusion. Avatar-based participation and virtual campuses can reduce the pressure of direct face-to-face interaction while still allowing students to attend classes, communicate with others, and participate in school life. Reports on VR and metaverse-based learning suggest that virtual spaces are increasingly being used as environments for participation, communication, and educational experience rather than merely as supplementary technologies (Ko, 2020; Shin, 2022). From a capability perspective, the value of education rests on students' ability to participate without fear, stigma, or exclusion, as well as on their formal enrollment status (Sen, 1999).

Figure 5

Conceptual Illustration of a Large-Scale Collective VR Learning Environment



Crucially, VR schooling strengthens the institutional recognition of alternative forms of learning. Many forms of online learning provide informal access to educational content, yet they do not necessarily lead to recognized educational pathways. Japan's correspondence and virtual schooling models are discussed as part of an expanding alternative schooling system for students who cannot remain in conventional schools (KBS World News, 2024; Park, 2023). This institutional recognition is crucial for educational equity because students require learning pathways that are acknowledged by schools, employers, universities, and society. VR-based education becomes more meaningful when it is embedded in official schooling structures rather than positioned as a detached digital supplement.

In tandem with this, institutional recognition expands educational agency for marginalized learners. In the Capability Approach, agency is closely connected to the ability to make meaningful choices and pursue valued life paths (Sen, 1999). For students who cannot attend traditional schools because of bullying, social isolation, or geographic barriers, VR schooling widens the range of educational choices available to them. Instead of forcing students to either return to conventional classrooms or leave education entirely, VR-based schooling creates a third pathway by allowing continued participation through a flexible digital environment. This does not eliminate all forms of inequality, but it expands the real options available to students who previously had limited choices.

The Japanese case further demonstrates how ICT-based education can support sustained engagement beyond initial access. Many digital education initiatives provide materials or platforms without ensuring long-term participation. VR-based schooling combines online learning, communication tools, virtual spaces, and institutional structure. This combination allows students to remain connected to teachers, peers, and school activities even when they are physically distant from school. In this sense, VR schooling addresses a key limitation of access-centered digital education by shifting the focus from "Can students access content?" to "Can students continue learning in a socially and institutionally meaningful way?"

The promise of VR schooling must simultaneously be understood alongside the risks of digital transformation. On the positive side, technology can reconstruct educational participation for students excluded from traditional systems. Previous development discussions, however, have emphasized that digital inclusion is not automatic and that unequal access to ICT can deepen existing social and educational divides (Pedrelli, 2001; World Economic Forum, 2024). If VR schooling is available only to students with sufficient digital access, family support, or institutional awareness, it may reproduce new forms of inequality. Its contribution to

educational equity therefore depends on the extent to which the system is designed to support inclusion, affordability, accessibility, and continuity for diverse learners.

Moreover, VR schooling aligns deeply with the broader aims of SDG 4. SDG 4 emphasizes inclusive and equitable quality education and lifelong learning opportunities for all, which directly relates to students who are excluded from mainstream schooling (United Nations, 2015). Japan's VR-based schooling model contributes to this agenda by expanding access to recognized education, supporting learning continuity, and offering alternative pathways for students facing social or geographic barriers. SDG 4 should therefore be interpreted beyond the expansion of enrollment. It also requires educational systems to create flexible forms of learning that respond to the actual conditions of vulnerable and marginalized students (UNESCO, 2000; United Nations, 2015).

The Japanese case may similarly serve as a useful reference for Southeast Asian countries facing educational exclusion caused by remote geography, natural disasters, and limited school infrastructure. The model should not be transferred mechanically, since VR education depends on institutional recognition, digital infrastructure, teacher capacity, and a policy commitment to educational equity. For countries seeking to adapt similar models, the key lesson is not simply to import VR technology, but to build an educational ecosystem in which technology supports students' substantive freedoms and recognized learning pathways.

Synthesizing these dimensions, Japan's VR-based schooling can be understood as a capability-expanding model of digital education. Its significance lies in the way it combines flexible access, learning continuity, safer participation, institutional recognition, and future-oriented educational engagement. These findings support the central argument of this paper that VR schooling should not be evaluated only as technological innovation, but as a possible means of restoring educational capabilities for students who have been excluded from mainstream pathways. Japan's case demonstrates that ICT-based alternative education can contribute to educational equity when technology is embedded within inclusive institutional design.

Implications & Conclusion

The findings of this study suggest that Japan's VR-based schooling carries important implications for educational equity by reframing digital education as an institutional pathway rather than a simple extension of online content delivery. In this case, VR schooling functions as an alternative route for students excluded from traditional schooling because of bullying, school refusal, social isolation, or geographic barriers. Educational inequality is therefore revealed as a problem of participation as well as access. Students may remain formally located within an education system while still being unable to participate safely, continuously, or meaningfully in conventional learning environments. From this perspective, educational equity requires flexible learning environments that allow students to remain connected to education in ways that reflect their actual social and personal conditions (High School Graduation Support Association, 2023; MEXT, 2023; Sen, 1999; Tatsuya, 2024).

A primary implication concerns the formal status of alternative education. VR schooling gains educational significance when it is recognized as part of the official education system and connected to legitimate learning pathways. N High School and similar ICT-based schooling models demonstrate that students who cannot attend traditional schools may still continue their education through institutionally recognized digital environments. Informal online learning can provide access to knowledge, but recognized schooling provides qualifications, social

legitimacy, and future academic or career opportunities. The value of VR schooling therefore lies in its ability to connect technological flexibility with institutional recognition and the protection of students' right to learn (KBS World News, 2024; Park, 2023).

Evaluated through the Capability Approach, ICT-based education should be assessed according to the substantive freedoms it creates for learners. A narrow evaluation of VR schooling as a digital tool risks overstating technological novelty while overlooking students' real opportunities. The more important question concerns whether VR schooling expands what students are actually able to do and become. For marginalized students, this includes the ability to continue learning, participate without fear of bullying or stigma, maintain educational status, and pursue future pathways. VR schooling can therefore be interpreted as a capability-expanding model when it gives students real alternatives to educational withdrawal (Sen, 1999).

This capability-expanding potential depends on the equity conditions under which digital transformation is implemented. Previous discussions on ICT and development show that digital technologies can widen existing development gaps when access to infrastructure, skills, and institutional support is uneven (Pedrelli, 2001; World Economic Forum, 2024). This warning is particularly relevant to VR schooling. While VR-based education can create new opportunities, it may also generate new forms of exclusion if students lack digital devices, stable internet access, family support, or knowledge about alternative schooling options. The success of VR schooling depends on adequate infrastructure, affordability, teacher support, digital literacy, and clear pathways for recognition. Technology itself is not neutral because its educational meaning is shaped by the institutional and social conditions under which it is implemented.

The Japanese case also extends the meaning of educational resilience. Japan's experience with remote education has been shaped by natural disasters, school disruptions, and the broader digitalization of education through initiatives such as the GIGA School Program. These policy developments show that ICT can support learning continuity when conventional classrooms are disrupted by social, geographic, or environmental conditions (The Japan Times, 2021). VR schooling applies this logic to students whose everyday educational lives are disrupted by bullying, social isolation, or school refusal. Educational continuity, in this sense, is not limited to emergency response. It becomes a long-term condition for protecting the right to learn.

Japan's VR schooling model may offer useful lessons for Southeast Asian countries facing educational exclusion caused by remote geography, disaster-prone environments, and limited school infrastructure. In such contexts, ICT-based alternative education can expand learning opportunities for students who cannot consistently attend physical schools. The Japanese model, however, requires adaptation rather than replication. Each country must consider its own infrastructure, cultural context, school governance, teacher capacity, and students' needs before adopting VR-based education. The main lesson from Japan is that digital education becomes meaningful when it is embedded in a recognized and inclusive educational system.

International ICT cooperation can further support this form of inclusive education. In many developing contexts, digital education requires devices and platforms alongside institutional capacity, teacher training, technical support, and sustainable governance. Japan has emphasized technical cooperation and human resource development through ODA, including the transfer of ICT-related knowledge and support for capacity building in partner countries (Ministry of Foreign Affairs of Japan, 1999, 2022; Miyake, 2015). Japan's VR schooling case can therefore contribute to broader discussions of ICT cooperation by showing how digital

tools may support educational development when they are connected to equity, institutional recognition, and long-term learning continuity.

The findings also contribute to the interpretation of SDG 4. SDG 4 calls for inclusive, equitable, and quality learning opportunities for diverse learners, including those excluded by social, psychological, geographic, or institutional barriers (United Nations, 2015). Japan's VR schooling model demonstrates one way of responding to this broader interpretation of educational inclusion. By offering recognized alternative pathways, supporting continued learning, and reducing the risks associated with conventional school participation, VR-based schooling contributes to the goal of leaving no learner behind (UNESCO, 2000; United Nations, 2015).

This study has several limitations. Since it is based on document analysis and policy review, it does not directly measure students' learning outcomes, emotional experiences, or long-term transitions into higher education and employment. The analysis focuses on the policy and institutional meaning of VR schooling rather than its direct empirical effects on individual students. Future research should include interviews with students, teachers, parents, and school administrators to examine how VR schooling is experienced in practice. Further studies could also compare Japan's model with other ICT-based alternative education systems in Southeast Asia to identify which elements are transferable and which require local adaptation.

This study argues that Japan's VR-based schooling should be understood as a meaningful case of student-centered digital transformation. Its significance lies in its potential to restore educational capabilities for students excluded from mainstream schooling. Through the Capability Approach, the study shows that VR schooling can expand access, support continuity, reduce social risk, strengthen institutional recognition, and open future educational and career pathways. These elements suggest that technology can contribute to educational equity when it is designed as a means of expanding human freedom rather than as an end in itself.

The paradigm of "learning without walls" captures the central argument of this paper. The walls that prevent students from learning are physical, social, psychological, geographic, institutional, and digital. Japan's VR schooling model shows that ICT-based education can help dismantle some of these barriers when supported by inclusive policy design and formal recognition. For Japan and for other countries seeking to achieve SDG 4, the challenge is to ensure that digital transformation expands real opportunities for learners who have been left outside conventional pathways. In this sense, VR-based education can become a tool for building more inclusive, sustainable, and capability-centered education systems.

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