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Enhancing disaster risk reduction competencies among school educators: an academic hub and certification initiative for prospective teachers

Takashi Oda[1,2,*], Tomonori Ichinose[2]
[1]Graduate School of Arts and Sciences, The University of Tokyo, Tokyo, Japan
[2]Disaster Risk Reduction Learning Institute for Educators, Miyagi University of Education, Sendai, Japan

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***Corresponding author**
Takashi Oda
Graduate School of Arts and Sciences, The University of Tokyo, Tokyo, Japan
Tel: +81-3-5454-6254
E-mail: oda@humgeo.c.u-tokyo.ac.jp

ORCID
Takashi Oda
https://orcid.org/0000-0002-5990-7796
Tomonori Ichinose
https://orcid.org/0000-0003-1270-4665

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Abstract

The establishment of an academic hub and certification initiative for prospective teachers presents a viable solution to address gaps in disaster risk reduction (DRR) education by offering structured and comprehensive training. Miyagi University of Education (MUE), situated in Sendai, Japan, a region affected by disasters, has been at the forefront of promoting DRR education across teacher training universities nationwide. This study explores the role of a university hub in facilitating the implementation of DRR education and examines the foundational organization established within MUE and its collaborative efforts with related institutions. The integration of DRR education into teacher training courses is introduced, and the DRR education certification system initiated by MUE is elaborated. The curriculum includes a foundational course on school DRR delivered in an omnibus-style format by faculty across multiple disciplines, enabling students to approach DRR from interdisciplinary perspectives. Under this system, students participate in DRR educational activities, and their learning outcomes are certified at beginner and advanced levels, addressing both content-related and operational challenges. The study highlights the ongoing challenges and initiatives necessary to sustain a university's qualification system, including monitoring students' progress, ensuring coherence and balance of learning content across courses, and developing effective class-management strategies. The study aims to inspire similar institutionalization efforts in other educational contexts while leveraging unique factors, such as proximity to disaster-affected areas and partnerships with relevant organizations. It further examines the foundational organization established within MUE and its collaborative efforts with related institutions. This study introduces the integration of DRR education into teacher training courses and elaborates on the DRR education certification system initiated by MUE. Under this system, students participate in DRR educational activities, and their learning outcomes are certified at beginner and advanced levels, thereby addressing both content-related and operational challenges.

Keywords: disaster, competencies, pre-service, teacher training, certification, Great East Japan Earthquake

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Introduction

This study explored implementing disaster risk reduction (DRR) education in pre-service teacher training programs, including establishing organizational structures, allocating staff, developing curricula, and instructional methodologies. It also investigates the necessity for certification in this context. The overarching goal is to analyze the evolution of systems established over the past decade at an only teacher training national university in regions affected by the Great East Japan Earthquake, offering insights applicable to similar initiatives globally.

To examine how a DRR education and certification system can be institutionalized within a university of education, this study analyzes the case of Miyagi University of Education (MUE) through five interrelated dimensions: (1) institutional background and motivation, (2) curriculum development, (3) certification framework and competency structure, (4) instructional design and pedagogical strategies, and (5) internal and external collaboration.

These dimensions were selected based on deliberations within MUE's Academic Hub and reflect the multifaceted nature of DRR education, which requires alignment among institutional policies, curriculum content, instructional practices, and stakeholder partnerships. In particular, the inclusion of "instructional design and pedagogical strategies" as an independent perspective stem from MUE's commitment to bridging foundational knowledge acquisition and applied competencies. While all students receive core instruction through lecture-based classes that provide conceptual and theoretical grounding, the program also incorporates experiential and inquiry-based learning, including off-campus fieldwork that leverages MUE's proximity to disaster-affected communities. This pedagogical emphasis is further supported by an interdisciplinary instructional team whose diverse professional backgrounds allow for varied and contextually grounded teaching methods.

While grounded in the specific case of MUE, these five perspectives are not exclusive to this context. They may serve as useful reference points for other institutions aiming to develop or benchmark DRR education and certification initiatives, especially those situated in disaster-prone regions or seeking to build transdisciplinary, practice-oriented teacher preparation programs.

The main aim was to study how these systems have changed over the last 10 years in a national teacher-training university located in areas affected by a major earthquake in Japan in 2011. These findings could help with similar efforts in other parts of the world.

The Great East Japan Earthquake, which resulted in nearly 20,000 casualties, prompted global reassessment of DRR mechanisms. The creation of the Sendai framework for disaster risk reduction 2015–2030 (SFDRR) was a pivotal outcome of the Third United Nations World Conference on Disaster Risk Reduction in Sendai, Miyagi Prefecture. This framework advocates tangible measures and emphasizes the importance of fostering a sustainable society and achieving DRR and mitigation through intangible aspects.

Following the earthquake, there was a heightened focus on DRR in schools, particularly because of the tragic loss of 74 children and 10 teachers from the tsunami that ensued. This tragedy occurred in Miyagi prefecture where MUE is located garnered widespread media attention and led to scrutiny of the local government's response and subsequent legal actions. The need for enhanced DRR management and education in schools has become evident, prompting significant reforms [1].

Attention shifted towards the DRR knowledge and expertise of teachers responsible for ensuring school safety. Many aspiring teachers lacked sufficient exposure to DRR education in their training programs in the past. Although some provisions exist for current teachers, they are often inadequate to address the comprehensive needs of DRR education. Despite concerted

efforts, the challenges in implementing comprehensive DRR education and school safety measures in Japan remain significant. The Okawa Elementary School Accident Investigation Committee's recommendations highlight the critical need to integrate environmental and DRR education into teacher training curricula as mandatory subjects. This approach aims to equip future educators with the knowledge and skills necessary to effectively prepare students for potential disasters and ensure their safety in emergencies.

The government's School Safety Promotion Plan [2], updated quinquennially, further reinforces the importance of enhancing DRR education and teacher training. By emphasizing these aspects through certification standards for pre-service teaching courses, the plan seeks to create a more robust framework for national school safety. Although the full impact of these initiatives is yet to be determined, they represent a significant shift towards prioritizing school safety and disaster preparedness in the education system. These efforts reflect a growing recognition of the vital role teachers play in safeguarding students and the need for systematic nationwide approaches to DRR in educational settings.

Considering these policies, it is anticipated that Japanese universities will intensify their efforts to enhance DRR education. In the aftermath of disasters, certain universities are pioneering initiatives to promote DRR education within teacher-training programs. For instance, the Hokkaido University of Education offers a university-wide collaborative subject, "Children, Community, and DRR Education (Crime Prevention)," which has been available since 2005. Similarly, the Faculty of Regional Education and Culture at Yamagata University implemented a mandatory course titled "Fundamentals of School DRR to Become a teacher" for elementary school teacher-training students in 2015, with a significant focus on Earth science content. Moreover, other national universities, such as Wakayama University, Iwate University, and Fukushima University cover earth science and DRR in their respective courses, albeit not as compulsory subjects. Yamagata University Graduate School of Teacher Education introduced a compulsory "School Safety and DRR Education" course since its inception in 2009. However, efforts to certify qualifications across multiple faculty educational subjects have not yet been pursued. Additionally, Iwate University offers "School Safety and DRR Education" as a mandatory subject for obtaining a teaching license, alongside an elective course on "Iwate's Recovery and Education," addressing earthquake recovery and DRR [3].

Given its status as a teacher-training university situated in a region directly impacted by the 2011 Great East Japan Earthquake, MUE offers a particularly relevant and contextually grounded case through which to explore the institutionalization of DRR education in pre-service teacher preparation programs.

This study is grounded in participatory action research, wherein the authors, serving as faculty members engaged in the design and implementation of MUE's DRR certification system, undertake a critical reflection on institutional processes, challenges, and insights gained. Rather than analyzing the initiative from an external standpoint, the study draws upon firsthand data and practical insights, including internal policy documents, curriculum materials, records of program development meetings, and feedback from participating students and faculty. Both authors A and B were members of MUE's steering committee responsible for designing a new hub for DRR training, and both subsequently served as Deputy Director-General of the institute upon its establishment, with author A serving from 2019 to 2022, and author B from 2022 to the present.

By systematically documenting and analyzing these experiences, the study aims to contribute to both the academic understanding and the practical design of DRR competency frameworks in teacher education.

After reviewing the related studies in the following Chapter, it first outlines Japan's teacher training system and universities of education to support MUE's implementation of DRR education (Chapter 3). It further examines the foundational organization established at MUE and its collaborative efforts with related institutions. Chapter 4 introduces DRR education in teacher training courses, while Chapter 5 elaborates on the DRR education certificate issuance system initiated by MUE. This system involves students participating in DRR education activities, with their learning outcomes categorized into beginner and advanced levels, addressing both content and operational challenges.

Literature Review

The enhancement of DRR competencies among school educators is a critical initiative supported by extensive research. Studies have highlighted the importance of equipping educators with the necessary skills and knowledge to effectively teach and implement DRR strategies in schools [3–10]. However, these studies also revealed a range of challenges, including a lack of teaching materials on specific disaster-related topics [4], the need to and challenges in integrating disaster subjects into curricula [5], deficiencies in risk assessment implementation [6]. These findings indicate that while progress has been made in integrating DRR into schools, educators still require additional support and specialized training in key areas.

Among recent efforts to enhance disaster preparedness among educators, the Interdisciplinary Disaster Education Program (IDEP) [7] offers a robust example of targeted teacher training. The study employed a mixed-methods design to assess the impact of IDEP on teachers' disaster literacy, focusing on cognitive, affective, and behavioral dimensions. Results indicated statistically significant improvements particularly in behavioral tendencies and emotional readiness for disaster situations, though cognitive gains were less pronounced. These findings suggest that interdisciplinary and experiential approaches—such as simulations, field activities, and scenario-based learning—can meaningfully contribute to cultivating disaster-responsive attitudes and practices among educators. As mentioned, the 2011 Tohoku disaster called for the need to systemically train pre-service and in-service teachers through university education as well as national and local training programs [8]. Additionally, a pilot study [9] was conducted in Japan involving 143 pre-service teachers and developed an introductory disaster training program emphasizing the dual role of educators as both teachers and emergency shelter managers. The study found statistically significant gains across cognitive, affective, and psychomotor domains based on Bloom's taxonomy. Notably, the training promoted vocabulary convergence and clarity in describing post-disaster responsibilities, thereby supporting more effective communication with community stakeholders. These improvements are especially important given that most participants lacked prior disaster experience or training. The results highlight how even a short-duration intervention (approximately 90 minutes) can enhance awareness and readiness among aspiring teachers and lay the foundation for more advanced DRR education. Such programs underline the urgent need for training initiatives that address not only classroom management during disasters but also responsibilities related to school shelter operations and coordination with local residents. However, the authors emphasize that the primary role of teachers during emergencies is to ensure the safety of their students and to resume educational services as quickly as possible, rather than being directly involved in managing evacuation shelters.

In addition to structured training programs for teachers, studies on students' disaster literacy reveal significant challenges in awareness and preparedness. A large-scale survey conducted at

Catanduanes State University in the Philippines found that while many students demonstrated a basic understanding of disaster-related concepts, substantial gaps remained in their awareness of preparedness measures, evacuation procedures, and localized risk perception [10]. Over half of the students were uncertain about their vulnerability to natural hazards, lacked confidence in their current shelter's resilience, and had limited participation in disaster preparedness drills or training. These findings underscore the critical need for strengthening DRR education at the secondary and tertiary levels—not only through curricular integration but also through teacher capacity-building and frequent, community-based experiential learning opportunities. The study concluded that effective DRR implementation requires not only student awareness but also systematic support for educators, who serve as key agents in translating DRR principles into classroom practice.

The findings highlight the necessity for a comprehensive approach to DRR education that encompasses both teacher training and student engagement. The establishment of academic hubs and certification frameworks, as discussed in this study, can facilitate the institutionalization of DRR competencies within teacher education programs, thereby ensuring a more systematic and sustainable approach to disaster preparedness. By integrating structured training programs with experiential learning opportunities and community-based initiatives, educators can better prepare themselves and their students to address the challenges posed by natural hazards.

Establishment of Centers at Japanese Universities for Teacher Training

Structure of the Japanese teacher training system and certification process

In Japan, pre-service teacher training is typically conducted at four-year university. Under an "openness" model in the teacher training system, individuals can attain the necessary credits for acquiring a teaching license without mandatory enrollment in the Faculty of Education. For instance, prospective junior high school social studies teachers may pursue studies in the social studies department of the Faculty of Education, or they may opt for specialized courses in faculties, such as Letters or Economics, supplemented with specialized teaching courses. Completing teaching practices at a university-affiliated school or a cooperating school, along with caregiver training, is a prerequisite for meeting the licensing criteria. Obtaining a teaching license does not guarantee employment, as job placement relies on passing the teacher employment examination, leading to appointments as public schoolteachers.

The Educational Personnel Licensing Act was revised in November 2016, followed by enforcement of regulations in November 2017, marking the first comprehensive review of course certification requirements in approximately two decades. Notably, the revised curriculum now includes provisions for "social, institutional, or management matters related to education," encompassing community-school collaboration and school safety responses. In August 2016, establishing the "Study Group on the Idea of the Core Curriculum for Teacher Training Courses" led to the proposal of a core curriculum. This core-curriculum outlines specialized subjects pertinent to the teaching profession, emphasizing areas closely linked to school safety, including "Collaboration between schools and local communities" and "Response to school safety." Although the overarching aim is to develop fundamental skills in educational systems and management, specific objectives and outcomes have been defined [11].

Although the revised curriculum mandates courses on fundamental educational understanding, including aspects of school safety, the precise details regarding their significance and content

remain unspecified. Consequently, while including school safety content in the new curriculum marks a significant advancement, its operational efficacy across universities remains uncertain. As part of the "Third School Safety Promotion Plan" (March 2021 Cabinet decision) [12], the central government emphasized enhancing school safety learning, improving training, and providing information for in-service teachers. The government is anticipated to continue exploring strategies to assess the practical implementation, content presentation, and evaluation of professional development in school safety, encompassing DRR, at the teacher-training stage.

MUE is one of Japan's 11 national teacher-training universities and is the sole institution in the Tohoku region. Positioned within the disaster-affected area of the Great East Japan Earthquake, the MUE's initiative identifies specific processes, challenges, and operational methodologies for integrating DRR education into teacher training programs, serving as a valuable model for future endeavors.

Evolution of hub function - transitioning from educational reconstruction support center to disaster risk reduction education and research organization

Following the Great East Japan Earthquake in March 2011, MUE swiftly established the Center for Disaster Education and Recovery Assistance as an affiliated education and research body in June of that year. The center embarked on reconstruction support to address educational challenges, such as financial stability and psychological well-being.

In April 2017, five years after the earthquake, MUE restructured it to the Center for Disaster Education and Future Design. Building on the insights gained over the preceding five years, their commitment to supporting school education in disaster-affected regions and disseminating lessons learned internationally and domestically remains steady. MUE actively engaged with relevant stakeholders and extended our efforts to advance DRR education and school safety.

As the sole national teacher-training institution in the disaster-affected region, the center underwent further reorganization, establishing the 311 Disaster Risk Reduction Learning Institute for Educators (311 DRR-LIFE). Following the university's budget request to the Ministry of Education, Culture, Sports, Science, and Technology (MEXT), a portion of the personnel expenses requested for its formation were approved, facilitating its establishment.

Building on our university's endeavors in disaster-affected areas, the institute intensified its outreach efforts for students and educators, focusing on lifesaving DRR education. The overarching objective was to establish a nationwide training hub for school DRR education, transmitting lessons from earthquake disasters, particularly targeting regions vulnerable to future seismic events such as earthquakes in the Nankai Trough and the Tokyo metropolitan area. To enhance teachers' disaster preparedness, MUE is enhancing existing graduate programs for current educators in disaster-affected regions and augmenting DRR components in teacher-license renewal courses [3,8,13].

External cooperation and collaborative partnerships

As a modest local national university, MUE recognizes the importance of collaborating with external organizations to cultivate effective DRR expertise. To this end, MUE has formalized partnerships with multiple entities through agreements and joint projects, as summarized in Table 1. These partnerships range from local school boards and municipal governments to national ministries and international agencies.

Notably, based on a formal agreement signed with the Tohoku Regional Development Bureau of the Ministry of Land, Infrastructure, Transport and Tourism (MLIT), MUE's Academic Hub

and its graduate school collaborated to develop disaster education materials focused on wind and flood disasters. These materials—designed and tested with in-service teachers enrolled in the graduate program—are aligned with elementary and junior high school science curricula. A teacher's guide and student worksheets were created and published on a dedicated public website (Fig. 1).

In addition, MUE has co-hosted multiple teacher training workshops in collaboration with the National Research Institute for Earth Science and Disaster Resilience (NIED) and the Sendai City Board of Education, focusing on the use of web-based Geographic Information Systems (GIS) for school-based disaster education.

These collaborations reflect MUE's position not only as a site of teacher education, but also as a regional hub for DRR knowledge co-creation and dissemination.

In addition to domestic partnerships, MUE has actively pursued international collaborations to promote disaster education and teacher training across the Asia-Pacific region.

In January 2018, MUE signed an interdepartmental agreement with the Disaster Preparedness and Mitigation Management program at the Asian Institute of Technology, an international graduate institution near Bangkok, Thailand. This partnership facilitated exchanges in

Fig. 1. From the disaster risk reduction Education Booklet. (Left) Students tested how water moves through sand, mountain soil, and asphalt. They observed that mountain soil held water slowly, similar to a dam. The asphalt did not absorb water, causing it to run off. The teacher asked, "Where does the water go in the city?" Students learned how land types affected the floods. (Right) Effective use of web-GIS hazard mapping is explained. GIS, Geographic Information Systems. Adapted from Miyagi University of Education [19] with permission of the copyright holder.

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curriculum design and research on DRR competencies.

Furthermore, MUE has been an active member of ProSPER.NET—an international consortium of graduate schools dedicated to Education for Sustainable Development, coordinated by the United Nations University Institute for the Advanced Study of Sustainability (UNU-IAS). Through this network, MUE has contributed to regional discussions and pilot initiatives for advancing DRR education and teacher capacity-building across multiple hubs in the Asia-Pacific region.

Institutional collaboration outcomes and educational applications

Building on the external cooperation structures described above, MUE has achieved several notable outcomes through its collaborative framework. These efforts have gone beyond formal agreements and joint research to include the development of practical DRR teaching materials and in-service training programs.

For instance, in partnership with the Tohoku Regional Development Bureau of the MLIT, MUE's graduate school conducted collaborative research involving in-service teachers. This project led to the creation of instructional materials focused on wind and flood hazards for elementary and junior high schools, including teacher's guides and student worksheets (Fig. 2). These materials were made publicly available through an online platform and have since been used in schools across the region.

In addition, MUE has hosted professional development programs with partners such as the NIED and the Sendai City Board of Education. These programs focused on applying GIS to disaster education, responding to the recent introduction of mandatory geography education in Japanese high schools.

These collaborations reflect the university's role not only as a training institution but also

Fig. 2. Field Visit to the Arahama Elementary School Earthquake Ruins by MUE Undergraduate Students (September 21, 2019). As part of the School DRR Basics course, students visit disaster-affected sites such as Arahama Elementary School in Sendai to deepen their understanding of disaster risk reduction (DRR) through real-world observation and reflection. Photo by Oda T.

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Table 1. Status of conclusion of inter-organizational collaboration agreements on the theme of disaster risk reduction education and awareness

Institution name	Year	Types
Asian Institute of Technology Disaster risk reduction and Mitigation Management Program (Thailand)	2018	International Interdepartmental
Tohoku University International Research Institute of Disaster Science	2018	Interdepartmental
Ministry of Land, Infrastructure, Transport and Tourism Tohoku Regional Development Bureau	2019	Inter-organizational
Sendai City/Sendai City Board of Education	2019	Inter-organizational
Research Institute for Earth Science and Disaster risk reduction Disaster Process Research Division	2020	Interdepartmental
Minamiawaji City, Hyogo Prefecture	2021	Inter-university

as a regional hub for DRR knowledge co-production and dissemination. Table 1 provides an overview of the key partner institutions and the formats of cooperation that supported these outcomes.

Pre-Service Curriculum

Organizing competencies

The significance of integrating DRR education into teacher training programs has been emphasized in recent years. However, the nationwide implementation remains insufficient. This section elucidates the "School Disaster Risk Reduction and Safety Meister" initiative established by the MUE, aimed at enriching educational opportunities concerning DRR. Understanding the origin of this system and its early implementation are crucial for contemplating advanced qualifications, which will be discussed later.

In the aftermath of the earthquake, the faculty and staff of MUE committed themselves to the reconstruction of the affected areas and the dissemination of disaster risk reduction (DRR) education. Since 2013, merely two years following the Tohoku disaster, the course "Environmental and DRR Education" has been mandatory for all first-year undergraduates, thereby ensuring foundational knowledge of DRR and school safety across various disciplines [14]. The "DRR Education Review Subcommittee" was established to systematize student guidance, comprising seven university educators from diverse fields such as school management, geography, and electronics engineering. The university's Third Medium-term Plan, required as a national university corporation and submitted in March 2016, aimed to enhance learning opportunities related to school safety and DRR. By the fiscal year 2017, the objective was to equip students with the necessary skills to promote school safety and DRR education, supplemented by experiential activities and public lectures. Completion of the program certifies students as proficient instructors in DRR education and management, which involves cultivating practical leadership skills relevant to safety education and organizational activities.

Certification entails completing designated courses and engaging in extracurricular activities. A survey conducted in July 2017 assessed existing subjects related to DRR and school safety. Faculty members provided insights into the available resources and proposed new subjects and qualification systems. The survey garnered responses from 29 undergraduate and graduate subjects, revealing a diverse coverage of school safety-related topics.

Furthermore, the MUE offers DRR courses and certifications to students and the public by leveraging its proximity to disaster-affected coastal areas and faculty expertise (Fig. 2). Prioritizing this endeavor, the university embarked on constructing its own certification framework, as detailed below.

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The organization of the certification system is outlined in a leaflet titled "DRR Education and School Safety at MUE," released in March 2017. This document delineates the expected scope of school DRR education for the MUE students.

"MUE believes safeguarding lives, particularly children's, is a fundamental duty for all educators, irrespective of school type or subject. In addition to compensating for these deficiencies, MUE is committed to further training teachers with distinct strengths in DRR and school safety. MUE encourage students to utilize this pamphlet as a guide to address the challenges encountered in the educational domain and to seize various learning opportunities with fervor." (The translated excerpts from the Leaflet).

Drawing from this ethos, MUE incorporated curriculum guidelines from the MEXT [15], key competencies [16] outlined by the Organisation for Economic Co-operation and Development (OECD), the "Comprehensive School Safety" [17] framework by United Nations Office for disaster risk reduction (UNDRR), and the cluster approach [18] by United Nations Office for the Coordination of Humanitarian Affairs (OCHA), among other public resources concerning school safety and disasters. MUE's project team identified the expected roles of educators and institutions, defining the qualifications and capabilities pertinent to DRR education and school safety. This compilation, titled the "Comprehensive Approach of MUE," was illustrated and distributed to students and faculty members (Fig. 3).

The selection of the four core competencies—1) leadership, 2) utilization of knowledge and information, 3) collaboration, and 4) emotional care and consideration—was informed by a triangulated process that integrated empirical evidence, international frameworks, and internal deliberation.

First, the need for these competencies was underscored by post-disaster case analyses, particularly lessons learned from the case of Okawa Elementary School, which highlighted the importance of proactive decision-making, and multi-stakeholder collaboration.

Second, the competencies were aligned with internationally recognized frameworks, including the OECD's Key Competencies and the Comprehensive School Safety Framework developed by

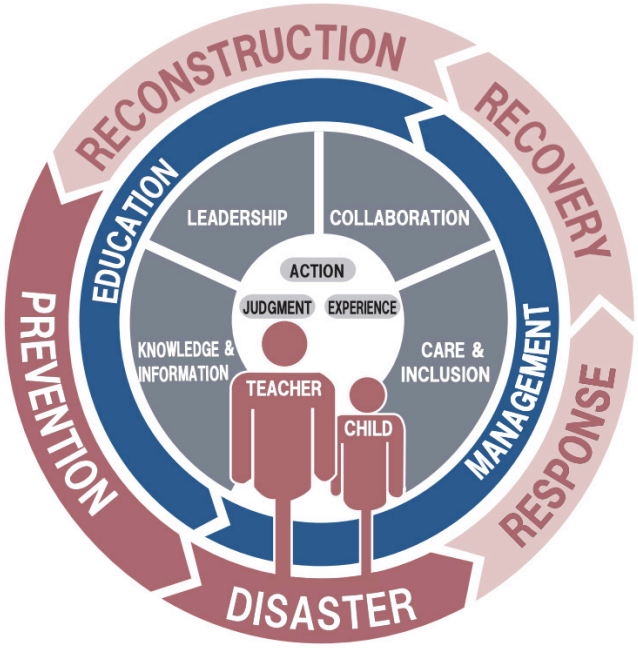

Fig. 3. Miyagi University of Education (MUE)'s comprehensive approach for school safety.

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the UNDRR, which was known at the time as the United Nations International Strategy for Disaster Reduction (UNISDR).

Third, a series of deliberations by an interdisciplinary working group at MUE comprising faculty members from geography, science education, educational policy, psychology, and special needs education reviewed the curriculum in light of Japan's national teacher training standards and emerging needs in disaster and safety education.

Through this process, the four competencies were identified as essential to equip future educators with the capacity to respond to both instructional responsibilities (e.g., DRR education in the classroom) and institutional roles (e.g., school safety management and emergency leadership) required during disaster situations.

These competencies also reflect the dual aspects of school-based DRR: DRR education, which aims to equip children with the ability to safeguard themselves and others; and DRR management, which empowers teachers and staff to protect children during emergencies. Considering the evolving challenges across different phases, such as daily life (pre-disaster) → disaster occurrence → emergency response/recovery → return to daily life → ..., MUE identified four essential qualities and abilities that are crucial for students aspiring to become educators:

1) Leadership: The capacity to guide children (as teachers) and to make independent decisions and take action (as children).
2) Utilization of knowledge and information: The ability to gather, analyze, and apply information, knowledge, language, and tools independently.
3) Collaboration: The capability to collaborate with individuals from diverse backgrounds, including parents, residents, NGOs, governmental bodies, and emergency services.
4) Emotional care and consideration: The skill to address children's emotional needs and foster inclusive classroom and school environments, ensuring that children in challenging circumstances are not marginalized.

Guided by these frameworks, the establishment of the "School DRR and Safety Meister" system, detailed subsequently, was realized by organizing and structuring various classroom subjects and extracurricular activities.

Construction of curricula

Following the Great East Japan Earthquake, MUE undertook a comprehensive review of its educational curriculum, aiming to augment learning opportunities concerning school DRR in response to seismic events. In 2013, an obligatory undergraduate course titled Environmental and DRR Education (2 credits, 30 hours) was introduced and made mandatory for all first-year students. This course encompasses fundamental aspects of environmental studies, disaster management, and perspectives on emergency response strategies. The objective is to instill students with a foundational understanding of DRR by incorporating experiential learning, and awareness of contemporary safety education practices [8].

The course, now titled School DRR Education Basics, is structured as a 15-session curriculum and is delivered in an omnibus-style format. Faculty members from a range of disciplines including geography, psychology, health sciences, educational policy, and special needs education, contribute lectures based on their respective areas of expertise.

This interdisciplinary instructional design allows students to approach DRR education from multiple perspectives, helping them understand the scientific, psychological, institutional,

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and ethical dimensions of disaster preparedness and school safety. Although the course is not conducted via team-teaching, the diversity of instructors fosters integrative thinking and a broader understanding of DRR as a cross-cutting theme in education.

Subsequently, in 2020, two additional compulsory elective courses were introduced: "Introduction to School DRR Education" (2 credits, 30 hours) and "School DRR Education Exercises" (2 credits, 30 hours, with a partial concentration).

Furthermore, several modifications have been made as part of the significant overhaul of the MUE curriculum slated for implementation by 2022. Specifically, "Environmental and DRR Education" has been renamed as "School DRR Education Basics (Table 2)" This course offers a foundational exploration of DRR within the context of school education, with a particular emphasis on lessons learned from the 2011 Great East Japan Earthquake. It aims to equip aspiring teachers with the knowledge, awareness, and ethical perspective necessary to foster safer and more resilient school communities. Structured in 15 sessions, the program is collaboratively delivered by faculty from diverse academic fields including geography, psychology, education, and health sciences. The all first-year students must take this course and they are introduced to various dimensions of DRR, such as the scientific basis of natural hazards, emergency management in schools, the psychological and emotional impact of disasters on children, and inclusive approaches that consider the needs of students with disabilities. The course also addresses educational policy and the ethical responsibility of educators in preserving disaster memory and promoting a culture of preparedness. Through interdisciplinary lectures, case-based learning, and discussions grounded in real-world experiences, students gain a multidimensional understanding of disaster risk and its relevance to their future professional roles. By the end of the course, students will be able to approach DRR not only as a safety measure, but as an integral part of educational practice and social responsibility.

Additionally, "Introduction to School DRR Education" evolved into "School Safety Management and DRR Education," and "School DRR Education Exercise" is retitled "School DRR Applied Practical Exercise," with continuation. Notably, the MUE frequently integrates DRR-related content within both compulsory and elective courses and optional subjects in the teacher training curriculum, as delineated in Table 3.

Table 2. Undergraduate compulsory subject "school disaster risk reduction education basics"

Times	Contents	Faculty's field of study
1	Refracting 311 (Part 1) Are the earthquakes past issue?	Media study
2	Refracting 311 (Part 2) How did schools respond?	Media study
3	Refracting 311 (Part 3) Who takes responsibility to pass the disaster memory?	Media study
4	Educational efforts tackling for the increasing worldwide disasters	International education
5	Learning from disaster cases in Japan and the world	Physical geography
6	Types, processes, and causes of disasters	Physical geography
7	The basics of disaster risk reduction management learned from the Okawa Elementary School incident	Human geography
8	Evacuation drills and shelter management	School education
9	Understanding and preparing for disaster risks	Physical geography
10	Disasters and the mind: from a psychological perspective	Psychology
11	Toward advanced school safety: school health, educational health, and school disaster risk reduction	Health science
12	Toward the enhancement of school disaster risk reduction education practices	Psychology
13	Disaster response from the perspective of people with disabilities	Special needs education
14	From the perspective of educational administration	Educational policy
15	Conclusion	

Table 3. **Undergraduate subjects related to disaster risks and school safety**

Main subjects	Compulsory	Elective compulsory
School disaster risk reduction education basics	○	
First grade teaching practices excicise	○	
Health and exercise theory	○	
Research on curriculum (including special activities)	○	
School safety management and disaster risk reduction education		○
School disaster risk reduction applied practical exercise		○
Educational systems and management		○

A curriculum dedicated to DRR education was implemented at the professional graduate schools that grant professional master's degree of teaching. This course entails analyzing earthquake-related records, reports, and legal cases; observing school evacuation drills; devising school safety plans informed by local disaster history; and exploring methods to utilize earthquake disaster sites for educational purposes. Both graduate and recent undergraduate graduates participated in this course, fostering the capacity to comprehend DRR from various angles and implement strategies in collaboration with the local community. Notably, teacher-training institutions collaborated with the partners listed in Table 1 to develop teaching resources and to design curricula [3,8]. One of the notable outcomes of the university's graduate school and 311 DRR-LIFE, in collaboration with external organizations, was the joint development of disaster education materials focusing on wind and flood disasters. Based on a formal agreement signed with the Tohoku Regional Development Bureau of the MLIT, MUE conducted collaborative research involving in-service teachers enrolled in the graduate program. This initiative resulted in the creation of teacher's guide and learning materials for disaster-related instruction in elementary and junior high school science curricula [19]. These materials were compiled and made publicly accessible through a dedicated website (Fig. 1). This initiative has been recognized as a highly commendable and proactive effort in external evaluations, including the National University Corporation Evaluation and the accreditation review of the professional Graduate School of Teacher Education.

Systematization of Grade-Based Certification: School Disaster Risk Reduction Safety Meister System

Structuring the school disaster risk reduction safety meister certification system

A curriculum dedicated to DRR education was implemented at teachers' graduate schools. This course entails analyzing earthquake-related records, reports, and legal cases; observing school evacuation drills; devising school safety plans informed by local disaster history; and exploring methods to utilize earthquake disaster sites for educational purposes. Both graduate and recent undergraduate graduates participated in this course, fostering the capacity to comprehend DRR from various angles and implement strategies in collaboration with the local community. Notably, teacher-training institutions collaborated with the partners listed in Table 1 to develop teaching resources and to design curricula.

The "Beginner Certification" represents the foundational level within the Miyagi University of Education School DRR Safety Meister system. It encompasses the following four components: recognizing students' accumulated learning and experience in DRR.

- Fundamentals of DRR: Completion of the compulsory course "School DRR Basics".
- Lifesaving practice: Completion of an assignment within the compulsory course "First Grade Teaching Practices".
- Visit to a disaster-affected area: Participation in a university-organized visit to a disaster-affected site.
- Beginner report (final assignment): Independent preparation and submission of a reflective report.

The 311 DRR-LIFE certification system was initially conceived as a three-tiered structure—basic, intermediate, and advanced—and discussions were held regarding its requirements and implementation procedures [3]. However, subsequent deliberations led to the decision to adopt a two-tiered structure consisting only of the basic and advanced levels. One of the key reasons behind this shift was the university's medium-term objective to significantly increase the number of DRR Meisters. Many students were unable to enroll in the courses initially envisioned as part of the intermediate certification due to scheduling conflicts. Furthermore, in the teacher training program, many students pursue multiple qualifications outside their primary subject licenses, such as those for kindergarten, special needs education, high school, and school librarianship. In light of these circumstances, there was a shared understanding that the certification process should not place an excessive burden on students, which ultimately led to the simplified two-tier system.

The Beginner Certification is defined as the acquisition of basic knowledge and skills related to disaster prevention and school safety. At this level, candidates are expected to hold a teaching license in their university major field when applying for teacher recruitment examinations. In addition, they are encouraged to present a DRR Meister certificate as evidence of their foundational competency in school-based DRR education.

In 2024, MUE introduced the Advanced Certification to further strengthen the DRR competencies of teacher candidates and to prepare them for leadership roles in school safety and disaster preparedness. This advanced level builds upon the basic foundation by incorporating both the acquisition of practical DRR techniques and hands-on teaching experience through the application of learned content.

At the advanced level, candidates are expected to demonstrate leadership potential in DRR education. This includes responsibilities such as coordinating school-wide evacuation drills and serving in roles like DRR Head Teachers, who oversee and guide school-wide safety initiatives.

- DRR experience and practice: Participation in DRR training, empirical activities related to disaster mitigation, and outdoor education programs to develop practical skills.
- Lifesaving course: Completion of one of the following options: a first-aid course (in-person) at a fire station, the Ministry of Internal Affairs and Communications Fire and Disaster Management Agency's online "Advanced Lifesaving Course" (110 minutes), or the Japanese Red Cross Society's "Basic First Aid Course" (4 hours).
- Transmission and instruction experience: Engagement in activities related to the dissemination and instruction of DRR education.

Moreover, by enrolling in the course within the Graduate School of Teacher Education, the MUE students can further enhance their DRR education leadership and organizational management skills pertinent to DRR management.

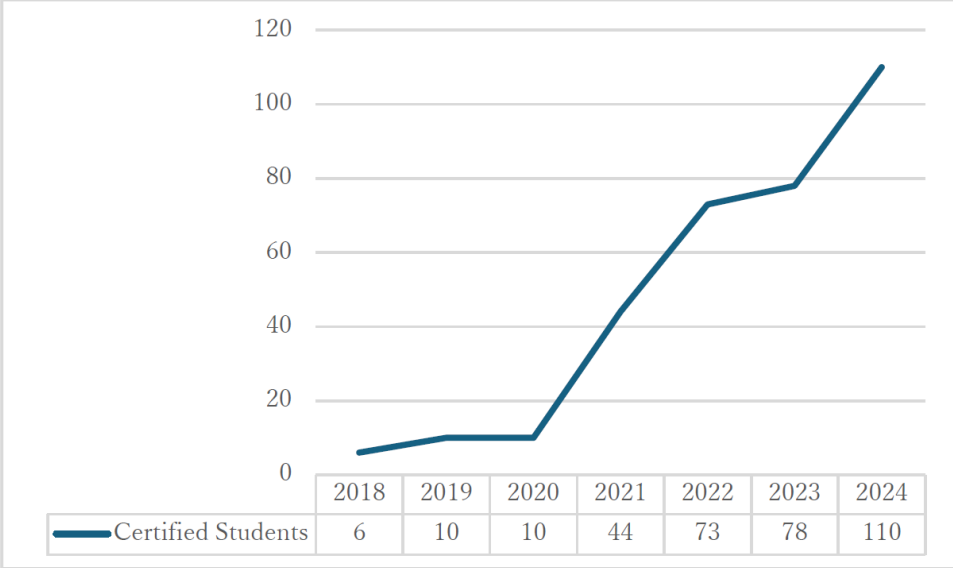

Fig. 4. Annual number of students awarded the beginner-level certification in the School DRR Meister System (2018–2024). DRR, disaster risk reduction. Data Source: Miyagi University of Education.

The number of students earning Beginner-level certification has steadily increased since the system's introduction, reflecting the growing integration of DRR education into the university's teacher training programs (Fig. 4).

Monitoring the impact of disaster risk reduction education on student competencies

To assess the effectiveness of its DRR education efforts, MUE conducts an annual survey of graduating fourth-year undergraduate students who intend to become teachers. Among the key items, students are asked whether they feel they have acquired the necessary competencies to teach school safety and DRR education.

A comparison between the 2020 and 2024 survey results—before and after the curriculum enhancements—reveals an increase in students' self-reported confidence. As shown in Fig. 5, there is a rise in the percentage of students who affirmatively responded that they had acquired these skills.

The survey also includes questions on students' confidence in teaching other interdisciplinary subjects, such as the Sustainable Development Goals (SDGs) and science, technology, engineering, arts, and mathematics (STEAM) education. Interestingly, students consistently reported higher confidence in teaching disaster prevention education than in these other areas, highlighting the relative effectiveness and emphasis of the DRR component within MUE's curriculum (Fig. 6).

These quantitative findings offer tangible evidence that the certification initiative, curriculum reform, and related instructional strategies at MUE have contributed to a measurable improvement in students' disaster education competencies.

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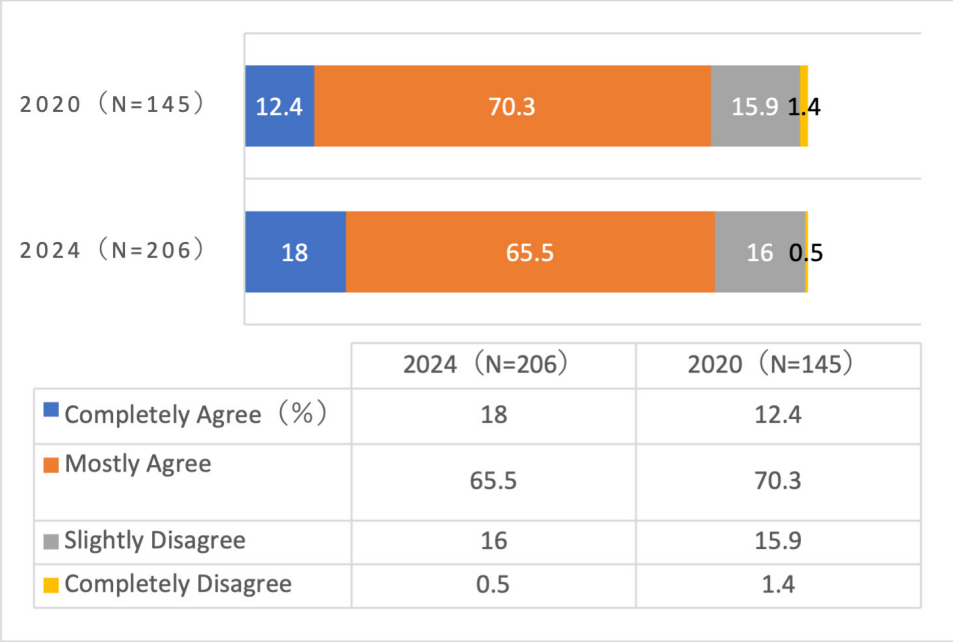
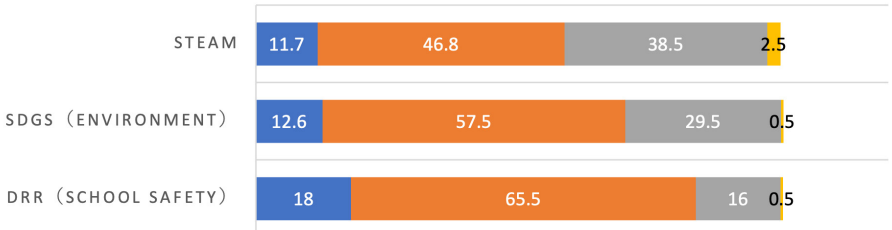


	2024 （N=206）	2020 （N=145）
Completely Agree （%）	18	12.4
Mostly Agree	65.5	70.3
Slightly Disagree	16	15.9
Completely Disagree	0.5	1.4

Fig. 5. Pre-service teachers' confidence in teaching disaster school safety and DRR (2020 vs. 2024 survey results, N=145 and N=206 respectively). DRR, disaster risk reduction. Date Source: Miyagi University of Education.



	DRR （School Safety）	SDGs （Environment）	STEAM
Completely Agree （%）	18	12.6	11.7
Mostly Agree	65.5	57.5	46.8
Slightly Disagree	16	29.5	38.5
Completely Disagree	0.5	0.5	2.5

Fig. 6. Pre-service teachers' self-assessed confidence in teaching DRR, SDGs, and STEAM education (N=206, 2024). Date Source: Miyagi University of Education. DRR, disaster risk reduction and school safety; SDGs, environment and sustainable development goals; STEAM, science, technology, engineering, arts, and mathematics.

Conclusion

This study illustrates the integration of DRR education into university teaching programs in educational institutions in disaster-affected regions following the Great East Japan Earthquake. This elucidates the need to establish a system to enhance DRR competencies among aspiring educators. The key aspects discussed include utilizing university resources for qualification certification, aligning academic subjects and extracurricular activities, and implementing

objective evaluation methods to assess learning outcomes across two certification levels. Consideration should be given to the adoption of similar evaluation mechanisms for different subjects. The implementation of such evaluation mechanisms could provide a standardized framework for assessing DRR competencies across various disciplines. This approach would not only ensure consistency in the quality of education but also facilitate the development of a more resilient and prepared workforce. Furthermore, it could serve as a model for other regions and countries facing similar challenges, promoting global collaboration in DRR education.

Moreover, this study highlights the ongoing challenges and initiatives that are necessary to sustain a university's qualification system (Fig. 7). Monitoring students' progress through class participation and credit acquisition is imperative to assess their understanding of DRR education. To monitor students' progress, MUE adopts a multi-faceted assessment approach. This includes tracking the acquisition of required course credits, maintaining records of participation in designated certification activities, and evaluating reflection reports submitted by students. Instructors supervising field exercises and practical assignments also provide feedback on students' competencies. These mechanisms enable the program to ensure continuous learning and improvement in DRR competencies.

Operational issues, such as ensuring coherence and balance of learning content across courses, require attention. This includes continuously recruiting faculty members with relevant expertise and developing effective class-management strategies. To address these challenges, universities must implement robust evaluation mechanisms that go beyond traditional assessments. Additionally, fostering collaborations with external experts and disaster management agencies can enhance the curriculum's relevance and provide students with real-world exposure to the field.

Another concern is the unclear benefit of obtaining such qualifications. A discussion is needed

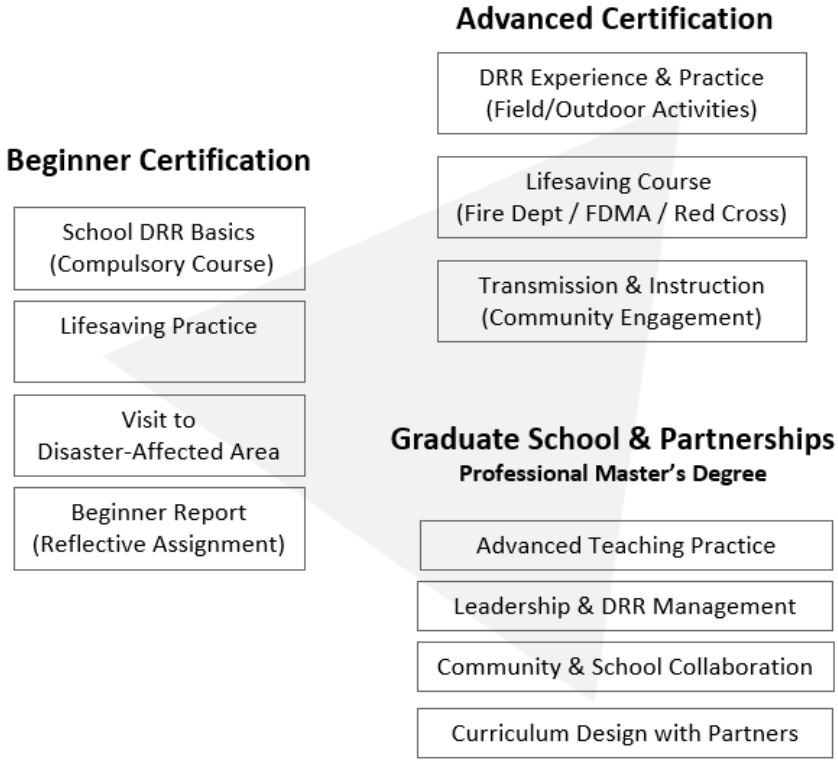


Fig. 7. MUE School DRR Meister System. MUE, Miyagi University of Education; DRR, disaster risk reduction.

to determine the potential advantages of teacher recruitment processes and the subsequent employment conditions. This study aims to inspire similar institutionalization efforts in other educational contexts while leveraging unique factors, such as proximity to disaster-affected areas and partnerships with relevant organizations such as local boards of education.

Unlike conventional DRR qualifications, this study focuses on enhancing practical leadership and management skills specific to school-based DRR. However, an objective evaluation framework for these skills has yet to be developed. Despite Japan's strides in DRR education, there is still room for further development of teacher-training programs.

The establishment of a hub within the teacher university has significantly enhanced collaboration with specialized agencies, such as the Tohoku Regional Development Bureau, resulting in tangible outcomes, including the creation of disaster education guides for teachers. Furthermore, multiple in-service training sessions have been conducted by MUE's 311 DRR-LIFE in conjunction with the professional graduate school. With the introduction of a compulsory geography education course in Japanese high schools in 2022, there has been an increased focus on disaster prevention and the application of GIS. In response to the growing demand for improved disaster education competencies among geography teachers, MUE has also functioned as a training hub by providing professional development programs for in-service teachers, including workshops on the utilization of web-based GIS for disaster education working in partnership with NIED and Sendai City Board of Education [20].

At MUE, 311 DRR-LIFE also plays a key role in international collaboration and outreach. One notable example is the international symposium held during the World Bosai Forum in 2019, in which officials from the Turkish Ministry of National Education and Japan's MEXT were invited to discuss the enhancement of teachers' DRR competencies. This symposium also served as a commemorative event marking the establishment of the DRR Institute highlighting the university's mission as a hub for fostering DRR educators in Japan's teacher training programs. Particularly in Turkey, teacher training modules have been developed using the ADDIE model under a centralized, top-down system, an approach that provides valuable insights for Japan. As mutual exchanges have deepened through JICA initiatives and other international cooperation, the MUE hub has functioned as a platform for advancing dialogue on teacher training and curriculum design, thus contributing to broader global collaboration in disaster education. This collaboration culminated in the publication of a Turkish language book in 2021, which introduced Japan's DRR policies and practices in education. Contributors from Japan participated in the volume, allowing for meaningful knowledge exchange despite the constraints of the COVID-19 pandemic.

The continued exchange of insights into international practices is essential for advancing this field. Further discussions and knowledge sharing are encouraged to deepen understanding and foster progress in DRR education [21].

References

1. Okawa Elementary School Accident Investigation Committee. Okawa elementary school accident verification report [Internet]. 2014 [cited 2025 May 7]. https://www.e-riss.co.jp/oic/pg85.html
2. Ministry of Education, Culture, Sports, Science and Technology-Japan. Guidelines on school safety education [Internet]. 2025 [cited 2025 May 7]. https://www.mext.go.jp/a_menu/kenko/anzen/1419593_00001.htm

3. Oda T, Nashimoto Y, Hayashida Y, Murayama Y, Ashidate Y. Development of disaster education courses in a Pre-Service Teacher Training University: an introduction of a Certificate Program at Miyagi University of Education, Japan. Saf Educ Res 2023;22(2):23-35.
4. Pujianto P, Wasis W. Profile of elementary school science teacher instruction in disaster risk reduction: case study of volcano disaster. J Phys Conf Ser 2018;1006:012013. https://doi.org/10.1088/1742-6596/1006/1/012013
5. Desilia NR, Lassa J, Oktari RS. Integrating disaster education into school curriculum in Indonesia: a scoping review. Int J Disaster Manag 2023;6:263-274. https://doi.org/10.24815/ijdm.v6i2.34867
6. Galvizo RE. The integration of disaster risk reduction education in the ASEAN region: the case of Butuan City, Philippines. SMCC High Educ Res J 2022;9:79. https://doi.org/10.18868/md-v9-a7
7. Şeyihoğlu A, Kartal A, Tekbiyik A, Sezen Vekli G, Birinci Konur K. The design and implementation of a teacher training program for improving teachers' disaster literacy: interdisciplinary disaster education program (IDEP). Probl Educ 21st Cent 2021;79:781-803. https://doi.org/10.33225/pec/21.79.781
8. Oda T. Schools, teachers, and training in risk reduction after the 2011 Tohoku disaster. In: Shiwaku K, Sakurai A, Shaw R, editors. Disaster resilience of education systems: experiences from Japan. Springer; 2016. p. 53-71.
9. Kawasaki H, Yamasaki S, Yamakido M, Murata Y. Introductory disaster training for aspiring teachers: a pilot study. Sustainability 2022;14:3492. https://doi.org/10.3390/su14063492
10. Toyado DM. Awareness of disaster risk reduction (DRR) among student of the Catanduanes State University. Int J Eng Manag Res 2022;12:38-43. https://doi.org/10.31033/ijemr.12.2.7
11. Ministry of Education, Culture, Sports, Science and Technology (Japan). Final report of the central council for education subcommittee on safety education [Internet]. 2008 [cited 2025 May 7]. https://www.mext.go.jp/b_menu/shingi/chousa/shotou/126/houkoku/1398442.htm
12. Ministry of Education, Culture, Sports, Science and Technology (Japan). The third basic plan for the promotion of school safety [Internet]. 2025 [cited 2025 May 7]. https://www.mext.go.jp/a_menu/kenko/anzen/1419593_00001.htm
13. Miyagi University of Education. Miyakyo × educational recovery [Internet]. Aoba Wakaba; 2022. https://bousai-miyagi.sub.jp/bousai-kyoiku/
14. Yoshida T. Reflections on conducting "Environment and DRR Education" course: a case from two-hour lessons on "school safety". Bull Cent Disaster Educ Recovery Assist Miyagi Univ Educ 2015:35-43.
15. Ministry of Education, Culture, Sports, Science and Technology (Japan). School safety materials: cultivating the zest for living through safety education in schools [Internet]. 2025 [cited 2025 May 7]. https://www.mext.go.jp/a_menu/kenko/anzen/1416715.htm
16. Organisation for Economic Co-operation and Development (OECD). The definition and selection of key competencies: executive summary [Internet]. OECD; 2005 [cited 2025 May 7]. https://www.oecd.org/pisa/35070367.pdf
17. United Nations Office for Disaster Risk Reduction (UNDRR). Comprehensive school safety framework 2017 [Internet]. UNDRR; 2017 [cited 2025 May 7]. https://www.undrr.org/publication/comprehensive-school-safety-framework-2017
18. United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA). We coordinate [Internet]. 2025 [cited 2025 May 7]. https://www.unocha.org/we-coordinate

19. Miyagi University of Education; Tohoku Regional Development Bureau, Ministry of Land, Infrastructure, Transport and Tourism (Japan). DRR education booklet: flood and water-related hazards edition [Internet]. 2020 [cited 2025 May 7]. https://drr.miyakyo-u.ac.jp/eduport/
20. Oda T, Ikeda M, Nagata T, Kimura R, Nagamatsu S. Development of a teacher training program for disaster prevention education in high school "general geography". E-journal GEO 2023;18:199-213. https://doi.org/10.4157/ejgeo.18.199
21. Oda T, Suwa S, Kodama M, Ozdamar E. Establishment and dissemination of disaster prevention education system in the Republic of Turkey. Disaster Prev Educ Res 2023;4:63-76. https://doi.org/10.51004/rjde.4.1_63