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DIRECTORATE FOR EDUCATION
EDUCATION POLICY COMMITTEE

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Centre for Effective Learning Environments Board of Participants

REPORT TO OECD COUNCIL ON OECD RECOMMENDATION CONCERNING GUIDELINES ON EARTHQUAKE SAFETY IN SCHOOLS

BOARD OF PARTICIPANTS

To be held at the OECD Conference Centre, Paris
from Monday 16 November at 9.30 a.m. to
Tuesday 17 November 2009 at 1.00 p.m.

This revised paper takes account of remarks made by the CELE Board of Participants.

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Background

1. In July 2005, Council approved the OECD Recommendation Concerning Guidelines on Earthquake Safety in Schools [C(2005)24]. The Guidelines "recommend that Member countries take steps to establish and implement programmes of school seismic safety…based on the principles and taking into account the major elements of such programmes as set out in…the Recommendation". On 10 December 2008, the Secretariat of the Programme on Educational Building (PEB) – which was renamed the Centre for Effective Learning Environments (CELE) in January 2009 – presented an interim report to Council on the efforts undertaken to review actions taken by OECD member economies since the approval by Council [C(2008)211].

2. The interim report noted that despite repeated attempts to engage countries, as of December 2008, only four of the 19 OECD countries with buildings that could potentially suffer damage in the event of an earthquake had responded to the Secretariat's requests for information on how they are taking steps to carry out the instructions of the Recommendation. In response, the Council granted the CELE Secretariat an additional year to gather information before presenting the final report to OECD Council.

3. This paper describes progress made since the interim report to Council in December 2008, and provides an analysis of findings from countries that provided information to the CELE Secretariat on the steps taken to implement the Guidelines.

Progress since the Interim Report

4. In November 2008, a letter was sent to OECD Delegations by the Director for Education, Barbara Ischinger, inviting them to indicate by 22 December 2008, whether they intended to participate in the peer review. On 20 July 2009 the OECD Secretary-General, Angel Gurria, sent a further message to OECD Ambassadors encouraging them to participate in the OECD School Earthquake Safety Review.

5. Since the interim report to OECD Council, OECD non-member economies have continued to use the Recommendation as a reference point for developing comprehensive school earthquake safety programmes:

6. In the wake of the Great Wenchuan earthquake in May 2008, CELE organised a meeting of 25 central, provincial-, city- and county-level officials responsible for reconstruction work in the most affected provinces of Sichuan and Shaanxi, China. The visit, which took place in December 2008, was part of a 10-day International Training Programme on the Post-Earthquake Reconstruction of Public Facilities, which was organised by the China Development Research Foundation (CDRF), with the support of CELE. The programme's objective was to enhance participants' understanding of how to plan, regulate and implement the reconstruction and retrofitting of public facilities by drawing lessons from international experience. On 9 July 2008, CDRF invited the CELE Secretariat to present its work on school earthquake safety in a teleconference with high-level officials from the ministries of Construction, Education and Supervision, as well as from the Department of Development Planning. Collaboration with China is ongoing.

7. The Economic Co-operation Organisation (ECO), an intergovernmental regional organisation that includes Afghanistan, Azerbaijan, Iran, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkey, Turkmenistan and Uzbekistan, approached the CELE Secretariat about possible collaboration. Following earlier collaboration in 2006 and recent exchanges in 2009 between the OECD Secretary General, Angel Gurria, and the then-ECO Secretary General, Khurshid Anwar - both of whom expressed interest in further collaboration and concrete activities in this area - representatives from ECO will meet with the CELE

Secretariat and GeoHazards International in Paris on 3 December 2009 to discuss a collaborative activity on improving school earthquake safety in the ECO region.

8. However, there has been little change in reporting by OECD countries to the CELE Secretariat since the interim report to Council:

- *All five countries* expressing initial interest in the review have submitted self-evaluation questionnaires: Greece, Japan, Mexico, New Zealand and the United States (California).

- *Mexico agreed to participate in the review visit element*, pending confirmation of financial support. No other OECD countries agreed to participate in the review visit element.

- *Six countries formally declined to participate in the review*: Australia, Canada, Czech Republic, Germany, Switzerland and Turkey.

- *Eight countries*, some of which sent requests for information to the CELE Secretariat, *did not reply to the request for participation*: Austria, France, Hungary, Iceland, Italy, Portugal, Slovak Republic and Spain.

Findings

Methodology

9. Following the approval of the Recommendation in July 2005, the CELE Secretariat developed comprehensive documentation for the review, including a self-evaluation questionnaire. This questionnaire is composed of seven parts and 30 open-ended questions that cover the spectrum of principles and elements in the OECD Recommendation Concerning Guidelines on Earthquake Safety in Schools. The purpose of the questionnaire is to describe the characteristics of past, present and future policy and practice at national, province/state and local levels as they relate to the principles and elements of an effective school earthquake safety programme.

10. National authorities, through a national co-ordinator, are responsible for completing the self-evaluation questionnaire. The responsibilities of the national co-ordinator include managing the completion of the self-evaluation questionnaires by ensuring co-operation between all relevant ministries and agencies, as well as the involvement of key stakeholder groups, in order to provide the CELE Secretariat with a single, integrated response. National co-ordinators were asked to provide brief responses for each question, between 200 and 400 words, provide data and statistics, where possible, use case studies and provide historical context, where appropriate, and reference national legislation and regulations.

Caveats

11. A summary of key findings is provided below, followed by a more detailed description of responses from the seven sections in the self-evaluation questionnaires submitted by Greece, Japan, Mexico, New Zealand and the United States (California). Three important caveats should be taken into consideration when interpreting information provided by countries, all of which limit the ability of the CELE Secretariat to make international comparisons and generate recommendations for countries in particular and for the future of this work in general:

- A successful school seismic safety programme, as described in the OECD Recommendation, is composed of a set of principles and elements. These elements are principles are complementary. It

is not sufficient for a country to have a well-developed regulatory framework, for example, with no mechanism for building code enforcement.

- Only about ¼ of countries concerned have responded to the self-evaluation questionnaires.

- While self-evaluation has a significant role to play in the peer review process, the fact that no countries agreed to complete a full-scale review precludes in-depth or objective reporting.

Key findings

12. Taking these caveats into consideration, the main findings of this report are presented below. In summary:

- No country was able to fulfil all the criteria for a comprehensive school seismic safety programme.

- Governments in all reporting countries have made good progress in implementing many aspects of the Guidelines.

- Countries exhibited different strengths and weaknesses regarding implementation of these guidelines:

  – ***California*** has the most comprehensive programme, with regularly updated codes, criteria and accessible technical and other guidelines reflecting current local needs and international research on good practice. It also has established an independent body staffed with qualified professionals with clear roles and responsibilities regarding the implementation, monitoring, enforcement and evaluation of its programme. California has strong community involvement in these issues at the district level, and the responsible state authorities are working to engage these and other stakeholders more closely to reduce earthquake risk in communities.

  – ***Greece*** has established seismic regulations for schools and criteria based on international standards and expert knowledge of local seismic conditions, and it is in the process of broadening the mission of an existing national agency and developing a mechanism to monitor, enforce and assess the implementation of these regulations. Greece has strong community involvement in these issues, and national agencies are playing an important role in raising public awareness and preparing communities for a seismic event. However, Greece faces many challenges in assessing the vulnerability of its vast school building stock, much of which is not covered by the existing school building code, and in establishing priorities for schools most in need. Greece also needs to develop a transparent process to ensure enforcement of school building codes.

  – ***Japan*** has a wealth of experience and expertise in this area, and assessing the vulnerability of its school building stock and establishing a funding mechanism to strengthen schools most at risk have received significant attention in recent years. Japan has well-established building legislation, a mechanism to ensure compliance with legislation, and funding legislation that secures earthquake-proofing of school buildings. Japan is particularly strong in the area of disaster prevention, and there is a high level of community awareness and participation in the country. Through the earthquake proofing programme for schools, national authorities are demonstrating a continued commitment to reducing disaster risk in schools.

- ***Mexico*** is also in the early stages of broadening the mission of an existing national agency and developing a mechanism to monitor, enforce and assess the implementation of existing regulations and to ensure that the assessment, planning and construction of schools is being undertaken by certified professionals. Mexico has a complex legal framework and few established enforcement mechanisms to ensure compliance with legislation. With its large school building stock and complex administrative structure, one of the greatest challenges for the new agency will be to establish effective communication channels between different administrative levels in the country and to move from an advisory to an enforcement role.

- ***New Zealand*** has expended considerable effort to address the issue of seismic vulnerability of its school building stock. It has developed legislation, codes, criteria and documentation that are regularly reviewed and based on the latest research and international good practice. It has also undertaken a thorough review of the seismic risk in schools and taken immediate steps to address any deficiencies. All aspects of the design and construction process are undertaken by highly qualified professionals, and national authorities have also ensured good communication and engagement with communities by involving schools in the development of training materials and programmes. Conducting regular reviews of the seismic vulnerability of schools will ensure the continued success of New Zealand's programme.

Implementation of the Guidelines in five OECD countries

School earthquake safety policy

13. Establishing a school earthquake safety programme as set out in the OECD Recommendation requires national commitment and support, and an established regulatory framework. The purpose of this section is to explore the nature of existing legislation and public bodies and programmes established to support and implement a school earthquake safety programme.

14. Greece, Japan, Mexico and New Zealand have sound national regulatory frameworks. While California has an exemplary regulatory framework, it should be noted that the United States has no co-ordinated national policy, no responsible government body and no specific legislation relating to school earthquake safety. However in 1997, the National Clearinghouse for Educational Facilities (NCEF) was created under the auspices of the United States Department of Education to provide information on seismic and non-structural building hazards that may affect school safety. Frameworks in California, Greece, Japan, Mexico and New Zealand comprise the following essential features:

a) *Legislation on seismic strengthening standards for schools.*

- In *California*, the 1933 Field Act requires all schools to be earthquake resistant. In 1939, the state passed the Garrison Act that required pre-Field Act public schools constructed prior to 1933 to be retrofitted or replaced. By 1976, nearly all public schools were made to comply with the Field Act. In 2002, California prepared a new inventory of public schools to identify early Field Act-approved schools requiring additional mitigation.

- In *Greece*, new schools are designed and constructed according to the Greek Antiseismic Regulation (EAK 2003). However, EAK 2003 does not address deficiencies in schools constructed before 1959 – the year of enforcement of the first anti-seismic regulation in Greece. In 1985, the 1959 regulation was revised with a view to improving the performance of schools in earthquakes. In 1995, the new Greek Antiseismic Regulation came into force. A

recommendation on strengthening damaged schools and addressing general inadequacies in school building stock was developed by the School Building Organisation (SBO) and applied to strengthen 36 schools following the September 1999 earthquake in Attica. A new framework is currently being prepared by the Organisation of Antiseismic Design and Protection (OASP) to address deficiencies in older schools not covered by EAK 2003.

- In *Japan*, the Building Standard Law, which has implications for disaster reduction in educational facilities, establishes minimum standards in public buildings relating to the building site, structure and equipment. Guidelines for Comprehensive Earthquake-Resistance Design of Government Buildings define seismic hazard and building performance in the event of an earthquake. The Ministry of Education, Culture Sports, Science and Technology (MEXT) has adapted these documents to develop two sets of guidelines applicable to school buildings: Guidelines for Promoting Earthquake-Resistant School Buildings and Guidelines for Designing Educational Facilities. Guidelines for Promoting Earthquake-Resistant School Buildings describe the function of schools, which is to protect the lives of children and students in the event of an earthquake, to serve as an evacuation site following an earthquake, and to resume educational activities as soon as possible after an earthquake.

- In *Mexico*, the General Civil Protection Law provides a general framework for government policy on civil protection and for special plans and programmes addressing disaster prevention, rescue, recovery and support. These include the Special Programme for Prevention and Disaster Mitigation, the National Civil Protection System and the National Plan of Development. Each state has its own civil protection laws, which also provide legal frameworks for school safety issues. In February 2008, the General Law on Physical Education Infrastructure was created to complement the General Law as it relates to educational infrastructure.

- In *New Zealand*, the Building Act 2004 and the New Zealand Building Code (NZBC) are the two principal pieces of legislation. However, the Ministry of Education has set its own standards that are beyond that which is required by this legislation.

b) *Authorities with legislated responsibility for implementing school seismic safety policy.*

- In these countries, national and/or local authorities have responsibility for ensuring or promoting compliance with legislation.

- In *California*, the Division of the State Architect (DSA), which administers the California Field Act (1933), is an independent regulatory authority that employs California licensed engineers to perform detailed code compliance review of calculations, plans and specifications of all schools. The DSA has a USD 50 million annual budget and 300 employees.

- In *Greece*, with the exception of the Attica prefecture - where SBO is responsible for the design, construction and renovation of schools -, local authorities or municipalities are responsible for large-scale interventions concerning schools, including seismic strengthening. A municipality may request the support of the prefectural authority if it is unable to carry out an intervention. According to a 2002 law, the SBO is responsible for developing and implementing pre-seismic inspection programme for school buildings in the country.

- In *Japan*, MEXT implements seismic strengthening policies for school buildings. The municipal authority is responsible for developing and implementing its own ordinance, policy and programmes.

- In *Mexico*, according to the General Law on Physical Education Infrastructure, the Educational Facilities National Institute (INIFED) is responsible for developing all legislation related to educational facilities, including seismic safety, and disseminating it to the bodies responsible for constructing educational facilities. Similarly, the Interior Ministry, through the National Civil Protection System, can also propose the creation of regional bodies, mechanisms, instruments and procedures to assist disaster recovery and prevention. However, both bodies have a co-ordinating and supervisory role, and each individual state or municipal authority is ultimately responsible for developing and implementing its own legislation, policy and programmes.

- In *New Zealand*, the Department of Building and Housing has statutory responsibility for administering legislation and supporting standards. In addition, the Ministry of Education as the owner of the facilities must ensure building compliance with legislation.

c) *National programmes prioritising and strengthening vulnerable schools.*

- These countries are all at various stages of implementing national programmes to assess seismic risk in school building stock.

- In 2001, the *California* Department of General Services (DGS) was required by a bill endorsed by the California Legislature (AB 300) to conduct an inventory of public school buildings that were designed before the major code changes of the 1976 California Building Code and after the 1933 Field Act came into effect. From this investigation it was found that 14% of California's school buildings fall into a category that needs further seismic safety evaluation.

- In *Greece*, as part of the first phase of its pre-seismic inspection programme, the SBO established the Permanent Scientific Committee for Planning and Monitoring the Pre-Seismic Inspection of the Territory to oversee the programme's implementation. In this phase, rapid visual screening techniques are used, following the US Federal Management Agency (FEMA) 154 Handbook (1988) to establish the structural vulnerability of school buildings in zones of high seismic risk and those constructed before 1959. A questionnaire was also developed to assess non-structural vulnerability. Subsequent phases, which borrow from international methods and regulations such as FEMA and ICSSPR4, seek to make detailed estimations of the seismic performance of schools.

- In *Japan*, MEXT provides national subsidies to local governments for projects related to strengthening schools through reconstruction, reinforcement or enhancing disaster-preparedness functions of schools. In order to encourage local governments to accelerate seismic retrofitting of school facilities, especially those at high risk, the national government revised the Act on Special Measures for Earthquake Disaster Countermeasures in June 2008. The budget for subsidies in 2008 was JPY 278 900 million. Priorities for seismic rehabilitation of existing schools and siting for new schools in Japan are stipulated in its guidelines. In April 2009, an assessment of public elementary and junior-high schools conducted as part of earthquake-proofing measures in Japan found that 33% of schools are not earthquake resistant and require retrofitting. In 2009, as part of a 5-year programme on

renovating and constructing national universities, 17% of total building stock that is not earthquake resistant will be strengthened.

- In *Mexico*, a new programme, to be implemented by INIFED, will seek to assess and reduce seismic vulnerability of schools. Other national programmes such as the National Civil Protection Programme and School Emergency Programme, National Fund of Natural Disaster (FONDEN) and Fund for the Prevention of Natural Disasters (FOPREDEN) have established physical and financial mechanisms for disaster prevention, rescue and recovery to ensure the security of schools and their occupants before, during and after an emergency.

- In *New Zealand*, a structural survey of all existing school building stock (21 000 buildings) was undertaken between 1998 and 2001. Only 11% of buildings were found to have at least one structural defect that required remedial work, which was completed at a cost of NZD 60 000.

15. Although these countries are at different phases of implementation, given the recent and significant investments by countries in strengthening schools, there has been limited assessment of the long-term sustainability and effectiveness of these programmes.

Accountability

16. A successful national school earthquake safety programme requires all stakeholders to share responsibilities and work together towards a common goal. Establishing clear roles and a mechanism for independent assessment of current practices will ensure that all parties are accountable for their actions. The purpose of this section is to explore these two elements of accountability.

17. The five countries identified ***a range of stakeholders and agencies*** involved in implementing school seismic safety policy, notably those associated with authorities with legislated responsibility for implementing such policy in education, civil protection and construction sectors: designers, architects, engineers, inspectors, contractors, school facility managers, officials in national, regional and local governments and the school community.

18. Although most reporting countries reported some level of ***formalised co-operation*** related to school seismic safety policy development and/or implementation, the nature and effectiveness of co-ordination between different bodies was unclear. In Mexico, for example, the need for co-ordination between different levels of government, the private sector and civil society is promoted through the National Plan of Development, but it is unclear how this actually works in practice. California provides the best example of clear definition of roles and responsibilities of key actors. In fact, one of the recommendations of the evaluation of the effectiveness of the California Field Act was to improve communications between implementing agencies.

19. With the exception of the DSA in California, no countries reported the existence of ***an agency or mechanism – independent*** of the organisations responsible for planning, designing, constructing and financing school facilities – for overseeing and approving proper planning, design, construction and maintenance of school facilities.

Building codes and code enforcement

20. A building code should provide clear guidelines for all stakeholders on the processes related to the safe planning, design, construction and use of school facilities. However, the existence of mechanisms to help enforce these codes is critical to ensure a safe learning environment. The purpose of this section is

to explore the objectives and performance criteria of existing school building codes, and the national administration's capacity for review and enforcement of these codes.

21. The ***objectives of existing school building codes*** in all reporting countries are to reduce the risk to life and to minimise damage to schools as a result of an earthquake. In addition, codes also refer to the important role of schools as emergency shelters and the need to resume normal functionality as quickly as possible after an earthquake. In California, Greece, Japan and New Zealand, the authorities responsible for school construction have issued its own standards beyond the minimum standards that are required in general legislation to ensure public safety for public buildings.

22. In all reporting countries, ***criteria used for developing school building codes*** is primarily based on current international research and good practice in earthquake-resistant design which take into consideration local conditions, such as soil type, geology and wind conditions. Ground-shaking criteria are commonly used in codes, which specify mechanisms to maximise the structural performance, displacement control, post-elastic deformation and ductility of schools.

23. In California, ***criteria are developed*** by licensed professionals (geologists, seismologists, architects, engineers) or academic experts affiliated with specialised bodies including the International Code Council (ICC), Building Seismic Safety Council (BSSC), American Society of Engineers (ASCE), California Geological Survey and US Geological Survey. In Japan, criteria relating to earthquake resistance in legislation and guidelines for public buildings are developed by the Ministry of Land, Infrastructure, Transport and Tourism. MEXT develops criteria in guidelines related to educational facilities. In Mexico, INIFED is working with the National Centre for Disaster Prevention (CENAPRED) to approve criteria to strengthen schools constructed before 1985.

24. Only California reported on the ***secondary effects of earthquakes***, such as landslides and liquefaction. Maps and mitigation guidance and regulations are used, criteria for which are developed by the California Geological Survey by licensed professionals or academic experts.

25. In California, Japan, Mexico and New Zealand, ***building codes are regularly reviewed***. In California, the DSA, ICC, BSSC, ASCE and California Building Standards Commission update regulations annually with major updates triennially. In Japan, legislation is regularly revised by the Ministry of Land, Infrastructure, Transport and Tourism. In New Zealand, legislation is regularly reviewed by the Department of Building and Housing. In Mexico, one of INIFED's responsibilities is to review existing technical legislation at the beginning of each financial year, or more frequently if required, with the Project Manager, Deputy Manager of Design and Equipment and Co-ordinator of Technical Legislation. In Greece, while there may be a review mechanism - the Permanent Scientific Committee for Planning and Monitoring the Pre-Seismic Inspection of the Territory is responsible for reviewing EAK 2003 and other regulations under development – a review process is not undertaken regularly.

26. In California, Japan and New Zealand, there are ***clear processes to ensure enforcement*** of school building codes. In California, a team of 60 senior structural engineers and 12 supervising structural engineers are responsible for verifying schools plans and reviewing calculations and construction drawings in conformance with the California Building Code. District structural engineers are responsible for overseeing the construction site. In Japan, a building permit inspection is carried out by qualified experts in administration authorities or a private inspection organisation to verify building drawings and specifications. During construction, officials from national and local governments oversee construction until project completion. A penalty is applied with a builder does not adhere to the Building Standard Law. In New Zealand, school building designs must be prepared and certified by a professional consultant, who is also responsible for supervising construction. In addition, all projects must obtain building consent from local government authorities, who check the design and completed work.

27. In Greece and Mexico, this process is less transparent. In Greece, plans for new schools are reviewed by town planning offices, which are responsible for issuing building permits. SBO also has procedures for design control, although the nature of this control was not elaborated. In Mexico, due to the decentralisation of responsibilities for the construction and management of educational facilities, federal authorities are not able to enforce existing legislation.

Professional training and qualifications

28. The training of professionals in safe design and construction is another important element of a school seismic safety programme. The purpose of this section is to ascertain the level of formal qualifications, training, certification and licensing procedures for professionals involved throughout the facility's lifecycle.

29. A ***tertiary-level qualification*** is required for most professionals engaged in the planning, design and construction of school facilities in California, Greece, Japan and New Zealand. In California and New Zealand, all professionals are qualified; in Greece, planners and construction site supervisors (engineers) are qualified by the Greek Technical Universities; and in Japan, designers, construction site supervisors (engineers) and inspectors are qualified. California, Greece, Japan and Mexico reported that professionals also require ***knowledge of seismic design and construction issues***.

30. In addition, professionals in California, Japan and New Zealand must be ***members of recognised professional organisations***. In California, for example, school building designers must be California-registered structural engineers, architects must be licensed by the California Architects Board, and inspectors certified by DSA and ICC in their areas of specialisation. In Japan, architects and execution management engineers must be approved by the Minister of Land, Infrastructure and Transport and Tourism; risk inspectors for school buildings by MEXT; and risk inspectors by the prefectural governor. In New Zealand, engineers must be members of the Association of Consulting Engineers of New Zealand (ACENZ) and/or the Association of Consulting Engineers of New Zealand (ACENZ). INIFED in Mexico is looking to establish a mechanisms to ensure the certification of professionals involved in planning, design and construction of school facilities in the future.

31. While recognised academic and/or technical training courses for professionals in the field are widely available in all reporting countries, ***these courses are only mandatory for some professionals in California***: DSA-certified inspectors are required to attend an update class every four years, and plan reviewers and contract plan reviewers are required to take code update classes when a new building code is published. In Greece, SBO encourages engineers to attend conferences on strengthening technology every three years and seminars on reinforced concrete every two years. In Japan, non-mandatory training courses – including a recent 2-day seminar on seismic capacity evaluation and anti-seismic reinforcement design of school buildings - are organised by local governments and public corporations every year. In Mexico, INIFED encourages the states to send professionals to courses, workshops and technical visits related to disaster prevention and safety. CENAPRED organises training courses for managers of civil protection to develop prevention programmes to reduce the risk to educational infrastructure from natural disasters. Individual states, such as Guerrero, and universities, such as the National Autonomous University of Mexico, also organise training workshops related to school seismic safety. In New Zealand, non-mandatory training is conducted by universities or other government or industry training establishments, and all courses are recognised by the New Zealand Qualifications Authority.

32. The existence of ***continuing education and training*** for professionals was not reported by any countries.

Preparedness and planning

33. School emergency plans, post-earthquake procedures for assessing the safety of the school, regular drills, and education and training programmes can act to reduce risk and prepare communities for earthquakes. The purpose of this section is to explore the preparedness of schools and communities in terms of school emergency planning, post-earthquake assessment and drills.

34. There are ***school disaster plans*** in all schools in California, Greece, Japan and New Zealand. In California, schools are required to develop an Earthquake Emergency Procedures System as part of the School Disaster Plan. It describes the "drop" procedure, protective measures to be taken before, during and after an earthquake, and a programme to ensure that students and staff are trained in the System. In Japan, school disaster management plans describe daily measures and natural disaster prevention measures to be taken by schools and funding authorities,, for example verification of facilities, equipment, emergency stockpiles and communications equipment; safe school policy in the event of a disaster; management policy for the use of the school as a shelter; and co-operation with local residents. In New Zealand, the Ministry of Civil Defence and Emergency Management (CDEM) is the principal agency involved in assisting communities to become more resilient to hazards and disasters through a risk management approach to reduction, readiness, response and recovery. In Mexico, while the existence of school plans was not reported, the Secretariat of Public Education (SEP) promotes a "Safety and emergency programme" for schools, parents and federal agencies, in which school workshops are organised on civil protection issues in the event of an earthquake.

35. All countries reported the existence of ***official post-earthquake procedures***, which include immediate inspection of schools and dissemination of information to the public. In Greece, the Ministry of the Environments, Planning and Public Works, the municipalities of the Prefectures and SBO conduct school inspections immediately following an earthquake. Schools are classified as suitable for immediate occupancy (green), unsuitable for immediate occupancy (yellow) or unsuitable for occupancy (red). California uses a similar colour-coding system. In Japan, MEXT dispatches engineers to conduct an immediate assessment of the safety of schools, which may result in the closure of buildings and relocation of students to temporary facilities. In Mexico, visual damage after an earthquake is reported by campus heads to the heads of the sector, who send an urgent message requesting a condition assessment of the school property.

36. Post-event data surveys are not undertaken systematically in all reporting countries. In California, the DSA compiles a report on the performance of schools, which is then published and lessons learned incorporated into the next cycle of codes. In Greece, there is no formal procedure to undertake these surveys. In Japan, a detailed assessment of the condition of facilities is usually undertaken. The National Institute for Educational Policy Research, for example, carried out a recent surveillance study about the disaster prevention function of school facilities used as a shelter. In Mexico, these surveys are carried out at the request of the campus director or personnel.

37. California, Greece, Japan and Mexico reported that ***earthquake drills*** are held regularly in schools. Exercises relating to behaviour in the event of an earthquake are carried out twice each school year in Greece; annually in Japan according to the Disaster Prevention Plan of the school; and twice per year in Mexico.

Community awareness and participation

38. Galvanising the support of all members of the community can significantly reduce the vulnerability of communities to earthquakes. The purpose of this section is to explore the capacity of the national administration to perform duties related to improving community awareness and participation

through the use of formal and informal communication tools, partnerships with school communities, community-based programmes and school-based curriculum and training.

39. In all reporting countries, there is significant community awareness and participation on school earthquake safety-related issues, some of which can be attributed to concerted efforts by national governments.

40. All countries reported the widespread use of ***communications tools,*** mostly web-based, to disseminate information related to national policies, programmes and responsibilities related to school seismic safety to school communities and other groups. In Greece, OASP has played an important role in raising public awareness and preparing communities for a seismic event by developing and disseminating free information and educational materials such as books, leaflet and posters. Students are informed through student bulletins. In Japan, MEXT publishes the results of the survey on earthquake-proofing of public schools annually on its website. The National Institute for Educational Policy Research also publishes its report on the surveillance study on anti-earthquake issues online. In Mexico, one of the roles of the National System of Civil Protection is to promote education for self-protection in the event of an emergency. More specifically, the Ministry of Public Education in Mexico broadcasts on the web a program called "Security and emergency", and the National Programme for Civil Protection and Emergency School also publishes information on planning guidelines.

41. In New Zealand, the CDEM disseminates "The way forward - Strategic framework for the national CDEM Public Education Programme", which provides the strategic framework in which CDEM and its supporting groups work to improve public awareness, understanding, commitment and preparedness for disasters. More specifically, the Ministry of Education has produced "Worksafe at school" guidelines on civil defence planning for schools, which provide useful information and templates. In the United States, the NCEF is the principal communication tool through which information, advice and research is disseminated to the general public on school seismic safety issues in all states.

42. There were several examples cited by countries of successful ***formal and informal partnerships involving public administration*** that acted to empower communities, with a view to reducing seismic risk. In California, the DSA, for example, reported that meetings with local school districts in Los Angeles and San Diego improved communications and working relationships and efficiency. In Japan, a workshop on improving disaster prevention was organised in an elementary school in Itabashi-ku. Local residents, teaching staff, students and parents worked together to develop suggestions for a committee working to improve the school's building reconstruction plan. In Mexico, the public administration has established partnerships with two civic associations: the Mexican Institute for the Protection and Communitarian Assistance, which addresses marginalised groups living in areas of high seismic risk; and Mexican TOPOS, a non-profit organisation of voluntary rescuers who assist communities in the event of a disaster. In New Zealand, "What's the plan Stan?" is a resource developed by CDEM with the support of teachers and civil defence staff. Disseminated to all schools in 2006, the resource features Stan the dog and five children who model behaviours in an emergency. "What's the plan Stan?" focuses on earthquakes, tsunami, volcanoes, storms, floods and non–natural disasters.

43. Similarly, most countries reported ***successful community-based programmes*** that seek to raise awareness and knowledge of risk from earthquakes and other natural hazards. The success of the Berkeley Unified School District in reducing seismic risk in schools through raising support and funds to implement its own retrofitting programme was reported in the OECD publication *Keeping Schools Safe in Earthquakes* (2004). A junior high school in Shizuoka City in Japan is integrating disaster education in various school progammes in order to improve knowledge about disaster prevention. A forum at the school brought together local administration, residents and teaching staff to discuss local disaster organisation. Following the forum, 453 students participated in a local emergency drill. In Mexico, the most successful

community-based programmes have been organised by the Association of Parents, who are working to integrate disaster reduction issues into the school curriculum. In 2008 Kia Takatū, a Maori language version of New Zealand's "What's the plan Stan?" was developed and sent to over 300 Maori immersion and bilingual schools.

44. Most countries reported that earthquake safety awareness and preparedness was incorporated into the ***curriculum*** across different levels of education in different subject areas. In the United States, FEMA has developed a number of teaching packages for different educational levels, including "Earthquake safety activities for children and teachers in elementary schools" (FEMA 527) and "Seismic sleuths: Earthquakes – A teacher's package for grades 7-12" (FEMA 253), which provides middle and high school teachers with information about the causes and effects of earthquakes. In Japan, disaster education is an essential component of all educational programmes, for example, at some schools, students draw a hazard map or attend a training camp where the school is used as an emergency shelter. In Mexico, courses on "Physical development and security" are taught from pre-primary level. In New Zealand, these issues are integrated into the science curriculum, and "What's the plan Stan?" includes a number of components including a curriculum-based teaching resource for schools.

45. Only Greece, Mexico and New Zealand reported the existence of ***training programmes for students and teaching and non-teaching staff***. In Greece, OASP organises education and training programmes for teachers, engineers and volunteers in schools and communities. While students do not receive mandatory training, there are compulsory training exercises for teaching and non-teaching personnel. In Mexico, training programmes are mandatory according to the Security and Emergency programme in the National Programme for Civil Protection and Emergency School. In New Zealand, 15 successful professional development workshops were held in 2006 and more in 2007 to implement "What's the plan Stan?"

Risk reduction on new and existing schools

46. Knowledge of land use and seismic hazard maps, and identifying and addressing the most vulnerable buildings as a priority can significantly reduce the risk of building collapse. The purpose of this section is to describe the capacity of national administration to perform duties related to improving elements of risk reduction in new and existing educational facilities.

47. While ***seismic hazards maps*** exist in all reporting countries, these maps are not routinely consulted when selecting a site for a new school, with the exception of California, where it is prohibited to construct a school between active fault zones. Responsible authorities – such as the EAK 2003 in Greece and MEXT in Japan - do recommend that these maps are consulted when a new school site is selected. In New Zealand, all schools are in zones of high seismic risk, and sound school building design is the most effective way of mitigating this risk. In Mexico, one of the tasks of INIFED is to develop national seismic maps, which define the seismic vulnerability of each school.

48. According to country reports, ***schools are not routinely assessed for seismic risk***. However, recent individual programmes described earlier in this report have sought to assess the vulnerability of existing school building stock (Par. 12c).

49. In California, Greece and Japan, technical guidelines to ***reduce the risk of structural damage*** during earthquakes have been published. However, in Greece, guidelines do not exist for schools constructed before 1985, when the 1959 Antiseismic Regulation was revised. In California, Chapter 34 of the California Building Code provides detailed guidelines regarding the process for retrofitting existing school buildings, including the evaluation of the seismic performance of the building, a peer review to assess the necessity for retrofitting and the selection of the design method. In Japan, technical guidelines

for retrofitting existing buildings are available. In New Zealand, quality control standards in the building construction industry are high. In addition, the vast majority of schools buildings are one- or two-storey braced timber-frame construction with low vulnerability, and those structures most vulnerable to damage have been successfully strengthened. In Mexico, the Mexican Society of Earthquake Engineering published a manual for general structures, which is not specific to schools. INIFED is currently developing guidelines to reduce the risk of structural and non-structural damage to schools in the future.

50. In California, Greece and Japan, numerous guidelines are also available to schools to ***reduce the risk of non-structural damage during earthquakes***, for example by bracing and anchoring furniture, equipment and building components. In California, DSA provides non-structural guidelines to schools; and in Greece, OASP has published a special bulletin on non-structural vulnerability. In Japan, reports on earthquake-proof measures of non-structural components in schools have been published by the Architectural Institute of Japan and the National Institute for Educational Policy Research. MEXT is also currently undertaking research on anti-seismic measures of non-structural components in schools.

51. Only California, Greece and Japan reported ***regional differentiation*** in application of performance criteria, codes and construction practices. In California, design forces in regions distant from active earthquake faults are lowered, and building component detailing requirements are relaxed in regions of low seismicity. Some building systems are prohibited from being constructed in high seismic regions. In Greece, EAK 2003 identifies three seismic risk zones according to the level of seismic ground acceleration. In addition, buildings are categorised according to the seismic risk and the estimated socio-economic cost of the eventual destruction or closure of the school. Both factors are considered when planning for schools. In New Zealand, the level of seismic risk is high throughout the country, which could account for the lack of regional differentiation. In Mexico, although there are four seismic zones, it is not possible to enforce differentiated application of any code.