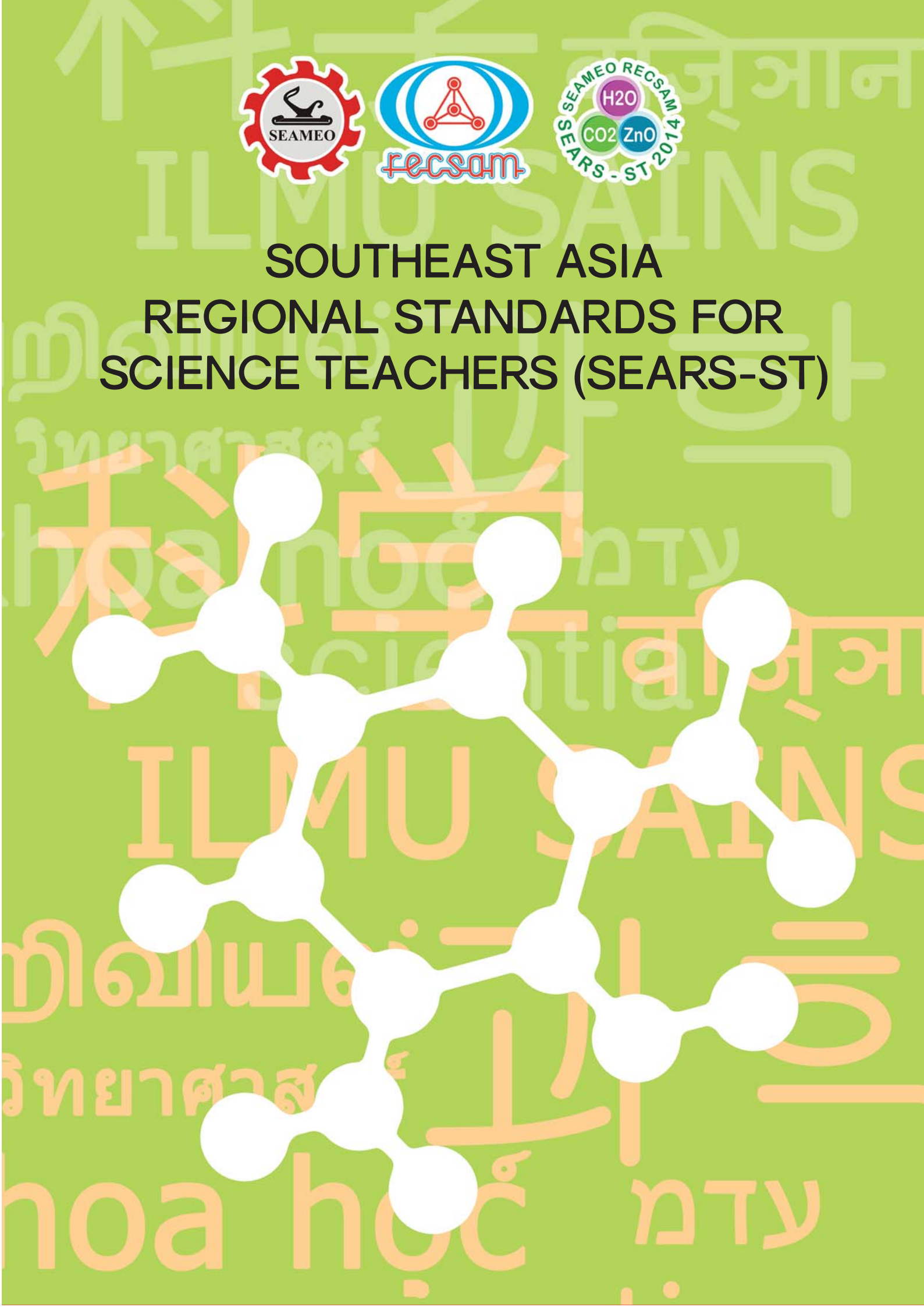
SOUTHEAST ASIA REGIONAL STANDARDS FOR SCIENCE TEACHERS (SEARS-ST)



INTRODUCTION

Teachers and their development of teaching must be at the heart of any plan to improve educational systems. The Southeast Asian Ministers of Education Organization (SEAMEO) has uniquely represented the educational systems in the SEAMEO region with the collective aspirations of providing quality education for the next generation of leaders emphasising on science and mathematics education that underpins the agenda human resource needs of the region. Hence a framework and standards to support and improve the quality of science teachers is important for enhancing the standards of science education. Considering this, the SEAMEO Regional Centre for Education in Science and Mathematics (RECSAM) has outlined the Southeast Asia Regional Standards for Science Teachers (SEARS-ST). Standards are statements of expectations of what the teachers should know and be able to do.

PURPOSE

To set the standards that all science teachers should acquire to improve the quality of teaching and learning in the SEAMEO region.

METHODOLOGY

Participatory inquiry approach

First workshop: 20-22 January 2014 at SEAMEO RECSAM, Penang

Plenary presentations:

'Developing and using standards for beginning, experienced and expert science teachers for continuing personal and professional development (CPPD)' by Director of International Programmes Mark Windale from the Centre for Science Education, Sheffield Hallam University, United Kingdom (UK).

'Developing knowledge, skills and attributes of beginning science teachers' by Director of the Science and Technology Education Research Lab Assoc. Prof. Lindsey Conner from the University of Canterbury, New Zealand (NZ).

24 educators from Indonesia (SEAMEO QITEP Science), Malaysia (Ministry of Education, Teacher Training Institutes, Universities), RECSAM staff (Malaysia, Philippines and Thailand) attended the seminar.

Second Workshop: 16 – 18 June 2014 at SEAMEO RECSAM, Penang

Attended by international consultants from UK and NZ as well as country experts including Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, the Philippines, Thailand and Vietnam

◄ a Group photo during the first SEAR-ST workshop

b Country representatives and RECSAM's staff

◄ c Closing ceremony officiated by Centre Director

d Brief report by consultant Assoc. Prof. Dr. Lindsey Conner

REFERENCES

Australian Teaching Standards. Retrieved http://www.teacherstandards.aitsl.edu.au/

Malaysian Ministry of Education (n.d.). Standard Guru Malaysia (SGM). Retrieved from http://www.moe.gov.my/sgm

Teaching Competency Standards in Southeast Asian Countries: Eleven countries audits (SEAMEO INNOTECH, 2010).

Jemaah Nazir Sekolah [School Inspectorate] (2008). Professional qualities indicator: Standard kualiti pengajaran guru sains. [Quality standards for science teachers teaching in English] (Draft). Putrajaya, Malaysia: Jemaah Nazir Sekolah.

National Science Teacher Association (NSTA) Standards for Science Teacher Preparation. Retrieved http://www.nsta.org/preservice/

RESULTS

Four dimensions including standard and indicators of SEARS-ST were identified:

(1) Professional Knowledge	(2) Professional Practice	(3) Professional Attributes and Ethics	(4) Professional Development

Table 1 Dimension 1: Professional Knowledge with its Components and Elements

COMPONENTS		ELEMENTS	
	Knowledge of science		Knowledge of science content (e.g. facts, concepts, principles, theories, philosophies, explanation, ideas, etc.)
			Knowledge of nature of science (NOS) (e.g. tentativeness, etc.)
			Knowledge of scientific skills (include science process skills and science manipulative skills)
			Knowledge of science in the cultural context (e.g. religion, indigenous knowledge, etc.)
			Knowledge of scientific attitude and noble values
			Knowledge of the big ideas in science (e.g. energy, climate, interconnectedness of science with other disciplines, etc.)
			Knowledge of application and implication of science [e.g. Sustainable Development (including conservation, waste management, etc.)]

Table 1 Dimension 1: Professional Knowledge with its Components and Elements (cont.)

COMPONENTS		ELEMENTS
	Knowledge of science teaching and learning	Knowledge of a range of relevant theories, models and practices in science teaching and learning
		Knowledge of current research in science teaching and learning (e.g. new approaches in creating positive teaching and learning environments)
		Knowledge of the repertoire of effective science teaching strategies
		Knowledge of strategies to address needs of diverse learners (e.g. ability, cultures) in diverse teaching and learning environments
		Knowledge of curriculum
		Knowledge of assessment
	Knowledge of students	Knowledge of students' motivation and engagement in learning science (e.g. attitudes toward science, students' educational expectations, readiness to learn)
		Knowledge of students' background (e.g. socioeconomic, home environment support, cultural, ethnic and religious)
		Knowledge of developmental characteristics of the students (e.g. physical, social, emotional, spiritual and intellectual)
		Knowledge of students' learning needs (e.g. literacy, special needs, etc.)
	Knowledge of students' learning of science	Knowledge of the impact of students' prior knowledge and skills on their science learning
		Knowledge of factors that promote science learning (e.g. school resources, teaching and learning approaches of science, contexts, school climate, etc.)
		Knowledge of potential difficulties in learning particular science concepts
		Knowledge of the application of learning and pedagogical theories in the teaching of science
		Knowledge of students' learning progression
	Knowledge of enhancing students' thinking	Knowledge of strategies for supporting creativity and innovation in science
		Knowledge of strategies for developing students' higher order thinking (including metacognitive) skills in science
		Knowledge of strategies for developing students' ability in making interconnections between key concepts in science
	Knowledge of ICT	Knowledge of integration of ICT in the teaching and learning of science (e.g. supporting learning of concepts, modelling, solving science problems, etc.)
		Knowledge of application of ICT in the assessment of science learning
		Knowledge of application of ICT in administration (e.g. monitoring and recording)
		Knowledge of developing students' ability in using ICT in learning science
	Knowledge of health and safety	Knowledge of safety related to science activities (e.g. handling laboratory equipment and chemicals, disposing waste, doing field work, etc.)
		Knowledge of risk assessment related to science activities (e.g. slippery floor, current health threat, etc.)
		Knowledge of emergency procedures
		Knowledge of health and safety regulation policy and law
		Knowledge of safety procedures and practices in the country

Table 2 Dimension 2: Professional Practice with its Components and Elements

COMPONENTS		ELEMENTS
	Plan and design effective learning experiences	Plan and design a range of meaningful and relevant learning activities that are aligned to the curriculum (e.g. learning objectives, methods and assessment)
		Plan and design assessments to inform teaching and learning
		Plan to use appropriate teaching and learning technologies and tools that aid teaching and advance learning
	Implement teaching and learning plans	Promote student scientific inquiry to develop deep understanding and foster values and attitudes related to science
		Engage students in reflecting on the nature of science
		Use appropriate strategies to foster key skills and to address the needs of diverse learners as well as diverse teaching and learning environments
		Use appropriate questioning and discussion techniques to challenge students' thinking and engage them effectively
		Communicate effectively to convey expectations for learning, directions, procedures, and explanation of content
		Use appropriate scientific language and correct concepts
		Manage student behaviour effectively (e.g. expectations for, monitoring of and response to student behaviour)
		Establish a positive culture for learning (e.g. create an environment of value, respect and rapport)
		Manage safe classroom and laboratory routines, procedures, transitions, materials and supplies effectively
		Use technologies and tools effectively to aid teaching and advance learning
		Provide effective enrichment and enhancement of experiences for science learning beyond the classroom
	Implement assessment plans	Use a range of types and strategies of assessments continuously (in terms of the cognitive, skills and affective domains)
		Set and share assessment criteria with students
		Give timely, specific, relevant and accurate feedback to advance student learning
		Describe, analyse, evaluate and document student performance data
		Use performance data to inform and improve teaching practice and student learning
		Communicate learning results to students, parents and other stakeholders
	Reflect critically on teaching and learning	Use data about learning to reflect on and assess student learning
		Use data about learning to reflect on and evaluate teaching practice
		Use evidence to reflect on and identify areas for professional growth

◄ e 1st SEARS-ST Workshop

f 2nd SEARS-ST Workshop

Table 3 Dimension 3: Professional Attributes and Ethics with its Components and Elements

COMPONENTS	ELEMENTS
Personal attributes	Passionate about science and teaching science
	Be able to apply a range of ways of teaching and managing the classroom appropriate to the needs of their students
	Reflect regularly on own practices for continuous improvement
	Be open and prepared to implement new ideas with regards to teaching and learning
	Be a positive role model who is inquisitive as well as open to new ideas and evidence in science
	Act with integrity and with a strong conscience of their personal and professional responsibility
Personal responsibilities towards others	Demonstrate caring and approachable attributes
	Show positive expectations and support for the total development of the students
	Impart values, knowledge and skills enthusiastically
	Empower students to take charge of their own science learning (and advancement)
	Engage in school and community science activities to promote science learning
	Demonstrate and encourage scientific ethics
	Implement health and safety measures
Professional ethics	Comply with the Professional Code of Ethics for teachers
	Model personal and social responsibility for citizenship (e.g. sustainability of living environment, co-existence of humans, well-being, safety of children, etc.) to contribute to the harmony and betterment of the nation and the world at large

Table 4 Dimension 4: Professional Development with its Components and Elements

COMPONENTS	ELEMENTS
Reflecting on evidence	Collecting classroom evidence (e.g. students' work, portfolio, observation, etc.)
	Analyzing the evidence collected in relation to students' outcomes (e.g. student' work, portfolio, observation, etc.)
	Identifying own professional strengths and weaknesses to inform professional development needs
	Reflecting with peers (e.g. coach or mentor) to improve professional practice
Developing and implementing action plans	Identifying professional development needs
	Formulating professional development goals
	Developing strategies for achieving professional goals
	Implementing action plans
	Reviewing achievement of action plans
	Revising action plans for further improvement
Enriching professional knowledge	Keeping abreast of contemporary scientific developments (e.g. reading publications, attending meetings, workshops, colloquia, etc.)
	Keeping abreast of contemporary pedagogies
	Keeping abreast of educational policies
	Engaging with scientists and science educators
Collaborating with professional learning communities	Participating in professional groups (e.g. professional associations, department team, lesson study groups, etc.) at school, state, national and/or international levels
	Sharing exemplary practices within and beyond the school (e.g. participating in professional learning communities, delivering professional development courses and workshops either orally or in written form)
	Becoming a mentor or a coach

CONCLUSION

- The SEARS-ST is not a binding document and should be used as reference for the country experts to develop their respective tools for the development of teachers' proficiency and evaluation of the standard level of the teachers.
- It can be used as guide for continuing professional development (CPD) of teachers in the SEAMEO member country.
- It can also be used for benchmarking in the formulation of any development initiatives for the quality of teachers.
- Future research and development activities could be extended for policy direction and formulation by developing local descriptors in the context of each SEAMEO member country.

SEAMEO
RECSAM

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