



**Asia-Pacific Forum on
Science Learning and Teaching**
亞太科學教育論壇

Asia-Pacific Forum on Science Learning and Teaching, Volume 9, Issue 1

FOREWORD

The implementation of the educational achievement study of the science curriculum

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Executive Summary

IEA (International Association of the Evaluation of Educational Achievement) and OECD (Organisation for Economic Co-operation and Development) are two large-scale worldwide assessment projects that conduct international surveys on students' educational achievement. Looking into the approach of the surveys, IEA focuses on students' educational achievement based on the educational systems while OECD leans on the students' capacity in continuous learning throughout their adulthood. In terms of the contents of the surveys, both of them included internationally recognised core subjects such as Reading, Mathematics, and Science. Most of the participating countries would review the impact of their own teaching and learning curricula, educational systems, culture in the society, and family background on the students' educational achievement according to the worldwide ranking. Furthermore, NAEP from the United States, APU from the United Kingdom, as well as the national research from Japan also generate different levels of effects. As a result, there is a significant meaning for the implementation of the surveys when we explore the educational achievement of the Science curriculum in three aspects — the basic framework of the survey, the core contents, and the major methods.



There were numerous discussions and practices on the issues of assessment framework for scientific literacy in the Mainland China. Scientific literacy has been treated as the major objective in the teaching and learning of science subjects, especially after the implementation of the new curriculum. It highlights the exploration of scientific literacy, which is based on the three dimensions of the scientific assessment framework — knowledge and skills, processes and methods, emotions, attitudes and values, in the assessment of educational achievement in the science subjects.

Upon the implementation of the new curriculum, the integrated investigation of the three dimensions has become more outstanding in the assessment of educational achievement of science subjects. In terms of the research on scientific knowledge, the close relationship between students' learning and their practical lives, the research on students' understanding of scientific knowledge and their abilities to apply knowledge to explain phenomena, to analyse, and to solve problems were emphasized. In terms of the research on scientific exploration, there are concerns about students' abilities to explore practical problems. In term of the research on emotions, attitudes, and values, emotion education is permeated into specific and lively examples and activities. Asking students to differentiate the item(s) that cannot form a solution in water from oil, soy sauce, salts, and alcohol is an example to reflect the problems of contents of assessments in scientific literacy. This example, in fact, examines the level of students' understanding of the concept of solvents. Through lively situations, students are given chances to apply their previous knowledge to practical problems.

In terms of the assessment of science, Mainland China has not fully participated in students' educational achievement assessment projects run by international assessment institutions such as IEA and OECD due to various reasons. Yet starting from late 1970's, with reference to Bloom's Taxonomy of Educational Objectives, theorists of our country introduced, absorbed, and localized the assessment through aspects such as cognition, skills, emotions and attitudes, and students' moral characters. Our country has explored and practised many times on the surveys of our students' current educational achievement and the analysis of influential factors since 1990's. Since the 15th CPC National Congress, especially after the commencement of the new curriculum, comprehensive theoretical researches and practices on specific projects and topics have been carried out. We have obtained significant and meaningful results.