[N435] The I-INCE Technical Initiative Noise and Reverberation Control in Schoolrooms

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ABSTRACT

A technical initiative titled “Noise and Reverberation Control for Schoolrooms” was approved by the International-INCE General Assembly at its meeting in December 1999. The initiative is intended to be an internationally coordinated program to assist participating nations with engineering issues associated with achieving satisfactory acoustics in learning spaces. The Technical Study Group, held three formal and one informal meetings, has now grown to a membership of 16 member societies from 14 countries and 4 continents. Main topics of the meetings were as follows; classification and presentation of the previous and current researches; presentation of current national and international guidelines and standards; description of architectural, cultural and environmental properties of schools and classrooms in different countries; investigation on the cost-effective application of noise control and room acoustical technologies related to the classrooms. A report covering recommendations for schoolroom acoustical criteria, besides the above listed items will be the output of this study. The aim of the recommendations is to provide practical guidance to educational space designers and builders and to those who influence national codes for schoolroom design. This paper will report the scope, membership and the progress of I-INCE TI #4.

KEYWORDS: classrooms, noise, reverberation, control
INTRODUCTION

The main objective of the Technical Initiative #4 of I-INCE, is to develop recommendations for schoolroom acoustical criteria, including practical knowledge of the costs and benefits of noise and reverberation control, in order to optimize acoustic environment, in learning spaces. The aim of these recommendations is to provide acoustical and noise control guidance to educational space designers and builders, and to those who influence national codes for schoolroom design [1]. This paper summarizes highlights of some of the work and preliminary results already accomplished and outlines some of the effort being planned to be realized by the group.

OUTLINE OF THE WORK REALIZED

The Technical Study Group (TSG #4), held three formal and one informal meetings respectively at Internoise 2000, at Internoise 2001, Internoise 2002, and at the 17th ICA 2001, has now grown to a membership of 16 members representing 16 member societies and 14 countries.

Collection of all the current information (including standards, guidelines, recommendations etc. and various studies) on school and classrooms acoustics; determination of different architectural, cultural and environmental properties for classrooms and school buildings environment; investigation on the cost-effective methods and materials that can be used in schoolrooms acoustics improvement; construction of a template methodology or recommendations list; encouragement of the participation of other countries -like Mexico, Argentina - to the study group; and attempts to contact with international entities such as WHO, ISO and UNESCO are determined as the main topics of the work [2]. Depending on the works realized within these concepts, the outline of the final report content is designed as follows;

1. Introduction; scope and solutions, economical aspects, and report objectives
2. Research, technical knowledge and experience in classroom acoustics
3. National and international noise policies (standards, regulations, guidelines, etc)
4. School and classroom characteristics; physical-operational and acoustical properties
5. Recommendations
6. Noise and reverberation control measures; architectural and operational acoustics measures
7. Conclusion; dissemination of technical knowledge, development of policies, economic aspects, further data collection and research needs
Guidance and preparation of each part of the report has been undertaken by different members of the working group.

For Part 2, two basic reviews;

- effects of noise on children in schools - previous surveys of schools,
- work on the technical side - classroom design optimization, design and control, prediction methods etc.

are aimed and being carried on.

The analysis of existing regulations, recommendations and standards, which is the subject of the Part 3 of the TSG #4 report, pointed out, at national level, the large extent of these type of regulations, in many countries. A new interest in classroom acoustics is appearing also in international institutions, like the World Health Organization.

In conformance with the plan existing regulations, recommendations, guidelines or standards for classroom acoustics from 17 different countries have been identified and partially assembled. The documents examined are from Australia, Belgium, Brazil, France, Germany, Greece, Italy, Japan, Netherlands, New Zealand, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom and USA. Two recent papers; one in the Journal of Noise Engineering Control [3] and the other at Euronoise 2003 [4], stated the existing guidelines.

Most of the investigated policies could be considered with a common basis: they take into account a core set of acoustical parameters and suggest the relevant physical levels required: RT, background levels, airborne and impact insulation, noise from equipment. In the final report, these national standards and guidelines will be tabulated in a summary of different performance criteria (e.g. background noise levels and reverberation times) or design requirements for noise isolation between learning spaces and other spaces within a school.

For Part 4, a detailed questionnaire is prepared and distributed to the participants to realize the “School and classroom Physical Operational and Acoustical characteristics” investigation. Contribution from Belgium, Brazil, Germany, Japan, Italy, Sweden and Turkey are received so far and a brief summary presenting the situation on these countries is prepared.

Part 5, which is “Recommendations”, is aimed to be a clear document to support individuals and entities in improving the acoustics of learning spaces. It will cover design guidelines for sound insulation, reverberation control, technical equipment and also procedures to verify classroom performance. The new ANSI standard “ANSI S12.60-2002 American National Standard Acoustical Performance Criteria, Design, Requirements and Guidelines for schools” has been mentioned as a document to be considered in the Final Report and possibilities of using the annexes of this document, especially for Part 5 is decided to be asked to ANSI. Two documents [5, 6] from Acoustical Society of America, explain in detail the reasons to adopt this new guidelines and provide detailed information on the problems and solutions related to
classroom acoustics. Other guidelines, such as British Guidelines on classroom acoustics (BB 93), Swedish and Japan design guidelines will also be taken into consideration.
For the cost-effective application of noise control and room acoustical technologies related to the classrooms which is Part 6 of the report; architectural acoustics measures, operational measures and measures related with equipment are planned to be classified.

CONCLUSION

I-INCE TSG #4 has initiated a study of noise and reverberation control in classrooms at a time when this topic is receiving increasing attention worldwide. Several special sessions on classroom acoustics have also been organized related to the work of this technical initiative at different international congresses. While a considerable part of the work planned for I-INCE TI #4 has been completed, there is still much to do. Particularly challenging will be the development of a matrix of cost-effective noise and reverberation control methods appropriate for the various categories and types of construction and design for school classrooms.

REFERENCES