

RECENT EFFORTS AT POPULARISING MATHEMATICS IN BRUNEI DARUSSALAM (A CASE STUDY)

JATHIRATNE RUBERU
University of Brunei Darussalam

The year 1990 was officially declared "The Year of Enchantment of Mathematics" in Brunei Darussalam. The Fifth South East Asian Conference on Mathematics Education (SEACME 5) was successfully hosted in June. School based promotional activities were carried out effectively. Chief among them was a National Exhibition: "Mathematics in School". A National Mathematics Quiz was also held. It has since been established as an annual event. A National Mathematical Society has also been formed. Overall, an attempt has been made to ensure that the benefits of hosting SEACME 5 would be lasting. That private enterprise too, can stimulate national educational growth has been demonstrated.

The year 1990 has been an important milestone in the annals of Mathematics Education in Negara Brunei Darussalam, indeed in the entire South East Asian region.

The Hon. Minister of Education of Brunei Darussalam in October 1989, formally declared the year 1990 to be the "Year of Enchantment of Mathematics" in Brunei Darussalam (Year of Enchantment of Mathematics (Y.E.M) Newsletter No.7, Dec. 1990). The impetus for this declaration stemmed chiefly from a recognition of the importance of an international event in the arena of Mathematics Education which was due to take place in Brunei Darussalam towards the middle of that year. This was the Fifth South East Asian Conference on Mathematics Education (SEACME 5).

A committee called "The Year of Enchantment of Mathematics Committee" was instituted at the request of the Hon. Minister "to coordinate and oversee the completion of the various projects commenced during the year to promote Mathematics in Brunei Darussalam" (Y.E.M Newsletter No.6, Nov. 1990).

The theme of the international conference SEACME 5 itself was "The Enchantment of Mathematics". The Hon. Minister's declaration reinforced it. It also provided a focal point for most of the activities planned by the SEACME 5 Programme Committee. The main aim of these activities was to make the best use of the opportunity provided by the Conference to promote Mathematics Education in Brunei Darussalam. The benefits should be lasting.

To most people, especially to those not well versed in Mathematics, the title "Enchantment of Mathematics" would seem a contradiction in terms! Many a parent would say "Oh! we never found mathematics interesting", when confronted with their children's poor grades in the subject.

The successful learning of mathematics involves a systematic building up of mathematical concepts, skills and facts (Skemp, 1971; Ruberu, 1987). Also, it should occur in an order commensurate with the intellectual development of the learner (Piaget, 1950; Collis, 1972).

It is not unusual for people who have not had a proper mathematics training during their school days, to develop a sort of fear of the subject, or even worse, a strong dislike for it. This has been cited by Professor McKay (1968) as one of the reasons why much eloquence is not possible on mathematics as a discipline. McKay cites two further reasons. First, he says mathematics training is not always conducive to oratorical skill. He quotes from Professor J. J. Sylvester who had once said:

"... An eloquent mathematician must, from the nature of things, ever remain as rare a phenomenon as a talking fish and it is certain that the more anyone gives himself up to the study of oratorical effect the less he will find himself in a fit state to mathematize. It is the constant aim of the mathematician to reduce every superfluous word and phrase, and to condense the Maximum of meaning into a Minimum of language ..."

Second, McKay says that the non-descriptive, abstract nature of mathematics makes it a very difficult subject to present verbally. "In fact mathematicians are well known for their copious use of pencil, paper and waste-paper baskets or alternatively, of chalk, blackboards and dusters". To some people mathematics is only an art of reckoning and computation, and mathematicians are a weird tribe sitting all day making enormous calculations!

These erroneous and negative perceptions of mathematics and mathematicians have persisted through the ages, especially in the less developed countries of the world. Even today there are many people who look back on their school experiences with mathematics as so distasteful that they were glad to be finished with the subject.

On the other hand, there are also those who find mathematics interesting. To them there is something intrinsically beautiful in the subject. They perceive order, clarity and economy in mathematics and accept it as a powerful medium for a precise and coherent expression of their thoughts. To them the aesthetic value of mathematics is self-evident. These are the lucky ones! They have been properly initiated into the subject either through their own effort, or through the efforts of enthusiastic teachers; probably both. However, such people are only a minority in most countries.

Against such a background to present mathematics as an enchanting activity is indeed a tremendous uphill task. Yet a group of academic and education leaders of Brunei Darussalam decided to do just that! A courageous and innovative group of people indeed. How far were they successful in their efforts? Let's find out.

The Fifth South East Asian Conference on Mathematics Education (SEACME 5) was planned to be held in Brunei Darussalam in June 1990. To organise this Conference a Steering Committee was formed under the chairmanship of the Permanent Academic Advisor of the University of Brunei Darussalam (UBD). The Committee included members from the Department of Mathematics and the Department of Science and Mathematics Education of the UBD, Heads of schools, and officials from the Ministry of Education. This Committee formally adopted the title : "Enchantment of Mathematics" as the theme of the Conference (Minutes of Meeting 1 held on 10/04/1989).

The major target group of the Conference was the primary and lower secondary teachers. It was decided to conduct two workshops for these groups prior to SEACME 5, with assistance from foreign experts. The upper secondary, tertiary and vocational levels were also targeted.

The Steering Committee of SEACME 5 realised at the outset that their task was an innovative and ambitious one. Their Conference was going to be different. "It would ambitiously aim to communicate the pleasure and the fascination of Mathematics, to share enjoyment and enthusiasm, and to give numerous constructive ideas for passing on these positive attitudes in the classroom" (Y.E.M. Newsletter No.7, Dec. 1990).

Three Subcommittees were formed. The organisation of the academic Programme of the Conference was the responsibility of the Programme Subcommittee headed by the Professor of Mathematics at UBD (Minutes of Meeting 1 of SEACME Steering Committee, 10/04/1989).

For a start, this Subcommittee decided to clarify the term "enchantment". They used the definition: the feeling of great delight which would stem from something beautiful or fascinating or mysterious", and reference was made to G. H. Hardy's words : "A mathematician, like a painter or poet, is a maker of

patterns ... The mathematician's patterns, like the painter's or poet's, must be beautiful; the ideas, like the colours or words, must fit together in a harmonious way" (Y.E.M. Newsletter No.7, Dec. 1990).

The overall aim of the Conference was well formulated in the Programme Subcommittee's statement:

"The intention of the Conference is to show not only that mathematics can be enjoyed, but to demonstrate how this enjoyment can be brought into the classroom at all ages and levels of ability" (Minutes of Meeting 3 of Programme Subcommittee, 01/06/1989)."

A series of school-based promotional activities to boost the Conference was planned, and financial assistance for their execution was sought from Brunei Shell Petroleum Company (Minutes of Meeting 8 of Programme Subcommittee, 16/08/1989). A "Task Force for School-Based Promotional Activities" was also formed.

Meanwhile, the SEACME Steering Committee at its meeting held on 19/08/1989 requested the Professor of Mathematics, UBD, "to prepare an outline of possible activities which would justify 1990 being proclaimed the Year of Enchantment of Mathematics". The Hon. Minister of Education had agreed with the proposal that 1990 be proclaimed the "Year of Enchantment of Mathematics" in education in Brunei Darussalam (Minutes of Meeting 9 of Programme Subcommittee, 30/08/1989).

The workshop for secondary school mathematics teachers was held on 5-9 September 1989, with the assistance of a Curriculum Development Officer from Singapore. The attendance was good, and there was general agreement that on the whole the workshop was successful. Apparently, a majority of participants had been looking for more of "teaching method" than activities for enchantment of mathematics! (Minutes of Meeting 10 of Programme Subcommittee, 13/09/1989).

Local and regional needs in the sphere of mathematics education were also probed as a prelude to the Conference and documented (SEACME 5 - PS 6) (ibid.).

The newspaper "Borneo Bulletin" of October 28, 1989 reported on the Announcement made by the Hon. Minister of Education declaring 1990 as the "Year of Enchantment of Mathematics". As further activities during 1990, the formation of a mathematics association in Brunei Darussalam and the production of a SEACME 5 Newsletter were considered. It was decided that the Newsletter be called "Year of Enchantment of Mathematics Newsletter". The Mathematics Association would be primarily for the mutual benefit of teachers of mathematics at all levels of the education system. A document titled "Education in Brunei Darussalam" (SEACME 5 - PS 11) would also be prepared, for advance circulation to prospective speakers and participants in SEACME 5 (Minutes of Meeting 14 of Programme Subcommittee, 04/11/1989).

A large number of projects, to be carried out by school children, were planned as a part of the proposed school-based promotional activities. A special issue of the Newsletter was proposed as a vehicle to convey to schools the idea behind those projects. Selected projects from the schools would form a major component of a National Exhibition, entitled "Mathematics in School" to be held during 1990 (Minutes of Meeting 20 of Programme Subcommittee, 15/02/1990).

As yet another means of promoting interest in mathematics, representatives of Brunei Shell Petroleum Company proposed the production of a Year of Enchantment of Mathematics badge. They also came up with the idea of an interschool mathematics quiz to be organised after SEACME 5 (Minutes of Meeting 22 of Programme Subcommittee, 15/03/1990).

Efforts were made by Brunei Shell Petroleum Company to procure materials from abroad for building up of a "Mathematics Resource Package". The Company had also produced two mathematical board games which, after trialling, would be distributed to the local primary schools. The idea of the proposed badge was subsequently modified to two types of stickers containing the Year of Enchantment of Mathematics logo with the phrases "Enchantment of Mathematics" and "Pemikatan Matematik" round it

(Minutes of Meeting 24 of Programme Subcommittee, 12/04/1990).

A series of school-based exhibitions was planned. Their organisation would be left to the schools themselves. The schools were to be encouraged to subsequently display a selection of many of their best exhibits at the proposed National Exhibition. To maximise the impact of the national exhibition, attempts would be made to publicise it by radio, television and the local press. TV coverage of the opening ceremony would be sought (ibid.).

Another activity proposed for the year 1990 was for Bruneian children to participate in the Australian Mathematics Competition held in July that year (ibid.).

The Ministry of Education would invite a large number of teachers from state primary and secondary schools and also from private schools to participate in SEACME 5. They would be exempted from payment of registration fees (Minutes of Meeting 27 of Programme Subcommittee, 10/05/1990).

Discussions with Radio Television Brunei (RTB) to televise a mathematics quiz series involving students from local schools were successfully concluded. Seven programmes involving eight secondary schools would be screened on RTB in November and December 1990 (Minutes of Meeting 28 of Programme Subcommittee, 19/05/1990).

As an additional activity of the Year of Enchantment of Mathematics, an exhibition of Fractals was planned to be held at the University of Brunei Darussalam in July 1990. This would consist of 96 framed pictures of fractals comprising the touring "Beauty of Fractals" exhibition of the West German Goethe Institut (ibid.).

By the middle of 1990 membership of the newly formed Mathematical Society was expanding and a second chapter of the society was formed for the Kuala Belait / Seria region (ibid.).

A public lecture was delivered at the University of Brunei Darussalam on 30/05/1990 by Professor Celia Hoyles of UK on the theme "Popularising Mathematics on TV : The Story of Fun and Games". A video recording of two series of her TV programmes was also available (Minutes of Meeting 30 of the Programme Subcommittee, 06/06/1990).

All preparations for the National Mathematics Exhibition were completed, and the exhibition was opened on the date decided : Sunday 10 June 1990 (ibid.).

The National Exhibition "Mathematics in School" was well received by the public and was given good coverage by Radio Television Brunei. Arrangements were made to distribute the prizes to the schools as soon as possible.

The Mathematical Society of Brunei Darussalam would be represented at the South East Asia Mathematical Society meeting to be held in Hong Kong in August 1990. Professor Roger Eggleton, the then Professor of Mathematics at the University of Brunei Darussalam, who had been the prime mover in most of the activities already described, was nominated for the task (Minutes of Meeting 31 of Programme Subcommittee, 27/06/1990).

SEACME 5 was held during 14 - 16 June 1990. Most participants were highly complimentary on its success. Papers presented were to be collated and published as a "Conference Proceedings" book. It was suggested that the next Conference, SEACME 6 to be held in Surabaya, Indonesia (1993), should have its scope extended from Tertiary Education to include also school education. This would give it wider appeal in the region (ibid.). The "Conference Proceedings" of SEACME 5 have since been published (Programme Committee, 1991).

An important spin-off from the Year of Enchantment of Mathematics was the Concept of a National Mathematics Quiz for secondary schools as an on-going activity. As mentioned earlier, the quiz conducted under this title in 1990 was the brain child of representatives of Brunei Shell Petroleum Company. Sponsorship from Brunei Shell Petroleum Company and Radio Television Brunei received at

a very early stage of its development helped to make it a reality. This mathematics quiz generated considerable interest and enthusiasm among members of the public towards mathematics. The Mathematical Society of Brunei Darussalam Newsletter No.10 of January 1992 commented :

"It showed that Mathematics can be entertaining, can be successfully presented as a competitive skill by pupils in Brunei, and can be presented as a spectator sport! The serious immediate results of this Quiz included the stimulation of public interest in this mathematical activity, the raising of the public profile of mathematics, and the cultivation of a more positive public image of mathematics. The longer term effect of the Quiz is to assist in improving the acquisition of mathematical knowledge and skills in Brunei Darussalam".

This positive feedback from the schools and the public created an additional impetus and motivation for the organisers of that Quiz to conduct such competitions on a more systematic basis as a continuing annual activity.

With this end in view a Committee was formed in 1991, at the request and with the support of the Permanent Secretary to the Ministry of Education. It comprises University staff, mathematics teachers, School administrators and representatives from Brunei Shell, Radio Television Brunei, the Ministry of Education and the Mathematical Society (The mathematical Society of Brunei Darussalam Newsletter No.10, January 1992). Called the "National Mathematics Quiz Steering Committee", this body has already successfully organised and concluded the National Mathematics Quiz 1992 in collaboration with Maktab Sains Paduka Seri Begawan Sultan, a leading secondary school in Brunei Darussalam (Minutes of Meeting 11 of the National Mathematics Quiz Steering Committee, 20/08/1992). The 1993 Quiz is now in progress, in collaboration with another leading secondary school in the country - Sekolah Menengah Berakas .

In conclusion, it must be stated that

- (1) 1990 - the "Year of Enchantment of Mathematics" has been a tremendous success in boosting the image of Mathematics in Brunei Darussalam, with impact extending to all the South East Asian Region, and
- (2) University Departments and private enterprise (evidenced by the role played by Brunei Shell Petroleum Company) can effectively join forces with the government sector to make substantial advances in the educational development of a country.

Acknowledgments :

The author is indebted to Professor Roger Eggleton, the former Professor of Mathematics at the University of Brunei Darussalam for giving him access to relevant documents, and for comments on an earlier version of this paper.

Acknowledgments are also due to Professor Patrick Duignan, the Dean of the Faculty of Education, UBD, for providing the initial impetus to prepare this paper depicting a recent educational advancement in the arena of Mathematics Education in Brunei Darussalam.

REFERENCES :

- Borneo Bulletin. (1989, Oct.). Newspaper of 28/10/1989.
- Collis, K. F. (1972). A Study of Concrete and Formal Operations in School Mathematics. Ph.D. Thesis, University of Newcastle, NSW.
- Eggleton, R. B. (1992, Jan.). National Mathematical Quiz 1992-The Mathematical Society of Brunei Darussalam Newsletter No.10.

- McKay, M. H. (1968). What is New in Mathematics? - Inaugural Lecture by Foundation Professor of Mathematics, University of Papua New Guinea.
- National Mathematics Quiz Steering Committee. (1992). Minutes of Meeting No.11.
- Piaget, J. (1950). The Psychology of Intelligence. London: Routledge and Kegan Paul, Ltd.
- Ruberu, J. (1987). An Investigation of Concept Attainment in Secondary School Mathematics. Ph.D. Thesis, La Trobe University, Melbourne.
- SEACME 5 Programme Subcommittee. (1989, 90). Minutes of Meetings 3, 8, 9, 10, 14, 20, 22, 24, 27, 28, 30, 31.
- SEACME 5. (1989a). PS 3, Local and Regional Mathematical Needs.
- SEACME 5. (1989b). PS 6, Resource Materials.
- SEACME 5. (1989c). PS 11, Education in Brunei Darussalam.
- SEACME 5 Programme Committee. (1991). Proceedings of the Fifth South East Asian Conference on Mathematical Education. University of Brunei Darussalam.
- SEACME 5 Steering Committee. (1989). Minutes of Meeting No.1.
- Skemp, R. R. (1971). The Psychology of Learning Mathematics. Harmondsworth: Penguin Books.
- Sylvester, J. J. (1968). Baltimore Address : Mathematical Papers, Vol.3, pp. 72-73. As quoted by M. H. McKay, What is New in Mathematics? - Inaugural Lecture by Foundation Professor of Mathematics, University of Papua New Guinea.
- Year of Enchantment of Mathematics. (1990a). Newsletter No.6.
- Year of Enchantment of Mathematics. (1990b). Newsletter No.7.