Towards a School-Based Mathematics?

Mathematics

The subject is found important, but it does not attract students. The examination results are poor both in Ordinary and Advanced levels. What is wrong, and what can be done to make things better?

One thing is sure: *something* must be done. In fact, many things have to be done, starting from modernizing the curriculum and developing teacher education. My point of view is on how the existing school mathematics can be trimmed using School-Based Assessment as developing tool.

The Basic Competencies

The five basic competencies should be seen as a general framework of all school education. Our youth should grow competent in communication, ethics and religion, understand and interact with their environment, have the full benefit of play and leisure, and develop their ability of learning to learn. The competencies cannot be the direct target of student assessment. It is in mastering general and subject-specific skills that the development of the competencies becomes visible and measurable, and it is these skills that should be subject to assessment.

The Method is a Message

While we think that we are "just teaching mathematics", we actually convey many other things into the teaching-learning process. It is sometimes said that the first and foremost things the child really learns in the school are such as being able to sit still on inconvenient benches, walk in line and not ask the questions arising in his/her mind. Preparing for the examinations tends to develop certain skills rarely needed after the school, such as memorizing details without a context and selecting from a set of given alternatives.

If we want to teach and develop new kinds of skills needed in the modern society, we must also change the way we arrange the learning situations and how we ourselves behave as teachers. As we start planning our teaching-learning practices based on developing the basic competencies, we must bear in mind that our methods carry at least as much information as the contents we want to transmit. Communication or group working skills cannot be taught by lectures, and problem-solving skills are difficult to assess using multiple-choice questions. New kinds of teaching-learning activities are necessary, and new forms of assessment are needed to support learning the new skills.

1.Competencies in communication

Mathematics can be seen as a formal language. This means that from a certain point of view mathematics *is* communication. In a more practical sense, writing down solutions to mathematical problems should be seen as reporting the problem-solving process. A good report is understandable to other people. Ability to describe written mathematical problems visually (in the form of pictures or tables) and interpret graphical information is also an important form of communication.

The students should be encouraged to "speak mathematics". Mathematics should not be learnt only through solitary calculate-and-write activities, but also by oral presentations and group discussions. The students should be guided to use correct mathematical terminology.

A simple exemplary exercise is a task where a student is shown a geometrical figure and he/she is asked to describe it orally to another student who does not see the original object, and whose task is to reproduce the original figure. The exercise is also a simple example of a group learning process where the result depends on the abilities of both students. This task can naturally be used in assessing mastering of communicative skills.

2.Competencies relating to the environment

There is a strong tradition in mathematics to keep it "pure", the examples and exercises being taken from the abstract world of mathematics. If practical examples are given, even they are often rather applications of mathematics into real life than mathematical modelling of real-life problems.

Real problems from everyday life should be taken under mathematical study. This would give the student the idea that mathematics is not just something academic with little or no connections to the life, but a powerful tool to describe the world around us and explain phenomena that may appear chaotic or strange. In this way, mathematics will help understanding our physical, biological and cultural environment.

Example: If there are any reparations or renovations of the school facilities to be planned, let the students calculate for example the amount of paint of roof tiles needed. This task can be assessed as a group assignment.

3.Competencies relating to ethics and religion

By its nature, mathematics seems to be theoretical and free from any burden of ethical values. On the other hand, there are old traditions of astrology and numerology that allegedly utilize mathematics, although the "scientific" basis is somewhat questionable In modern world, statistics is used in the society as a basis of decision-making.

In mathematics, a clear distinction should be made between knowledge, reasoning and beliefs. A firm understanding of statistical reasoning could reveal the students any attempt to use false interpretations of statistical data or complicated but meaningless calculations to justify immoral acts. This is an important ethical dimension of mathematics.

4.Competencies in play and the use of leisure

Activating mathematical games, mathematical field activities and interactive computer software will add a flavour of joy into mathematics. Even though this is not the main reason of adding the role of activating learning methods, they will certainly develop the recreational competencies.

In mathematics, beauty can often be seen in the form of clarity and simplicity. This does not, however, always explain why some formula or reasoning looks more beautiful than others. Mathematics is a part of humanity, and not all its features are as strictly objective as we may think.

5.Competencies relating to "learn to learn".

This is probably the competency easiest to connect with learning mathematics. The skills supporting learning to learn include at least problem solving skills and skills of logical thinking. Skills of identifying and modelling problems and solving them should be made one of the major subjects of development in school mathematics. If the problems are taken from "extramathematical" environments, the learning skills enforced in mathematics will transfer to other subjects as well.

Ability of learning to learn contains a strong affective dimension. To be able to learn, the student must be motivated and trust his/her talents. For many children the myth of mathematics as a "difficult subject" is a heavy burden preventing them from learning. The working methods should be developed to encourage students with different talent structures and learning styles.

Problem solving should be practiced throughout the syllabus, and every mathematical task should be considered as a problem to be solved.

Assessment and the Basic Competencies

The Basic Competencies are a framework for school education. They cannot be a target of student assessment. Practical skills derived from the given competencies can be both practiced and assessed. Teaching-learning processes in mathematics as well as in any other school subject should be planned not only to transfer knowledge, but also to develop a variety of skills. This will certainly lead to better performance even in traditional tests. The assessment tradition in mathematics has favoured testing academic knowledge and neglected assessing the learning process or mastering the more practical skills needed on the way to the highly academic knowledge. Changing the teaching traditions seems to require a support from new kinds of assessment modalities.

The question of developing the working methods to support diverse general skills was raised in the Finnish school mathematics a decade ago. In the present-day Sri Lanka I can hear opinions very similar to those I faced in my country at those times. *Aren't we supposed simply to teach mathematics? Don't all kinds of silly and childish games reduce the time needed to teach all the topics of mathematics?* Such questions are rare today, as the teachers have got the opportunity to widen their range of methods and noticed that "the silly games" indeed improve their students' performance. The pedagogical freedom and independence of the Finnish schools and teachers has been an important factor to make it true. Results were seen in recent studies showing that Finnish students have the best functional literacy in the world, one dimension of it being mathematical literacy. Without firm development of cross-curricular competencies this would hardly have been possible.

Adopting new ways of teaching and new assessment methods may take time and require additional training. But first and foremost we need an open mind, a diverse view of the role of mathematics – and a firm trust on both our own intelligence and the talents of our youth.

In its inaugrual year VESL (Volunteers for English in Sri Lanka) sent five volunteers to work in five different rural schools in the central and north eastern provinces. The programme ran in June and July this year. The five teachers were Tom Harrison, Emma Sykes, Mags Feardon, Ian Livingstone and Sophie Harrison and were also aided by a translator Mr Wijesooriya. The five schools were:

Marassana Model Primary school - Kandy Disrict

Irrakakandy School - Tricomlaee District

Koddaikaller School - Batticaloa District

Puwakpitiya School, Luggala, Matale District

J/ Vigneswara College - Jaffna District

The programme was set up to help children from rural schools get an exposure to English language and culture. The teaching concentrated on converstaional skills and was aimed at imporving the students confidence and motivation. The lessons were very interactive and involved songs, role plays, dramas and games. During the week in all five of the schools many improvements were seen in the students verbal English skills. Studnets who had been too shy or embarressed to speak at the beginning opened up as the week went on and became more confident using the English they knew, as well as learning new vocablurary. We found that generally writing and reading skills were pretty good amongst the students whereas listerning and speaking skills were much weaker. Due to the fact the volunteers spoke little to no Sinhala or Tamil the students were forced to try and communicate in English.

In all areas the programme was received very well by Education departments, Principals, Teachers and students. The students were very keen to attend the classses and keen to participate in the lessons. In some areas the English teachers also joined in the lessons, and in Jaffna even teachers from other schools came to observe the programme. There were many calls to reapeat the programme in the future.

Tbe programme was funded by the volunteers themselves with some help from VESL's chief sponsor Asia Power. The volunteers covered the flight, food and accommodation costs themselves and Asia Power gave a very generous donation towards stationary and travel costs. During the programme the volunteers lived with the local communities and ate local food. Hence many informal lessons were set up with students and teachers who lived in the area. It was also a great opportunity for the volunteers to learn about Sri Lanka and its history and culture.

The VESL 2003 programme was a pilot scheme, but due to its many success's it hopes to continue in the future. Plans are already underway to send ten volunteers next July to work for a five week period in schools accross the country.

Picture shows Dr. Karunasena Kodithuwakku in conversation with Arjuna Christopher Perera, a student of Grade 5 of Sumanatiss Vidyalaya, at a recently held book distribution Programme.

Keppitipola Gamini Thillekeratne who authored 'Pragna Probodhini', made a presentation of the book to Dr. Karunasena Kodithuwakku at the Ministry of Cultural Affairs in 'Sethsiripaya'.

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Signs of Life

While the teacher job market has clearly contracted in many places in the past year, recent news reports show that schools systems around the country are still seeking out talented educators. With many schools facing heightened staffing and academic pressures, there has been a flurry of innovative teacher-recruitment and -training activities. We offer a brief survey of recent reports:

Philadelphia School District: Seeking to hire as many 600 new teachers, the Philadelphia district has designed several new recruitment initiatives, including an "information clearinghouse for applicants," a recent Philadelphia Inquirer article reports. According to a news release from the district, its Teacher Welcome Center provides interview rooms, counseling and computer centers, and personnel support to potential teachers. District officials have also launched the Teacher Ambassador Program, through which current teachers can earn bonuses of between $500 and $1,000 by referring new candidates to the district. Meanwhile, its Corporate to Classroom Transitions program identifies professionals seeking a career change and provides certification in high-need subject areas. Retention efforts include New Teacher Coaches, a program in which veteran teachers provide new teachers with guidance and support. Additional incentives include partnerships with Teach For America, Troops to Teachers, and The New Teacher Project.

Los Angeles Unified School District: A recent Los Angeles Times article reports the Los Angeles district is reaping the benefits of other districts' losses. School officials expect to hire 3,000 teachers for the upcoming school year, among them 300 credentialed teachers who were laid off elsewhere. "It's a silver lining of the bad news that's hitting school districts up and down the state," said Richard Van Der Laan, a spokesman for the Long Beach Unified School District. The district also hopes the new hires will help it meet the mandates of the "No Child Left Behind" Act, under which every teacher must be certified by the end of the 2005-06 school year.

Boston Public Schools: Intending to give aspiring educators greater hands-on preparation for the realities of teaching in urban classrooms, Boston is preparing to begin what they believe is a first-of-its-kind teacher-training program replicating the medical residency model. The 12-month Boston Teacher Residency program will place prospective teachers in classrooms four days a week under the supervision of a veteran teacher, as well as requiring supplementary coursework. BTR "residents"—to be drawn from both traditional and nontraditional backgrounds—will earn dual certification upon completion of the program, and if they chose to remain in the Boston schools system, will have the residency's $10,000 tuition costs forgiven. BTR leaders hope to have one third of all district hires coming from the program by school year 2008-09.

In Virginia: Several Virginia colleges are making changes in their teacher-prep programs, such as requiring more time student-teaching, to better address student needs, reports a recent Richmond Times-Dispatch article. "Both classroom time and practical experience are important for a well-rounded program," said Brenda Gilman, chair of the teacher-education department at Randolph-Macon College. The program at Randolph-Macon requires students to complete a semester- long student- teaching experience, instead of the typical two eight-week practicums. Another area college offers a program that places its education students in public school classrooms during each semester of college.

Education Week - Online Editor

THIS PAGE IS A JOINT VENTURE BETWEEN THE MINISTRY OF HUMAN RESOURCE DEVELOPMENT, EDUCATION & CULTURAL AFFAIRS AND THE DAILY NEWS

Q&A Column

There has been a very good response to our request to send in question encountered in the education sector. Most of the questions are of a very similiar nature. Hence we reproduce below some of the much sought after questions.

Q: *I am a student who sat for the GCE O/L examination in December 2002. Can you explain how the SBA grades are given for students at this examination. In Social Studies I had an 'A', as the SBA grade. But in the Examination Department paper I got only a 'C'. How can this discrepancy occur. Can you please explain?*

Mahinda Vithanage, Kurunegala.

A: At the GCE O/L examination SBA grades are calculated on the basis of the grades that the students had obtained in classroom assessments. The average of the grades given in the school is calculated to workout to the final grade. Schools are required to submit these details at the time applications are sent.

It is possible that a student who has got a high grade at the SBA may not get a similar grade at the written examination; for SBA grades are given on the basis of various types of assessments such as practical work, short answer questions, projects etc. A student who is more practically oriented may get a higher grade on the basis of the assessment done in the classroom. Unlike at the written examination the student's capabilities in practical work, core skills like leadership, teamwork, initiatives, decision-making are assessed under SBA.

Q: *I am attending an international school and studying for the London GCE O/L examination. Can I sit the local O/L examination in the English medium after I complete my London examination?*

Ishara de Silva, Colombo 5.

A: Yes, you can sit the O/L examination as a private candidate in the English medium.

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