Information Technology Education in the Sri Lankan School System: Challenges and Perspectives

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Abstract:

Introduction of Information Technology into the secondary school curriculum in Sri Lanka is a very recent development. The subject General Information Technology (GIT) was included for G.C.E. Advanced Level Examination in 2005 while plans are afoot to introduce Information Technology as a subject for G.C.E. Ordinary Level from 2008. Results of the first GIT examination held in 2005 clearly show poor performance by students. Considering the large amount of money spent for Information Technology education in schools and the aspirations of students in acquiring a sound knowledge in Information Technology while in school, it is essential that an analysis is done to evaluate the merits and demerits of Information Technology education in schools. This paper critically analyses the present structure and process of IT education in secondary schools in Sri Lanka, including aspects of curriculum and teacher training, and attempts to make suggestions to enhance IT education in schools, especially in the context of Ministry of Education's policy to broad-base IT education in schools.

1. Introduction and background

A remarkable growth in the interest among the younger generation in Sri Lanka to embark on information technology related study programs is observed during the last decade or so. However, the introduction of information technology as a subject in the secondary school curriculum is only a very recent development. The pilot project on teaching General Information Technology (GIT) to year 12 and year 13 school children started only in 2002 while teaching GIT as a *selective* subject in a limited number of schools commenced in 2004. At present there are approximately 10,000 schools in Sri Lanka and approximately 2400 out of these have G.C.E. Advanced Level classes. GIT is presently being offered as a selective subject in approximately 500 schools and the first batch of students took this subject in the G.C.E. Advanced Level examination[1] in June 2005. Plans are afoot to offer Information Technology as a subject in the G.C.E. Ordinary Level Examination from the year 2008. Apart form the above mentioned teaching of IT, there is no other formal teaching in IT at present in the primary and secondary school system in Sri Lanka.

[1] General Certificate of Education (Advanced Level) Examination also functions as the entrance examination to Sri Lankan universities

The Ministry of Education, Sri Lanka, according to its circular 2004/20, has identified four pre-requisites to conduct teaching GIT in a particular school namely,

(a) a minimum of four computers.
(b) one teacher with sufficient subject knowledge and training.
(c) a secure room (lab) with electricity supply.
(d) sufficient furniture.

The Government of Sri Lanka having recognized teaching GIT as a priority, formulated the National Policy on Information Technology in School Education (NPITSE) in 2001. The vision of NPITSE is "a new generation of Sri Lankans empowered with Information and Communication Technology and to facilitate the planning, implementation and sustenance of Information Technology education in schools to enhance students' learning and quality of teaching". Since the formulation of the NPITSE, the Government has initiated several programmes under four strategic themes namely, curriculum development, human resources development, physical infrastructure development and support initiatives development. Approximately 1000 teachers have so far been trained in teaching GIT, syllabuses have been formulated, computers have been provided to many schools and even physical infrastructure has been enhanced. There are plans to propagate teaching IT to even lower forms in schools in the near future.

The network of Government schools has been laid to provide universal access to primary and secondary education throughout Sri Lanka. Education is provided free up to University level by the Government. A comparatively even distribution of schools and teachers, in relation to student enrollment across the country is visible (Table 1).

Province	Number of Schools	Number of Students	Number of Teachers	Average School Size	Student Teacher Ratio
Western	1,393	873,434	38,187	627	23
Central	1,483	539,262	27,447	364	20
Southern	1,151	544,109	26,984	473	20
North-Eastern	1,802	628,195	27,361	349	23
North-Western	1,250	481,510	24,839	385	19
North-Central	783	269,380	13,010	344	21
Uva	829	299,897	14,464	362	21
Sabaragamuwa	1,135	391,288	19,520	345	20
Sri Lanka	**9,826**	**4,027,075**	**191,812**	**410**	**21**

Table 1. Government Schools, Student Enrolment and Teachers, by province, 2002 (Source: The World Bank, Human Development Unit, South Asia Region)

However, school completion rates are less satisfactory in the senior secondary level, with comparatively low examination pass rates at the G.C.E. O/L (grade 11) and G.C.E. A/L (grade 13) examinations (Table 2).

Province	Number of students Appearing for the GCE O/L Examination	Number of Students Completing the GCE O/L Examination and Qualifying for the GCE A/L Cycle	Proportion of Students Successfully Completing the GCE O/L Examination %	Number of students Appearing for the GCE A/L Examination	Number of Students Completing the GCE A/L Examination	Proportion of Students Successfully Completing the GCE A/L Examination %
Western	78,832	37,674	48	49,051	26,543	54
Central	48,641	15,757	32	24,564	13,491	55
Southern	48,390	17,801	37	27,337	15,599	57
North-Eastern	41,659	13,088	32	28,088	16,254	58
North-Western	41,609	15,779	38	22,226	12,892	58
North-Central	22,180	6,769	31	10,305	5,413	53
Uva	26,262	8,104	31	11,684	6,120	52
Sabaragamuwa	34,743	11,842	34	18,681	10,597	57
Sri Lanka	**342,316**	**126,814**	**37**	**191,936**	**106,909**	**56**

Table 2. GCE O/L and GCE A/L Examination Pass Rates, by Province, 2002 (Source: The World Bank, Human Development Unit, South Asia Region)

2. Motivation and usefulness

Given the above developments that have taken place during the recent past and the enormous amount of both financial and human resources invested in the process, a scientific study to evaluate the effectiveness of this whole process is yet to be done. This, in our opinion, is a national need due to several reasons. The wide variation in IT knowledge among teachers and general inadequacies in both knowledge and training, if any, should be identified and need to be remedied sooner than later in order to make the efforts of the Government bear fruit. Secondly, a proper study should be done to examine whether both physical and human resources are being optimally utilized. Thirdly, a proper evaluation of teaching GIT in year 12 and year 13 should be done to enable the authorities to be satisfied before propagating IT into the school curriculum in lower forms. Last but not least, a curriculum evaluation should be made to make sure that what is being presently taught is in line with the requirements of universities to which some of these students will eventually enter, and in general with the requirements of employers. This paper primarily analyses the performance of students at the first GIT Examination conducted in Sri Lanka. At the time of writing this paper, only marks in respect of the second paper was available.

Several research work carried out previously by distinguished academics motivated the author to do a similar study in the Sri Lankan context. Valentina Dagiene[1] presents the goals and nature of introducing IT into the school curriculum in Lithuania and Peter Micheuz [5,6]describes how the Austrian school system has responded to the needs of a growing digital economy over many years. Ewa Gurbiel *et al* [3] puts forward how ICT was integrated into the curriculum in the Polish Education System while Christian Doringer [2] discusses the importance of educational standards in school informatics in Austria. Standards in the Russian Education System with respect to ICT are discussed by Kuznetsov and Beshenkov [4] and recent tendencies in teaching ICT in Ukraine is given by Oleg Spirin [8]. Markus Schneider [7] discusses strategies to incorporate even abstract

concepts in IT into the school curriculum in Bavarian Gymnasiums. Many other researchers have also documented their research on different aspects of teaching and learning ICT in schools and experiences in introducing ICT into the school curriculum.

Introduction of ICT into the Sri Lankan school system is only a recent development and no research has so far been done on any of the above mentioned aspects. It is in this backdrop that the author presents the foregoing analysis on the performance at the first GIT examination in the Sri Lankan school system.

3. Structure, syllabus and assessment of the GIT Examination

According to the official document prepared by the National Institute of Education, Sri Lanka [9], setting out the syllabus of GIT examination, the objectives of the GIT examination are for the student to understand the basic concepts of IT, understand the potential of IT tools and apply them appropriately, identify the further study paths in IT based on his/her ability, gain knowledge in selecting the directions towards employment opportunities in IT and associated fields, adapt IT to enhance learning, demonstrate an awareness of social, ethical and safety issues related to IT and appreciate the importance of IT in national development. It is debatable as to how many of these objectives are in fact practically measurable.

Subject contents of the GIT examination and recommended time allocation are summarized in Table 3. One period is defined to be forty minutes.

Topic	Proposed no. of periods
1. IT Fundamentals	12 (Theory 11, Practical 1)
2. Mathematics for Computing	10
3. Information Systems and IT	14
4. Computer Programming	20 (Theory 10, Practical 10)
5. Use of Computer Software	14 (Theory 4, Practical 10)
6. IT and National Development	02
Total	72 (Theory 51, Practical 21)

Table 3. Contents of the GIT Examination
(Source: GIT Syllabus, National Institute of Education, Sri Lanka [9])

Assessment of the GIT examination is carried out as follows. School based assessment is done through a written examination administered by teachers under the guidance of the National Institute of Education. The National Level Examination (GIT Examination) is conducted by the Examinations Department of Sri Lanka. This examinations comprises two papers namely, objective type multiple choice paper of one hour duration (number of questions 40) and structured paper of two hours duration (number of questions 6 and students have to answer 4). The medium of both these papers is English and the distribution of marks is 40 and 60 respectively.

3. Analysis of Performance of Students in the GIT Examination

The author extends his appreciation to the R & D Branch of the Examinations Department of Sri Lanka for providing the data.

The examinations consisted of six structured questions out of which students had to answer four. Each question carried 15 marks. The lowest mark obtained was 00 while the highest was 60. The mean of marks was 8.9 and the standard deviation was 14.48. The Facility Index of almost all items is below 0.5, which is an indication of poor performance. Furthermore, the facility index in many parts is less than 0.1, which indicates that many students have scored low marks. This implies that the majority of students had found it difficult to answer the questions. Reasons of this poor performance could be many and needs investigation.

4. Discussion

The previous paragraph presented an analysis of the performance of students at the first GIT examination held in Sri Lanka. Results of this examination are not at all encouraging. In fact, the above analysis clearly shows that certain factors have influenced the poor performance by students. Though a thorough investigation has to be conducted to find the exact reasons, the author is of the opinion that the following reasons represent the exact reasons. These reasons given are not in any priority order.

(a) The medium of examination was English while the majority of schools in Sri Lanka still use native languages, i.e. Sinhalese or Tamil, for teaching.
(b) Insufficient computer laboratories for practical work.
(c) Insufficient number of well trained, specialized teachers in IT in the school system.
(d) Insufficient teaching and learning material in the form of books, tutorials, instruction manuals and e-learning content.
(e) Insufficient number of periods allocated in the school timetable for teaching IT.

5. Related perspectives

The results of an econometric analysis of the factors associated with primary grade cognitive achievement suggests that, among education variables, teacher performance plays an important role in determining the learning outcomes of students. Students perform better in classes where teachers use student-centered learning methods, employ desk work as part of classroom practice, use oral English in their teaching and evaluate student exercises. From a policy perspective, these findings emphasize the importance of teacher performance. Hence, initiatives to improve the capabilities, motivation and classroom practice of teachers needs to be a core element of education development strategy. According to the same study, the adoption of a student-centered learning approach contributes positively to learning outcomes in all three subject areas namely, first language, English and Mathematics. This finding provides important econometric support to findings from qualitative studies that parents and teachers perceive student-centered learning as improving student performance. The same argument could well be applied in IT education too.

The use of oral English in teaching contributes favorably not only to English language scores but also to first language learning and mathematics achievement. This could be attributed to the ability of teachers conversant in English to access ideas and general information better than teachers lacking English language competency. Improving the English language capabilities of teachers, hence, could yield broad benefits to students.

Students attending schools with electricity perform better than students in schools without electricity. Schools with electricity are likely to be better endowed, in terms of facilities and services, so that this is a plausible finding.

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