

**SAARC JOURNAL
OF
EDUCATIONAL
RESEARCH**

Vol 6. No. 1. 2008

**National Institute of Education
Maharagama
Sri Lanka**

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OF
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RESEARCH**

Vol 6. No.1.2008

Editor

Dayananda Keppetigoda

**National Institute of Education
Sri Lanka**

SAARC Journal of Education Research

SAARC Journal of Education Research is an annual publication. It is published by the National Institute of Education, Maharagama, Sri Lanka, the Regional co-ordinator for Education Research for SAARC Countries for dissemination of research findings. The Editor will be happy to receive a feedback on papers published in the journal. All correspondence should be addressed to:

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SAARC Journal of Educational Research

The Subscription price for a single issue including postage is

Local - Rs. 140.00

Foreign - £ 1.5

Ordering Information

Subscription orders and requests for sample copies should be sent to:

Director (Publication)
National Institute of Education
Maharagama
Sri Lanka

Tel. 2851301-5 Fax: 0094-1-2851306 e-mail : nie.lk@hotmail.com

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ISSN 1391 - 1880

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Vol 6. 2008

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1. to disseminate research findings to educational policy makers, planners and practitioners in SAARC countries and to international readers.
2. to promote and encourage original critical investigation of issues relevant to educational development in SAARC countries.
3. to encourage those interested in education to involve in research activities.

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Evaluating the Effectiveness of Swedish International Development Authority Funded Primary Education Projects in Sri Lanka

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Abstract

The paper reports an evaluation of the effectiveness of two primary education projects in deprived rural areas in Sri Lanka funded over twelve years by the Swedish International Development Authority. The impact of the project schools on pupils' attainment in mathematics and language, controlling for family background and school level effects, was positive and significant compared to that of non-project schools. The evaluation assesses equity by investigating differential impacts of the projects on pupils with different characteristics. The effectiveness of project schools in the earlier phase was attenuated compared to that of the later phase, indicating problems of sustaining the positive impact of donor-aided interventions.

Key words

Project evaluation, Developing country, Donor funding, Primary, School effectiveness

Background

The Sri Lankan education system has given high priority to investing in human capital. The education system expanded rapidly after independence in 1948 with remarkable achievements in securing universal primary education and almost 80% participation in secondary education (Hewage, 1992; Lofstedt et al., 1985). However, this huge expansion was accompanied by inequalities, inefficiency and disparities in school quality between provinces. The national averages obscure glaring imbalances between urban and rural education. There has been a sharp decline in the standard and quality of education at all levels in recent decades, which is one of the major challenges for education in South Asia. Poor and unevenly distributed infrastructure facilities, dearth of teachers as well as the lack of professionally qualified teachers are the main reasons for poor quality education (The Presidential Task Force on General Education in Sri Lanka, 1997).

Consequently changes were needed to improve the quality and standard of education. However, the economy was not sufficiently strong to support the required public sector investment in improvements. The education budget is mostly spent on maintaining the system (Aturupane and Abegunawardena, 2000). Funds for improving the education system have been mainly provided through aid-funded projects (Ranaweera, 2000).

Education sector support to Sri Lanka by the Swedish International Development Authority (SIDA) began in 1993 with a number of education development programmes and continued for more than twelve years (Abhayadeva et al., 1995). Among the development programmes, two - Plantation School Education Development Programme (PSEDP) and Primary Schools Development Programme (PSDP) - were especially concerned with the improvement of primary education.

PSEDP was mainly targeted on improving the quality of life of the Tamil community in the plantation area who had been brought from Tamil Nadu in India by British rulers as labourers to work in their tea and rubber estates. In order to educate the plantation workers' children the managers of the estates established schools called 'estate schools'. These schools had only the primary stage and the curriculum delivered was different from the curriculum taught in government schools. Although all these schools were taken under government control between 1977 and 1980, they were suffering from various shortcomings such as poor infra structure, shortage of qualified and competent teachers, absence of facilities for secondary education, lack of co-ordination and supervision at regional level, inadequate support for curriculum implementation and lack of communication between teachers and parents (Little, 1995).

The PSDP schools were selected from rural remote areas and from deprived urban areas in accordance with criteria identified by the Ministry of Education based on the difficult school index. These schools lacked basic physical facilities, such as adequate classrooms, staff quarters, safe water, sanitation as well as a stimulating learning environment. Most of these schools have only one temporary building with mud walls and thatched roof situated at least 7 kilometres away from a main road. The students come from most socially and economically disadvantaged families in the country. The parents of schools selected from rural areas are small paddy and chena cultivators, plantation labourers, casual labourers or are in the lowest rungs of the government service. The schools selected in urban areas are situated in the vicinity of slums or fishing villages of the coastal belt. The living standards of both communities are very low (Baker, 1988).

Due to these problems the achievement levels of pupils in these schools were very low with high repetition and dropout rates. The low pupil attendance due to the same family background factors in relation to plantation areas as well as

other areas also contributed to high dropout rates in these schools. Hence the percentage of pupils graduating from the primary cycle in these schools was very low and high transfer rates have been recorded in the primary cycle.

At the time when SIDA stepped in, improving deprived schools in the plantation sector and other remote areas was a burning issue for the Sri Lankan education system (Baker, 1988; Little, 1999). Hence PSEDP was designed to enhance the quality of primary schools serving children on plantations and PSDP to improve the quality of primary schools in other deprived and remote areas. Both projects came into operation in three phases – 1986-1992, 1992-1994 and 1994-1998. Five hundred and ninety four plantation schools and about 541 deprived schools were included in the three phases of PSEDP and PSDP respectively (Ministry of Education and Higher Education - Special Implementation Unit, 1999; Ministry of Education and Higher Education - Project Implementation Unit, 1999).

Both programmes shared some common concerns. They focused on participation and quality in the primary grades of the selected schools. The main goals with respect to PSEDP and PSDP were as follows (Gunasekara, 2000):

PSEDP: improvement of education in schools in the plantation areas in qualitative and quantitative terms so as to integrate these schools into the national system on an equal status;

PSDP: overall improvement of primary education in disadvantaged schools in Sri Lanka.

The specific objectives were set for both programmes in order to achieve universal, quality primary education. **When the projects moved forward the specific objectives were modified from phase to phase with the experiences of implementation (see Appendix 1).** To attain project objectives several measures were adopted under the main themes of infrastructure development and improvement, quality improvement, management improvement and community development (Gunasekara, 2000). The activities implemented under these themes were securing land; constructing buildings and classroom infrastructure facilities; provision of learning kits for primary school subjects, educational materials and library books; training of teachers in innovative teaching methods and training principals in school management; a scheme of monitoring and evaluation; awareness programmes for parents and community health programmes (Metzger et al., 1997).

Although the cost ingredients were similar for both interventions there were differences in expenditure patterns, as can be seen from Table 1. More than twice as much per PSEDP schools were spent on infrastructure than for PSDP schools

because schools on tea estates were very dilapidated. **The building programme in PSEDP was extensive as the intention in PSEDP was to invest heavily in expansion of access to education in the plantation sector.** Most building work for PSDP schools was limited to refurbishments such as classroom partitions. Similar amounts per school were spent on furniture and equipment in both projects. However, PSDP schools had 1.75 times as much spent on learning resources and training programmes, and almost three times as much on monitoring and evaluation. In contrast PSEDP spent 5 times as much on community education, which included parents' awareness and mothers' programmes, community surveys and health programme.

Table 1.

Costs incurred by SIDA for the implementation of PSDP and PSEDP phase 3 projects (1994 - 1988)

Cost ingredient	PSD phase 3			PSEDP phase 3		
	Total cost Rupee million	Share of Total cost %	Cost per school Rupee millions	Total cost Rupee millions	Share of total cost %	Cost per school Rupee millions
Infrastructure development	179.3	72	901.005	605.1	86	2,161.071
Furniture equipment	43.2	17	212.060	59.4	8.5	212.143
Learning resources and training programmes	16.5	6.6	82.915	13.3	2.0	47.500
Community education	0.66	0.3	3.317	4.9	0.7	17.500
Monitoring and education	3.5	1.4	17.588	1.8	0.3	6.429
Planning, organisation and management	6.8	2.7	34.171	16.8	2.5	60.000
TOTAL	249	100	1,251.256	701	100	2,504.643

(Source : PSDP and PSEDP project completion reports)

Comprehensive monitoring and evaluation programmes were undertaken during the project implementation by SIDA authorities in collaboration with the Ministry of Education (Little, 1994; Rajapaksa and Little, 1994). **Although impact evaluations were conducted by SIDA after implementing each phase, following the termination of projects in 1998 no overall evaluations were conducted on the effects of SIDA projects on the educational attainment of pupils.** There is thus an absence of evidence on the projects' impact especially over the longer run and hence on their sustainability.

Objectives of the study

The main objective of this study is to investigate whether the SIDA projects had been effective in raising the educational attainment of students in the project schools. The project schools selected for the study belong to one of four groups: PSDP and PSEDP schools each in Phase 1 or Phase 3 of the programmes. Because Phase 2 had only lasted for two years these schools were not included. The objectives of the evaluation were to determine whether:

- SIDA project schools (both PSDEP and PSDP) were effective in raising pupils' attainment relative to non-project schools;
- the four types of schools (PSDP and PSEDP in Phase 1 or Phase 3) were differentially effective as this has implications for sustainability;
- the projects were differentially effective for different types of pupils and to consider the equity implications of differential impacts on pupils.

Methodology

There are three main features of the research design employed in this evaluation. First, it is quasi-experimental – pupils in a sample of project schools were compared with a sample from control schools. Second, tests of cognitive attainment in mathematics and mother tongue language were administered to grade 6 pupils in order to obtain measures of attainment for comparing the effectiveness of project relative to non-project schools (Saunders, 1998; Cohen, 1969). Third, data on pupil and family background variables that affect attainment were also collected in order to control for these factors. Each aspect of the research design is now explained in more detail.

Quasi-experimental research design

The evaluation of the effectiveness of an educational intervention attempts to determine whether the desired effects occurred in the intervention schools and whether such effects, if observed, can be attributed to the intervention (Baker, 2000). This cannot be done simply by measuring outcomes, as there may be other factors that are correlated with the outcomes but are not caused by the project. Hence, to ensure methodological rigour an effectiveness evaluation has to estimate the counterfactual: what would have happened had the project never taken place? To determine the counterfactual, it is necessary to net out the effect of the intervention from other factors (Belli et al., 1998). Determining the counterfactual, which is at the core of evaluation design, is a complex task. In experimental or quasi-experimental methods (Becker and Boumol, 1996) this can be accomplished through the use of control groups (i.e. not affected by the intervention) who are subsequently compared with a treatment group (i.e. a group of individuals who do receive the intervention). Although the experimental design provides the optimum approach (Burtless, 1995) for establishing the counterfactual, this was not possible for evaluating the SIDA projects since they had not been randomly assigned between treatment and control schools at the start of the interventions. The quasi-experimental design (Cook and Campbell, 1979) is therefore more appropriate for evaluating the SIDA projects. A control group of schools was selected in order to carry out the evaluation.

Sampling project and control schools

The control schools were selected in order to match the characteristics of the four groups of project schools included in the study. **In order to control for variations in administrative procedures, staffing, financing factors and geographical factors, sampling project and control schools were limited to two adjoining districts - Nuwara Eliya and Kegalle. These two districts are very similar, being situated in the main plantation areas of the island. Most of the plantation community live there and have similar socio-economic characteristics.**

The main reason for selecting Nuwara Eliya was that 45 per cent of PSEDPP schools are in this district, where both Phase 1 and Phase 3 were implemented. PSDP Phase 1 schools were also selected from the same district. However, there were no PSDP Phase 3 schools in Nuwara Eliya, so this sample was selected from the adjoining Kegalle district, where PSEDPP had not been implemented. Non-project schools were selected from both districts.

As the schools in the sampling frame are in rural areas and are attended by relatively poor children with limited access to transport, there is little opportunity for parents to choose a school other than the one nearest their home. Hence the probability of selection bias between the school types due to parents choosing project schools rather than control schools is low.

The Hatton PSEDP and the Kegalle PSDP project cells were used as the basis for the sampling frame. When selecting the samples the school categories (types of schools) were taken into consideration. SIDA funds were provided for **Type 2¹** and Type 3 schools. The target student population for the study was grade 6 students who had just finished their primary education at the end of grade 5. Because most of the Type 3 primary schools have classes only from grades 1 to 5, the sample had to be selected only from Type 2 schools, which have classes from grades 1 to 11.

There were some constraints on drawing random samples of project and control schools. Due to insufficient numbers of grade 6 students in PSDP schools in Nuwara Eliya and Kegalle, equal numbers of Phase 1 and Phase 3 PSDP and PSEDP schools could not be included in the sample. A further problem was that Tamil medium schools could not be included in the control group as almost all the Tamil medium schools in Nuwara Eliya district were in the PSEDP project. The few remaining Tamil medium schools were funded by another aid-funded project (GTZ). Forty seven schools were selected randomly by using a random number table.

Measuring schools' value added

Because the evaluation of the two SIDA projects was conceived and undertaken some years after the projects had started, it was not possible to put in a base-line test for pupils on entry to the project and control schools before the intervention was implemented or even for the sample of pupils studied to assess them on entry to primary school. Since baseline assessment data were unavailable, family background information was collected from schools on parents' education, parents' occupation, family income and number of siblings.

A standardised test of mathematics and language (Sinhalese and Tamil), which had been developed previously under the assistance of UNICEF, was administered in 2002 to 850 students in grade 6 in the 47 sample schools. The scripts were marked by a panel of examiners using a 0-100 marking scale. The grade 5 scholarship marks (a national test) were also collected from schools for each student in the sample.

¹The Sri Lankan schools are categorized under 4 groups 1AB, 1C, 2 and 3 according to the facilities provided. Type 1AB schools have classes up to GCE(A/L) with Science, Arts and Commerce streams. Type 1C schools have classes up to GCE(A/L) with arts and commerce streams only. Type 2 schools have classes up to GCE(O/L) and Type 3 schools have classes up to Grade 5 or Grade 8.

We were interested in determining whether there were any differences in student attainment among the different phases of project schools (PSDP and PSED in phases 1 and 3) and the control schools. The effectiveness of the project schools is estimated as the difference in pupils' attainment in project schools compared to the control schools, controlling for gender, family background and school size. The estimation model tests first, for the effects on grade 6 pupils' attainment of attending a SIDA school and second, for whether these effects differ by the four different project interventions (Phase 1 and Phase 3 of PSDP & Phase 1 and Phase 3 of PSED).

A two level model was employed with school at level two and the pupil at level one. Three response variables (maths, language and scholarship mark), were regressed on gender, family background, school size and dummy variables for the types of school according to the project intervention. (See Appendix 2 for the model.) The random part of the model estimates the proportion of unexplained variance at school level and pupil level after taking account of the fixed effects at both levels. The intra-level 2 correlation is the proportion of the total variance that is between schools (Goldstein, 1995 and 1997; Plewis, 1997; Hill and Rowe, 1996; Saunders, 1998).

Effectiveness is estimated relative to the control schools, which are the reference group and the size of the effect is the estimated coefficient on the school project type dummy variable. The interaction terms between school type and pupil characteristics were included as these estimate the differential effectiveness of the four project school types for pupils with different characteristics. The interaction coefficient estimates provide evidence of impact on equity to include in the evaluation together with the more usual measures of average effectiveness (Kerr et al., 2002).

Description of the data

The distribution of mathematics scores was approximately normal and that of language scores slightly positively skewed. Parents were placed in three income groups – low (monthly income less than Rs. 10,000), middle (Rs. 10,000 to Rs. 50,000) and high (more than Rs. 50,000). Ninety five per cent of families were in the low-income category. Very few were in the middle-income category and none had high incomes. There was no significant difference between PSDP, PSED and control schools parents according to family income. Parental occupation was coded to seven categories - no employment, self-employed, manual/ unskilled labourer, skilled labourer/ technical, manager/ administrative and middle professional and upper professional. The majority of fathers were skilled or unskilled labourers, who in the plantation areas work on tea or rubber estates. The unskilled labourer category was more prevalent in the PSED than in the PSDP group. The majority of mothers

were either unemployed or unskilled labourers. Very few fathers or mothers appeared in the other employment categories. Since the parents in the sample did not have higher education qualifications, number of years of schooling was used as the measure of parents' education. Both fathers' and mothers' modal years schooling was 11. Very few had continued schooling up to year 13, while 4.8 per cent of fathers and 7.9 per cent of mothers had no schooling. Most of the students in the sample had two siblings and very few students had more than three.

In the preliminary analysis parents' occupation and family income were found to be insignificantly related to mathematics and language scores, which is not surprising as there is little variation in parents' occupational status and income.

Results

A set of regressions was run for different variants of the model in order to test the effectiveness of SIDA interventions in raising mathematics and language attainments of students. First, the overall impact of SIDA project schools on student attainment compared to control schools was estimated and then the effect of project schools of different phases and interventions on student attainment. Mathematics and language scores were regressed on mothers' education, gender, number of siblings, school size and PSDP1, PSEDP1, PSDP3, PSEDP3 dummies. In addition, the interaction variables of mother's education, gender and number of siblings with four school types were included in the model, since it was clear from initial analysis that coefficients on these variables are not the same for all school types. The results provide estimates of the effects of SIDA schools and, within the SIDA schools, the average effects of the four types of project school and differential effects for pupils with different characteristics. (The model is set out in Appendix 2)

The effectiveness of SIDA project schools

The results of a simple regression with no interaction terms and with SIDA as the only dummy variable are shown in Table 2. These indicate that SIDA project schools had a significant effect of 5.25 on mathematics scores and 6.34 for language, the respective mean scores being 48.3 and 63.6. Parents' education was positively related to student achievement in both subjects. The number of siblings in a family was significant, having a negative impact on student attainment. Although there was no gender difference in mathematics, girls performed better than boys in language. School size was significant for both mathematics and language attainment but the coefficient is very small.

Table 2.

*Effectiveness of SIDA Project schools compared to controls
(unstandardised coefficients)*

Explanatory Variable	Mathematics		Language	
	Coefficients	t statistic	Coefficients	t statistic
Constant	31.88	8.41**	42.91	10.4**
Father's years	0.55	2.69**	0.37	1.67*
Mother's of schooling	0.59	3.19**	0.95	4.79**
Gender (girl=1)	0.35	0.31	5.65	4.65**
No.of siblings	-0.75	-1.92*	-1.17	-2.78**
School size	0.01	2.89**	0.01	3.02**
SIDA	5.25	1.86*	6.84	2.05**

** Indicates significance at 0.05. * Indicates significance at 0.1.

Differential effectiveness of school improvement interventions

Apart from assessing the effectiveness of SIDA overall, the evaluation is particularly concerned with whether one of the programmes was more effective than another and whether phase 1 and 3 schools in each programme differed in effectiveness. Mathematics and language scores and scholarship marks (the response variables) were regressed on student and school level explanatory variables including four dummies – PSDP 1, PSDP 3, PSEDP 1 and PSEDP 3 and a number of interactions – father's education, mother's education, gender and number of siblings - with the four types of school.

Some interactions were not significant – father's education with all school types, mother's education with PSDP 1, female with PSEDP 1 and PSDP 3, number of siblings with PSDP 1, PSDP 3 and PSEDP 3. Hence these interactions were excluded from the model and the regression was re-run. The results are presented in Table 3.

Table 3.

Effectiveness off different SIDA interactive models (unstandardised coefficients)

Explanatory Variable	Maths		Language		scholarship marks	
	Coeffic i-ents	t stat.	Coeffic i-ents	t stat.	Coeffic i-ents	t stat.
Constant	25.73	5.82**	37.3	8.06**	12.24	3.74**
Father's years of schooling	0.54	2.62**	0.39	1.75*	0.46	3.23**
Mother's year's of schooling	1.23	4.39**	1.56	5.25**	1.27	5.37**
No. of siblings	-0.36	-0.86	-0.76	-1.72*	-0.49	-1.83*
Gender (girl=1)	1.06	0.69	4.12	2.52**	1.43	1.36
School size	0.01	2.26	0.01	2.64**	0.001	2.51**
SIDA-PSDP 1	-0.07	-0.02	-4.00	-0.85	3.24	0.77
SIDA-PSEDP 1	19.12	3.27	18.99	3.08**	10.63	2.83**
SIDA-PSDP 3	18.56	3.13**	19.67	3.16**	14.87	3.51**
SIDA-PSEDP 3	14.15	3.05**	14.27	2,93**	11.81	3.43**
Mother's educa-tion* PSDP 1	-	-	-	-	-0.63	-1.66
Mother's educa-tion * PSEDP 1	-1.02-	2.03**	-1.12	2.1**	-0.91	-2.43**
Mother's educa-tion* PSDP 3	-1.25	-2.40	-0.82	-1.47	-1.07	-2..78**
Mother's educa-tion * PSEDP 3	-0.93	-2.30**	-1.11	-2.57**	-0.67	-2.12**
Girl* PSDP 1	5.74	1.76*	11.7	3.36**	5.83	2.61**
Girl* PSDP 3	-5.07	-2.00**	-0.53	-0.20	-2.85	-1.64*
No. siblings* PSEDP 1	-2.80	-2.30**	-2.64	-2.0**	-	-

** indicates significant at 0,05;* indicates significance at 0.1.

Three of the project school types - PSEDP Phase 1, PSDP Phase 3 and PSEDP Phase 3 - were statistically significant for attainment in mathematics and language. Both father's and mother's education had a positive influence on attainment in both subjects. Girls performed better in language than boys but there was no gender difference in mathematics. School size is again significant but the effect is small for both subjects. Although the effect of the number of siblings on mathematics attainment was not significant, it had a significant negative effect on language.

The interactions of mother's education with PSEDP 1 and PSEDP 3 were negatively signed for both mathematics and language while mother's education interacted with PSDP 3 had a negative sign only for mathematics. This is an interesting finding, indicating that mother's education had less impact on children's attainment in these project schools than in the control schools.

In PSDP 1 schools the achievement advantage of girls over boys was wider. In contrast, in the PSEDP 3 schools boys performed better in mathematics relative to girls, who did not achieve relatively better in language than in the control schools. Pupils with more siblings performed relatively less well in both subjects in PSEDP 1 schools, which for language strengthened the small negative influence of sibling numbers in the other school types however pupils with more siblings still did 16 points better in PSEDP schools in both subjects than in the control schools.

The results for scholarship marks are also given in Table 3 and are similar to those for mathematics and language scores. Again only PSDP3, PSEDP1 and PSEDP3 dummies have statistically significant coefficients. Parents' education and school size are significant with positive effects, while the number of siblings depressed scholarship marks. Interactions with mother's education was again negative even for PSDP1 schools. Girls did better in PSDP1 schools but worse in PSDP3 relative to control schools.

The proportion of the remaining unexplained variance in attainment at school level is 18.1% for mathematics and 16.9% for language. The rest is at pupil level.

Effect sizes

The size of the effects in natural units (raw marks) of project schools is the addition to (or subtraction from) the test score an equivalent pupil would have got in a control school. It is calculated directly from the regression equation estimates. When there are no interaction terms, each explanatory variable acts independently so the size of the effect then is just the coefficient on the project type dummy

variable. When there are interaction terms we calculate the size of the effect as the coefficient on the school type dummy plus the sum of coefficients on the interaction terms times the mean value of the continuous variable with which school type is interacted (or 1 when the interaction is with girl). Table 4 reports the sizes of the effect of four types of schools on mathematics, language and scholarship marks in natural units, as well as the effect sizes (in terms of standard deviations). (To calculate the size of the effect for an interaction term with respect to continuous variables some value of these has to be assumed – the mean value is therefore assumed.)

Table 4.

Effect sizes by school project types for mathematics and language test score

Sex	Subject	PSDP phase1		PSEDP phase 1		PSDP phase3		PSEDP phase 3	
		Nat. units	Effect size	Nat. units	Effect size	Nat. units	Effect size	Nat. units	Effect size
Boy	Mathematics	0	0	5.14	0.28	9.53	0.52	7.42	0.41
	Language	0	0	4.66	0.23	13.74 ²	0.99	6.24	0.31
	Scholarship marks	-4.55	-0.35	4.05	0.31	7.13	0.55	6.97	0.54
Girl	Mathematics	5.74	0.32	5.14	0.28	9.53	0.52	2.36	0.13
	Language	11.7	0.59	4.66	0.23	13.74 ²	0.99	6.24	0.31
	Scholarship marks	1.28	0.10	4.05	0.31	7.13	0.55	4.12	0.32

Note 1. The first column of figures for each school type is the size of the effect in natural units: the second column gives the effect size (in standard deviations.)

Note 2. The size of the effect of 13.74 is obtained by including the interaction with mother's education even though this does not reach statistical significance ($t=-1.47$). If this interaction is not included the size of the effect rises to 19.676. Probably mother's education interaction should be included as it is significant for the sizes of the effect for PSEDP 1 and PSEDP 3 whereas an interaction between PSDP 1 and mother's education was not included in the regression as it is insignificant for both maths and language.

As shown in Table 4 PSDP Phase 1 schools had no effect on either mathematics or language for boys while for girls the effect size for language is bigger than for mathematics. The effect sizes of PSDP Phase 3 schools are the highest for both genders and subjects. The effect sizes for girls and boys are the same in PSEDP 1 and PSDP 3 schools, and there was a little difference in the effect size between the genders for mathematics in PSEDP 3 schools. It should be noted that when the effect size is the same for boys and girls, this does not mean that the absolute difference between the genders is zero because there is still the general effect for the whole sample since girls scored on average 4.12 more than boys in language. If the effect size is the same for both genders, this means that the increase over what a boy/girl would have obtained in a control school is the same for both genders. If the size of the effect is larger for boys (as is it in maths for PSEDP3 schools) this means that attending a PSEDP3 school added 7.42 marks on average to what a boy would have got in a control school whereas the increase for girls was 2.36 marks.

It can be seen that PSDP1 schools are the least effective, while PSDP3 schools have the highest effect sizes for all three attainment measures for both boys and girls. The third phase of PSEDP schools is more effective than the first phase, though the difference is not as marked as between phase 1 and 3 of the PSDP schools.

Discussion

This evaluation indicates that SIDA schools were more effective than control schools as their Pupils achieved higher scores in mathematics, language and scholarship examinations, after controlling for family background factors. These results hold for all four types of SIDA project schools except for boys in PSDP1 schools. The other three school types - PSDP 3, PSEDP 3 and PSEDP 1 – had a positive impact on pupil attainment in both subjects and scholarship marks.

The larger effect sizes of PSDP Phase 3 compared to PSEDP Phase 3 show that the impacts of different interventions by the same donor are not the same and this can be attributed to factors that vary between projects. The specific objectives of the PSDP show that they paid more attention on raising the quality of schools while PSEDP heavily considered increasing participation. In this study it is impossible to discuss the influence from the ethnic factor as it was not included in the design.

The inclusion of interaction variables provides estimates of the differential effects of the different school project types on pupils with different characteristics, which enables inferences to be made about equity. The negative coefficients on

the interaction terms mean that the attainment gap between children with more highly and less well educated mothers is smaller in PSEDP schools and PSDP Phase 3 schools than in the control schools. PSEDP schools and PSDP Phase 3 schools therefore perform better in relation to equity because they reduce the advantages of children with better educated mothers, while still improving the attainment of all children on average. This is quite plausible. In a poor school a child's progress will be much more dependent on what the home can provide than in a good school which teaches all children well. Furthermore, the SIDA schools projects included programmes for parents and mothers in particular, and these could well explain the reduction in the attainment gap between children of better and less well educated mothers.

However, girls in PSDP1 schools did better than girls in control schools while boys did no better. The PSDP Phase 1 schools could be criticised for enlarging the gender gap in language in favour of girls. PSEDP Phase 1 and PSDP Phase 3 schools were good in terms of gender equity as they had no gender effects on student attainment in mathematics and did not increase the gender gap in language. **The results suggest doing an in-depth qualitative study on the gender issues of project and non-project schools to find out the causes for gender differences.**

The effects of PSDP Phase 3 schools were considerably greater than those of PSDP Phase 1 and those of PSEDP Phase 3 schools were also larger than those of PSEDP Phase 1 schools, except for girls' mathematics score. This suggests that the positive effects of project schools on attainment start to fade once the project is terminated. The Phase 1 programme was implemented from 1986 to 1992 and, after making improvements in the infrastructure and teaching quality, schools were phased out of the programme in June 1992. Phase 3 schools were phased out in 1998. When considering the sustainability issue it should be noted that the tests were administered in the Phase 1 project schools 10 years after the termination of funds and for phase 3 schools after 4 years. There is no way of finding what had been the situation of Phase 1 schools 4 years after funding ceased. The collection of longitudinal data would be required for investigating how far and under what conditions project effectiveness persists over time.

This study collected additional qualitative data by administering a questionnaire to a sample of parents, teachers and officers involved in the SIDA projects. This asked about perceived benefits and implementation issues (Gunasekara, 2005). Interviews were also conducted with project officers. The data provided insights into reasons for lack of sustainability. One reason for schools failing to maintain improvements in quality is that funding fell once the project had terminated. Another is lack of interest and support among central and provincial authorities. There was no transfer of ownership of the projects' mission when the schools were handed over to provincial authorities. After the termination of the

projects nobody was responsible for or interested in supervising schools externally. Schools normally do not maintain their quality without external supervision, as this is a part of the educational culture in Sri Lanka.

The specially created structure for project implementation was partially dismantled. After the projects terminated the project units in the Ministry were dissolved. Some of the provincial resource centres were also not used for facilitating activities in the project schools. This situation was worst with PSDP project schools. In contrast PSEDP project cells are still continuing their programmes under the provincial administration. Although the special implementation units in the Ministry were dissolved, the plantation schools unit was still functioning, which helped PSEDP project activities to continue.

Another factor weakening sustainability was lack of awareness on the part of implementers of project activities in some of the schools. Fullan (2001) finds that frequent changes in implementation staff and administration cadres is powerful in undermining continuation. This is true for SIDA projects as most of the staff who were in project schools and education offices during implementation were not there at the continuation stage due to transfers and retirement. There were no programmes to orient and give in-service support to new members who joined after project implementation and had not experienced project activities. Although at the beginning education officers, principals and teachers were committed to implementing the projects effectively, at the continuation stage this had faded due to ignorance or lack of interest of the programme in the case new personnel. Nevertheless, some schools, with committed staff, still managed to maintain the quality achieved from project activities.

Conclusion

The evaluation indicates that SIDA school improvement projects in Sri Lanka were effective in raising pupil attainment in mathematics and mother tongue. The evaluation also demonstrates the value of estimating the impact of different interventions and phases and of including interaction terms to capture differential impact of the various school project types on pupils with different characteristics. The estimated differential impacts support inferences about the equity effects of interventions. PSEDP in both phases and PSDP phase 3 schools had equity promoting effects as the attainment gap for children whose mothers had little education was less pronounced than in other school types. The large effect sizes and stronger statistical significance of Phase 3 schools compared to Phase 1 indicates difficulties in sustaining the improvements achieved by donor-aided projects once they terminate. This is a particularly important finding for future educational planning. Much greater attention should be paid to ensuring the sustainability of project outcomes in the long run as well as achieving improvements in the lifetime of interventions.

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Appendix 1. PSDP AND PSEDP OBJECTIVES

Specific Objectives of PSDP

- To increase achievement level in the two basic skill building subjects, namely Mother Tongue and Mathematics in the disadvantaged primary schools.
- To increase participation rate in the 5-14 age groups including those who have never entered the primary cycle or have dropped out of it prematurely.
- To remove the inter-school disparities through the provision of infrastructure and basic physical needs such as classrooms, teacher's quarters, furniture and health facilities.

Specific Objectives of PSEDP

1. To improve and expand all elementary schools located in the plantation areas at the secondary level to improve the quality of education.
2. To increase primary school participation in terms of enrolment of eligible age groups and enhance the level of completion.
3. To enhance student's achievement levels especially in Mathematics and Tamil Language in the primary cycle.
4. To provide facilities for non-formal education for school leavers and adults in the plantation Tamil community.

Source: PSDP and PSEDP project documents

Appendix 2. Estimation Model

$$Y_{sij} = a_0 + b(G)_{ij} + c(FS)_{ij} + d(MS)_{ij} + f(FO)_{ij} + g(MO)_{ij} \\ + h(FI)_{ij} + l(NS)_{ij} + u_j + e_{ij}$$

$$\text{and } a_0 = a_1 + \sum_{k=1}^{k=4} a_{2k} PROJ_k + \sum_{m=1}^n a_{3m} (INTERACTIONS_m) + a_4 SSize_j$$

Where,

Y_{sij} = Mathematics/ language attainment/ scholarship mark for pupil i in school j

Pupil-level variables:

SM	=	Scholarship marks
G	=	Gender (Male=0, Female=1)
FS	=	Father's years of schooling
MS	=	Mother's years of schooling
FO	=	Father's occupation
MO	=	Mother's occupation
FI	=	Family income
NS	=	Number of siblings

School-level variables:

SSize	=	School size
PROJ ₁	= PSDP1	= PSDP schools in phase 1
PROJ ₂	= PSDP3	= PSDP schools in phase 3
PROJ ₃	= PSEDP1	= PSEDP schools in phase 1
PROJ ₄	= PSEDP3	= PSEDP schools in phase 3
SIDA	= PSDP1 = PSDP3 = PSEDP1 = PSEDP3 = 1	

INTERACTIONS = various interaction terms between PROJ_k and mother's education, father's education, number of siblings and female

The Underlying Structure of Entrepreneurship Development: A Study of Entrepreneurial Spirit among Higher Secondary Stage Students

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Abstract

The study presented in this paper investigated the mathematical structure of entrepreneurship development. To do this, fourteen variable model was constructed and tested in order to explain its underlying structure. The sample was drawn from Government Model Senior Secondary schools where academic commerce as well as vocational commerce streams were running simultaneously at the higher secondary stage. 407 students were selected randomly (Academic = 210 & Vocational = 197). Data collection was carried out using two instruments with reliability co-efficient ranging from 0.70 - 0.77. The concurrent validity of both the test found to be 0.76. Data analysis was done using factor analysis. The results indicated the appearance of five factors which accounted for 50.34 cumulative percentage of variance. The result of this factor analytic study along with the suggested structure of Entrepreneurship Development is discussed in this paper.

Key words

Entrepreneurship, Academic commerce, Vocational commerce.

Introduction

The area of entrepreneurship has grown dramatically and is now becoming a priority in the recent years, both in terms of courses taught and volume of researches undertaken. This field of study has historically relied heavily on other disciplines for much of its content. The discipline of science, business, economics and more recently cognitive psychology has been highly influential in forming the dominant methodologies used in entrepreneurship research. The progression in academic research contributed significant knowledge on the causes of entrepreneurial propensity and also focused upon the intrinsic human processes i.e., how people learn to be entrepreneurial. An approach to entrepreneurship considers the following questions which are frequently asked than answered:

- Where do the entrepreneurs come from?
- What motivates them?
- How do they reach a point where they are ready to initiate a new venture?
- Is entrepreneurship a practice like law or medicine?
- Else, it is an art consisting of vision and instances based on persistence, hardwork and creativity?

Many attempts have been made to theorise the concept of entrepreneurship: Amit, Glosten et.al (1993); Boumol (1993); Bygrave (1989a, 1989 b), Covin and Slevin (1991), Gartner (1988, 1990); Hofer and Bygrave (1992); Low and Macmillan (1988);. When we look at these structures, we find that the link established by Schumpeter¹ between entrepreneurship and innovation has remained a dominant feature of the discipline. Hoselitz (1952) asserts that one of the reasons why entrepreneurship has received relatively little research attention is that it is difficult to model it mathematically. There is, generally, no accepted definition or model of who is an entrepreneur and what it does. The situation has not altered four decades later when Bygrave and Hofer (1992) noted that entrepreneurship researches are hampered by a lack of common conceptual framework. The lack of consensus on the meaning of this term makes it imperative that researchers provide a clear statement to its meaning, the way they use it in their research. Bygrave (1993) notes that it is important to come to a common definition of entrepreneurship. He further suggests that what we need most is qualitative field of research to understand what entrepreneurs do. Shane (2000) noted thatrather than explaining and predicting a unique set of empirical phenomenon, entrepreneurship has become a broad label under which a hodge-podge of research is housed. What appears to constitute research today is some aspect of setting (e.g., small business or new firms), rather than a unique conceptual domain. As a result, many people have had

trouble indentifying any distinctive contribution of the field to the broader domain of business studies undermining the field's legitimacy.

Defining entrepreneurship

There have been as many definitions of entrepreneurship as there have been writers on the subject. The earliest definition of entrepreneurship, dating from the 18th century, used it as an economic term, describing it as the process of learning the risk of buying at certain prices and selling at uncertain prices (Cantillon, 1730). Later, the concept was broadened by bringing together the factors of production (Say 1816). This definition raised a question whether there was any unique entrepreneurial function or was it simply a form of management. Recent definitions on entrepreneurship describe it as the creation of new enterprise (Bygrave, 1993). The popular definitions in literature shows no unanimously agreed definition of this term, which on close analysis appear to contradict each other. In other words, the term entrepreneurship suffers from multiplicity of meanings. It has been little researched upon. Hence, the research literature offers little guidance on even where to start. Still, one wishes to know about the nature and meaning of entrepreneurship as well as what contributes to it, whether in industrial or educational context. Failure of knowledge on this issue is not only an academic problem but also a practical one. It is so because entrepreneurship contributes in ample measure to the economic growth of the country as well as to the livelihood to many people. To quote an interesting experience of one researcher my own personal experience was that for ten years we ran a research centre in entrepreneurial history. For ten years we tried to define entrepreneur. We never succeeded. Each of us have some notion of it.....what he thought was, for his purposes, a useful definition. And I do not think you are going to get farther than that (Cole, 1969).

Entrepreneurs are born versus entrepreneurs are made

The trait approach to entrepreneurship looks for commonality and similarity among entrepreneurs. But, if all entrepreneurs have common traits or characteristics is not an advantage to any one, since we are in need of a theory of differences. It is widely unknown whether entrepreneurial intent is primarily predetermined by steady personality characteristics or it is possible to foster propensity towards self-employment through pragmatic education programme? The issue whether entrepreneurs are *born or made* has been vigorously debated. But the nature-nurture question, upon close examination, shows that it is a product of the two. Entrepreneurship education and training support a paradigm that entrepreneurs are often made not born. It is so because many of its aspects require an attitude for entrepreneurial spirit, which involves: building a value system, flexibility, initiative,

skill formation, creativity, critical thinking, risk taking capabilities and other generic competencies. However, the responsibility for teaching entrepreneurship need not only rest entirely with the education world. Indeed, at the public level also there is a need for creating an atmosphere to encourage entrepreneurship among general population. Hence, it is a vital area of study, which needs to take place if it is to address the public policy, educational scenario and life choices of individuals. According to Caird (1990) entrepreneurial learning is concerned with how people construct new meaning in the process of recognizing and acting on opportunities and organizing and managing ventures. It is much more than acquiring the functional 'knowing ' for it involves active 'doing' as well as understanding 'what it is that works and realizing that one can do it'. Therefore knowing, acting and making sense are interconnected. The former President of India, A.P.J. Abdul Kalam² also underlined the need for entrepreneurship in educational setting: the whole purpose of education in a country like India is to develop and enhance the potential of our human resource and progressively transform it into a knowledge society. The education system should re-align itself at the earliest to meet the needs of the present day challenges and be fully geared to participate in societal transformation.... The education system should proactively build entrepreneurial and vocational capabilities in students...when they come out of educational institutions, they should have confidence to start small ventures and also possess the skills to do it..... above all, the education system has to impart the spirit that we can do it. We need education integrated with an entrepreneurial spirit... the curriculum for Arts, Science and Commerce should include topics and practical wherever, it is possible. Although the importance of entrepreneurship in the context of economic development is over stressed, there is hardly any study conducted particularly in school education to strengthen the spirit of entrepreneurship among young minds.

The study of entrepreneurship development

What is entrepreneurship or who is an entrepreneur, therefore does not receive the same answer. It is precisely for this reason; the term entrepreneurship has to be understood empirically. A way out to solve this problem is to list and thereby sample the diverse characteristics of successful entrepreneurs. The next step is to dimensionalise these traits and confirm the growth in actual practice in the economy. As the term entrepreneur suffers from multiplicity of meanings, it has to be examined from the psychometric point of view. A study to assess the incidence of entrepreneurial spirit among commerce stream students studying at higher secondary stage was undertaken with a purpose to identify the possible dimensions for nurturing entrepreneurship spirit among school children. The following are the objectives of the study:

- * To conceptualise and operationalise the term entrepreneurship at the school stage.
- * To develop tools for assessing the attributes of entrepreneurship and establish the construct of entrepreneurship.
To determine the mathematical structure of the developed tools used in the study.
- * To pinpoint the implications of the present study for further research.

The study attempts to answer the following questions:

1. What attributes of entrepreneurship are manifested explicitly and significantly by commerce stream students studying at higher secondary stage in the Union Territory of Chandigarh.
2. What is the unitary mathematical structure underlying the construct of entrepreneurship.

Method of Procedure

The study is conducted in two phases:

Phase I: Development of :

- (i) Entrepreneurship Self Assessment Scale.
- (ii) Problem Solving Adequacy Scale

Phase II: Defining the Underlying Structure of Entrepreneurship Development

Developing entrepreneurship self assessment scale

The success of any investigation depends upon the choice of tool as well as its reliability and validity. While searching the relevant literature, the entrepreneurship scale prepared by the Department of Education, Training and Employment, Adelaide, South Australia (1998) was located. It was a teacher made scale practiced for assessing the entrepreneurial skills of students studying small scale industry course. The scale initially comprised 32 items classified into eight

dimensions, each comprising four items. The scale attempts to evaluate the following eight dimensions of entrepreneurship:

1. Risk Taking
2. Persistence and Hard Work
3. Use of feedback
4. Personal Responsibility
5. Knowledge Ability
6. Persuasive Ability
7. Managerial Ability
8. Innovativeness

The score on each dimension varied between 0-20. Further, the first two scores on each item were positively coded and the last two were negatively coded. Through the in-depth study of dimensions of entrepreneurship, it was considered desirable to add twenty more items classified into five more dimensions of entrepreneurship:

1. Integrity and Communication
2. Emotional Stability
3. Motivation
4. Decision Making
5. Divergent Thinking

Based on the thirteen identified dimensions, stated above, The Entrepreneurship Self Assessment Questionnaire was constructed. For each identified dimension four suitable statements were developed. Out of four statements, two statements were positively coded and two were negatively coded. In all, the questionnaire comprised 52 items.

Finalising the questionnaire

As already stated, each dimension in Entrepreneurship Self Assessment Questionnaire comprised four statements: two positively coded and two negatively coded. Each statement had five responses as: strongly agree, agree, not sure, disagree

and strongly disagree. The positively coded statements were scored as 5,4,3,2,1 and negatively coded statements were coded as 1,2,3,4,5. The highest and lowest individual score was 260 and 52 respectively. The Government Model Senior Secondary Schools in the Union Territory of Chandigarh were selected for the study because vocational commerce and academic commerce streams were running simultaneously. Stratified random sampling technique was used and hundred students (N = 100) from both the streams were selected randomly. The data was analysed using mean and standard deviation. The final selection of the test items was done through Item Analysis Technique. Under item analysis, top and bottom twenty five percent (25%) of the total respondents termed as high and low performers were selected. 't' test was employed to ascertain the significant mean difference between high and low performers. Both the groups differed significantly ('t' 19.31, P<.01). Each statement with a significant mean difference was calculated and those statements which showed significant results were retained and the rest were rejected. On the whole, forty (N=40) statements were finally found significant and henceforth selected for the final questionnaire. In the final questionnaire two to four test items lay against each dimension (refer Figure 1).

The problem solving adequacy scale

In order to understand the entrepreneurial spirit, one has to understand and grasp the range of activities, an entrepreneur performs. Therefore, the term problem solving becomes an important concept to demand our attention. The study of literature available showed that critical thinking, problem solving, right decision at the appropriate time and evaluating skills for alternatives available are integral to entrepreneurship. So, a small questionnaire was developed to assess the problem solving skills of students, apart from the entrepreneurship self assessment questionnaire. This questionnaire comprised 16 statements (all positively coded). Since, entrepreneurial activities involve risk and uncertainties, problem solving is considered to be an effective indicator of entrepreneurship. The problem solving adequacy questionnaire consisted sixteen statements with highest and lowest score of 80 and 16 respectively. The same procedure, as done for entrepreneurship self assessment questionnaire, was followed and the total of sixteen statements were selected for the final questionnaire. According to the investigator, it is not a test of personality, but in short it is a test of behaviour, on the job one has to perform (refer figure 2).

Computation of reliability and validity

For the computation of Reliability, both the tests were again administered to a group of fifty students (N=50) studying commerce (both vocational and academic) at the higher secondary stage. The reliability of entrepreneurship self assessment questionnaire and problem solving adequacy questionnaire found to be

0.70 and 0.77 respectively using split half method. The entrepreneurship self assessment questionnaire was again studied in relation to problem solving adequacy questionnaire for the computation of validity. The concurrent validity of the test found to be 0.76. The test items included in both the tests showed content validity.

The Mathematical structure of entrepreneurship

The major objective of this study is to determine the basic structure of entrepreneurship. Apart from thirteen identified dimensions of entrepreneurship ($V_1 - V_{13}$) and problem solving skills (V_{14}), the construct of entrepreneurship is also studied in respect to age (V_{15}), family background (business/service) (V_{16}), and stream of study (vocational commerce/academic commerce) (V_{17}) as the study is confined to grades XI and XII at the school level. In total there are seventeen variables. The sample of 407 commerce students was drawn from ten Government Model Senior Secondary schools in the Union Territory of Chandigarh.

Figure 1. Defining the Questionnaire

S.No.	Dimensions	Test Items	Item Nos.				
1	Risk Taking	i. I would like to take risk in business if the chances of success lie between 30% to 40% ii. The business I am thinking of is not really unusual.	31	23	-	-	-
2	Persistence and Hardwork	i. I do not give up even in the face of difficulty. ii. I do not allow failures to discourage me. iii. I am not willing to work for more than eight hours a day.	4	17	40	-	-
3	Use of Feedback	i. I do not get upset when I receive negative feedback for my performances. ii. Mistakes and Failures make me so depressed that I can not learn from them. iii. I enjoy those activities where I get information on how good or how bad I am doing.	6	11	36	-	-

4	Personal Responsibility	<ul style="list-style-type: none"> i. I do not get excited with the favourable results if these are not due to my own efforts. ii. I do not enjoy working in a team as a leader, rather I like to be the member of the team. 	13	20	25	-
5	Knowledge	<ul style="list-style-type: none"> i. I do not see the importance of reading newspaper Ability everyday. ii. I need not waste time and money on market research, if the product sells, I will go on producing. iii. I shall attempt to become an expert in the product I am selling. 	5	32	38	-
6	Persuasive	<ul style="list-style-type: none"> i. I do not find difficulty in convincing people around me to trust my capability to succeed. ii. My parents/friends/people around me doubt my capability to start and successfully handle the business. 	16	27	-	-
7	Managerial Ability	<ul style="list-style-type: none"> i. It is not necessary to be scientific and rational about management techniques as long as one has a will to do it. ii. I am able to lead a group only when people are willing to follow me. iii. I do not find anything wrong in seeking expert advice on how I should manage my business. 	24	30	37	-
8	Innovative-ness	<ul style="list-style-type: none"> i. I find it difficult to come up with new ideas. ii. I am comfortable in tackling difficulties through my ingenuity and problem solving abilities. iii. I find it difficult to perceive a need (foresee a problem) unless some one points it out. 	9	12	33	39
9	Integrity and Communication	<ul style="list-style-type: none"> i. I contribute in building up the image of my area/whole organization. 	3	14	15	29

		ii. During my free time (leisure period), I like discussing rumors among my friends.				
		iii. I try to maintain open communication channels with everyone.				
		iv. Setting a personal example of integrity and conscientiousness is not needed.				
10	Emotional Stability	i. I believe that I can learn from errors and that it should be reflected in my behavior.	1	8	28	-
		ii. I like to take challenges in assignments and ensure their successful completion.				
		iii. I think new ideas lead to disagreement, discussions and frictions.				
11	Motivation	i. I am action oriented and always meet the expected results of my work.	10	22	34	-
		ii. I have a lot of initiative and am always ready for collaborations.				
		iii. I do not believe in conveying appreciations and compliments.				
12	Decision	i. I keep an eye on the implementation of plans and remove Making the blockages.	2	18	21	26
		ii. When faced with a sudden change in plan of action, I am able to think of alternatives and decide on a new situation.				
		iii. I generally 'shoot down' the ideas of others.				
		iv. I emphasise regular evaluation, measurement and review of performance.				
13	Divergent	i. When I am dealing with a problem, I tend to get stuck easily.	7	19	39	-

- ii. When faced with a sudden change in plan of action, I am able to think of alternatives and decide on a new situation.
- iii. I do not find anything wrong in seeking expert advice on how I should manage my business.

Figure 2 . Problem Solving Adequacy Scale

S.No.	Test Items
1.	A problem should be defined in more than one way
2.	I like the company of creative people
3.	Problem should be solved by adopting playful activities.
4.	I encourage the original ideas of people around me.
5.	Brain storming is preferred for solving a critical problem.
6.	In a working situation, I prefer to first visualize and then communicate whatever I read.
7.	New ideas should be experimented irrespective of the results they yield.
8.	I generally apply new ways of doing things.
9.	To solve a particular problem various alternatives are preferable.
10.	While reading, something new, I am more likely to remember the main ideas.
11.	When faced by a difficult situation, I persist and set the problems aside temporarily without giving up.
12.	Innovative ideas should be employed in solving problems.
13.	While making plans for the future actions, I prefer to use paper-pencil.
14.	I consider it a challenge to find a solution in different areas, irrespective of major or minor.
15.	Being restricted to one or few ideas does not satisfy me.
16.	I consider problems as opportunities.

For analysing the structures of both the tests, factor analysis is used in this study to clarify the concept of entrepreneurship. The first step was to obtain the correlation coefficient of seventeen variables. The correlation matrix (Table 1) shows 136 (correlation coefficients, out of which 89 are significant at 1% and 5% level of

confidence. This correlation matrix was then subjected to factor analysis for obtaining the basic mathematical structure underlying among varied relations of these variables. The varimax factor matrix along with its eigen values, percentage of variance and cumulative variance carried by various factors is shown in table2. The factor matrix (table2) shows the appearance of five factors whose eigen values are greater than unity. So, each of the five factors is significant. Secondly, the cumulative percentage of variance carried by these five significant factors is 50.34% which is quite reasonable. These factors are interpreted as follows:

First factor

Its eigen value is 3.78; therefore it is a significant factor and carries 22.22% of variance. It is further noticed that six variables load significantly on this factor. It is observed that all the variables load positively on this factor:

V_2	Persistence And Hard work	.665
V_{14}	Problem Solving Adequacy	.656
V_3	Use of Feedback	.643
V_9	Integrity and Communication	.535
V_{12}	Decision Making	.476
V_{10}	Emotional Stability	.442

The loading of the first factor ‘persistence and hardwork’ (V_2) is the highest positive loading followed by problem solving adequacy, use of feedback, integrity and communication, decision making and emotional stability. Now, we can safely say that these variables are closely akin to the construct of entrepreneurship. Studies on entrepreneurs reveal that they have a desire to take on challenges and test their abilities to a limit. They anticipate problems and develop strategies to surmount obstacles in advance. They find resourceful and effective ways to overcome them. In other words, they have a urge to achieve the desired goals. It is, therefore safe to conclude this factor as ‘Need for Achievement’.

Second factor

Its eigen value is 1.41 and carries a percentage variance of 8.26. Three variables load significantly on this factor. Three positive loadings of this factor on the corresponding variables are:

V_{13}	Divergent thinking	.735
V_8	Innovativeness	.634
V_6	Persuasive Ability	.627

Gray D.A. in his book 'How to determine your potential for success' (1987) quoted entrepreneurs have strong desire to originate an idea or product, to develop something new, to make something happen, to imprint personality, dreams and *ideas into a concept and to foresee many possible market ideas*. It can, therefore, be interpreted straight away as 'Desire to Create' factor which depends upon divergent thinking and innovativeness.

Table 1.
Showing Correlation matrix for Variables $V_1 - V_{17}$

	V_1	V_2	V_3	V_4	V_5	V_6	V_7	V_8	V_9	V_{10}	V_{11}	V_{12}	V_{13}	V_{14}	V_{15}	V_{16}	V_{17}
V_1	1																
V_2		1															
V_3		.317**	1														
V_4		.155**	.114*	1													
V_5		.340**	.296**	.222**	1												
V_6		.217**	.252**	.195**	.222**	1											
V_7		.145**	.121*	.359**	.261**		1										
V_8		.293**	.309**	.142**	.371**	.301**	.157**	1									
V_9		.343**	.276**	.205**	.309**	.288**	.175**	.321**	1								
V_{10}		.266**	.352**	.202**	.319**	.310**	.188**	.364**	.286	1							
V_{11}		.199**	.164**	.150**	.328**	.243**	.188**	.229**	.282	.224**	1						
V_{12}		.310**	.326**	.264**	.376**	.290**	.248**	.357**	.387	.377**	.227**	1					
V_{13}		.376**	.209**	.197**	.318**	.343**	.422**	.290	.276**	.209**	.330**	.330**	1				
V_{14}		.375**	.232**	.214**	.381**	.315**	.224**	.345**	.381	.383**	.221**	.432**	.250**	1			
V_{15}															1		
V_{16}				.107							.102					1	
V_{17}																	1

Note: Insignificant correlation coefficients are not shown. A two starred (**) correlation coefficient shows that it is significant at 1% level of confidence. A one starred (*) correlation shows that it is significant at 5% level of confidence.

Table 2
Showing the Rotated Factor Matrix

S.No.	Variables	Factor I	Factor II	Factor III	Factor IV	Factor V
1	Risk Taking	-	-	-	-	.749
2	Persistence and Hardwork	.665	-	-	-	-
3	Use of Feedback	.643	-	-	-	-
4	Personal Responsibility	-	-	-	.718	-
5	Knowledge Ability	-	-	.718	-	-
6	Persuasive Ability	-	.627	-	-	-
7	Managerial Ability	-	-	-	.785	-
8	Innovativeness	-	.634	.785	-	-
9	Integrity and Communication	.535	-	-	-	-
10	Emotional Stability	.442	-	-	-	-
11	Motivation	-	-	-	-	-
12	Decision Making	.476	-	-	-	-
13	Divergent Thinking	-	.735	-	-	-
14	Problem Solving Adequacy	.656	-	-	-	-
15	Age	-	-	-	-	.534
16	Family Background	-	-	-	-	-
17	Stream of Study	-	-	-	-	-
	<i>Eigen Value</i>	3.78	1.42	1.30	1.06	1.01
	<i>Percentage of Variance</i>	22.22	8.26	7.65	6.27	5.94
	<i>Cumulative Percentage of Variance</i>	22.22	30.484	38.13	44.40	50.3

Note: The factor loadings $\pm .30$ are not recorded for the purpose of interpretation

Third factor

Its eigen value is 1.30 and it carries a percent of variance of 7.65. Four variables load significantly on this factor:

V ₁₅	Family background	.649
V ₁₁	Motivation	.501
V ₅	Knowledge ability	.469
V ₉₁₇	Stream of study	-.634

This factor as safely interpreted as 'Work Motivation'.

Fourth factor

Its eigen value is 1.06 and carries a percentage variance 5.94.

V ₇	Managerial ability	.785
V ₄	Personal responsibility	.718

Two variables load significantly on this factor and it is named as ' Sometimes system and sometimes people'.

Fifth factor

Its eigen value is 1.01 and carries a percentage of variance of 5.94.

V ₁	Risk taking	.749
V ₁₇	Age	.534

Risk Taking appeared as a highest loading on this factor, the second being age , which is a outside variable. Therefore, the factor is named as 'Risk taking aptitude'.

Results

It is very rarely that one gets a clear mathematical picture of a complex phenomenon. In that case, the interpretation of factors is a highly subjective process. It was desirable to look back for the growth of these factors for confirmation purposes. In other words, this sort of research exercise goes on until one reaches the end logically. Here, we examined the construct of entrepreneurship in relation of its various dimensions, problem solving adequacy and three outside variables – age, family background and stream of study.

1. Entrepreneurship, as viewed, is substantially confirmed and that too mathematically. It is shown by the first factor. The variables loaded on this factor reveals original, creative, critical and analytical thinking amongst students. This shown by the first factor which is 'Need for Achievement'.
2. The problem solving adequacy (V₁₄) is closely akin to the dimensions of entrepreneurship. In other words, higher the scores on this variable so reflect higher scores on various dimensions of entrepreneurship.
3. The above mentioned view receives further support when the capacity of problem solving, especially under stress and pressure, load positively and significantly with emotional stability.

4. The second factor 'Desire to create' factor, which is dependent particularly on divergent thinking, innovativeness and persuasive ability. It shows that the core of entrepreneurship is based on an ability to develop an idea into a concept.
5. The third factor is 'Work motivation'. Three variables load positively on this factor whereas one outside variable stream of study (V_{17}) load negatively. At the same time, the two dimensions of entrepreneurship i.e., motivation and knowledge ability and two outside variables i.e., family background and stream of study do not load at all on the first, second, fourth and fifth factor. It is a distinct factor which has appeared clearly and is psychologically speaking, meaningful.
6. It is observed that academic stream and vocational stream students are similar on various dimensions of entrepreneurship. Although entrepreneurship, as a subject, forms an integral component of vocational education programme, yet its negative loading on the third factor implies that merely teaching of entrepreneurship course does not reflect the competency in becoming entrepreneurs. It requires nurturance and efforts should be made to keep it floating.
7. The fourth factor has appeared independently and clearly, it is straight away interpretable from the psychological point of view. It is named as 'sometimes system, sometimes people'.
8. Similarly, the fifth factor has also appeared independently and clearly which is dependent on Risk taking and Age.

The result of this factor analytic study along with the suggested view is as follows

S.No.	Factor	Positive Structure	Negative Structure
1.	Need for Achievement	Persistence And Hard work Problem Solving Adequacy Use of Feedback Integrity and Communication Decision Making	— — — — —
2.	Desire to Create	Divergent thinking Innovativeness Persuasive Ability	— — —
3.	Work Motivation	Family background Motivation Knowledge ability	— — —
4.	Sometimes System Sometimes People	Managerial ability Personal responsibility	Stream of study
5.	Risk taking Aptitude	Risk taking Age	— —

Discussion

The present study aimed at exploring the existence of the hypothesized construct of 'Entrepreneurship Development' among commerce stream students studying at the higher secondary stage in the Union Territory of Chandigarh. The present study gathered views about relevant variables, mutual relations between them and finally analysed the mathematical structure underlying the tests and tools used in this study. In this context, the study is opened for further research:

1. The study is confined only to grade XI and XII where not much age difference exists. How does spirit of entrepreneurship develops over a period of time – is a problem which needs to be investigated.
2. How the concept of 'Entrepreneurship Development' differs from subject to subject. How it can be appropriately integrated in various school subjects. How can spirit of self employment be inculcated among the school students needs to be studied?

3. No wide distinction, statistically speaking, in terms of dimensions of entrepreneurship and stream of study and family background provides a strong viewpoint for advancing entrepreneurship education into the general school education programme.

Notes:

1. Schumpeter equated entrepreneurship with a concept of innovation applied to business context. As such, the entrepreneur moves the market from equilibrium. His definition also emphasized combination of resources. Yet, the manager of already established business is not an entrepreneur to Schumpeter. The entrepreneur is the innovator who implements change within markets through carrying out new combinations. The carrying out of new combinations can take several forms.
2. Address to the Nation on the eve of the 58th Independence Day, Employment News, Sunday, August 15-21, 2004.

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A Study of the Changes to the Cognitive Organization of Sri Lankan Pre-Service Teachers' Knowledge about Effective Teaching during their Student Teaching Period

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Abstract

The study investigated how a group of Sri Lankan pre-service teachers changed their understanding of effective teaching during twenty days student teaching period of their teacher preparation program. In order to explore changes in their understanding across this period, two methods were combined: concept maps and structured interviews. The study involved twelve student teachers preparing for teaching in secondary mathematics and science as participants. The student teachers were asked to draw concept maps of effective teaching three times: prior to beginning their student teaching period, in the middle of student teaching, and at end of the student teaching period. Half of the participants received their previous maps before developing their second and third concept maps; the other half drew their maps without reference to previous maps. Shortly after they drew their concept maps, participants were interviewed at these three stages. These interviews were audiorecorded. Data were triangulated from concept maps and interviews. Based on these data, multiple case studies were developed. Using qualitative analysis, these case studies were used to identify the changes in the student teacher's understanding about teaching and the factors that influenced these alternations. The results of the case studies were used to interpret patterns of change in participants understanding about effective teaching. The prominent change across the maps was that over the time the participants' views of effective teaching had broadened significantly. The simple constructions of their first and second maps had become much more complex, with more concepts, more levels and more cross links. In their interviews, the student teachers provided some possible explanations for the changes, including the nature of their school experience, the support provided by workshops at their college and their own reflections. On the basis of the findings the study makes several recommendations for developing Sri Lankan teacher preparation and some directions for further research.

Introduction

In relation to wider social and political changes in the educational field and new understandings of the most effective methods for preparing teachers, teacher preparation programs in Sri Lanka have placed a greater emphasis on the role of student teaching in preparing teachers (NATE, 2001). The student teaching period has been substantially extended with attention to the quality of supervision and guidance of student teachers. This has been accompanied by an increased provision of student teaching experience to improve student teachers' knowledge about teaching. Sri Lankan authorities therefore considered it necessary to examine and evaluate what is happening in the changing student teaching field. This study takes up these challenges by examining how student teachers construct and organize their knowledge about teaching over the period of their student teaching. This study also provides strategies for developing teacher preparation programs at National Colleges of Education (NCOEs) in Sri Lanka, and provides a reference point for further research in teacher education in Sri Lanka.

Teaching and changing role of teaching

Over the past thirty years or so there have been some major changes in teaching and learning that have challenged the traditional school system and structure of teacher preparation programs. Students are no longer regarded as passive learners; they are expected to be active learners and problem solvers. Teachers too are no longer regarded simply, 'dispensers of knowledge', they are expected to perform a multitude of roles. Kizlik (2001) describes the different roles a teacher must enact:

As a teacher you will wear many hats. You will be a communicator, a disciplinarian, a conveyor of information, an evaluator, a classroom manager, a counsellor, a member of many teams and groups, a decision maker, a role-model, and a surrogate parent, to name but of a few of the roles teachers assume in carrying out their duties. (p.1)

In addition, there have also been major developments in the content and structures of school subjects over the past thirty years. For example, subjects are often no longer implemented as academic disciplines. Lorentzen (1999) points out:

...traditional subjects like history and geography have taken into their curricula a number of aspects from the contemporary agenda of globalization and need for democratic citizenship, while biology and other school subjects connected to the natural sciences have turned in the direction of environmental protection, both in the local and the global perspective. (p.1)

In many school contexts including Sri Lanka, biology, physics, and chemistry have been integrated into science and technology subjects, while geometry and algebra have been integrated into mathematics. These structural changes in subjects reflect and necessitate changes in the roles of both schools and teachers.

Schools are expected additionally to respond to the challenge of preparing individuals for life in the 21st century. These challenges require more innovative ways of learning (Bentley, 1999). Tom Bentley (1999), Director of DEMOS, Britain's leading independent '*think tank*' and one of their prominent educational thinkers, states that sustainable solutions must be introduced to meet the educational challenges of the 21st century. For example, Bentley states that connecting students with workplace learning opportunities creates skilful workers for the future:

By providing students with a structure that allows them to learn how to work, plus educational policies that encourage them to think and anticipate future needs, the youth of today who are the employment force of tomorrow, will be much better prepared to deal with an increasingly global and ever changing market. Current education policy cannot equip our students to deal with those sorts of demands (p.2).

According to Bentley (1999), the school should now help students move out of the classroom and into the workplace so they can develop a new set of skills and experiences to meet the contemporary agenda of globalisation. The Enterprise and Career Education Foundation (ECEP, 2001) argues that:

Connecting students with structured workplace learning opportunities in real businesses is one positive way of stemming the tide of youth unemployment and providing the workers of the future with a skills set that will help them become more attractive employees. (p.2)

According to Bentley (1999), meeting students' new set of needs means that government education systems now require a much stronger partnership with employers and community organisations. Structured workplace learning in real businesses (Bentley, 1999) has already been applied in British schools and in the Australian city of Newcastle, New South Wales where students studying for their Higher School Certificate (HSC) move between school and the workplace (Australian Broadcasting Co-operation, 1999). This pragmatic approach recognises that schools must incorporate real life experience to keep up with the rapidly changing and competitive nature of the modern workplace.

With the need for schools to adopt more innovative ways of teaching, teachers must become more skilful and professional to remain effective in the future school. The report (UNESCO, 1996) states that:

A new teacher is at the epicentre of educational transformation. Teachers of the new millennium must be able to develop in their

students the competencies and attitudes considered fundamental, such as creativity, receptivity to change and innovation, versatility in knowledge, adaptability to changing situation, discerning capacity, critical attitudes, problem identification and solution. (p.14)

It follows that teacher educators and teacher preparation programs must prepare student teachers to meet contemporary challenges.

The student teaching as a central component of teacher preparation

In the context of social change and challenges to teacher education, 'student teaching' (the practicum) as a major component of most teacher preparation programs becomes crucial (Jones & Vesilind, 1996). Literature written on student teaching highlights its importance in developing student teacher abilities. According to Hammond (1994), it can help create a pathway from theory to practice and help student teachers understand the many professional roles related to teaching, schooling and the student learning process they will need to undertake. Moreover, it also helps construct knowledge useful for practice and ongoing theory building. It also assists student teachers to learn how to look at 'the teaching world' from multiple perspectives and use this knowledge to reach learners with diverse backgrounds.

Despite the importance of the practicum and its substantial benefits, Jones and Vesilind (1994) suggest that it is a concern for student teachers and can be a time of crisis for student teacher action. According to Jones and Vesilind (1996) little is known about how and what students learn during their student teaching experience. In technical terms, "little is known about the interaction of specific student teaching experience and student teachers' construction of pedagogical knowledge" (Jones & Vesilind, 1996, p.92). This is the challenge taken up in this study with a particular focus on the Sri Lankan context.

The purpose of the study

The purpose of this study is to examine how the organisation of pre-service (mathematics and science) teachers' knowledge about their teaching changes during the student teaching (practicum) period in the teaching diploma program in Sri Lankan Colleges of Education.

Research questions

The following questions are used to guide the research.

1. How do pre-service teachers' knowledge and concepts of teaching, alter over the student teaching period?
2. What factors contribute to these alterations?

Theoretical underpinning of the study

To address these questions, the theoretical framework of constructivism is drawn on, as it applies to understanding changes in teacher knowledge and the methodological tools of concept mapping. Constructivism provides the theoretical framework for conceptualizing how people learn and how they organize their knowledge; or more specifically, how “learners actively take knowledge, connect it to previously assimilated knowledge and make it by constructing their own interpretation” (Cheek, 1992, p.12).

Research design

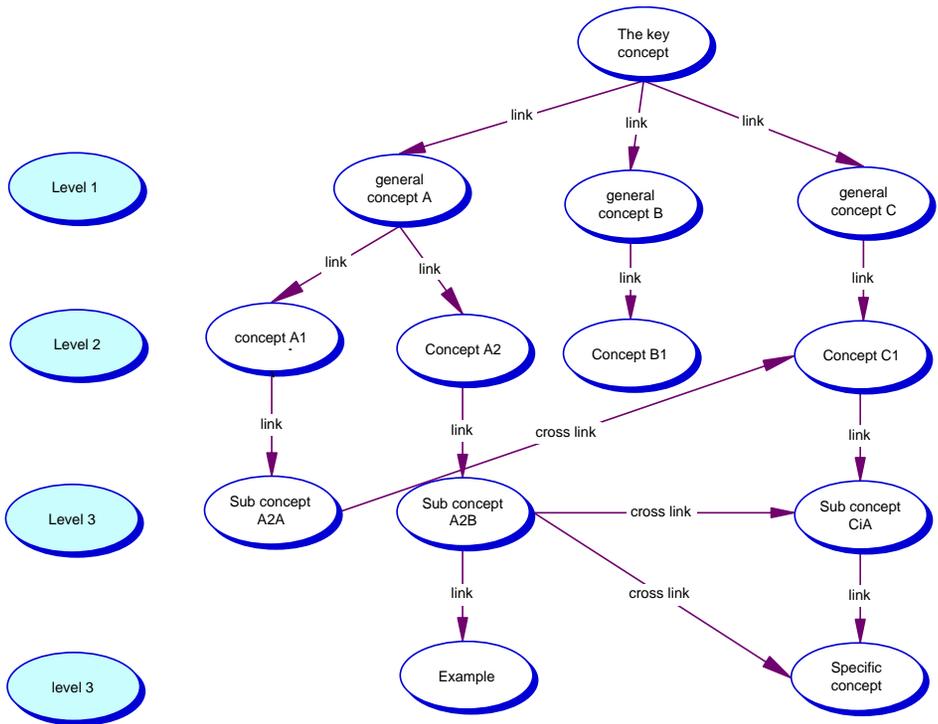
A qualitative research approach was used in this study to gain a broader understanding of how pre-service teachers organise their knowledge about teaching during the student teaching period in their teaching diploma course. Strauss and Corbin (1998) describe qualitative research as: “any type of research that produces findings not arrived at by statistical procedures or other form of quantifications” (p.11).

This study focuses on how student teachers made meaning of their teaching experience and how their understanding of teaching changed over the duration of their student teaching period. This study therefore, uses an analysis of textual data derived from interviews and from participants’ drawings of concept maps.

Concept mapping as a research technique

As Novak and Gowin (1984, cited in field Tested Learning Assessment Guide, National Science Education Standards, 1998) state, a concept map is a two dimensional diagram that contains concepts and directional named links. Concepts can be events, things that happen, objects or any thing that exists and can be observed. In concept maps, concepts are unified by relationship lines, which indicate how the relationships between the concepts are seen and understood. According to Novak (1985) concept map can also help students think more effectively about a specific topic, and manage the complexity of their ideas without trivialising them or losing detail.

The following figure provides an example of the way in which a concept map can be constructed, using notions of levels and relationships (links).



Structure of the concept map (From Novak & Gowin, 1984)

For this study, Level 1 ‘general concepts’ were identified as the ‘main organisational concepts’, because other sub concepts were organised under these concepts.

According to Novak (1985), the core element of a concept map is a *proposition*, where the relationship between two concepts is connected by a *labelled link*. When all these propositions are connected to each other the hierarchical, branching structure formed represents the organisation of knowledge in memory (Novak, 1985). These ideas, which are known as schemas, are organised as networks of related ideas called semantic networks. *Semantic networks* are special representations of concepts and their interrelationships that are intended to reveal their organisational structures of knowledge (Novak & Gowin, 1984). This structure provides the researcher with a useful and visually appealing way of exploring the participants’ cognitive structures or schemas of long-term conceptual knowledge, which can be compared to subsequent maps and interview data to reveal how, in the case of this study, student teachers organise and reorganise their knowledge about teaching. In relation to this study, information was gained from the concept maps participants (student teachers) developed at different stages of their student teaching, and from the interviews with the participants about their maps which followed.

It was assumed that the student teachers' knowledge about teaching would change over time according to the new knowledge gained from the student experience in the classroom and that these changes would be recognisable in the participants' concept maps drawn at different times during the student teaching. The concept map technique is thus used here to provide pictorial maps to represent changes in the student teachers' understanding about teaching.

Concept maps have been used for over twenty-five years in the educational field (Novak & Gowin, 1984; Jones & Vesilind, 1994; Jonnassen, 1997a). They are becoming increasingly popular as a useful tool for student teachers' knowledge representation (Novak, 1987). Zeilik (2003) for example, has used concept maps to assess student teachers' knowledge about a specific topic. Their knowledge was represented as graphics or diagrams using nodes that contained concept labels that were linked together with labels and directional lines (Zeilik, 2003). The concept map can thus indicate student teachers' knowledge about a specific topic as networks of ideas in a graphical form. Other researchers (Morine-Dershimer, 1993; Winitzky & Kelly, 1994; Winitzky & Kauchak, 1995) used concept maps to trace long-term changes in participants' cognitive structures. In another example, Park (1995) used concept mapping to enable teacher educators to assess student teachers' knowledge organisation at various points in their training. Park (1995) also examined whether concept-mapping assessment reflects expected differences and changes in student teachers' conceptual frameworks.

The strength and power of the concept map rest on the assumptions of many researchers and psychologists that concepts are ultimately understood through their relations with other concepts, and that concept maps can be used for assessing conceptual change (Bridge & Wandersee, 1988; Novak & Musanda 1991). How this works is represented in figure 3.2 which also provides an explanation of how concept maps are constructed.

Research setting

This study is set within a pre-service teacher education program called the Teaching Diploma course conducted by the National Colleges of Education (NCOEs) in Sri Lanka. This three year course prepares teachers for teaching in secondary schools. These teacher preparation courses have been designed by the National Institute of Education (NIE) in Sri Lanka. The NIE authority is responsible for curriculum development and professional development of teacher education courses in Sri Lanka, and has recently changed the course work and the duration of the practical experiences of teaching diploma courses at NCOEs. All of the participants in this study were involved in the second year of their three year Science and Mathematics teaching diploma courses.

Gaining access to participants and ethical considerations

According to Glesne and Peshkin (1992), gaining access from the 'gatekeepers' is the preliminary step for implementing the research. Prior to conducting this study, permission was obtained from the Human Ethics Committee

of the University of Wollongong. Consent from the NCOEs authorities was also obtained to conduct the research using their student teachers and their premises .

Analysing data

The data gathered from the concept mapping, and interviews, were analysed both separately and together, the difference in the organisation of students' knowledge revealed a cognitive pattern and provided contextually relevant information to help explain choices of concepts and changes from map to map. The following description provides the strategies that used for analyse each data collected by two different tools.

The concept maps data

This study primarily adopted a qualitative analysis; however concept maps can be used both in qualitative and quantitative approaches. This is because of the nature of the research questions in this study and or protocol of the case studies. The qualitative analysis involved coding a number of features of the concept maps: represented hierarchies, cross-links, relationships and examples. This analysis used procedures described by Novak and Gowin (1984) and Markham, Mintzes and Jones (1994). According to Novak (1985), the two most important features of concept maps are the hierarchical structure and cross-links. In addition, other features that may be created in concept maps are specific examples of events or objects that help to clarify the meaning of a given concept. The sub-categories of concept maps can be described as follows.

- Example: Specific object or event that can be present as a valued instance.
- Relationships: Connecting lines and linking words between two concepts.
- Hierarchy: Connections among concepts, from general to specific.
- Cross-links: The connection between an item in one hierarchy and an item in another hierarchy.

The interview data

In their interviews, each of the participants described their maps, providing insights into the sources of changes. The interviews also helped to triangulate data from the concept map drawings. The interviews examined how the student teaching and related experience influenced student teacher knowledge organisation. To examine this each student's comments about changes in their maps was coded into a category that represented the source of the changes. The interview data were analysed for each student within and across each time period. They were also analysed across different interview questions.

For this study, as a result of using participants' concept map drawings and their interview data, multiple case studies were developed-one for each student teacher. The concept maps were analysed with the interview data to identify changes in knowledge and to provide contextually relevant information and to help explain choices of concepts and changes from map to map.

Case studies

Case studies have been used in this study, to present participants' data. These case studies built on the data from participants' concept maps, and the interview data which followed with participants' descriptions about their own maps. The case studies include information about the background of the participants describing what the participants bring to the study and about their concept maps that participants developed at different stages during their student teaching period.

The case studies are an important type of interpretive (ethnographic) research mode for educational researchers (Yin, 1994, p.166). According to Lincoln and Guba (1985) the case study report format is very useful for raising the researcher's understanding, especially for the naturalistic researcher. Lincoln and Guba (1985) believe that raising the level of understanding in a specific field of inquiry is the ultimate purpose of the case study report. While superficial descriptions and statistics can be gained by investigating a multitude of cases, "the case study enables the reader to gain a deeper personal understanding of a topic and to make more naturalistic generalisations" (p. 358).

Validity and reliability of the data analysed

To improve the validity and reliability of this study, several strategies were used. Firstly, the concept map method used for this study was trialled in a *brief pilot study* with four student teachers from an Australian context. These student teachers were engaged in the primary teaching diploma course at University of Wollongong. The interview questions were also trialled with them. These student teachers developed concept maps twice during their practicum period, and after drawing their maps they were also interviewed. (*At first, the researcher planned to conduct three concept map drawing sessions and follow-up interviews, however, due to the administration and technical problems, student teachers attended only two map drawing sessions and interviews at the beginning of the practicum and after the practicum*). From these concept maps and following interview data four case studies were developed. After examination of this strategy in the pilot study, similar methods were used for the final project case studies, and the concept map methodology was refined and a mode of qualitative interpretation of the concept map developed.

Secondly, in the study the researcher explained clearly to the participants the procedures being used. In interviews with the participants, all interpretations were discussed with those participants and agreed upon with them. Moreover, conclusions reached by the researcher on the basis of the data were always shared with the participants and their suggestions were accepted. All decisions and criticisms were discussed and appropriate suggestions, modifications and adjustments also made. Ultimately consensus was reached in each case.

It is important to note that, according to the constructivist perspective, learning is a process not a product (Von Glasersfeld, 1987; Brooks and Brooks, 1993). It is acknowledged therefore, that the research method of concept mapping

could have affected or enhanced student teachers' reflections about teaching, thereby influencing changes in their knowledge organization.

Discussion

The participants (student teachers) constructed three concept maps during the study to illustrate their views of what constitutes 'effective teaching'. Effective or good teaching was indicated by 'Sinhalese' term '*Sarthaka Egenveema*'. This overview describes the development of the three concept maps over time.

This discussion outlines the results of the study, in particular the patterns of change to the participants' knowledge about effective teaching. The themes that have emerged from the study will be explored, such as the smaller number of concepts related to pedagogical knowledge in the first maps, as well as the apparent differences the participants had in identifying broad related concepts in the classroom, their inability to see the 'big picture' of the school context and the very negative focus on the role of the teacher. Other themes that will be analysed include the student's ability to transform and create knowledge and the increasing complexity in expressing these notions in the participants' concept maps.

The first maps were relatively simple and straight forward, primarily including concepts that related to college coursework knowledge, concepts limited to the classroom, which were focused on teachers more than students, and did not generally go far beyond the first level after the organizational concepts. Perhaps the reason for the simplicity of the first maps is due to student teachers' limited knowledge as a result of their coursework and their brief practical teaching experience in the first year of their course. Also, these maps were probably limited to '*classroom*' concepts due to the students' lack of knowledge about the relationship between theory and practice at this stage in their courses and lack of student teaching experience. All these assumptions might also help to explain why the first maps did not generally go beyond the first level after the organizational concepts. These judgments were further supported by analysis of the changes that developed over the subsequent maps.

Importantly, while the role of the teacher was present in the concept maps at the beginning of the study in each successive map is associated with more sub concepts and relationships. The role of the students was not reported in the majority of the first maps. However, it was an important organizational concept in the map drawn the end of the student teaching period. All of the students had introduced it as a concept with sub concepts and interrelationships

In the student teachers' third maps a sharp contrast in the student teachers' third maps as compared with other maps could be seen. The third exercise indicated how the students were developing a broader view of what is involved in effective teaching. For example, Shamalie's third map appeared more complex, addressing areas such as the '*administrative structure*', '*parents*', and '*outside resources*' and

identifying 'others' who may influence effective teaching. Malanie on the other hand included the concepts of a 'good school environment' and 'outsiders'.

This change or broadening of emphasis is supported by Knoener-Ekstrand (2002) who conducted a study of how student teachers in secondary Social Studies constructed and reconstructed their practical knowledge about teaching. Knoener-Ekstrand placed special emphasis on addressing the gap between school-based experiences within teacher preparation programs and outside resources, and influences such as family background, prior schooling experiences, personal values, and the political and educational philosophies of the student teachers. Knoener-Ekstrand (2002) argues that:

The traditional model for student teaching assumes that university based coursework provides the necessary content knowledge and theoretical pedagogical knowledge for teaching and the student teaching field placement provides a context in which pre-service teachers can practice applying that knowledge under the guidance of co-operating teachers and university supervisors. (p.1)

Kroener-Ekstrand (2002) supports the notion of why the third maps in the current study may have broadened providing the big picture of what is involved in effective teaching.

Almost all the student teachers reconstructed their understanding and knowledge of the main concepts of effective teaching with increasing complexity. It is very interesting to note that while only half of the student teachers were given their previous maps to look at before constructing their second and third maps, there were no strong differences between the two groups in the way the concepts were reorganised and changed in the second and third maps. For example, Elvina was presented with her previous maps and Shamalie was not, however, while their subsequent maps were reconstructed very differently, they both finally focused on the concept of 'learning'.

As constructivist theory predicts, the student teachers appear to have constructed and reconstructed their own understanding and knowledge of effective teaching according to their practicum experiences and their reflections of those experiences. This probable active involvement in the process of meaning and knowledge construction (Gray, 1997) seems to explain why they broadened their original simplistic constructions of effective teaching significantly. The student teachers apparently became active creators of their own understanding by asking questions, exploring and assessing what they knew previously about effective teaching. In this study and in line with the above theory, the student teachers organized and reorganized their mental structures to accommodate their new understandings through the college reflection sessions and workshops as well as discussions with college lecturers, colleagues, mentor teachers, and experienced teachers at the practicum site. This is also in line with the view of Brooks and

Brooks (1993) and Shepard (1991) who asserted that by reflecting on their experiences, learners generate their own meaning, which would explain clearly why the subsequent concept maps became more and more complex.

Moreover, according to Shulman's (1992) model of pedagogical reasoning, the student teachers appear to have undergone a transformation of how they organize their knowledge through reflecting on their practical experiences. They appear to have learned to transform theoretical knowledge into practical teaching through adapting several strategies such as preparations for adaptations and tailoring. For example, in this study in the student teachers' third maps they introduced concepts such as *teaching aids*, *relevant strategies*, *knowledge of students*, *teaching ability*, and *prior knowledge*. The student teachers' broader view of factors that are important for learning, such as knowledge of students, teaching ability, demonstrates that some change has occurred. That is, much of the theoretical knowledge expressed in their first maps has become more practical in nature.

As well as helping to understand how teachers' knowledge can be transformed Shulman's (1992) model also provides insights into how student teachers develop their understanding and skills through their practical experience in classrooms and the opportunities for reflection afforded by their workshops and seminars between student teaching periods. Shulman (1992) notes that practice assists teachers develop their knowledge about their students, and improve teachers' evaluation skills. Shulman's (1992) ideas also help to provide possible reasons for why the student teachers increased their understanding about the role of students, after reflecting on their own practice experiences.

The interviews with the student teachers provided insights to the rich contexts in which the changes in the concept maps took place. The interviews helped to reveal how the teaching experience and student teaching responsibilities influenced students developing knowledge. Each of participants' explanations about changes in their maps was coded into a category that represented a source of change: workplace experience, course experience, external influences, own reflections, and others. The interview data was analysed for each participant and for the whole sample within and across each time period as well as for each of the interview questions. The categories into which the interview data was coded was developed from the analysis of the interviews.

Through the interviews the student teachers themselves provided some possible explanations for the changes in their concept maps. The main reason given for the changes they made to their maps was the impact of their practical experiences. Included under school experiences were the support provided by the school (principal, other teachers, parents, students, and others). Other influences on the choices of concepts and influences on their knowledge of teaching were factors associate with 'reflection' and learning from the college environment.

Suggestions

Suggestions will be made to help in the development and upgrading of teacher preparation courses generally, particularly focusing on the individual development of the student teachers' teaching skills. Finally, this section will suggest directions for further research.

From this study, relevant and important implications can be drawn in relation to pre-service teacher education for Sri Lanka. A number of possible areas of development can be offered to improve teacher education. The main areas include: the nature and degree of student teachers' relevant knowledge before commencement of the student teaching; the need for consideration of broadening and/ or lengthening the student teaching experience; the value of reflective journals and reflective student support groups; the possibility of introducing a teacher demonstration model; the need for closer examination of course content in relation to the theoretical/ practical experience praxis; the importance of the support of mentors in the supervision process; the need to develop strategies for students to transfer the theoretical knowledge gained in their pre-service teacher education courses into practical situations; and finally, the value of concept maps for synthesizing knowledge.

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Creating Engaging Self Learning Opportunities for Out-of-School Children in Sri Lanka: Employing Constructivist Design Principles for Distance and Open Learning

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Abstract

This paper provides an overview of designing self-learning materials using constructivist theory and principles to promote learner engagement and motivation in out-of-school children and youth. First, it will describe how constructivist theory and principles support designing self-learning materials to promote learner engagement and motivation. Then, the paper discusses results achieved by a research project that was designed to investigate how a constructivist approach can readily be utilized to address the challenges of developing self-learning materials. In particular this paper describes how the constructivist design approach is compatible with the learning needs of out-of-school children. The findings demonstrate that a constructivist learning environment when introduced to target groups provides a new path for experiencing enjoyable, interesting and exciting learning. The study indicates that a paradigm shift is possible in the design of out-of-school learning activities.

Key words: Constructivist learning theory, Design principles, Self-learning materials Out-of-school children

Introduction

Addressing the issue of access to quality education is a matter of urgency, and yet the formal education system in Sri Lanka has not tended to provide education for out-of-school children. Children should experience learning that is meaningful for their real life. The learning should be flexible, providing opportunity for the out-of-school children to learn whatever they prefer to learn, whenever they like to learn and they should be able to learn at their own pace. Unlike those attending in school, these out-of-school children may not like to sit in the same place for a long period as they need to engage in some kind of activities. Thus, there should be an alternative path to provide education access for out-of-school children.

Many developing countries as well as international organisations have identified distance and open learning as the appropriate and alternative path to provide education access for out-of-school children (Dodds, 1996; National Open School (NOS), 2000; Perraton, 2001a). In the developing world, printed, self-learning materials is still the prominent delivery mode for open and distance learning. The Commonwealth of Learning (COL) which was established to increase learning opportunities for basic education in developing countries through the use of distance education techniques and methodologies. The COL stated that the key challenge of open and distance education is writing self-learning materials that engage and motivate learners to learn (COL, 2001). This paper discusses how constructivist theory and principles support designing self-learning materials to promote learner engagement and motivation out-of-school children.

Research questions

In order to achieve the broad aim of the study in identifying appropriate design principles for the development of self-learning materials to promote learner engagement and motivation of the out-of-school children the following research questions are examined:

- 1) How does constructivist learning theory assist the development of self-learning materials?
- 2) What design principles promote learner engagement in self-learning materials?

Constructivist theoretical approach for learning

Many educationists have become interested in the last decade in applying constructivism to explain how people learn and the nature of knowledge. Jonassen (1991, p.32) defines constructivism as being:

... the belief that knowledge is personally constructed from internal representations by individuals using their experience as foundation. Knowledge is based upon individual constructions that are not tied to any external reality, but rather to the knower's interaction with the external world.

Accordingly, the constructivists believe that knowledge and truth are constructed by people and do not exist outside the human mind.

The notion of constructing knowledge is well described by Bednar, Cunningham, Duffy, and Perry (1995 p.103.) in their theoretical discussion of a constructivist perspective:

Learning is an active process in which meaning is developed based on experience... Conceptual growth comes from the sharing of multiple perspectives and simultaneous changing of our internal representations in response to those perspectives as well as through cumulative experience. Consistent with this view of knowledge, learning must be situated in a rich context, reflective of real world contexts, for this constructive process to occur and transfer to environments beyond the school.

These points that learning must be situated in a rich context, learning should be reflective of real world contexts, and that learning transfers beyond the school are key points of the constructivist learning approach.

Other theoretical bases of constructivism are multiple truth and multiple realities. These concepts relate to more thinking and a deeper understanding. Von Glasersfeld (1987, p.15) states that learning is a process of constructing meaningful representations and making sense of one's experiential world. In this process students' errors are seen in a positive light and as a means of gaining insight into how they are organising their experiential world. The notion of doing something 'right' or 'correctly' is to do something that fits an order one has established oneself. According to Von Glasersfeld, this perspective is consistent with the constructivist tendency to privilege multiple truth representations and multiple realities.

The collaborative approach to learning is another pivotal concept of constructivist learning. Learners are not isolated, they learn from each other. The dialogue that results from a combined effort with peers provides learners with the opportunity to test and refine their understanding in an ongoing process. While different learners may arrive at different answers, it is not a matter of 'anything goes' (Spiro, Feltovich, Jacobson & Coulson, 1991). Learners must be able to justify their position to establish its viability (CTGV, 1991). It also encourages the construction of a social context in which collaboration creates a sense of community, and where teachers and students are active participants in the learning process (Jonassen, 1991).

From the above authors' views, key practices from constructivist learning theory can be summarized as :

- Learning is construction of knowledge according to learner experience.
- Social and cultural context support for construction of knowledge.
- Multiple realities and multiple truths.
- Learning is mentally active process.
- Collaborative supports for learning.
- Learning is related to learner context.
- Learning is making sense (meaningful).
- Learning is adaptive.

Constructivist approach to designing self-learning materials

The constructivist influence on instructional design to provides insight into how to address the challenges for developing self-learning materials. A selection of literature is reviewed under the following headings:

- The promotion of engagement for open and distance learners.
- The promotion of active and constructive learning.
- The promotion of collaborative support for construction of knowledge.
- The creation of authentic learning environment (situated learning).
- The development of problem -based learning (PBL).

The promotion of engagement for open and distance learners

Neerja (2001) states that high motivation; self-discipline, a strong desire to learn and looking for alternatives are some of the characteristics of distance learners that make them different from traditional learners. As distance learners gain greater control of their learning, motivation and self-discipline become greater factors in their success or failure. Distance learners must take responsibility for much more of their cognition, metacognition, and motivation than face-to-face learners. Tam (2000) states that distance learning provides a unique context in which to infuse constructivist principles where learners are expected to function as self-motivated, self-directed, interactive, and collaborative participants in their learning experiences by virtue of their physical location. The autonomy called for by open and distance-learning advocates is also reflected in the constructivist views to encourage active, collaborative and responsible learners.

Motivation, especially in distance educational experiences, provides the fuel for student engagement. Without motivation, students will not use what they know or think about nor will they organise their knowledge. Even teaching strategies of how best to learn will be fruitless if students are not motivated to use them. Self-efficacy and the intrinsic value of an academic task have been shown to be positively correlated to cognitive engagement and performance (Pintrich & De Groot 1990).

Moore (1990) suggests that transactional distance can be decreased by increasing the transactional dialogue. Within the constructivist approach, learning takes place in collaboration with others. Distance learners need to be more interactive to enhance their learning, maintain and continue the learning, and minimise their isolation. The personal meaning gained in this way might promote learner engagement. Jonassen et al., (1995) advocate using constructivist tools and learning environments that foster personal meaning-making and discourse among communities of learners (socially negotiating meaning) rather than by instructional interventions that control the sequence and content of instruction and seek to map a particular model of thinking onto the learners. Hence, the constructivist approach is compatible with and helps to engage learners in distance and open learning.

The promotion of active and constructive learning

As Perkins (1992, p.49) describes, “Learners do not just take in and store up given information. They make tentative interpretations of experience and go on to elaborate and test those interpretations”. He states that students need to develop their own learning strategies, goals and objectives and they should be given responsibility for their own learning. Constructing knowledge is not a mechanical process of sorting and processing as a computer might (Duffy and Cunningham 1996). Learning is active mental work (Woolfolk, 1993). The new information links with prior experience then changes the existing mental framework as a result of the thinking of the learner. According to prior experience, the learner analyses, interprets, and criticises new information, then makes sense of their real life after the learner constructs their own knowledge of what is important to their life.

In the constructivist approach many authors advocate that the learner comes to learn through experiences to develop their own learning (Honebein et al., 1993; Maxwell, 1995). Maxwell states that in the constructivist view of learning, individuals bring different background knowledge, experience, and interests to the learning situation they make unique connections in building their knowledge.

Constructivist learning is adaptive. It is a process of building functional understandings rather than of uncovering fixed truths. Constructivist learning is an

active process controlled by the learner so that learning and the context of learning are deeply intertwined (Brooks & Brooks, 1993; Duit, 1995; Duffy & Cunningham, 1996).

The promotion of collaborative support for construction of knowledge

Social constructivism supports the learner to confirm his/her constructed knowledge. Accordingly, Vygotsky's (1978) states that learning is a social event where learners communicate to help each other construct meaning. The learners learn through interaction with others. Learners work together as peers, applying their combined knowledge to the solution of the problem. The dialogue that results from this combined effort provides learners with the opportunity to test and refine their understanding in an ongoing process. Dewey (1976) provided a theoretical description of experiential learning that would best facilitate the learner's ability to construct meaning. Learning occurs when learners use their existing knowledge during the interaction with their environment. Through educational experiences, they are able to build understanding and to create new knowledge. Savery and Duffy (1996) also support the concept of interactive learning. They state that "knowledge evolves through social negotiation and through the evaluation of the viability of individual understandings" (1996, p. 137). Knowledge can be produced when a community of learners interacts with each other. together. According to this perspective, learning can be, and should be accomplished in cooperative groups.

The creation of an authentic learning environment (situated learning)

Authentic learning environments provide children with rich experiences and opportunities to construct knowledge in context, and in ways that make sense to their existing knowledge, which is based on prior experiences (Cox-Petersen & Olson, 2000). Reeves (1997) emphasises the importance of contextual learning in order for students to make connections between the problem and the solution. The constructivist suggests that situated learning is a strategy for learning and promotes transfer of knowledge in day-to-day real-life situations.

Courtney and Maben-Crouch (1996) concluded that learning transfers more easily when a 'natural learning environment' is created. They demonstrated that a natural learning environment engages learners in solving authentic, non-routine problems likely to be encountered back on the job Brown, Collins and Duguid (1989) argue that if learners learn of information that is isolated from a meaningful context, then their understanding is often incomplete and meaningless. They emphasise that "knowledge is situated, being in part a product of the activity, context, and culture in which it is developed and used" (p.32).

Merrill (1992) states that if learning must occur in realistic settings the learning must be situated in a rich context, reflective of real-world contexts. McLellan (1996, p. 9) noted that situated cognition, “involves adapting knowledge and thinking skills to solve unique problems [and that it] is based upon the concept that knowledge is contextually situated and is fundamentally influenced by the activity, context, and culture in which it is used”.

Mandl and Reinmann (1995) also argue that situated learning environments refer to learning as an active, constructive, situated process in which the student learns by discovery, in a flexible way. Bennett, Harper and Hedberg (2002) propose that authentic activities support and promote critical thinking and problem-solving skills. Children can construct actual knowledge that supports the solving of their daily problems. Sheldon and Biddle (1998) state that intrinsically motivated persons are more wholly engaged and absorbed in their activities, bringing more of their previous knowledge and integrative capacities to bear in their pursuit of new understanding and mastery.

Bransford, Brown, and Cocking (1999, p.100) point out that children naturally learn when there is “no external pressure to improve and no feedback or reward other than satisfaction”. Furthermore, Bransford et al. state “learners of all ages are more motivated when they can see the usefulness of what they are learning” (p.49). As with adult learners the out-of-school children might need to utilize their experience in order to learn effectively. Thus, situated learning may be suitable for designing learning experience for out-of school children.

The constructivist approach may help out-of-school children to learn effectively. Unlike children in formal school, the out-of-school children are members of the wider society. They are engaged in different kinds of activities and contribute to the survival of their family. They have urgent needs and interests. They need to solve their own problems. Through the constructivist approach, students are expected to engage in real-life activities in situated learning. Then they are motivated to learn something that can be useful in their real life to solve their problems. By engaging in different kinds of work, the children have a lot of experience that they can bring to the learning environment..

The development of problem-based learning (PBL)

Giebler (2000) suggests that children should be exposed to the constructivist-learning environment which encourages open challenges and is flexible and dynamic. In this manner, students are encouraged to become higher-order thinkers and problem solvers. If we want to design learning environments to engage learners in personal and/or collaborative knowledge construction and problem-solving outcomes, then we must consider designing constructivist-learning

environments (Jonassen, 1999). Problem-based learning promotes critical thinking and self-monitoring of the learning in the constructivist model (Savery & Duffy, 1996). Oliver and Herrington (1995) argue that text-based descriptions are less effective when used as a means to present advanced knowledge where principles and concepts need to be developed. Therefore, the challenge is how to develop self-learning materials to promote higher knowledge skills.

Goodwin (2000) found that students are most likely to be engaged in learning when they are active and given some choice and control over the learning process and when curriculum is individualized, authentic, and related to student interests.

The major issue in designing learning materials is how to promote intrinsic motivation. The problems are related to the learner context (learner needs, interests) and their real life, which motivates learners to engage in an active learning process to solve problems. In this way, the problem belongs to the learner and it meets the learner's needs and so it is enhancing the intrinsic motivation of the learner (Norman and Spohrer, 1995).

The above literature review demonstrated that the constructivist approach could be utilised in open and distance learning to create an effective learning process, which is active, creative, motivating, constructive and meaningful. This section examines the constructivist design principles that support design of the development of self-learning materials.

Constructivist design Principles

Harper and Hedberg (1997) emphasise the importance of designing the learning environment to engage the learner in an active learning process. Honebein (1996, p. 11) argues that constructivist learning environments are characterized by seven pedagogical goals as noted below.

1. Provide experience with the knowledge construction process.
2. Provide experience in and appreciation for multiple perspectives.
3. Embed learning in realistic and relevant contexts.
4. Encourage ownership and voice in the learning process.
5. Embed learning in social experience.
6. Encourage the use of multiple modes of representation.
7. Encourage self-awareness in the knowledge-construction process.

Lebow (1993, p5) describes five underpinning principles that integrate the effective and cognitive domains of learning in ways that support constructivist principles of learning. These principles suggest the need for the learning environment to:

1. Maintain a buffer between the learner and the potentially damaging effects of instructional practices(directions for the designer to protect the learner from damaging side-effects of instruction)
2. Provide a context for learning that supports both autonomy and relatedness.
3. Embed the reasons for learning into the learning activity itself.
4. Support self-regulation through the promotion of skills and attitudes that enable the learner to assume increasing responsibility for the developmental restructuring process.
5. Strengthen the learner's tendency to engage in intentional learning processes, especially by encouraging the strategic exploration of errors

Lewbow's instructional design principles provide support for the design of learner-centred learning environments to promote self-regulated learning, which can contribute greatly to the design of self-learning materials for distance and open learning. Therefore constructivism, in its practice of collaborative learning and problem-based learning, shares Lebow's learner-centred learning principles.

Jonassen (1994, p.35). states that there are a number of design principles by which knowledge construction can be facilitated. These design principles include:

1. Provide multiple representations of reality.
2. Represent the natural complexity of the real world.
3. Focus on knowledge construction, not reproduction.
4. Present authentic tasks (contextualizing rather than abstracting instruction).
5. Provide real-world, case-based learning environments, rather than pre-determined instructional sequences.
6. Foster reflective practice.
7. Enable context-and content-dependent knowledge construction.
8. Support collaborative construction of knowledge through social negotiation.

Jonassen (2001) shows that the constructivist learning environment should follow certain characteristics. It should be active, constructive, collaborative, intentional, complex, contextual, conversational and reflective

Savery and Duffy 1996, p.137) also outlined a set of instructional principles that can guide the practice of teaching and the design of the learning environment to support problem-based learning. Their principles are as follows:

1. Anchor all learning activities to a larger task or problem.
2. Support the learner in developing ownership for the overall problem or task.
3. Design an authentic task.
4. Design the task and the learning environment to reflect the complexity of the real world environment.
5. Give the learner ownership of the process used to develop a solution.
6. Design the learning environment to support and challenge the learner's thinking.
7. Encourage testing ideas against alternative views and contexts.
8. Provide opportunity for and support reflection on both the content learned and the learning process (Duffy & Savery, 1996, p.137).

Taking into account the constructivist design principles of Jonassen (1994), Lebow (1993) and Savery and Duffy (1996), the Instructional designer could design the learning environment to promote active, constructive, collaborative and meaningful learning. Furthermore, the designer could successfully support and enhance learner motivation and engagement.

Methodology

The research was conducted in a natural setting utilizing a multiple- case study method. This study proceeded through several steps including planning, course developing, training, applying and evaluation. Table 1 indicates the step-by-step flow of the study and the intended outcomes.

	<p>Scenarios – objectivist and constructivist-</p> <p>Scenario –analysis of existing self learning materials-</p> <p>Brainstorming-</p> <p>Sample scenario Fatale fever-</p> <p>Group discussion –Constructivist Theories-</p> <p>Group discussion - theoretical framework-</p>	<p>Identified differences between objectivist perspective and constructivist perspective-</p> <p>Identified different instructional design principles embedded in constructivist and objectivist approach-</p> <p>Identified main instructional structure embedded in the existing self-learning materials (Distance courses)-</p> <p>Analysed appropriate ID principles for self –learning materials-</p> <p>Analysed ID principles embedded in the sample materials and constructivist features-</p> <p>Identified main instructional assumptions presented by constructivist theorists-</p> <p>Appropriate theoretical framework for designing instruction-</p>
<p>d). Workshop 2 (Two-day Practical writing)</p> <p>e.) Sample study</p>	<p>Group discussion–based on the course writers gained experience from OS children</p> <p>Preparing check list to evaluate self-learning materials.-</p> <p>Writing and discussion of the first draft -</p> <p>Writing the final draft and preparation of a check list to evaluate the written sample materials-</p> <p>Editing and finishing-</p> <p>Trying out the sample materials with OS children.-</p>	<p>Analysed context of OS children and decided the content for writing sample materials -</p> <p>Refresh knowledge relevant to the ID principles.-</p> <p>Revised the learned Instructional principles and theoretical framework-</p> <p>Applied constructivist principles and Identified embedded ID principles in the sample materials-</p> <p>Production of attractive material-</p> <p>Identified the practicability of the design principles -</p>
<p>f). Evaluation workshop</p>	<p>Discussion with the course writers</p>	<p>Identified whether the principles served to promote learner engagement and learner motivation</p>

Participants

The participants in this study were ten course writers who were engaged in writing self-learning materials for Distance Teacher Education Courses implemented by the National Institute of Education in Sri Lanka. Throughout the study the participants are referred to as the “course writers.”

Target group (Out-of-school children)

This study investigated the appropriate instructional design principles for writing self-learning materials with particular reference to out-of-school children in the secondary school level age group 11-16 in Sri Lanka. Thus, the study focused on the children in the age group of those who had completed their primary education and were not attending any kind of educational activities at the time of this study.. In the study, these out-of-school children are referred to as students.

Details about each course writer and his/her student are indicated in Table 2

Table 2. *Information course writers and their students*

Course writer	Introduction	Student	Introduction
Naalin	Nalin was the most experienced course writer. He had experience in writing, editing and translating skills relevant to science and environment studies. He was a senior tutor at the Distance Education Regional Centre, Kandy.	Lanka	Lanka was a 16year old out-of- school boy who stayed with his grandmother and his aunt. He helped his grandmother in her vegetable business. He gave up his formal education during Grade 7 after his mother’s death.
Tissa	Tissa was an experienced distance teacher educator. He was a senior tutor at the Distance Education Regional Centre at Matara. Tissa had writing and editing skills relevant to science and environment studies.	Ranga	Ranga was a 15year out-of-school girl who was waiting for a job in a garment factory. She gave up her schooling in Grade 9 due to her own decision get a job.
Susi	Susi was an experienced distance teacher educator. She was the senior tutor at the Distance Education Regional Centre at Hatton, which is located in the plantation area of the country. She had writing as well as editing experience relevant to social studies and professional education.	Sudath	Sudath was a 15 year-old working boy in a carpentry shop. He gave up his formal education in Grade 8 because his parents could not afford money for his schooling.

Azar	Azar was the youngest course writer who participated in the workshop. He was a Tamil-medium tutor of the Additional Language Improvement Course, attached to the Distance Education Regional Centre at Puttalam where many displaced families were living.	Krishnan	Krishnan was a 15-year-old Tamil boy who worked as a helper in a tea shop. He gave up his formal education in Grade 5 due to the insulting attitudes of his classmates and teachers towards him.
Asha	Asha was an experienced distance teacher educator. She was a senior tutor at the Distance Education Regional Centre at Kalutara. She had writing as well as editing experience relevant to social studies and professional education.	Ruwan	Ruwan was a 14-year-old out-of-school child who worked as a lorry cleaner. Ruwan, after the completion of his primary education, stopped his schooling because he was isolated in the class and other students insulted him.
Vasala	Vasala was an experienced course writer. As a course writer, he had writing and editing skills relevant to the development of material for mathematics. Vasala was senior tutor of the Distance Education Regional Centre at Gampha.	Nadi	Nadi was a 16-year-old girl who stayed at home waiting for a job in a garment factory. Nadi gave up her schooling in Grade 9 because her parents could not afford to pay for her studies.
Pala	Pala was a Tamil-medium course writer from the plantation area (Balangoda), where many out-of-school children were living. He worked as a senior tutor at the Distance Education Regional Centre at Rathnapura. He had writing, editing and translating skills.	Ferina	Ferina was a 14-year-old Muslim girl. She was in Grade 8 when her parents stopped her schooling because they did not like to send her out. She stayed at home and helped her mother in housework.
Sara	Sara was an experienced course writer who was working in the National Institute of Education. He had been working in the Student Support Unit. His main responsibility was planning, organising, implementing and monitoring the study support activities. He had writing as well as editing experience relevant to social studies and professional education. Lathika	Ranjana	Ranjana was 15 years old out-of-schoolboy. He stopped his formal education in Grade 8 because of his illness. He helped his mother in gardening.
Malan	Malan was an experienced course writer who represented the National Institute of Education. Malan had been working in the Student Management Unit. He was responsible for the recruitment of tutors and trainees for regional	Lathika	Lathika was a 14-year-old out-of-school girl. She stopped her formal education in Grade 6. She had to look after her younger siblings after her father's death.

	centres and monitoring management activities of the regional centres.		
Abdual	Abdual was a Tamil-medium senior tutor of the Additional Language Improvement course at Kalmunai centre where a lot of out-of-school children were living because of on-going civil war.	Rasidu	Rasidu was a 12-year-old Muslim child. He stopped his formal education in Grade 5 due to his friends' insults. His mother sent Rasidu to another school, but he did not like to go to school and he stayed at home.

Data collection methods and procedures

In this study, the data were collected utilising multiple data-gathering techniques. By engaging the course writers in the awareness and practical writing workshops data were collected before awareness workshop, after awareness workshop and after practical writing workshop through interviews, reflective journals and observations. Further engaging the course writers in a sample study data were collected through the evaluation reports.

Interviews

All participants were interviewed individually, each for 20-30 minutes three times during the training program according to learning phases (before awareness workshop, after awareness workshop and after practical workshop).

Before the awareness workshop, all participants were interviewed to explore their ideas about how appropriate the distance education mode was for providing access to education to out-of-school children; what ideas would guide the development of self-learning materials for out of school children and what would be the main features of the self-learning materials? In addition, the modalities that the course-writers would follow to develop the self-learning materials were also discussed. Furthermore, their previous experience in the instructional-design field and whether they had a need of training to write self-learning material for out-of school children were discussed.

After participating in a three-day awareness workshop, the course writers were interviewed a second time to determine their ideas and views on the instructional design principles, the usefulness of the workshop conducted for the development of self-learning materials, and the appropriateness of particular instructional design principles for writing self-learning materials. During the

interviews it was discussed as to whether it would be helpful to introduce instructional design principles for developing self-learning materials which are engaging, creative and motivating, why participants prefer the constructivist approach for developing self-learning materials, and what problems might arise in adapting these principles for developing self-learning materials.

After participating in the two-day practical writing workshop, the participants were interviewed a third time using the same interview guidelines to re-examine the above data. By presenting each of them with the same questions again, it was possible to confirm, or amend this information and examine it and how participants changed their ideas and views after the practical workshop.

Reflective Journals

Each course writer was asked to write a reflective journal during the period of the awareness and the practical workshops. They were given questions to help them write their journal reports: How did they construct their knowledge about instructional design principles; What were the strengths and weaknesses of the principles; What was the practicability for the Sri Lankan context and other associated issues? The reflective reports were collected at the end of the workshops. The content of each report was carefully studied and integrated with the course writers' stories.

Evaluation reports

During the practical workshop the course writers wrote sample learning materials for the following selected Topics.

- Opening a savings account.
- Be aware of lightning effects.
- Prepare Vesak Lanterns.
- FatalDengue Fever

Each course writer was asked to apply the developed sample materials for an out-of-school child and to write a report about how the course writer engaged the child in the learning activity and how was the learning process of the student. They also wrote about the practicability of the material and their reflections. The researcher provided the following guideline questions for writing this report:

Did the student engage actively in his/her learning?

- Did the learner co-operate with others in his/her learning?
- Did the learner develop more skills than expected?

- Did the learner acquire given information easily?
- Were the materials relevant to the learner's experience?
- Were the learning activities related to their real life?
- Was the learner interested in the learning activities?
- Did the learner ask to do more activities?
- What were the difficulties faced by the learner while he/she was learning?
- Did the learner utilise instructional strategies provided by the CLE model?
- Did the learner take responsibility for her/his learning?
- Did the materials motivate the learners?
- Were the materials successful in creating dialogues?
- Were the materials successful in reflecting the daily life?
- Were the materials successful in generating the ideas of the student?
- Did the learner organise his /her own work?
- Did the learner use different resources?
- Did the learner complete the materials?
- Was the learner happy/ unhappy about the learning materials?
- Comments of the course writer
- Background of the child (age, family background, present activities, educational level, reason for dropping out of formal schooling, their interests, hope, working environment, etc).

At the end of the sample study the researcher met with the participants. The participants handed over their evaluation reports. The researcher held informal discussions with each participant relevant on his/her experience and how he/she evaluated the achievement of learning.

Informal discussions / informal observations

Informal discussions were held with the course writers during their free time. Since the workshops were residential, there were opportunities for the course writers to chat with each other. In addition, during the evaluation workshop informal discussions were held. These chats were useful to find out more information and to clarify the data gained from different methods. Informal observations were conducted during group discussion. This also helped to gain a clear understanding concerning the course writers' views and ideas relevant to the instructional principles.

Data analysis

Engaging themselves in the awareness and practical workshop on instructional design principles, the course writers discussed, analysed, interpreted the constructivist principles, and reasoned out why those principles were more appropriate than the traditional principles, which were already in use for developing self-learning materials. The course writers constructed their own knowledge and, during the writing workshop, experienced the writing of self-learning materials based on constructivist principles. According to the course writers' individual differences and different contexts, their views, opinions and suggestions on the design principles and constructivism were different.

Further, each course writer selected an out-of school child and applied the developed sample learning materials and observed, examined and monitored the student's learning process throughout. According to the students' individual differences and different contexts their learning processes were also different. Therefore, each course writer's experience of their student's learning process was also different. The collected data from the both situation (course writer training and student learning) were presented as a collection of individual stories of course writers and students.

These collected data were coded and identified the following themes.

- Learning related to the learner context.
- Real world problem-based activities (Authentic learning).
- Construction of knowledge rather than transmission.
- Collaborative support for learning.

To answer the research questions the data discussion is organised the above themes and each themes relates to the experiences of the course writers and out-of-school children.

Discussion

Learning related to the learner context

Constructivist learning is an adaptive, active learning process controlled by the learner and a process of building understanding so that learning and the context for learning are deeply intertwined (Brooks & Brooks, 1993; Duit, 1995; Duffy & Cunningham, 1996). According to these authors, the relationship of the learning and learner context is the key point to motivate and engage learners in an active and constructive learning process. This study reveals that when the content of the learning was related to the learner's context and experience, learner interest was enhanced in learning and the learner was motivated to engage in a more

active learning process. Furthermore, the learners could construct meaningful knowledge, which could be applied to their real world. In order to maintain the benefits of learning the students' parents encouraged their children to learn. Evidence for the above findings is next discussed according to the learning related to the learner's needs, experience and transferability of learning.

Learning relate to learner needs and experience

The study demonstrated that most learners engaged actively in their learning and the learning made sense for their real life. Furthermore the study revealed that if learning is related to the learner's experience then learning is generally accelerated and made easier.

Evidence from the course writers

The content of the training program was related to the course writers' real needs professionally. Even though they were experienced course writers, they had no training in the instructional design field or constructivist learning, and they had an urgent need to learn new methods and techniques for writing self-learning materials for the new target group. The study reveals that all the course writers expressed strong needs for training in writing self-learning materials. This need raised their interest and motivation. As a consequence, the course writers engaged actively in their learning tasks and learning made sense for them.

The course writers' learning process demonstrated that while they were learning new knowledge they reflected on their prior experience and were able to grasp new information more easily and construct their own knowledge through analysing and interpreting new information in relation to their prior experience. Further, the study reveals that the learning process was not limited to their workshop sessions; learning also took place at their dinner table, tea table, hostel, dorms; that is whenever they were free and wherever two or three course writers were gathered together. It shows that learning related to their prior experience had a genuine power to actively immerse the course writers in the continuing learning process.

Evidence from the students

When comparing out-of-school children's experience of the learning the study demonstrates that the content of the learning materials (Opening a savings account, Be aware of lightning, Prepare Vesak Lanterns and Fatal Dengue Fever) was related to their needs, experience and environment. Therefore, most students were motivated to do the learning activities. Significantly, the findings show that all four working children who were among the ten out-of-school group selected the topic 'Opening a Savings Account' for their learning activity in order to fulfil their

need for saving money. Some students demonstrated an active engagement in finding resources for their learning because the content was related to their environment and needs.

Fardouly (1998) shows that students needed to learn by setting personal learning goals and then constructing for themselves meaningful knowledge as a result of their own activities and interaction with others. The argument is that learners can set their own learning goals for their learning only if the learning is related to their context.

Similarly, this study shows that students' prior experiences assisted students in their learning. Some students (Ranga, Farina, Ruwan and Sudath) had experience concerning what was happening in and around their environment (different programs on dengue fever; posters, and notices, radio and television news regarding lightning disasters). Therefore, they were able to relate their learning easily to their own lives. The study shows that the experience led them to engage actively in collection of necessary information for their learning. Furthermore the study shows that one student (Nadi) reflected what she had learned in the formal school relevant to her non-school learning activities. She found her old science notebook and read and collected necessary information relevant to her learning activity on lightning. Accordingly the study shows that even though the students had not as much experience to relate to their learning activities as the course writers, the above examples are evidence that when learning was related to the students' experience the learners were able to orient more easily to their learning and this motivated students to engage in their own learning processes.

Transfer of knowledge

The current study affirms that if learning was related to the learner context learners could construct meaningful knowledge for their real world and this led many of them to think of situations where that new knowledge could be transferred. Moreover, the learning was interesting and there was a tendency for continuing learning. The significant finding is that the learning was meaningful for students and the students were not only motivated to engage in their learning but it also motivated their parents.

Evidence from the course writers

The study indicates that all the course writers thought the fields were applicable to their new knowledge due to the learning activities being related to their professional careers. As experienced educators their thoughts were not limited to their course writing but went beyond it to how the concepts could contribute to the school system, distance teacher training and their future workshops. Many course writers (7) were determined to explore more information regarding

constructivist learning and instructional principles to improve their knowledge. Further, two of them were encouraged to disseminate their new knowledge among other officers in their colleges and to share their experience because they felt this new knowledge was very important for the wider system.

These findings indicate that if the learning context is authentic and it relates to the learner's real world then learners can construct more meaningful learning not only for their own lives but also for others. This is compatible with the constructivist assumption that learning goes beyond the school or training setting (Bednar et al. 1995).

Evidence from the students

In the out-of-school learning context it has been demonstrated that learning is significantly related to learners' real world context, which not only motivates students to learn but also motivates their parents and other family members. The parents and family members were also interested and motivated to engage in their children's learning and they encouraged their children and helped them in many ways (providing resources, directing students to meet the necessary persons to get information, giving some information when children wanted it, supporting in selecting learning materials for learning, and maintaining a friendly relationship with the course-writer). Another important point is that all the students were interested to varying degrees in their learning and four students (Ruwan, Sudath, Ranga, and Nadi) wanted to continue it beyond the trials. Due to their new interest in learning, five course writers (Susi, Abdul, Asha, Azar and Vasala) found it difficult to stop these children's learning activities. So they decided to continue their students' learning and all the course writers became willing to help them. An equally exciting outcome is that some parents (4) wanted to continue their children's learning and they thought that this was the opportunity to complete their children's missing education.

Many studies of the out-of-school children show that their learning programs are not related to learner context. Shrestha (1997) showed that the Ivory Coast out-of-school program had little relevance to everyday village life. Also many out-of-school programs in India have focused on school curriculum rather than the children's real worlds (Ruth, 2000). However, putting out-of-school children in the formal school was not a successful activity as they did not provide life-oriented and flexible learning systems (NFED, 2002).

Real world problem-based learning activities (authentic learning)

The study found that the real world problem-based activities engage learners in an active and constructive learning process to promote the thinking processes of the learners for construction of their own knowledge and to gain a deeper

understanding. Furthermore, the study found that the problem-based activities had the power to motivate the learners to engage in learning that gave them ownership of and responsibility for their learning. Evidence for the above findings is discussed in the following sections.

Promoting the thinking process

The study shows that problem-solving, real-world environments and reflective thinking are key points for active and constructive learning. Furthermore, the study demonstrates that reflective thinking leads to the development of higher order problem-solving levels of the learners.

Evidence from the course writers

The study reveals that real world problem-based scenarios engaged the course writers in an active learning process and brought out their many years of experience in development of self-learning materials, encouraged them to reconsider what they had done previously in designing materials, and constructed new knowledge. The study demonstrates that through involving several activities during the development of self-learning materials (editing, writing, designing, and translating) during the last eighteen years the course writers had gained much experience. As working tutors and senior tutors they also had had much experience regarding how students study these materials.

However, the study also demonstrates that the writers' lack of training in the instructional design field had given them insufficient opportunity to become aware of new methods and techniques of designing self-learning materials. Some course writers (4) noted that they heard the words 'instructional design' for the first time. Also, during the last eighteen years they did not have opportunities to reflect on their own work. Here in developing training activities relevant to their real problems of designing self-learning materials (as problem-based scenarios) the course writers were motivated to analyse, criticise and interpret their prior experience through this new information.

They criticised themselves. Their thoughts were different. They had discussions and arguments with their colleagues to clarify their ideas. In this way the course writers gained a deeper understanding of their design problems. The course writers noted that the problem-based scenarios reflected what they had done in developing self-materials. Tissa, Pala, Sara and Nalin's views were that the activities were mental exercises and brainstorming for them. As an example was Nalin's view as:

The second activity gave me an opportunity to understand a new learning approach. That was interested activity and I think it was brainstorming, mental activities. I understood differences between constructivist and instructivist. I realised even we discuss learner-centred but still we are in instructivist path. I felt how much this activity affect engaging us to creative thinking. I thought we have to apply this scenario method for our teacher training activities

(Nalin, Reflective journal, 12 May).

The course writers clearly showed that their learning process was active, constructive and learner-centred.

The findings of Woolfolk (1993) and Jonassen (1999) that demonstrate the effectiveness of materials using a constructivist-learning environment for students encouraged the course writers to construct their own knowledge and solve their own problems. Other researchers have also confirmed these claims (Savery & Duffy, 1996).

Evidence from the students

The out-of-school children were a disadvantaged and underprivileged group. Their experience was limited. However, the findings indicate that by providing actual learning situations (situated learning) many students could learn more effectively unless they did not have enough prior experience about their learning situation. In the real-life situations most of the students gained experiences through their own strategies (observation, inquiry and dialogue). The study also reveals that after experiencing real-life situations, most students could be engaged in tasks that promoted higher-order thinking. For example, students used charts, posters, and drawings to reflect what they learned and how they learned. They analysed and summarised the learning. The study demonstrates that where instructors (Course Writers) only guide, monitor, and give feedback and scaffolding to support learning problem-based activities promote situated learning and helped to engage learners in an active and constructive learning process.

So the study clearly shows that the more prior experience learners (course writers) have the more they are mentally very active and able to gain a deep understanding through analysing, arguing and interpreting their experience, thus constructing their own new knowledge. Educational designers should consider designing learning to link more specifically to the learners' real-world situations so that they may be able to construct their own knowledge. Also, the designer should provide more guided tasks that can promote higher-order thinking skills related to the experience gained from actual situations.

Many out-of-school programs continue to employ learning processes which are still teacher-oriented and teacher-directed (Shrestha, 1997; Rath, 2000; Nirmala, 2000). This study confirms, previous research by Jain (2001) and Mahapatra (2001) that out-of-school materials must provide balanced opportunities to increase the learner's participation in real world, learner-centred activities

Learner ownership and responsibility

The study provides evidence that real-world problem-based activities can help learners engage in learning because such activities allow learners to take ownership and responsibility for their learning. The learners here were independent problem-solvers and decision-makers.

Evidence from the course writers

The findings reveal that the course writers were willing to take more responsibility and ownership of their learning. They set their own learning goals and viewed the scenario based learning activities differently. This was new for them and at the same time an enjoyable experience for them. It is evidence for the following response of Pala:

.... I have participated in several distance education workshops but this showed us a new path. We were always discussing, even at the dining table and in the dorms until 2 am, about constructivist approach, and instructional design principles. We enjoyed while learning. There were so many Duffys, Lebows, and Jonassens among us (Pala, After awareness, 14 May).

Evidence from the students

Another significant finding of this study is that real-life problem-based learning activities have power to motivate and engage students who had previously dropped out from formal schooling in an active and constructive learning process because the learners could take ownership and responsibility for their learning and learn independently. None of these students wanted to go back to school but they wanted to learn. None of them could recall prior interesting experiences of formal learning and some did not have positive attitudes towards their teachers or their teaching. Furthermore, they felt that their teachers did not treat them well.

The study demonstrates that real-life problem-based activities were able to bring the out-of-school students back to an active learning process. While they had a variety of reasons why they gave up their formal schooling, real-life problem-based learning activities and learning processes were able to return them to the

new path of learning. Most of these students were happy to take ownership of their learning and become independent learners, as Ruwan demonstrates:

I got whatever I needed in the classroom we could not take decisions. In this method, we could make decisions. Where to go? To whom to consult? I was not afraid of anything, as I am not going to school. They did not pay much attention to what I asked” However he said he inquired repeatedly

(Asha, Evaluation report, 6 June).

By relating learning to problems that occur in real-life situations out-of-school children are motivated and actively engage in constructing knowledge that can be transferred to their real life. In this study the materials were only developed on general topics that could be useful for out-of-school children for their day-to-day life. However, compared to formal school children these students engaged in different kinds of activities and their capabilities were shown to be vastly different. Therefore, there are key issues that should be investigated such as further development of quality, development of out-of-school education programs.

Construction of knowledge rather than transmission

The study shows that real situations supported the course writers and out-of-school children to become motivated and engaged in an active and constructive learning process.

Real experience and self-preparation

Experience from the course writers

The study indicates that the course writers were more able to construct their own knowledge, to add more meaning to their professional life and to develop more meaningful learning materials. This was because they had prepared for the training program and gained practical experience. Some course writers (4) noted that gaining awareness of the training program and training materials beforehand helped them to come to the training program with many ideas. They could also contribute more during the discussions and they actively participated in the discussions.

The study finds that (due to meeting the out-of-school children,) the course writers could obtain real experience regarding the children's needs, interests, family background, schooling and current activities.. This information created a broad picture of the out-of-school children in the minds of course writers. They could use this information to link with the students they met. Three course writers stated that the children who spoke to them remained in their mind. When someone put forward a new idea, they always considered whether it would be relevant to those students. Thus, course writers were not isolated from the target group when they were conducting training or writing sample learning materials.

Thus, course writers were not isolated from the target group when they were training and writing sample learning materials. Consequently they thought that constructivism provide a better framework for course writing. As an example was Asha's view:

I gained lot of experiences from out-of-school children whom I met. While I was learning I always thought how to apply my learning to children I met. That experience helped me to develop content of the materials. I thought that a new way was opened for us to write materials. We got the feeling that constructivism was better (Asha, After practical, 16 May).

Even though the course writers did not have any prior experience in writing self-learning materials for out-of-school children, the current study shows that their experience with the learners, helped the course writers to develop effective learner-centred learning materials

This finding is important, as it represents a significant challenge for course developers. Generally, although course developers employ course writers to write learning materials after doing a needs analysis of the target group, the course writers are usually unable to develop a realistic picture of that group. The result is that materials are not successfully matched to the needs of the target group. Many researchers have pointed out this critical issue. For example, McLoughlin (1999) notes that students have been expected to fit into the system and to cope with knowledge transmission as best they can, contrary to the findings of this study that instructional materials can be designed to meet the needs of individual learners. The recommendation of the conference on Quality Issues in the Delivery Mode for Education for All, particularly in Open Basic Education (NOS, 2001) is that the writing of the materials accommodates learners' individual needs. Therefore finding of this study is important because it reveals that when the course writers engaged with the target group and gained real experience of them before writing, they could develop more meaningful learner-oriented materials accommodating individual difference.

Experience of the students

When considering the learning process of students, the study demonstrates that, due to the development of self-learning materials based on real-life situations, the students attempted to engage in guided tasks that led them to analysing, examining, and summarising their experiences as well as to gain deeper understandings and to construct knowledge that could be applied to their day-to-day lives. The study demonstrates how learning materials could be created to assist students' construction of their own knowledge. For example, the learning material "Opening a Savings Account" was developed based on an actual situation related to the post office. The students had an opportunity to learn by doing. Through inquiry, observation, discussion, filling the necessary forms and dialogues, the majority of the students understood and developed knowledge and skills relevant to opening the account and withdrawing cash..

The study also provides evidence that it is equally important to follow-up the practical activity with a guided task. After opening their accounts, the students were asked to prepare a chart and or to "teach" a friend, to explain the procedure of opening an account. This activity promoted thinking and reflection about what they learned. While they were analysing, summarising, and creating new ideas, they prepared artefacts such as a chart or poster.

These activities indicate that the students' learning was not mere rote or memorising, and was not transmitted by the instructor. The students constructed their own learning, which could be transferred to other real-world situated-learning (learning by doing) activities. The study shows that this type of material is practical and meaningful and students can be excited when they are learning what they deem relevant.

These findings are similarly significant, to those of Sharma (2001). One challenge raised by Sharma was to adopt the methods of learning by doing and learning by practical work, rather than the more abstract, less interesting traditional methods. Thus, introducing methods of curriculum transactions based upon learning by doing can meet particular challenges of teaching out-of-school children. The study shows that students can be motivated and engaged by the active learning process to gain knowledge which is important for their lives.

A significant finding of the current study is that students can be intrinsically motivated by their actual learning whereas the similar studies in India related to extrinsic motivation (puppet shows, cassettes stories, songs, games, trips and picnics)

(Rath, 2000). Although Kozma and Croninger (1992) found out that low-income students often disengage from learning because what they learn in school cannot be applied to their lives outside school, in this study the developed sample materials demonstrated how learning could be made applicable to students' real world practical situations.

Practical work to promote a deeper understanding

This study has found that by providing opportunities for the course writers to do practical work with new information they were able to put theory into practice by constructing their own knowledge, developing higher-level skills and gaining deeper understandings. Thus, the hands-on work enabled the course writers to gain greater experience and it gave them confidence to develop self-learning materials embedded in constructivist design principles.

Evidence from the course writers

In this study organising the training program was putting 'theory into practice' which helped the course writers to construct knowledge and develop skills. The study found the practical writing workshop promoted the higher-level skills of the course writers. The majority of the course writers (7) noted that the practical workshop provided an opportunity for them to apply what they had learned from the awareness workshop. Some of them stated that they could rethink and analyse the work themselves during the writing workshop. Others noted that while discussing the draft of the materials, they had an opportunity to rethink the constructivist principles that they had learned from the awareness workshop. By the end of the training workshop, most course writers believed that they were able to develop learner-centred materials including constructivist design principles.

Moreover, two course writers, Vasala and Susi, noted that they were able to evaluate whether the learning material followed the constructivist approach or not and that they could analyse specific learning material and identify embedded constructivist and instructional design principles in it.

These findings are evident in that at the end of the training program the course writers had developed higher-level skills (analysis, evaluation) and they had confidence in writing learner-centred materials based on constructivist design principles. A significant finding is that there was not only an improvement in their writing and evaluating of the materials but that they also had confidence to guide others in writing self-learning materials. Accordingly, the study has demonstrated that the course writers developed knowledge and skills that are useful for their own

real lives. Some researchers have already predicted this outcome (Jonassen, 2001; Reynolds, 1997). Reynolds (1997) notes that practical works help to promote deep understanding and increase learners' confidence and motivation for participating actively in learning. Jonassen (2001) supports this in stating that meaningful real-world tasks or simulation in some case-based or problem-based learning environments are not only better for gaining understanding but are also more consistently transferable to new situations than abstract ideas. The significant finding was that all the course writers were interested in the constructivist approach and design principles.

The study reveals that due to the construction of new knowledge and gaining a deeper understanding of their problems the course writers were changed: they could criticise themselves; their change came through themselves; they were able to see their distance materials through a constructivist eye; they were excited by their changes. As an example, Sara's view was:

If we had more days, it would have been better. We go out as new persons. We were not taught. The changes come from within us. This sort of experience was gained for the first time

(Sara, After practical, 16 May).

Another significant finding of the current study is that new knowledge contributed to the development of new attitudes in the course writers to their target group. At the end of the students' learning some course writers (4) were more compassionate about the out-of-school children whom they met. This study has shown that the course writers developed their confidence and began to think more about the education of the target group, providing evidence that the course writers gained wider and more meaningful understanding through their training. As examples Abdul and Tissa's thoughts:

Especially, it was real exercise for me. Even though I had lot of experience in displaced students I had never thought of their education. I thought this program might enlighten the lives of the OSC and it might help to introduce out-of-school children in to the society as good citizens. Because of the participation of different persons from many parts of the country, this led us to create a vast picture about out-of-school children.

(Abdul, Reflective journal, 12 May).

Many of us think that it is impossible to provide education for the out-of-school children but today I felt that if we work hard achieving the goal is not that much difficult, and the session guided me to achieve that goal and it gave me the confidence.

(Tissa, reflective journal 15 May).

The findings of this study show that course writers' new knowledge represents a challenge for the training system of the course writers in the National Institute of Education in Sri Lanka. Even though the distance learning materials have been developed by the National Institute of Education since 1982, the study shows that the instructional design field was new for the majority of the course writers. The study highlights the lack of theoretical background of the course writers engaged in development of self-learning materials and most course writers were able to identify that their modules (the present self-learning materials are used for teacher training courses) are more instructivist or teacher-centred.

An example is Susi's view:

I realised that existing modules were focused on teacher-centred instruction. I also realised that a lot of features of our modules are not suitable for a constructivist approach. I felt that the format of our module should be changed for creating constructivist learning.

(Susi, After awareness, 14 May).

Evidence from the students

The study reveals that these students had the opportunity to develop declarative, procedural and conditional knowledge. Through the learning materials this was clearly demonstrated by learning stories created by students, such as Sudath and Nadi. Sudath's learning story revealed how he developed the above three kinds of knowledge. Sudath gained information about savings accounts by observing the notice pasted on the post office and also through discussion with the postmaster. He learned rules and facts such as the requirements for opening a savings account and the requirements for the withdrawal. Then he learned the procedure for opening a savings account. Finally, he prepared a visual chart, outlining his overall learning situation. He demonstrated the learning situation as a story through dialogue and pictures. This indicated that he reflected on how he learned and what he learned. Finally, he went beyond the learning situation. He guided his friend to open an account. He could apply his knowledge to his daily life.

Accordingly, the study indicates that the sample materials developed in the constructivist approach were helpful in developing these three levels of knowledge of the students.

Self-directed skills

Another significant finding concerns the learning environment to promote self-directed learning. The study shows that the learners took ownership of the learning and responsibility for it. These learners developed their own learning strategies and constructed their own knowledge. Furthermore, the study reveals that the learning environments challenged the thinking processes of the learners and encouraged novice learners to learn.

Experience from the course writers

The study shows that dialogue was a prominent support strategy used to construct knowledge. The researcher's observation was that the course writers were more active and constructive during the group work. All were independent learners. If they had difficulty understanding they consulted the group. The researcher's observation was that there was a living-learning situation leading to creative arguments and discussions. The researcher observed that the presentation situation was really an active learning situation engaging the course writers in putting forward their ideas, questioning, arguing, explaining, and giving examples. In this way, the course writers were actively engaged in constructing knowledge.

The data revealed that experienced course writers engaged very actively in the group work and presentations, and the novice course writers were also active in group discussions and group presentations. The significant point is that group discussion and group presentations were challenging for all participants and this led the novice course writer to explore and learn more. The novice course writer Azar stated that he tried to understand the concept in the discussion rather than contribute to it. Furthermore, he noted that later he was able to clearly understand and construct knowledge through the discussions held with colleagues during the night in the hostel dorms. These late time discussions were a great benefit to novice course writers. It is also evident that the learning activities promoted self-directed skills, such as self-confidence and self-regulation.

A significant finding is that construction of meaningful knowledge for the real world is not tiring; it is enjoyable. The study has found that the friendly and favourable learning environment supported learners to learn more and to construct knowledge. Most course writers' views were that learning was enjoyed. The study reveals that even though the course writers worked from 8.30 am. to 8.30 pm. they were not tired. The new organizing approach of the training programme and new

learning approach promoted and motivated the course writers to be engaged in the learning process and the residential nature of the training workshop strongly promoted a positive and pleasant environment to support the construction of knowledge through collaboration.

As an evidence the course writer Milan's views:

This was the most successful workshop that I ever have participated in. We were not taught or directed. We gained knowledge through activities. We improved a lot.

(Milan, Reflective Journal, 14 May).

It is nice to get together with my friends in distance education. I felt that studying in a joyful environment is much more interesting and relaxing than doing it in a tiresome environment.

(Milan, Reflective Journal, 13 May).

Evidence from the students

Similarly, the students' learning processes demonstrated that they were self-directed learners; they developed their own learning strategies and engaged their own learning processes to solve their own problems. Further more the study demonstrates that instructors created the learning environment to support self-directed learning by giving ownership and responsibility to the students and taking monitoring, facilitating and co-ordinating roles.

The study indicates that in the course writers' training activities, the learning materials were developed based on students' real world problems that were not fully structured or defined. Therefore many students could set their own learning goals and gain ownership and responsibility of their learning. Students could engage themselves by developing their own learning strategies. The important point is that the same learning material was used by many students for their learning yet their learning processes and their learning strategies were different from each other. The study demonstrates that inquiry includes discussion, conversation, explaining, describing, analysing, and interpreting, which were the major learning strategies used by these students. Here, nobody directed most students to develop specific learning strategies. The students worked alone. Only two students received support in preparing their charts. The students did not expect to learn directly from the course writers and they did not perceive the course writers as didactic teachers but rather as facilitators.

In this study, the course writers did not act as knowledge-givers but as facilitators for the construction of knowledge and co-ordinators in designing friendly learning environments. The course writers visited students' homes from time to time. They had friendly conversations with students. Sometimes students were not at home so they waited until they returned home. They discussed what they learned, how they learned and what they wanted. They observed and monitored what students did. They saw the students were problem solvers, decision makers and independent learners. A significant finding is that there was a tendency for the students to continue learning, as the students were very interested in their learning and the developed materials, and some students asked to do more activities. They were interested in their course writers, too. They sometimes asked when would be the next day that they would meet.

The above finding has been predicted by many researchers (Perkins, 1992; & Jonassen et al.1999). It has been found that students need to select or develop their own learning strategies, goals and objectives and should be given much as possible of the responsibility for deciding what to learn and how to learn it (Perkins, 1992). Perkins (1992) also claims that learners must take control of their own learning otherwise they will never be able to be autonomous thinkers.

Furthermore, the study shows that students' learning situation in this study challenges the value of formal classroom learning processes. In the normal classroom there is usually no opportunity for students to develop their own learning strategies because the teacher decides the learning strategies and learning objectives prior to students' learning. However, this study revealed that the students could apply their own learning strategies and learning processes. The critical issue is that although many out-of-school learning programs are distance and open the learning processes as involved are teacher-directed. However, in this study, even though the students had been away from their formal education for a lengthy period constructed meaningful learning for their own lives using their own learning strategies. The significant example is Nadi's learning story. She constructed her own knowledge by herself with collaborative others and then she taught her father what she learned. This is beyond the learning. Vasala's view of her learning was:

Nadi learned alone. She learnt the facts she wanted to. When she could not get the information from her father, she got it from her cousin. She found her old science book and got the information. I did not help her. I only made inquiries how she was learning and guided her. Learning occurred through her own effort.

(Vasala, Evaluation report, 6 June).

These findings clearly indicate that when the students perceived something as useful for their lives they wanted to learn.

The current study has raised some very important considerations for the direction of future research in this field. This research has shown that the most important role of the instructor is to develop a friendly learning environment to promote learning. The instructor made several visits to the student's home to monitor and facilitate the student learning rather than the student visiting the teacher's place to learn. The learning situation was home-based learning, a significant change from school-based learning for these students. There were friendly learning conversations not only with students but also with their parents. The instructor provided necessary resources as well as necessary guidance. The learning occurred with more comfort in their familiar environment, which might be the reason for students being more interested, encouraged and motivated for learning. This is an important point to study further because of the nature of the target group.

The study shows that such students do not want to go back to school. They preferred to learn something useful for their life at home whenever they have free time at their own pace. Another issue for consideration in future research is the use of visiting instructors. There has been a successful attempt to engage visiting tutors to develop distance and open learning for educating out-of-school children as highlighted by Robinson (1999) in the study of an open and distance learning program in Mongolia. Learning materials were created both locally and centrally including topics relevant to learners' day-to-day life. The visiting teachers had a "travelling box" which contained various resource materials. Further research should consider the implication of using visiting tutors and the travelling box concept in distance and open learning.

Collaborative support for learning

The study has shown that collaborative learning opportunities were integral to the course writers' and students' learning processes. Furthermore, it indicates that collaborative learning provides multiple avenues for learners to learn more and gain a deeper understanding of their subjects. Collaborative learning also enhances the active engagement of teachers and students. Moreover, collaborative learning reduces isolation and increases interaction

Evidence from the course writers

The study reveals that all course writers emphasized the value of discussion in the construction of knowledge. Discussions help them to express their ideas, and thoughts as well as to analyse, rethink, organise, and reorganise their construction

of knowledge. Consequently, they gained deeper understanding. Discussions provide multiple avenues to learn, and engage the course writers on thinking more deeply in their own way.

During discussions, course writers present various perspectives of an idea. The course writers felt that their different ideas led them to contribute more to the discussions and arguments. Many course writers' noted that by working in two groups, they had an increased opportunity to discuss their ideas and consolidate them. They gained a broader picture and a deeper understanding from different perspectives. The researcher's observation was that their learning was accompanied with much noise due to their arguments, explaining, questioning, laughing and clapping. In this sense, through collaborative interaction with their colleagues, they created opportunities for better understanding.

The study shows that the discussions among the course writers in the awareness program filled their knowledge gaps, confirmed and verified their knowledge and promoted their understanding. A most significant finding is that these discussions and arguments lead to a continuing learning process.

The researcher's observations also revealed that different kinds of discussion occurred among the course writers. Accordingly, the researcher identified the following types of discussion. *Corridor-talk* took place when two course writers started a discussion in the corridor and this was joined by the other course writers who heard their discussion. *Dorms-talk* occurred at night in the hostel dorms with colleagues. *Waiting-talk* took place in the dinner room until their meals or tea were prepared, or before starting daily learning programs in the learning room. *Supper-talk* happened during free time when some course writers had discussions with the researcher. *Knower-talk* took place when some course writers gathered around the person who knew more of the subject. *Walking-talk* occurred among the course writers while two or three were walking for having tea or dinner, or going to the washroom together. *Teashop-talk* occurred among the course writers while having tea with their colleagues in the nearby teashop in the evening.

The course writers' learning process illustrated that although collaborative learning was powerful for construction of knowledge it did not happen instantaneously; it took time. In the training situation they gained new information and later they were mentally active in their experience. Then, the continuous engagement in discussions and arguments led to a deeper understanding. This indicates that the construction of meaningful learning is a long process. Because the training program was residential and ran for five days, the course writers had enough time to engage in discussion and argument to construct their knowledge gradually.

In the opinions of most of the course writers' the residential workshop provided many opportunities to learn more by clarifying their knowledge, filling knowledge gaps, solving their problems. The findings here have given greater insight to the designer in designing learning environments to allow learners to think freely, to bring them into a position for active discussion and to provide more opportunities to collaborate with others and construct knowledge through multiple perspectives. Many researchers have confirmed the importance of collaborative interaction for the learner to construct their own knowledge (Jonassen, 1991; Savery & Duffy 1996; Vygotsky, 1978). This collaborative interaction helps to form knowledge in a social context. Knowledge comes from learners through social negotiation and the evaluation of individual understanding accomplished in cooperative groups (Savery & Duffy 1995). Jonassen (1991) also finds that constructivism encourages the construction of a social context, a sense of community, and active participation in the learning process. Moreover, Vygotsky's (1978) theories demonstrate that learning is a social event where learners communicate to help each other construct meaning with collaboration.

Evidence from the students

When comparing the students' learning with the course writers' learning, the study demonstrates that the collaborative opportunities supported them in different ways. The students' learning activities demonstrated that collaborative opportunities helped to heighten their awareness of their real world and provided support for them in collecting information and resources that they needed. In other words, the collaborative learning opportunities promoted the socialisation of the students.

The experience in this study reveals that the students' parents played a crucial role in their children's learning by providing necessary resources, information and guidance. The majority of the students were encouraged by their parents or other family members in their learning. A significant finding is that even though the majority of the families were socially disadvantaged, most created a collaborative, friendly learning environment at their homes to promote their children's study.

Furthermore, the study demonstrates that parents performed different roles such as providing resources, directing students to meet the necessary persons to get information, giving some information when children wanted it, support in selecting learning materials, and maintaining a friendly relationship with the instructor (course-writer). Moreover, parents encouraged and motivated their children to learn. Accordingly, a key finding is even though parents may not be able to read, write or understand the study program properly, most are happy to encourage and support

their children's learning. The significance of home-based or work-based engagement should not be underestimated, no matter how disadvantaged the home or workplace is socially or economically. An example of Abdul's view of Rasidu's learning was:

In my 37 years in the field of education this is the first occasion when I got involved in a learning activity of this nature. I too got experience for my teacher education activities. It is my fervent hope that steps would be taken with the least possible delay to give this kind of education to all non school children who are now idling

(Abdul, Evaluation report, 6 June).

These students were able to collect information in multiple ways because the content of the learning materials was part of a wider social context. The study reveals the community as a resource pool for the students. The students met necessary persons and through inquiry, conversation, and observation they collected the information they needed. Furthermore, the study indicated the importance of peer support for the students' learning. The students who collaborated with their friends gained different types of support for their learning. Some gained peer support to collect information. Others went to see the course writer or other resource persons accompanied by a friend. A significant finding is that those friends who accompanied the students also contributed to the resulting discussion with the course writer and the students. A key point is that the learning activities made it possible for friends to be brought into the learning process.

These findings clearly show that collaborative opportunities engaged the students in a wider community which provided multiple resources to promote learning. In the out-of-school children context, these findings are significant because this student group was socially deprived. Some students demonstrated that they were shy and reluctant to talk at the beginning of their learning.

Some students selected peers to accompany them and to encourage them. Thus, socialization is an important outcome of collaborative activities.. Another important point is that the collaborative learning opportunities helped the students to develop skills which were socially important such as communication, gathering information and inquiring. Thus, collaborative learning strengthened the socialisation of the students.

The students' learning during the study showed that learning shifted from teacher-centred to learner-centred and could also be classified as community-centred. Thus, this study provides the idea that the entire community should be a stakeholder for out-of-school education learning programs. In this sense, a learner's

family, his/her neighbourhood, workplace, and peer group should all be partners in the out-of-school program. Although the current study somewhat demonstrate how family and society members can contribute, the important point is that students' workplace (employer and other members) can contribute to students' learning because much of these students' time is spent their workplace. It is important to further investigate how support from the workplace can be achieved and facilitated to contribute most effectively to students' learning.

Conclusion

The study provides significant insights into designing self-learning materials for out-of-school children and for training course writers. The constructivist theoretical approach guided the research to introduce a new path where learners are intrinsically motivated to learn and actively engaged in constructing meaningful knowledge for their real problems in collaboration with others. The findings demonstrate that learning is not necessarily tiresome, but can be enjoyable and exciting. The study concludes with a recommendation for a paradigm shift in educating out-of-school children – a shift from traditional instructional design methods to a constructivist approach.. The findings demonstrate how to bring real, collaborative, flexible, enjoyable and meaningful learning to the doorsteps of the millions of children who have discontinued their formal schooling for a variety of reasons beyond their control, and who have been sacrificing their childhood and engaging in a variety of non-educative activities financially support their families and themselves.

This study finds that successful engagement with learning is not tiring, that learning can centre on the home, and that learners can participate in real-life problem-based activities to solve their day-to-day problems. They can solve problems in a flexible, friendly and collaborative learning environment. In such a learning environment, everyone including students, parents, employers, peers, community members, and teachers can learn from each other and teach. The researcher concludes that the constructivist paradigm provides an alternative path for training course writers to construct meaningful knowledge, to apply real-life situations in their own work and, perhaps, to facilitate its extension though the education system as a whole.

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Meta Cognitive Strategies Used by Secondary School Children in the Writing Process

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Abstract

There is a growing theoretical and practical interest in the topic of metacognition: how we monitor and control our own mental processes. An important aspect of learning is using cognitive and metacognitive strategies to control and regulate students' own learning. Metacognition is a construct similar to Executive Decision Making Process of Information Processing System. Metacognition is also an aspect of Self-regulation. According to the constructivist viewpoint, the learner should have a control over his or her own learning because the responsibility is with him in sensitizing with the learning and the student needs cognitive and metacognitive knowledge and skills to do this successfully. Although as a new construct, the concept of Self-regulated learning is embraced by policy makers, teachers, educationists and parents, the research emphasis in Sri Lanka on the concept of metacognition is not grounded and its application at classroom is yet to be identified.

Metacognitive skills and strategies can be used in any subject area of school curriculum and in the thought processes of children such as attention, motivation, learning, memory, and understanding. Further, there are 'General metacognitive skills and strategies' that can be applied across different subject areas or mental processes and 'Specific metacognitive skills and strategies' that can be used in specific subject areas or mental processes. The present study focuses on a specific subject area, i.e. writing of secondary school children.

Writing is a complex activity. It also has a recursive process. The present trend of research into the writing of children focuses on the process of writing rather than on the product of writing, and on the recursive nature of writing rather than the linear nature of writing. Although Planning - Composing and Revising stages are overlapping in the writing process, they can be taken separately to facilitate description. An important time log of Writing should be focused on planning stage of writing where the goal setting occurs. Goal setting is one important aspect of good writing. During the second stage of Writing process, i.e. the Writing stage, ideas are translated into the written mode. The writer is expected to perform many

tasks during this period and due to this, writing becomes an unusually complex task. Revising which enhances the quality of an essay is a basic and important aspect of the Writing process. Professional writers set apart considerable time for Revising. Effective revising results in good writing. Many writers, however, revise little. They tend to be proof readers rather than reviewers whose role is to edit the document to suit a known audience.

Metacognition was defined, for the purpose of this study as the knowledge, awareness, and monitoring and the controlling of that knowledge and awareness, in using strategies for writing. The present research focused on the writing strategies, and 'knowledge and awareness' of children on the writing strategies and the 'monitoring, controlling, and regulating' of such 'knowledge and awareness' in the three stages of the Writing Process, namely Planning, Writing and Revising. The objectives were to identify metacognitive strategies used by secondary school children (Grades 6-10) in the three stages of Writing Process, to identify distribution patterns of metacognitive strategies used by secondary school children within 'metacognitive strands (Awareness and Regulation)' and 'metacognitive fields (Generating ideas, Goal setting, Organization, Self monitoring and Self evaluation)'; to identify the nature of their knowledge/ awareness and monitoring / regulation of metacognitive strategies and to identify whether the metacognitive strategies used differ according to the type of school (rural / urban), grade (6-10) and sex (boy / girl).

Survey research method was employed. The sample comprised of 725 children (Male 363; Female 362) of Grade 6, 7, 8, 9, and 10 from four purposively selected schools (Urban = 2; Rural = 2). A sub sample of 120 children was used to collect 408 observation notes and written exercises as classroom artifacts. They were collected from 278 Mother Tongue lessons by 12 data collectors, including the researcher. 289 interviews were conducted with the children in the sub sample focusing on their writing behaviour. Based on the data collected from the sub sample of 120 children, a questionnaire was developed to collect data from the sample of 725 students. Observation and interview data, qualitative in nature, collected from 120 children were transcribed, coded and frequencies were calculated according to the Stages of writing (Planning, Writing, Revising), Metacognitive strategy fields (Generating ideas, Goal setting, Organization, Self monitoring and Self evaluation), Metacognitive strands (Awareness and Regulation) and 72 Metacognitive strategies. Differences between proportions of frequencies were tested using z test for proportions. In the reporting of findings extracts of classroom artifacts, observations and interviews were quoted as qualitative examples. The quantitative data derived from the questionnaire, that were used to study the generalizability of patterns identified from 120 students, were analyzed using 'Hierarchical tree cluster analysis' to identify speculative patterns, 'Chi square test' to identify confirmed patterns and 'Factor analysis' to identify specific patterns.

The time period, children in the sub sample engaged in the Writing process during their Mother Tongue lessons was 60% (Rural 67%, Urban 54.5%). Grade wise percentages were 58% (Grade 6), 58% (Grade 7), 67% (Grade 8), 62% (Grade 9), and 56% (Grade 10). During the 408 observed writing activities, Planning of writing was observed in 19% of the instances (Rural 17%, Urban 21%) and Revising in 12% of the instances (Rural 5%, Urban 21%). During the Writing stage, however, children engaged in Planning in 65% of the instances and in Revising in 75% of the instances. Writing stage is dominant in the Writing Process of Grades 6 -10 students of both sexes and in rural / urban schools. Rather than been two separate stages, Planning and Revising stages are mixed with the Writing stage because children tended to plan and revise while writing.

Out of the 72 metacognitive strategies 40 were related to Planning and it was cited as being used only in 30% instances as against 48% on the strategies related to Writing stage indicating the emphasis on the Writing stage than the other two stages.

The Planning stage is dominated by explanation of the lesson by the teacher, which gives children ideas that can be used in the Writing stage. Students do not show an awareness or regulation of metacognitive strategies on Planning writing. Revising stage is dominated by mechanical and surface level changes.

The metacognitive strategies used in the Planning stage are 'awareness about the assigned writing task', 'memorizing', 'self-evaluation', 'understanding the necessity of writing', 'seeking information', 'adjusting facts in mind', and 'evaluating the need for writing'. The lesser used strategies in the Planning stage are 'summarizing basic facts', 'rewriting as facts', 'mnemonic', 'self instructional coding', 'thinking using more than two media', 'classification of basic facts, 'breaking into parts', 'keeping reports / notes', 'identification of alternative concepts', and 'adjusting the environment'. Metacognitive field of 'Goal setting' is not used for Planning. Students do not show an awareness or regulation of metacognitive strategies in metacognitive strands on Planning.

The metacognitive strategies used in the Writing stage are 'self-regulation of writing', 'activating cognitive processes about writing', 'showing awareness on present cognitive and emotional status in the writing process' and 'self-monitoring of progress'. Least used metacognitive strategy is 'adjusting the beginning, middle and end aspects of writing activity while facing external influences'.

A mechanical and surface level Revising style can be identified among students. Deep level changes are not found. The only metacognitive strategy used in Revising stage is 'checking the product of writing'. Least used metacognitive strategies for revising are 'summarizing / paraphrasing', 'seeing his / her own written work as a

reader', 'predicting new incidents', 'recreating expected meaning' and 'taking necessary steps to add extra information'.

According to theories of Writing, 'knowledge telling process', rather than 'knowledge transformation process' can be found in the writing process of secondary school children.

Metacognitive strategies used by students, their awareness of those and the way they regulated them do not differ according to rural schools and urban schools. Writing characteristics of Grade 6 children are distanced from Grade 7, 8, 9, and 10. Hence the Sculpture Style of Grade 6 students changed to an Engineering style in Grade 10. There is no significant difference between girls and boys on ideas of Revising stage. However there is a tendency towards a boy - girl dichotomy with regard to using Metacognitive strategies in the Writing process. Girls emphasize the Planning stage than boys and boys emphasize the Writing stage than girls

The study suggests the need for training on metacognitive strategies for students and teachers, and inclusion of metacognitive strategies in teacher guides and textbooks. The emphasis placed on product of writing has to be changed to an emphasis on process of writing at the classroom level teaching learning process.

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ISSN 1391-1881