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# **2<sup>nd</sup> International Research Symposium 2022**

*Digital Transformation and Best Practices in  
Mitigating Challenges in Education*

## **Symposium Proceedings**



**Faculty of Education, University of Colombo  
Sri Lanka**

**25<sup>th</sup> November 2022**

**2<sup>nd</sup> International Research Symposium - 2022**

***Digital Transformation and Best Practices in  
Mitigating Challenges in Education***

# Symposium Proceedings



Faculty of Education, University of Colombo  
Sri Lanka

25<sup>th</sup> November 2022

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Digital Transformation and Best Practices in Mitigating Challenges in Education  
Symposium Proceedings  
2<sup>nd</sup> International Research Symposium - 2022  
Faculty of Education, University of Colombo.

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*To be a center of excellence in scholarship, teaching and research in education, committed to serve humanity*

### MISSION

*To facilitate the development of a committed professional educator with relevant knowledge, favorable attitudes and useful skills for teaching, research and service to the nation.*



**2<sup>nd</sup> International Research Symposium – 2022**  
**Faculty of Education, University of Colombo**

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## 2<sup>nd</sup> International Research Symposium – 2022

Faculty of Education, University of Colombo

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## 2<sup>nd</sup> International Research Symposium – 2022

Faculty of Education, University of Colombo

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		<i>Mr. P.K.J.E. Nonis</i>



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## Message from the Vice Chancellor



*It gives me great pleasure in issuing this message to the proceedings of the Second International Research Symposium 2022 of the Faculty of Education University of Colombo. This year's theme of the International Research symposium is "Digital transformation and best practices in mitigating challenges in education" which is very significant to all those who are involved in teaching and Learning.*

*In this context, I am very happy to have the Keynote speaker Professor Indika Liyanage, of the Beijing Normal University, Hong Kong, Baptist University, United International College (UIC) in China and Dr. George R.S. Weir, of the University of Strathclyde, Glasgow, United Kingdom.*

*While expressing my gratitude to the Keynote speakers Professor Liyanage, and Dr. Weir, for accepting our invitation to deliver the keynote address, I congratulate the presenters who will present their valuable findings on research conducted in the field of Education.*

*I convey my wishes for the Second International Research Symposium Sessions 2022 of the Faculty of Education to be successful.*

**Senior Professor H.D. Karunaratne**

**Vice Chancellor**

**University of Colombo**

## Message from the Dean



*It gives me great pleasure to send this message on the Annual Research Symposium - 2022 of the University of Colombo. The Faculty of Education actively contributed towards this vital annual academic event by holding its 2<sup>nd</sup> International Research Symposium - EDIRS 2022 on 25<sup>th</sup> November 2022 under the theme of Digital transformation and best practices in mitigating challenges in Education. Two eminent scholars from University of Strathclyde, Glasgow, UK and Beijing Normal University, China delivered keynote speeches on this theme this year.*

*Innovations and new scientific knowledge pertaining to digital transformation are highly required for the field of education in Sri Lanka to address the unresolved issues and to thrive forward with the emerging challenges. The findings of more than 35 research studies which were conducted by the researchers of various educational institute in Sri Lanka as well as other countries of the world are disseminated in this Symposium. I strongly believe that this Symposium will be a forum of creating a novel discourse on educational research. Also, it would contribute to close the gap in the field of educational research by increasing the enthusiasm towards research among the young researchers in Sri Lanka.*

*I take this opportunity to extend my sincere gratitude to the chair and co-chair of the Annual Research Symposium- 2022 of the Faculty of Education, and all those who contributed towards the success of this event to make it a reality. I congratulate all the presenters and wish them success in their future endeavours. Finally, I convey my best wishes for a successful Annual Research Symposium in 2022.*

**Dr. L.M. Kapila Bandara**

**Dean,  
Faculty of Education**

## Message from the Symposium Chair



The second International Research Symposium of the Faculty of Education (EDIRS - 2022) will be held on 25<sup>th</sup> November 2022 at the Faculty of Education, University of Colombo via Zoom conferencing providing a platform to researchers of education-related disciplines to disseminate their findings, knowledge exchange and knowledge creation towards the development of education in Sri Lanka.

The theme of this International Research symposium is “Digital transformation and best practices in mitigating challenges in education”, a timely theme to expand our insight into the research culture.

I am thankful to the Vice Chancellor Senior Professor H.D. Karunaratne for accepting to be the Chief Guest of EDIRS 2022. My thanks go to the Keynote speakers Professor Indika Liyanage, Beijing Normal University, Hong Kong, Baptist University, United International College (UIC) in China and Dr. George R.S. Weir, University of Strathclyde, Glasgow, United Kingdom.

I am thankful to Dr. Kapila Bandara, Dean of the Faculty of Education for the guidance and support extended to make this event a success. I had an excellent team to organize the Symposium 2022 and I thank them sincerely. Especially I extend my heartfelt gratitude to Ms. Jeevani Herath, the Co-chair of the Symposium and Dr. Lanka Wedikandage, the Secretary of the Symposium, for their support.

Finally, I would like to congratulate all paper presenters and wish them the very best in their future endeavors

**Dr. S.S. Dahanayake**

**Symposium Chair,**

**Faculty of Education,**

**International Research Symposium -2022**

## INTRODUCTION TO THE KEYNOTE SPEAKER - 1

### **Professor Indika Liyanage**

*Indika Liyanage (Ph.D) is Professor of English language and literature studies at Beijing Normal University-Hong Kong Baptist University United International College (UIC), Zhuhai, China, and an honorary at Deakin University, Australia. Professor Liyanage's research and publications address issues relating to teaching of English to speakers of other languages (TESOL) and English language teacher education.*



*He has strong established institutional and research connections that have achieved sustained socio-economic benefits for disadvantaged communities. Throughout his career he has aimed to empower students as knowledge-makers by engaging them in research and scholarly dialogue, and has been a doctoral (PhD) supervisor for many years. He has worked as an International Consultant on TESOL in the Pacific and is currently the Series Editor for Springer International's Multilingual Education Yearbook.*

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### KEYNOTE ABSTRACT

## **Digital transformation and best practices in mitigating challenges in education: Transforming practice through teacher learning**

**Indika Liyanage**

*Beijing Normal University-Hong Kong Baptist University United International College(UIC),  
Zhuhai, China*

Technology is reshaping the organisational fabric of universities. This transformation of the processes of communication, recruitment, administration, teaching, and research is framed by a parallel transformation – that of education as a competitive market-oriented global industry. The digital revolution has not only facilitated the internationalisation of higher education, but it has also seen digital flexibility, responsiveness and innovation emerge as key determiners of institutional competitiveness in this market, and as benchmarks of performance. Change can also be unexpected and disruptive, and the recent/ongoing pandemic has brought into sharp relief both the limitations of more traditional models of higher education and the opportunities afforded by digital technologies.

Amidst these changes, the challenges facing the core business of higher education, teaching and learning, are many, and harnessing the opportunities of digital transformation requires a corresponding transformation of teaching practices. As educators, we know the importance of



learning; and to navigate the challenges of the educational landscape we face and achieve best practice, it is imperative that individuals and institutions devote time and resources to the complex business of teacher learning.

The key to transformational teacher learning begins with understanding this complexity as an entangled process of recursive learning/practice inseparable from the complex world of a multiplicity of interactions with others, and with contexts both physical and non-physical - political, discursive, cultural, historical, and material. Learning/practice is a negotiated and collective activity, not an individual activity, and likewise agency is not exercised by the learner/practitioner alone, but distributed, not necessarily equally, among participants and throughout the context. To meet the challenges of digital transformation, institutions must pursue best practice through development and enactment of models of teacher learning based on this complexity of learning/practice as a dynamic, emergent activity that develops and transforms in unique, recursive relations with a multiplicity of factors.

## INTRODUCTION TO THE KEYNOTE SPEAKER - 2

### **Dr. George R. S. Weir**

Dr. George R S Weir is a lecturer in Computer Science at the University of Strathclyde, where he has taught for over twenty years. He holds degrees in philosophy from the University of Glasgow and the University of Edinburgh. His academic research has focused mainly on Cybercrime, Security, Digital Forensics, Corpus Linguistics and Readability, and he has published extensively on these topics. He is General Chair for the Cyberforensics conference, held annually in the UK, and has research links to institutions in Australia, Canada, Japan and Sri Lanka.



He is General Chair for the Cyberforensics conference, held annually in the UK, and has research links to institutions in Australia, Canada, Japan and Sri Lanka.

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## KEYNOTE ABSTRACT

### **A Story of Textual Analysis**

**George R.S. Weir**

*Department of Computer and Information Sciences,  
University of Strathclyde, Glasgow, UK*

This is a personal tale of a computer scientist encountering and engaging with Applied Linguistics, a study area adjacent to the author's main field of teaching and research. The adopted strategy was to seek and develop techniques to explore the scope and potential for academic research and collaboration in that unfamiliar area. This initially took the form of search for suitable analytical tools, followed by relevant software development. Based upon emerging insights, textual analysis was adopted as a viable and valuable approach, with application to English language textbook analysis, readability measurement, steganography, management of explicit language, and techniques for corpus linguistics. Subsequent combining of quantitative analytical techniques with supervised machine learning exposed multiple application areas, including Extremist Web content, Web/Dark Web & Social media analysis and similar approaches in the context of Arabic textual content. An extensive publications list is testament to the value of such cross-fertilisation and the moral of this tale is that a broad research focus can enhance perspective and research potential. This case study reflects a belief that boundaries between subject disciplines are ultimately artificial. Interest in seemingly orthogonal subject areas, including engagement with academics native to otherwise alien disciplines, can generate significant research opportunities.

## Technical Sessions

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### Panel 01 – Theme: Language Education

<b>Venue:</b> ELH 2			
<b>Session Chair:</b> Professor (Emeritus) Marie Perera			
<b>Session Coordinator:</b> Dr. E. Sulochana Neranjani			
<b>Technical Support:</b> Ms. Imesha Kinkini, Ms. Indunika Gunadasa			
Presentations			
No.	Title	Author/s	Presentation Time
EDIRS 02	Interest of Teachers Towards Professional Responsibility Who Teach Tamil as First Language	A. Paunanthie, T. Kalamany	1.00 pm – 1.20 pm
EDIRS 27	The Effectiveness of Online Learning of English Language in Sri Lanka	W.I. Darshika	1.20 pm – 1.40 pm
EDIRS 13	Students’ Use of Translanguaging and Pedagogical Implications in an EMI Institution in China	M. Prado, K. Choi	1.40 pm – 2.00 pm
EDIRS 06	Impact of Flipped Learning on Student’s- Academic Achievement, Engagement, Critical Thinking Skills, Motivation, and Perception: A Review of Relevant Literature	P.D. Kharsati, B.B. Kharbiryumbai	2.00 pm – 2.20 pm
EDIRS 03	Influential Factors in Interest of Teachers who Teach Tamil as First Language Towards Professional Responsibility	A. Paunanthie, T. Kalamany	2.20 pm – 2.40 pm
EDIRS 31	ICT and English Language Teachers: Reflection on Continuing Professional Learning Needs	S. Hidayati	2.40 pm– 3.00 pm

## Panel 02 – Theme: Science and Mathematics Education

<b>Venue:</b> ELH 3			
<b>Session Chair:</b> Professor W. Chandradasa			
<b>Session Coordinator:</b> Dr. Kumudu Senevirathne			
<b>Technical Support:</b> Ms. Aunurudhika Siriwardana, Mr. N.S.N. Dias			
<b>Presentations</b>			
No.	Title	Author/s	Presentation Time
EDIRS 24	Domain Factors Affecting Learning and Teaching Process of Mathematics of Type II Schools in the Jaffna District	V. Balamurali, S. Athirathan	1.00pm – 1.20pm
EDIRS 29	Contribution of Educational Technology in Teaching and Learning of Agriculture Science	Y. Raveendran, J. Rasanayakam	1.20pm – 1.40pm
EDIRS 15	Perception Towards the Use of ICT in Mathematics Learning (A Study Based on Selected Secondary Schools of Jaffna District)	N. Ampihaipahan E. Y. Charles T. Kalamany	1.40pm – 2.00pm
EDIRS 16	Students’ Performance in Van Hiele Levels of Geometrical Thinking in Secondary Schools in Jaffna	N. Prashanthan, P.K.J.E. Nonis	2.00pm – 2.20pm
EDIRS 18	Mathematics Teachers’ Perceptions in Creating Online Learning Environment During the COVID-19 Pandemic Period	R. Vijayatheepan	2.20pm – 2.40pm
EDIRS 30	Teacher Self-efficacy in Teaching Electronics in Grade 11 Science Curriculum in Sri Lanka	N.V.D.P. Priyadarshani, D.V.K.P. Seneviratne	2.40pm – 3.00pm
EDIRS 09	A Study on the Relationship between Written Examination Marks and Practical Test Marks Obtained by Students for Engineering Technology Subject in the G.C.E. Advanced Level Examination	J.W.R. Jayalath	3.00pm– 3.20pm

## Panel 03 – Theme: Educational Management and Administration

<b>Venue:</b> MLH 1			
<b>Session Chair:</b> Professor Iresha Lakshman			
<b>Session Coordinator:</b> Dr. H.M. Lalitha Kumari			
<b>Technical Support:</b> Mr. P. Sivananthan, Ms. Maheshika Dayananda			
<b>Presentations</b>			
No.	Title	Author/s	Presentation Time
EDIRS 05	Quantity vs. Quality of Participation: Stakeholder Perceptions about School Based Participatory Decision Making in Sri Lanka	C.P.W. Malepathirana	1.00pm - 1.20pm
EDIRS 17	Challenges Facing the Teacher Professional Development Centre in the Implementation of the Efficiency Bar Examination Programme for Teachers	P. Sivananthan	1.20pm - 1.40pm
EDIRS 20	Participation of Stakeholders in Programme for School Improvement in Developing Reopened Schools	S. P. Pihillegedara, H.M.L. Kumari	1.40pm - 2.00pm
EDIRS 25	School Based Management and National Competency Framework for School Leadership and Management of Sri Lanka: A Comparative Perspective on Consistency in Policy and Practice in terms of Accountability	V. Vijayabskar, L.M.K. Bandara	2.00pm - 2.20pm
EDIRS 33	Relationship between the Principal’s Demographical Characteristics and Students’ Academic Achievement in Secondary Schools of Jaffna District	K. Manimarrphan	2.20pm - 2.40pm

## Panel 04 – Theme: Technology Education

<b>Venue:</b> MLH 2			
<b>Session Chair:</b> Dr. T. Kalamani			
<b>Session Coordinator:</b> Mr. Jude Nonis			
<b>Technical Support:</b> Ms. Dulani Priyadarshani, Mr. Ishan de Silva			
<b>Presentations</b>			
<b>No.</b>	<b>Title</b>	<b>Author/s</b>	<b>Presentation Time</b>
EDIRS 08	Developing Essential Learning Skills in First Key Stage Students Through Online Education	I. Perukanda, S.S. Dahanayake	1.00pm – 1.20pm
EDIRS 11	The Challenges Experienced by Students in Self-regulated Learning in Online Teaching Learning Environment	K.W. Ekanayake	1.20pm – 1.40pm
EDIRS 23	L2 Learning via SNSs: A Study of Learner Engagement in a Closed Facebook Group	U. Rathnasena	1.40pm – 2.00pm
EDIRS 22	Inclusive Education, Implementation and its Impact on the Self-concept of the Students with Special Educational Needs: A Review of Literature.	R.A.B.U.I. Perera, W. Chandradasa	2.00pm – 2.20pm
EDIRS 28	Teachers Perceptions and Awareness on STEM Related Activities of Primary Environment Related Activity Curricula in Sri Lanka	W.M.C.K. Basnayake, W.A.P. De Silva, W.D. Chandrasena, G. Kodituwakku	2.20pm – 2.40pm
EDIRS 12	Access to and Use of Career Guidance and Counseling Services by Female Students in Secondary Schools in Sri Lanka (A Study Based on the Badulla District, Welimada Educational Zone)	L.A.M.H.P. Udayakumari	2.40pm – 3.00pm
EDIRS 26	Application of the Student-led Classroom Technique for Third-year Bachelor of Technology (BTech) Undergraduates: A Study on a Small Classroom	W.D.C.C. Wijerathne, R.L. Samaraweera	3.00pm- 3.20pm

## Panel 05 – Theme: Humanities and Social Science Education

<b>Venue:</b> MLH 3			
<b>Session Chair:</b> Professor Thusitha Kumara			
<b>Session Coordinator:</b> Dr. S.S. Dahanayake			
<b>Technical Support:</b> Ms. Udeshini Perera, Ms. Wasantha Kumari			
<b>Presentations</b>			
No.	Title	Author/s	Presentation Time
EDIRS 14	Investigating the Comprehensiveness of Sexuality Education Curriculum in Sri Lanka	M.P.S.A. Jayantha, C. Chandrakumara	1.00pm – 1.20pm
EDIRS 01	Problems Arising due to Teacher Shortage and Teachers Transfer among the Government Schools	A. Paunanthie	1.20pm – 1.40pm
EDIRS 19	Background Factors Influencing the Lower Academic Achievement of Grade 8 Students of Northern Province in National Level Assessment Conducted by National Education Research and Evaluation Centre (NEREC	S. Athirathan	1.40pm – 2.00pm
EDIRS 10	A Shift with a Twist: Transforming Experiences of Teaching and Learning Music Online	K. Samarasinghe, R. Nethsinghe	2.00pm – 2.20pm
EDIRS 07	Factors Affecting the Activity Based Learning (ABL) of G.C.E. Advanced Level Students to Promote Sustainable Development Goals: A Critical Review	H.D.A. Seneviratne, D.V.K.P. Seneviratne	2.20pm – 2.40pm
EDIRS 04	An Investigation of Opportunities to Develop Soft Skills in the NCOE Primary Education Curriculum	B.L.J.W.C. Wijenayake, S.S. Dahanayake	2.40pm – 3.00pm
EDIRS 32	Problems and Challenges Experienced by Home Science Teachers in Sri Lanka	R. Vimalkumar	3.00pm- 3.20pm

## PROGRAMME

9.00 am - 9.30 am	Registration
9.30 am - 9.40 am	Inauguration of the EDIRS 2022 <i>Digital transformation and best practices in mitigating challenges in education</i>
9.40 am - 9.45 am	Pooja Dance
9.45 am - 9.55 am	Welcome Address by the Dean of the Faculty of Education <i>Dr. Kapila Bandara</i>
9.55 am - 10.00 am	Introduction to the Chief Guest – <i>Dr. Lanka Wedikandage</i>
10.00 am - 10.15 am	Address by the Vice Chancellor of University of Colombo <i>Senior Professor H.D. Karunaratne</i>
10.15 am - 10.20 am	Introduction to the Keynote Speaker 1 – <i>Professor Lakshman Wedikkarage</i>
10.20 am - 11.00 am	Keynote Address 1 <b>Digital transformation and best practices in mitigating challenges in education: Transforming practice through teacher learning</b> <i>Professor Indika Liyanage</i> <i>Beijing Normal University-Hong Kong Baptist University</i> <i>United International College (UIC), Zhuhai, China</i>
11.00 am - 11.05 am	Introduction to the Keynote Speaker 2 – <i>Ms. Jeevani Herath</i>
11.05 am - 11.45 am	Keynote Address 2 <b>A Story of Textual Analysis</b> <i>Dr. George R. S. Weir</i> <i>Department of Computer and Information Sciences,</i> <i>University of Strathclyde, Glasgow, UK</i>
11.45 am - 11.55 am	Vote of thanks - Chair – EDIRS 2022 <i>Dr. S.S. Dahanayake</i>
11.55 am - 12.30 pm	Break
12.30 pm - 3.30 pm	Technical Sessions
3.30pm – 4.00 pm	Tea break and conclusion





## **Perception Towards the Use of ICT in Mathematics Learning** **(A Study Based on Selected Secondary Schools of Jaffna District)**

**N. Ampihaipahan<sup>1</sup>, E.Y. Charles<sup>2</sup> T. Kalamany<sup>3</sup>**

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### **Abstract**

The use of ICT has enabled teachers to facilitate teaching more effectively and enhanced learning among students. This study explores the perception of the Jaffna district mathematics teachers towards the use of ICT for teaching mathematics as the main objective. This objective would be attained under the sub-objectives of investigating the perception of the teachers on the need of ICT for mathematics teaching and the influence of ICT Knowledge and Trainings obtained towards mathematics teaching. The study considered seven factors, namely, the use of general ICT, lesson plan, use of mathematics-related ICT tools, less dependent on textbooks, integration of ICT into the teaching of mathematics, organization of classroom activities and readiness to meet various needs of students. A questionnaire was prepared and administrated to 100 teachers of ICT facilitated government secondary schools teaching mathematics to grade 11 students. Before providing the questionnaire, the participants were provided with information on how ICT can be used effectively to teach mathematics by way of video clips and verbal explanations. The study used statistical measures including mean, standard deviation, correlation and regression to analyse the responses. The results showed that 70.1% of the teachers have positively responded to the importance of using ICT in mathematics learning. The study identified that the regression model well fit with  $R = 61.1\%$  (.611) and found that all the identified seven factors are positively influencing mathematics teaching and learning. The study recommends that teachers should be motivated towards finding a link between their training and knowledge through ICT-based teaching models which encourage the use of ICT in mathematics teaching. The study identified that a lack of technical support and familiarity with ICT is the prominent factor hindering teachers' readiness and confidence in using ICT during lessons.

**Keywords:** Education, teaching mathematics, ICT for teaching

## **Introduction**

Life without the knowledge of mathematics would have been very difficult as mathematics is an important subject for the aspiration of scientific and technological development. No nation in the world has ever developed technologically without putting mathematics in the appropriate position.

Information and Communication Technology (ICT) is becoming more available in many schools nationwide and as such it is increasingly important that teachers should be familiar and comfortable with new uses of ICT. To help meet the constant challenge of motivating students to learn, teachers must change their traditional roles to become facilitators of learning in different dimensions of activities. They need to teach in computer laboratories where students are provided with hands-on experience with 21st-century skills. Sri Lanka has taken steps to integrate ICT education into the school education curricula since 2006 and ICT in secondary schools curricula since 2003. This manuscript describes the research study, titled The perception towards the use of ICT among teachers and students. The study offers invaluable information to school administration as well as to policymakers in education as to the nature of the contribution of ICT to the teaching-learning process. Since the attitude and perceptions of immediate stakeholders are critical to how effectively and innovatively implemented, the measure shows how teachers perceive this innovation and its usefulness as a tool for enhanced teaching and learning.

## **Objectives**

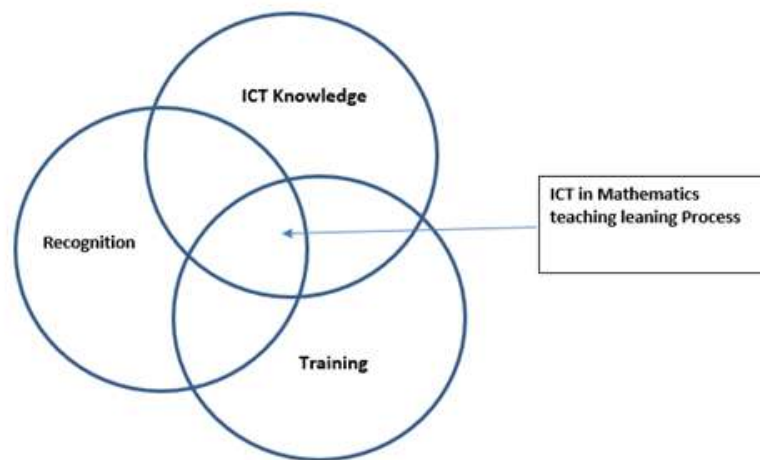
This research study focuses on identifying the perception of the Jaffna district mathematics teachers towards the use of ICT for teaching mathematics. This objective is examined under two sub-objectives:

1. Identify the perception of teachers on the need of ICT in teaching mathematics
2. Evaluate the influence of the mathematics teachers' ICT Knowledge and the capacity of training obtained on using ICT for teaching mathematics

## **Literature Review**

In education, literature shows that ICT is effective in addressing educational needs (Skryabin et al. 2015). This has increased the research on the causal and relational/associations between ICTs and education attainment. ICT can be incorporated into mathematics teaching in various

ways. For example, students can use a range of portable devices to collect data and manipulate it using spreadsheets for work in numeracy. Some portable equipment also enables the study of mathematics to move out of the classroom and to incorporate fieldwork investigations (Moseley and Higgins 1999). According to Chevallard, praxeology consists of several sets of tasks, techniques (to perform these tasks), technologies, and a theory that justifies these technologies. In addition, schools articulate the didactic and the pedagogical, mediated by the teacher as a facilitator. Based on the literature survey, the study identified a conceptual framework as shown in the Figure 1.



**Figure 1.** Conceptual Framework for the Study

This study focuses on three independent areas namely recognition (how much the teachers recognise the need for ICT in mathematics education), knowledge (mathematics teachers' knowledge of ICT) and training (ICT training received by the teachers).

## **Methodology**

This study was performed as survey research which collected the data for analysis through a questionnaire. This quantitative study selected mathematics teachers from ICT-facilitated schools in Jaffna as the study population.

The questionnaire consisted of several parts each targeting the key areas of the study. Part - A collect the demographic details of the participants. Part - B record of the respondents' perception towards the need for ICT for Mathematics education. Part - C collect the details regarding the participants' ICT knowledge. Another part records the training received by the respondents in ICT-related areas.

The researcher has identified/prepared various video content on the use of ICT for mathematics teaching and demonstrated these details to the respondents along with various other software applications.

### **Population**

The study was carried out in the Jaffna District of Northern province in Sri Lanka. The population of this study constituted all the teachers who were teaching mathematics in grade 11 of Government schools of the Jaffna district in the academic year 2021.

**Table 1**

*Study Sample*

<b>Education Zone</b>	<b>Total No. of Schools</b>	<b>Selected No. of Schools</b>	<b>Total No. of Teachers</b>	<b>Selected No. of Teachers</b>
Jaffna	70	59	125	92
Valikamam	68	59	106	80
Vadamaradchi	47	32	110	86
Thenmaradchi	35	32	54	48
Islands	36	32	31	28

### **Data Collection**

The questionnaires were administrated to 100 mathematics teachers in secondary schools of Jaffna district as per the identified study sample. The observation method was also used to collect the primary data. There are 20 respondents to the questionnaire who submitted answers partly. The rest of the participants responded completely.

### **Data Analysis**

The data from the completed questionnaires were recorded and each item was numerically coded and analysed using SPSS-16. Descriptive analysis approaches including means, standard deviation, correlation and regression were used to analyse the collected data.

### **Result and Discussion**

The socioeconomic characteristics of the teachers were analysed based on the collected details. Out of the total participants, 48% of teachers were female and 52% were male. Among the respondents, 2% of the teachers were in the age group below 25 years and 22% of teachers were in the age group above 50 years. 36% of the teachers have more than 20 years of service

experience. Based on the responses, 49% of the teachers have only G.C.E (A/L) qualifications. But they have professional qualifications such as specially trained mathematics or a National diploma in teaching. All the teachers have professional qualifications at different levels.

**Objective 1: Identify the perception of teachers on the need of ICT in teaching mathematics**

**Table 2**

*Teachers' Perception Towards the Use of ICT as a Pedagogical Tool*

Teachers' Perception		Mean	Std. Deviation
1.	Using ICT makes me more effective in teaching mathematics	4.11	.650
2.	Lesson plans are richer with information from internet	4.16	.615
3.	Using ICT tools in teaching mathematics can make it more attractive to students	4.23	.664
4.	I would like to rely less upon textbooks	2.96	.963
5.	I would like to integrate more ICT into my teaching of mathematics	4.02	.666
6.	I would like to change the way I organize classroom activities	3.91	.726
7.	I would like to be better able to meet the varying needs of students	4.50	.560

(Source: Teachers' Questionnaire)

Part B of the Teachers' questionnaire which consisted of 12 questions was analyzed to know the teachers' perception of Mathematics regarding the use of ICT as a pedagogical tool in teaching mathematics. It can be found from the summary of part B that 60% of the teachers agree and 26% of the teachers strongly agree that using ICT makes them more effective in teaching mathematics. Only one per cent of the teachers disagree with the use of ICT. According to table 2, the mean value of 4.11 shows most of the teachers agree that ICT makes them more effective in teaching mathematics. The mean value for statement lesson plans that are richer with information from the internet is 4.16 and using ICT tools in teaching mathematics can make it more attractive to students is 4.23. This highlights that the teachers have a positive attitude towards ICT integration in mathematics teaching. But most of them (33%) won't like to rely less upon textbooks. Only 5% of the teachers would like to rely less upon textbooks. Table 3 express that mathematics teacher has a positive perception of the use of ICT as a pedagogical tool.

**Overall teacher’s Perception of integrating ICT tools in teaching and learning mathematics.**

**Table 3**

*Teacher’s Perception of Integrating ICT Tools*

<b>Teachers’ Perception</b>		<b>Mean</b>	<b>Std. Deviation</b>
1.	I am able to plan Mathematics lessons effectively using Excel (time) tables and reminders from the mobile phones.	3.73	.802
2.	I am able to teach Mathematics effectively using materials from the internet	3.83	.792
3.	I can cover Mathematics syllabus within the time given with help of computer integrated system	3.31	.837
4.	I am able to organize teaching resources in order using computer organizer	3.56	.845
5.	I am able to effectively evaluate Mathematics performance of students through Microsoft excel	3.86	.841

(Source: Teachers’ Questionnaire)

According to this analysis of the responses, less than 6.3% of the respondents disagree with the integration of ICT tools in teaching and learning mathematics. 70.1% of the respondents agree or strongly agree with the integration of ICT tools in teaching & learning mathematics. Table 3 also clearly expresses the level of teachers’ perception towards integrating ICT tools in teaching and learning mathematics. Only one per cent of the respondents showed a low level of agreement to use ICT tools in teaching and learning mathematics.

**Table 4**

*Teachers’ Rotated Matrices for Part B of Teachers’ Questionnaire*

		<b>Frequency</b>	<b>Percent</b>	<b>Valid Percent</b>	<b>Cumulative Percent</b>
Valid	Low	1	1.0	1.0	1.0
	Middle	26	26.0	26.0	27.0
	High	73	73.0	73.0	100.0
	Total	100	100.0	100.0	

(low 12-30, middle 30-40, high 42-60)

According table 4: to the rotated matrices 73.0% of the respondents highly appreciate that ICT tools in teaching and learning of mathematics and agree that they are very useful for efficient teaching-learning process. Table 5 shows the gender-based teachers’ perceptions. Almost male teachers show a highly positive perception towards using ICT tools in teaching mathematics than female teachers. All the factors have a significant difference. Factor analysis was done to identify the factor that mostly influences teachers’ perception towards ICT integration in teaching mathematics.

**Table 5**

*Group Statistics for Teachers’ Knowledge on ICT Tools in Teaching & Learning of Mathematics*

	Group Statistics						
	Gender	N	Mean	Std. Deviation	Std. Error Mean	t-value	Sig. Level
I am able to plan Mathematics lessons effectively using Excel timetables and reminders from the mobile phones.	Male	52	3.85	.849	.118	46.497	.000
	Female	48	3.60	.736	.106		
I am able to teach Mathematics effectively using materials from the internet	Male	52	3.81	.715	.099	48.354	.000
	Female	48	3.85	.875	.126		
I can cover Mathematics syllabus within the time given with help of computers integrated system	Male	52	3.33	.901	.125	39.536	.000
	Female	48	3.29	.771	.111		
I am able to organize teaching resources in order using computer organizer	Male	52	3.65	.883	.122	42.145	.000
	Female	48	3.46	.798	.115		
I am able to effectively evaluate Mathematics performance of students through Microsoft excel	Male	52	3.90	.774	.107	45.891	.000
	Female	48	3.81	.915	.132		

Based on KMO and Bartlett's Test, seven questions related to teacher’s perception were factor analyzed using principal components analysis with varimax rotation KMO was 0.730 and was above the commonly recommended value of 0.50, which means the sample size is sufficient. Bartlett's Test of Sphericity was significant ( $\chi^2(21) = 172.238, p < 0.001$ ), which means that there is enough correlation for factor analysis.



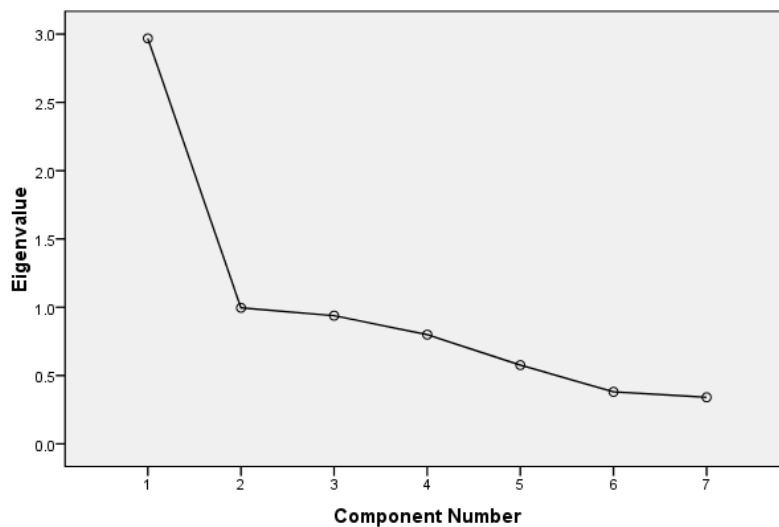
**Table 6**

*Total Variance Explained for Seven Factors*

Component	Total Variance Explained					
	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.969	42.411	42.411	2.969	42.411	42.411
2	.996	14.225	56.636			
3	.938	13.404	70.040			
4	.800	11.422	81.462			
5	.576	8.233	89.695			
6	.381	5.437	95.133			
7	.341	4.867	100.000			

Extraction Method: Principal Component Analysis

In this case, there are seven factors in total. Percentage of Variance tells how much of the variance in the dataset can be explained by each other. In the table, the factors are arranged in descending order of the variance. The first factor accounts for a relatively large proportion of the variance compared to the latter factors. Using both the scree plot and eigenvalues > 1 to determine the underlying components, the analysis yielded one factor explaining a total of 42.4% of the variance in the data. The Scree plot curve helps to extract the factors from all the factors. Figure 2 shows the scree plot graph.



**Figure 2.** Scree Plot

Correlation between the component 1 and each of the selected factors are at a low level (Table-7) so that all the factors are considered in the regression analysis.

**Table 7**

*Component Score Coefficient Matrix*

	Component 1
1. Using ICT makes me more effective in teaching mathematics	.235
2. Lesson plans are richer with information from the internet.	.206
3. Using ICT tools in teaching mathematics can make it more attractive to students.	.259
4. I would like to rely less upon textbooks.	.172
5. I would like to integrate more ICT into my teaching of mathematics.	.263
6. I would like to change the way I organize classroom activities.	.212
7. I would like to be better able to meet the varying needs of students.	.169

Extraction Method: Principal Component Analysis.  
Rotation Method: Varimax with Kaiser Normalization.

**Table 8**

*Model Summary*

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.611 <sup>a</sup>	.373	.326	.659

Since the R-value is greater than 0.5, and the difference between R Square and Adjusted R Square value is not higher, the multiple regression model is well fit and  $p < 0.01$  reveals that the model is significant.

**Table 9**

*ANOVA Table*

ANOVA <sup>b</sup>					
Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	23.782	7	3.397	7.828	.000 <sup>a</sup>
Residual	39.928	92	.434		
Total	63.710	99			

b. Dependent Variable: usage of ICT in mathematics teaching

**Table 10**

*Multiple Regression*

		Coefficients <sup>a</sup>				
Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-1.107	.691		-1.603	.112
	Using ICT makes me more effective in teaching mathematics	.154	.135	.125	1.144	.256
	Lesson plans are richer with information from internet.	.244	.132	.187	1.848	.068
	Using ICT tools in teaching mathematics can make it more attractive to student	-.079	.136	-.065	-.579	.564
	I would like to rely less upon textbooks.	.070	.075	.084	.934	.353
	I would like to integrate more ICT into my teaching of mathematics	.001	.133	.001	.008	.994
	I would like to change the way I organize classroom activities.	.334	.113	.302	2.958	.004
	I would like to be better able to meet the varying needs of students.	.445	.135	.310	3.289	.001

a. Dependent Variable: perception towards the use of ICT in mathematics learning

The regression equation shows that for six factors the increase and for one factor the decrease in perception towards the use of ICT in mathematics learning.

***Objective two: Evaluate the influence of the mathematics teachers' ICT Knowledge and the capacity of training obtained on using ICT for teaching mathematics***

Group statistics for teachers' knowledge of ICT tools in teaching & learning mathematics

### **KMO and Bartlett's Test**

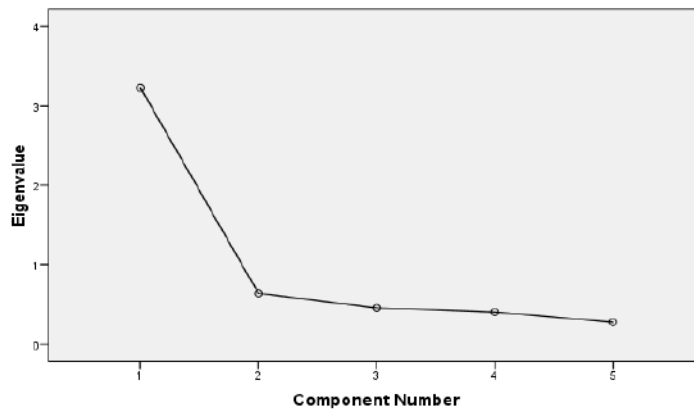
As the KMO Measure of Sampling Adequacy was 0.831, the sample size is sufficient. Bartlett's Test of Sphericity was significant ( $\chi^2 (10) = 218.088, p < 0.001$ ), which means that enough correlation for factor analysis.

**Table 11**

*KMO and Bartlett's Test*

Component	Total Variance Explained					
	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.228	64.568	64.568	3.228	64.568	64.568
2	.637	12.740	77.308			
3	.455	9.106	86.414			
4	.402	8.045	94.458			
5	.277	5.542	100.000			

Extraction Method: Principal Component Analysis



**Figure 3.** Scree plot

### **Component Matrix**

In this case, there are five factors in total. Percentage of Variance tells how much of the variance in the dataset can be explained by each other. Here the factors are arranged in descending order of the variance. The first factor accounts for a relatively large proportion of the variance compared to the latter factors. Using both the scree plot and eigenvalues  $> 1$  to determine the underlying components, the analysis yielded one factor explaining a total of 64.568% of the variance in the data. The Scree plot curve helps to extract the factors from all the factors.

### **Conclusion**

The socio-economic characteristics of the teachers show that 99% of teachers have A/L or bachelor's degree (BSc.) as their educational qualification. In addition, all of the teachers have professional qualification. Male teachers show a highly positive perception towards using ICT tools in teaching mathematics than female teachers. 73.0% of the respondents highly appreciate the use of ICT tools in teaching and learning mathematics. The regression equation shows all the seven recognizing factors confirm that ICT makes the teacher more effective in teaching mathematics. The study recommends that teachers should be motivated towards finding a link between their training and knowledge through ICT-based teaching models which encourage the use of ICT in mathematics teaching. The model is well fit with  $R= 61.1\%$  (.611) where respondents have more than average knowledge of ICT. But it was identified that they have issues with the use of ICT in mathematics teaching. The study identified that a lack of technical

support and familiarity with ICT are the prominent factors hindering teachers' readiness and confidence in using ICT during lessons.

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## **Background Factors Influencing the Lower Academic Achievement of Grade 8 Students of Northern Province in National Level Assessments Conducted by National Education Research and Evaluation Centre (NEREC)**

**S. Athirathan**

*Department of Social Science Education, University of Colombo, Sri Lanka.*

### **Abstract**

Assessments related to educational planning and development are essential. The importance of proper assessment is felt today. These are essential for new changes and fixing backlogs. In Sri Lanka, the National Educational Research and Evaluation Center at the Faculty of Education of the University of Colombo conducted national level assessment tests in 2012, 2014 and 2016 to evaluate the academic performance of grade 08 students. In these tests the performance of Northern Province was found to be at a very low level. In this background this study was undertaken with the aim of identifying the reasons for underachievement in the Northern Province. A mixed method study was carried out following a descriptive quantitative research design. 200 students, their parents, 100 teachers and 25 principals were selected from Kilinochchi e, Tunukai, Vavunia North education zones using random sampling method from the target population. The information obtained through questionnaires and interviews were analyzed using descriptive statistics. It was found that students scored less than 40 marks in math 52, 25%, Science 65% and English 81%, This trend is also observed in performances of the GCE O/L Examination. Moderate use of communication devices, parental indifference, lack of parent-school involvement, occupation of parent, family income, fewer restrictions found in schools, moderate resource shortage in schools were identified as important factors influencing the low achievement. It was found that there is a moderate correlation between household income and private expenditure on education, positive correlation between private expenditure on education and educational attainment, and parents' educational level and parent's involvement also has impact on students' academic achievement. Teacher-student interactions have significant relationship. Further there was lack of teacher-student interaction, lack of quality inputs for learning, lack of, modern technical equipment, classrooms that cannot use modern communication devices, shortages in computer lab resource and maintenance. These are the factors that have a strong impact on learning and teaching activities

**Keywords:** NEREC, achievement test, Northern Province, low achievement

## **Introduction**

National Education Research and Evaluation Centre (NEREC) of the Faculty of Education, University of Colombo carry out National Assessment of students in grade 04 and grade 08 with the financial and technical support of the World Bank. Among these assessments especially the assessment of students in grade 08 aim to make appropriate curriculum revision and changes in the teaching process at secondary level. NEREC conducted evaluation studies in the years 2012, 2014, and 2016 in grade 08 and differences were found in provincial, zonal and school levels. Achievement of schools in Northern Province has drawn attention because the education zones in the Northern Province showed relatively lower achievement level than the other schools. And their averages were also lower than the national average. Schools in Northern Province have shown lower standards in the G.C.E O/L performance. It is noteworthy that the education zones in Jaffna district were excellent in the earlier period. Despite thirty years of internal conflict and Northern as a province that directly experienced internal conflict and migration, its' performance at national level was at a satisfactory level. However, the evaluation studies carried out after the internal war showed that their performance were low. In the above background the present study was carried out with the aim of identifying factors influencing the low achievement of students in grade 08 in the Northern Province.

## **Background to the Study**

Northern Province was affected by 30 years civil war. Northern Province in Sri Lanka, exhibited the best learning outcomes before the long term internal conflict and has seen at a level in the recent times. Since 2009 the war has been ended. Northern Province was under the control of the Government of Sri Lanka for more than a decade. During this period, like other provinces, government of Sri Lanka has taken action to improve the quality of education in the Northern Province. According to Research Reports of National Education Research and Evaluation Centre (NEREC) and the reports published by the Department of Examination of Sri Lanka, academic achievement of students of Northern Province has been decreasing.



**Table 1**

*Achievement in Math in the NEREC Studies the Year of 2012, 2014, 2016*

Province	2012		2014		2016		Average Mean	Rank
	Mean	Rank	Mean	Rank	Mean	Rank		
Southern	54.74	2	53.66	1	55.63	1	54.67	1
Northern	50.79	6	46.05	8	47.02	7	47.95	8
All Island	51.44		50.87		51.11		51.14	

*Source: NEREC, 2012, 2014 & 2016*

**Table 2**

*Performance of School Candidates in GCE (O/L) Examination by Province*

Province	Year					
	2015	2016	2017	2018	2019	2020
Western	72.67	72.92	74.58	76.67	76.00	76.59
Southern	75.21	76.66	79.41	80.42	78.31	81.85
Northern	60.38	60.66	66.12	69.99	67.74	72.49
Island	69.33	69.94	73.05	75.09	73.84	76.59

*Source: Department of Examination, Sri Lanka, 2020*

Table 1 indicate the performance of students in Mathematics. Northern Province is at a very low level, and the Northern Province was ranked 06<sup>th</sup>, 08<sup>th</sup> and 07<sup>th</sup> respectively in the years 2012, 2014 and 2016 in comparison with other provinces.

In relation to G.C.E O/L examination held in 2020, the students who sat for 06 or more subjects from the Northern Province, about 2.9% failed in all the subjects (Department of Examinations, 2022). When compare with other provinces in Si Lanka the highest number of students failed in the Northern Province having completed 06 and above subjects and qualified for G.C.E A/L 76.59% nationally. It was 72.76 in Northern Province (Department of Examinations, 2020) and Kilinochchi and Mullaitivu District were 69.27% and 72.01% respectively. In terms of qualified students for G.C.E A/L Northern province has been in the end position for the last 06 years from 2015 to 2020.

## **Objectives of the Study**

1. Explain the trend in Academic achievement of grade 08 students in the Northern Province based on the National Level Assessment conducted by NEREC.
2. Identify the Socio- Economic and Psychosocial factors on student's achievement
3. Identify School Related Factors which had influence in Lower Academic Achievement
4. Suggest measures to minimize the negative effect of the background factors

## **Methodology**

This study adopted the descriptive survey method. Data for this study were collected through questionnaire, interviews, and focus group discussions, because quantitative and qualitative information have been obtained through such tools, and mixed method is suitable for analyzing and explaining such data and information. Population of the study was students who study in Grades 11-13 in the schools of Kilinochchi, Thunukai and Vavuniya North zones of Northern Province of Sri Lanka and their parents, teachers and principals. In this study, 200 students studying in grades 11, 12 and 13 have been selected from 25 schools using stratified sampling technique. 100 teachers who taught them and 25 principals from the above three zones too were selected. Questionnaires, interviews, observations and focus group discussions were used to collect data for the study. Questionnaires for students, and their parents, and teacher, interviews with principals and assistant principals and Focus group discussion with teachers were administered. Quantitative and qualitative data obtained through questionnaires, interviews and focus group discussions were analyzed in a direct and comprehensive manner. In that way descriptive and statistical analysis has been employed and interpreted. SPSS 16, MS Excel software were used for the purpose of data analysis.

## **Findings of the Study**

### ***Findings of first objective***

Northern Province Mathematics average achievement is very low (less than 50), and its provincial wise rank is eighth out of nine in the assessment test conducted by NEREC, Northern Province Science average achievement is also very low (less than 38), and the rank is ninth out

of nine in the assessment test conducted by NEREC, Northern Province English average achievement is also very low (less than 32) and eighth rank out of nine in the assessment test conducted by NEREC. Students scored less than 40 marks in math 52.25%, Science 65% and English 81%, NEREC Findings were reflected in the GEC O/L Examination performance.

### ***Findings of second objective***

The private education expenditure of the upper income group is five times more than the lower income group. Moderate use of communication devices, Parental indifference, lack of Parent-school involvement, occupation of parents, family income, fewer restrictions found in schools, moderate resource shortage in schools were identified as crucial factors influencing low achievement. It was found that there is a moderate correlation between household income and private expenditure on education, and there is a positive correlation between private expenditure on education and educational attainment, parent's occupation and prenatal School involvement influencing students academic achievement, parents Educational level and parent's involvement also impact on students' academic achievement. Teacher-student interactions have meaningful relationship. Further, there was lack of teacher-students interaction

### ***Findings of the third objective***

Lack of quality inputs for learning, lack of modern technical equipment, classrooms that cannot use modern communication devices, shortage of Computer lab resource and maintenance, were factors that had a strong impact on learning activities. Learning and teaching activities for students were boring and less effective. Among the factors related to teachers, more than 50 percent of the teachers were inexperienced in using modern technological equipment and modern teaching methods, and volunteer teachers were inexperienced in the subject matter. Also, teachers visiting from distant places were tired and distance travel affected the quality of teaching. Teachers taking many days of leave too have affected the learning but the teachers made the students more attentive and advanced their teaching. They adopted special approaches towards teaching backward students and followed less strategies to motivate them.

## **Conclusions**

This study was conducted with the aim of identifying the factors influencing the continuous decline in Northern Province in the national level. Through this study, the influence of social

political and social psychological and school factors influencing the low achievement of Northern schools were identified. By implementing systematic and organized measures, the impact of these factors can reduce and promote the performance of Northern Province schools to a higher level and identify specific measures for effective implementation of curriculum, especially in type 2 schools. Professionalization of volunteer teachers, monitoring of learning teaching process. Developing positive attitudes about national and international assessment tests among teachers and students, etc. too can be promoted.

### **Way Forward**

This study was carried out with the aim of finding out the reasons for the low performance in the Northern Province, especially in Kilinochchi, Tunukai and Vavuniya North Education Zones, by identifying the reasons for this status in the North Region, solutions can be formulated. The results of the NEREC studies at national level and the G.C.E O/L Examination results highlighted poor situation in the Northern Province Therefore the educational administration can take appropriate steps to improve the performance based on this study. It is possible by paying extra attention to the physical, human and psychological aspects related to teaching and learning

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## **Domain Factors Affecting Learning and Teaching Process of Mathematics of Type II Schools in the Jaffna District**

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### **Abstract**

The teaching - learning process is one of the various factors that influence student achievement. Schools and teachers both face various challenges as part of the process. The challenges mentioned above are one of the reasons why learning and teaching activities are ineffective. Mathematics is an essential subject in the secondary school curriculum in Sri Lanka. Unfortunately, the student achievement level in Mathematics is not satisfactory in type II schools in Jaffna District. So far, there have been no studies on the learning and teaching process of Mathematics in type II schools in the Jaffna district. The purpose of this study is to examine the opinions of students concerning the elements that affect the learning and teaching process of Mathematics in secondary schools in the Jaffna district. Survey research design and quantitative dominant mixed method were adopted to conduct the research. 30 schools were selected as the sample using the Systematic Sampling technique from 83 type II schools with G.C.E Ordinary Level in Jaffna, Valikamam, and Thenmarachchi education zones. Focus group discussions with selected students were implemented. Data were collected by questionnaire from 341 senior secondary students who were selected by stratified random sampling technique. The data were analyzed by factor analysis. The results revealed that the domain factors which affect learning and teaching process of Mathematics are 1) Teacher's and students' roles and attitudes, 2) students' personal background, and 3) external aid and support.

**Keywords:** Type II schools, teaching mathematics, Jaffna schools

## Background

A country's development depends on quality education (Madani, 2019). The quality of education depends on the quality of teaching staff, the governance of educational institutions, the willingness of students to learn, and the quality assurance of services. Teachers are essential for implementing educational policies and classroom objectives (George, Victoria & Monica, 2018). The five critical aspects of quality education are determined by what learners bring, the environment in which they learn, the subject material they study, the processes they go through, and the results they achieve (UNICEF, 2002). The focus of education on quality is on the input, namely, the amount of material and teacher time allocated per pupil, and how well the school organizes and manages these inputs to raise each pupil's achievement (Ministry of education, 2006).

Quality education is difficult to provide to all children in South Asia. In many places, learning methods are teacher-centric (UNICEF, 2014). Issues with education in Sri Lanka include teacher-centered to student-centered pedagogies, exam-oriented competition and pressure, mastering skills, and neglect of secondary education (Brinkmann, 2017).

Teachers across the world are moving towards more inquiry-based, experiential, and constructivist methods. In Sri Lanka, however, the transmission and transaction functions of education are diminishing in favor of a textbook culture (National Education Commission, 2017). Even though exam-focused instruction is still prominent in classrooms, the results have been poor. A significant number of students fail the O/L exam after 11 years of schooling. Even those with adequate basic skills are unable to fulfil the demands of the workplace, and there are also issues with discipline (National Education Commission, 2016).

The Jaffna district has less proportion between the number of students and the number of teachers in type II schools than Sri Lanka as a whole.

**Table 1**

*Gross Student-Teacher Ratio by Type of School-2017*

	Type 1AB	Type 1C	Type II	Type III	Overall student/ teacher ratio
Sri Lanka	21	17	13	18	17
Jaffna district	16	12	9	14	13

Source: Ministry of Education, 2017

Consequently, the schools in the Jaffna district should achieve better results than schools in other parts of Sri Lanka. However, the reality is otherwise.

**Table 2**

*Percentage of Qualified for A/L*

	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
Sri Lanka	66.67	69.02	69.33	69.94	73.05	75.09
Jaffna District	66.57	64.43	62.59	61.98	67.77	71.76

Source: Department of Examination, 2018

**Table 3**

*Percentage of Students Who Fail in All Subjects (Appeared for 6 or more subjects) in the O/L Examination*

	<b>2013</b>	<b>2014</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
Sri Lanka	3.57	3.17	3.18	3.11	2.46	2.00
Jaffna District	2.35	3.95	4.96	4.66	3.69	2.83

Source: Department of Examination, 2018

**Table 4**

*Analysis of Mathematics of O/L Examination of Jaffna District*

<b>Year</b>	<b>2015</b>	<b>2016</b>	<b>2017</b>	<b>2018</b>
Number of students who wrote the exam	9769	9429	9171	8487
Number of students who got fail in Mathematics	4281	3808	3465	2772

(Source: Department of Examination, 2015, 2016, 2017, and 2018)

According to National Education Commission (2016) classroom in reality; since the learning and teaching process is not student-centered and activity-oriented, students do not receive adequate instruction and are not fully developed. The process becomes dull and lifeless. Some teachers' malicious attitudes result in students and teachers being socially distant.

According to the NEREC (2016) study on grade 8 students, the performance of type II and 1C schools in Sri Lanka is lower than the performance of type III and 1AB schools. According to

the research unit of Northern Province (2017) inadequate learning and teaching processes are a problem in 20% of type II schools in the Northern Province. It is evident that the achievement of students belongs to type II schools in the Jaffna district due to ineffective learning and teaching processes.

According to National Education Commission (2016) 20 percent of teachers in government schools lack professional qualifications in teaching. According to the National Committee for formulating new act on general education (2009), teaching methods used in teaching are boring to some students. As some teachers are using ineffective methods in teaching more students show a lack of interest in learning.

Schools and teachers face various challenges in achieving the expected level of students' performance in final examinations in the subject of Mathematics. Learning and teaching activities are ineffective in terms of the outcomes of the school process. As a result, the student achievement level is not satisfactory (Ministry of Education Northern Province, 2014). Though the background factors that have been identified by previous studies that have an impact on the teaching and learning process are found to be satisfactory. Then the question emerges why the process of learning and teaching in the schools are ineffective. This context leads to the need for the study into this problem.

## **Objective**

To identify the factors affecting learning and teaching process of Mathematics.

## **Research Design/Materials and Methods**

When quantitative and qualitative research methods or the mixed method is used together in research, it helps researchers understand the research in depth and clarity, minimize the weaknesses of each method, and ensure reliability through triangulation of data (Wilson, 2009). The quantitative dominant mixed method was used in this study to identify the factors affecting learning and teaching process of Mathematics employing survey questionnaire and focus group discussion in line with the principle of triangulation.

30 schools were selected as the sample using the Systematic Sampling technique from 83 type II schools with G.C.E Ordinary level in Jaffna, Valikamam, and Thenmarachchi Education zones. Data were collected by questionnaire from 341 senior secondary students who were selected by stratified random sampling technique. A total of six schools from each of the three



educational zones were selected for a focus group discussion with students. Focus group discussions for students were conducted separately in each of these six schools. Five students from Grade 10 and five students from Grade 11 including both male and female students from each of the selected schools, were randomly selected for the discussion. The data were analyzed by Factor analysis using SPSS-25.

## **Results/Findings**

### *Measure of Kaiser-Meyer-Olkin (KMO) and Bartlett's Test*

**Table 5**

*KMO and Bartlett's Test*

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Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.942
Bartlett's Test of Sphericity	Approx. Chi-Square	3406.465
	df	153
	Sig.	.000

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Kaiser-Meyer-Olkin Measure is an index that defines sampling adequacy. The KMO test value is 0.942, which can be considered acceptable and valid to conduct the data reduction technique.

Bartlett's Test of Sphericity helps a researcher to decide, whether the result of factor analysis is worth considering and whether we should continue analysis of the research work. Bartlett's Test of Sphericity is significant to a level of significance less than 0.001 which shows that there is a high level of correlation between variables, which makes it adequate to apply factor analysis.

**Communalities**

**Table 6**

*Communalities*

Communalities		
	Initial	Extraction
Psychological Environment	1.000	.610
Teacher's Attitude	1.000	.665
Teacher-Student Relationship	1.000	.518
Student's Self-Motivation	1.000	.518
Private Tuition	1.000	.550
Friends Or Relations	1.000	.527
Other Organizations	1.000	.740
Teacher's Motivation	1.000	.620
Managing the lesson and classroom	1.000	.649
Effective Communication	1.000	.715
Teacher's Knowledge	1.000	.758
Teaching Process	1.000	.755
Usage Of Teaching Aids	1.000	.396
Student Knowledge and Skills	1.000	.525
Student Attitude	1.000	.620
Student preparation for learning	1.000	.631
The motivation of School's Management	1.000	.544
Family Background	1.000	.624

Extraction Method: Principal Component Analysis.

Every variable in the communality initially is expected to share 100% variance. Hence initially every item has value 1.00 which means 100% variance is shared by each item. The extraction value is ranging from 0.396 to 0.758 which shows that the minimum variance share of item after extraction is 39.6% and the maximum variance share of item is 75.8%.

According to this analysis, the factor usage of teaching aids contributed 39.6%. This factor contributes less than 50 % and was removed and reanalyzed.

**Table 7**

*Communalities*

Communalities		
	Initial	Extraction
Psychological Environment	1.000	.612
Teacher's Attitude	1.000	.667
Teacher-Student Relationship	1.000	.517
Student's Self-Motivation	1.000	.531
Private Tuition	1.000	.555
Friends Or Relations	1.000	.520
Other Organizations	1.000	.741
Teacher's Motivation	1.000	.623
Managing the lesson and classroom	1.000	.650
Effective Communication	1.000	.715
Teacher's Knowledge	1.000	.760
Teaching Process	1.000	.748
Students' Knowledge and Skills	1.000	.526
Students' Attitude	1.000	.627
Student preparation for learning	1.000	.642
Motivation of School Management	1.000	.544
Family Background	1.000	.637

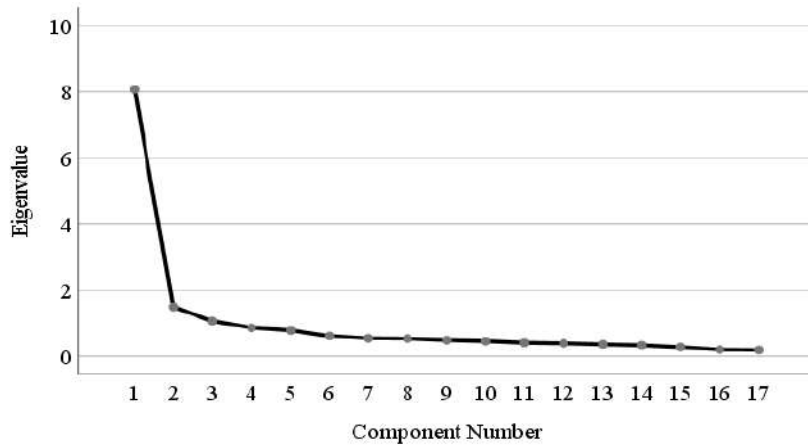
Extraction Method: Principal Component Analysis.

Every variable in the communality initially is expected to share 100% variance. Hence initially every item has value 1.00 which means 100% variance is shared by each item. The extraction value is ranging from 0.517 to 0.760 which shows that the minimum variance share of item after extraction is 51.7% and the maximum variance share of item is 76.0%.

According to this analysis, all the factors contributed more than 50% and all the factors were subjected to subsequent analysis.

### Total Variance Explained

The total variance contributed by the first component is 47.488, by the second component 8.697, and by the third component 6.245.



**Figure 1.** Scree Plot

The Scree plots show the components on the x-axis and the corresponding Eigenvalues on the Y-axis. The first three components are considered whose Eigenvalues are 8.073, 1.478, and 1.062. Since all these three factors have an Eigenvalue greater than 1 and share maximum variance, they are essential in the present study.

### Rotated Component Matrix<sup>a</sup>

**Table 8**

*Rotated Component Matrix<sup>a</sup>*

	Rotated Component Matrix <sup>a</sup>		
	Component		
	1	2	3
Teacher's Knowledge	.850		
Teacher's Effective Communication	.837		
Teaching Process	.830		
Teacher's Attitude	.810		
Managing the lesson and classroom	.783		
Psychological Environment	.757		

Rotated Component Matrix <sup>a</sup>			
	Component		
	1	2	3
Teacher's Motivation	.754		
Teacher-Student Relationship	.702		
Students' Attitude	.633		
Students' preparation for learning	.579	.462	
Motivation of School Management	.524	.514	
Student's Self-Motivation	.477	.426	
Private Tuition		.726	
Friends or Relations		.698	
Family Background		.676	
Students' Knowledge and Skills		.455	.428
Other Organizations			.854

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.<sup>a</sup>

a. Rotation converged in 5 iterations.

The following three factors were identified as the domain factors contributing 62.431% to the learning and teaching process of mathematics out of the 18 factors subjected to factor analysis. They are, (1) teachers' and students' roles and attitudes, (2) students' personal background, and (3) external aids. Table 1.8 illustrates the sub factors categorized under each domain factors affecting Learning-Teaching process of mathematics of senior Secondary students in the type II schools in the Jaffna District.

**Table 9**

*Domain Factors Influencing Learning-Teaching Process of Mathematics of Secondary Students in the Jaffna District*

No.	Domain Factors	Components
1	Teacher's and Students' roles and Attitudes	I. Teacher's Knowledge II. Teacher's Effective Communication III. Teaching Process IV. Teacher's Attitude V. Managing the lesson and classroom VI. Classroom psychological environment VII. Teacher's Motivation VIII. Teacher-Student Relationship IX. Students' Attitude X. Students' Preparation for Learning XI. Students' Self-Motivation XII. Motivation of School Management
2	Students' personal background	I. Private tuition II. Friends or relations III. Family Background IV. Students' Knowledge and Skills
3	External aids and support	I. Other Organizations

### **Recommendations**

Based on the findings of this study, it is suggested to improve the learning and teaching process of Mathematics in terms of the identified domain factors. Mathematics teachers must be co-learners so that they could update and develop their professional knowledge and skills. They also need to develop a positive attitude of improving their professional capacity to suit the needs of the students and Mathematics learning and teaching. The learning and teaching process of Mathematics should be carried out efficiently to achieve the expected outcomes, teachers and school management should motivate students appropriately to make them

willingly engaged in learning. Mathematics teachers should maintain rapport with students, the home environment of students should be organized in such a way that students can willingly engage in self-learning, and the cooperation of social institutions and organizations should be obtained to carry out the learning and teaching process of mathematics more effectively in schools.

This study will have a significant contribution to upgrade the learning and teaching process of Mathematics. It could be also used as initial work for those who are interested in conducting further studies in this area.

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## **Teachers' Perceptions and Awareness on STEM Related Activities of Primary Environment Related Activity Curricula in Sri Lanka**

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### **Abstract**

STEM is the integration of the skills and knowledge about Science, Technology, Engineering and Mathematics. STEM education is considered imperative for economic growth and scientific advancement. It plays a dynamic role for the expansion of social life. The STEM educational concept determines understanding of nature properly. Teachers' demographical factors are affecting teachers' perception and awareness about STEM education in primary level. However, there is a dearth of studies in this discipline in Sri Lankan context. Thus, this study examined teachers' perceptions and awareness of STEM activities in Environment Related Activity (ERA) curricula. Teachers' questionnaire was used to collect quantitative data. Eight nine primary teachers responded to the questionnaire. Convenience sampling techniques were used. According to the results teachers' perceptions and awareness ( $p>0.05$ ) were not affected by their demographics. Approximately 84.7% primary teachers were professionally qualified while 33% of them were qualified with G.C.E (A/L) qualification along with teacher training. Around 33% primary teachers teaching experiences were lower than five years. Results also indicate that teacher awareness and perceptions about STEM related activities in ERA curricula are considerably high. Flora and fauna, water and garden themes consisted more STEM activities. These themes in the curricula can be further improved with more STEM activities. Further, teachers are trained well on primary level STEM curricula. Hence, the above aspects are recommended to be considered in promoting STEM related activities to empower students' meaningful learning in primary level.

**Keywords:** Perceptions, awareness, primary teachers, STEM

## **Introduction**

Science, Technology, Engineering and Mathematics (STEM) literacy is an imperative component in the concept of 21<sup>st</sup>-century skills. STEM is the integration of Science, Technology, Engineering and Mathematics disciplines. STEM is not a novel phenomenon for existing education system in Sri Lanka.

STEM is a new way to reach students. It is not an entirely new phenomenon. This new approach will enable students to be responsible for their own learning. To achieve new goal perfecting pedagogy is necessary for educators to manage classroom and deliver effectively. Focus on in-service programs and provision of specific training for subject knowledge, pedagogy and classroom management to teacher's current needs is a great importance.

At primary level, basic science is taught in grades 1 and 2 (key stage 1), grades 3 and 4 (key stage 2) and grade 5 (keystage 3) as a component part of an integrated 'Environment Related Activities (ERA)' curriculum. Six hours a week are devoted to ERA. All primary subjects including science are taught in the mother tongue. The ERA syllabus is based on 16 themes. Activity-based teaching is employed to a fair extent and Science is successfully taught in primary schools. However, higher percentages of science based activities are STEM related. Students are able to get hands on experience and have the opportunity to learn in collaboration with peers. Teachers are guided by a Teacher's Instructional Manual (TIM) prepared by the National Institute of Education (NIE). Competencies that must be acquired and content learnt under each theme are described in the TIM together with activities necessary to understand the concepts. However, the balance of teachers' perception and awareness necessary to acquire a specific competency is not explicitly stated in the syllabus. More emphasis is placed on teaching content.

STEM education prepares all students for the challenges and opportunities in the 21st century economy. STEM literacy should relate both the goals of national economic growth and development of the individual students acquiring knowledge, perceptions and awareness to identify real world problems through an understanding of characteristic features of STEM subjects. A great challenge for teachers in STEM subjects is to design classroom activities that integrate four subjects in their teaching in both a meaningful and relevant way. Qualified teachers are essential to STEM teaching and professional development is a great need to cultivate knowledge content as well as pedagogy that ensures active participation in classroom

activities by learners. Teachers need to be actively involved in the changing process of STEM education and update training programmes.

Primary teachers should have perceptions, and awareness to teach STEM education connected to the daily lives of their learners. All forms of STEM experiences such as school based activities and out of school activities like workplace visits play a vital role in successful education programmes. It is important that teacher education focuses on producing teachers capable of dealing with STEM in their future classroom teaching and learning. STEM for future teachers in developing programs that will connect to all discipline with school based and life based scenarios. There is an increasing trend to prepare STEM focused schools and competent STEM teachers. Future teachers need to understand STEM for building confidence in teaching STEM which is integrated and connected to the real world.

High quality specialist teachers to teach in primary schools and question on understanding focused on attracting high achievers to teaching including STEM in teacher preparation, professional development and leadership in primary schools. Teachers' perception and awareness related to STEM helps develop creativity and innovation among children. However they have positive intentions to teach STEM. Further they would be committed in their future teaching as they consider STEM related issues important for life. Teachers' perception and awareness are more vital to succeed STEM related activities in primary level. This study examined teachers' perceptions and awareness of STEM activities in ERA curricula. However, there is a dearth of studies in this discipline in Sri Lankan context. These aspects are going to be recognizing primary teachers' perceptions and awareness about STEM education in primary level.

## **Research Aim, Objectives and Research Questions**

### **Research Aim**

To investigate primary teachers' perception and awareness about STEM related activities in Environment Related Activity curricula in primary level.

### **Research Objectives**

1. To investigate Primary teachers' perceptions and awareness about teaching STEM related activities in primary level.

2. To make suggestion to enhance teachers' perceptions and awareness about STEM related activities in ERA curricula.

## **Methodology**

### **Method**

Quantitative method was used to conduct research.

### **Data Collection**

#### **Procedure**

In this research, teachers' questionnaire was used to collect data. Google form was developed. Responses of questionnaire were analysed using SPSS software. 20 items were categorised into teacher perceptions and awareness about ERA curricula and STEM content in ERA curricula. The responses were related to what their perception and awareness while teaching STEM related activity in ERA curricula and future practices.

#### **Sampling**

Hundred primary teachers were selected to response questionnaire through goggle form. Teachers' were represented different schools in Sri Lanka. Purposive sampling techniques were used to select sample. Eight nine primary teachers were responded to questionnaire out of hundred teachers.

#### **Instrumentation**

The instrument contained twenty items on perceptions and awareness on a 4 point likert scale (1 strongly disagree to 4 strongly agree) and there were descriptive questions.

#### **Data Analysis**

Quantitative data were analysed through SPSS 22.0 and Ms Excel.

## Results and Discussion

This study examined the perception and awareness to teach STEM activities in ERA curricula using questionnaire each on 4-point Likert scale. These aspects are recognizing primary teachers' perception and awareness about STEM education in primary level.

### Cronbach's Alpha

Cronbach's alpha is a measure of internal consistency and reliability which is how clearly related a set of items are as a group. Reliability is the degrees to which the result of measurement, calculation or specification can be depended on to be accurate Alpha Coefficient were ranged between 0.924 and 0.952.

**Table 1**

*Cronbach's Alpha Value for Teachers' Perception and Awareness*

<b>Factor</b>	<b>Cronbach's Alpha</b>
Perceptions	0.924
Awareness	0,952

The above Cronbach's alpha value show high degree of reliability of the instrument used.

### **1. Investigate Primary teachers' perceptions and awareness about teaching STEM related activities in primary level.**

**Table 2**

*Primary Teachers' Perception on Teaching STEM Related Activities in ERA Curricular*

<b>No</b>	<b>Perceptions Items</b>	<b>Percentage of Strongly agreed teachers</b>	<b>Percentage of partially agreed teachers</b>	<b>Percentage of partially disagreed teachers</b>	<b>Percentage of Strongly disagreed teachers</b>
1	I think my education is sufficient to teach ERA curriculum in the primary level.	36.97	54.31	8.72	
2	I think my education is sufficient to teach STEM content in ERA curriculum. (Ex: water, plant, animal).	30.03	60.83	9.14	

No	Perceptions Items	Percentage of Strongly agreed teachers	Percentage of partially agreed teachers	Percentage of partially disagreed teachers	Percentage of Strongly disagreed teachers
3	I think I can prepare lesson plan to deliver STEM related content in ERA curriculum effectively	19.14	66.11	14.75	
4	I think I can prepare ERA STEM activities effectively.	20.38	64.96	14.66	
5	I think STEM content in ERA curriculum is important to improve students' critical thinking.	30.30	67.52	2.18	
6	I think STEM content in ERA curriculum is important to improve students 'creativity.	34.58	61.25	4.17	
7	I think STEM content in ERA curriculum is important to improve students 'motivation to learn science and technology.	38.95	61.05		
8	STEM content in ERA curriculum is important to improve students' hands on experience	19.35	74.08	6.57	
9	Students are very interesting to learn STEM content in ERA curriculum.	78.31	21.16	0.53	
10	Students will be motivated to learn STEM in future.	75.48	15.08	9.44	

The table depicts that higher percentage of primary teachers' were partially agreed with teachers' perceptions related in items 1 to 8. Approximately, percentages of these items were over 50. A few percentage of partially disagreeing teachers were in item1 to 8. Item 9 and item 10, higher percentage of primary teachers' were strongly agreed with statements. It depicts that, teachers' perceptions about engagement of students' of STEM related activity in ERA curricula are favourable where approximately 75% of teachers' were strongly agree with these

statements. It depicts that primary teachers' perceptions were favourable. Teachers' perception regarding STEM related activities in ERA curricula are most vital to succeed in teaching and learning STEM at the primary level. Therefore, according to the above data teachers' perceptions about STEM related activities are considerably high.

**Table 3**

*Primary Teachers' Awareness on Teaching STEM Related Activities in ERA Curricular*

No	Awareness Related Items	Percentage of Strongly agreed teachers	Percentage of partially agreed teachers	Percentage of partially disagreed teachers	Percentage of Strongly disagreed teachers
1	I am interested to do ERA activities with student.	74.77	25.23		
2	I am keen to do STEM content activities in ERA curriculum with student.	74.77	25.23		
3	I am interested to teach STEM content in ERA curriculum with using new Information technology.	70.11	26.78	2.11	
4	I am interested to improve my knowledge in STEM content in ERA curriculum.	72.18	27.82		
5	When I plan my lesson related to STEM related activities in ERA curriculum I consider students multiple intelligence.	68.43	31.57		
6	When I plan my lesson related to STEM related activities in ERA curriculum I select best teaching methodologies and teaching aids to students' active participation.	64.15	35.85		
7	When I plan my lesson related to STEM related activities in ERA curriculum,	74.55	23.15	2.35	

No	Awareness Related Items	Percentage of Strongly agreed teachers	Percentage of partially agreed teachers	Percentage of partially disagreed teachers	Percentage of Strongly disagreed teachers
	I select teaching methodologies and teaching aids to improve students' hidden talent.				
8	When I convey my lesson related to STEM related activities in ERA curriculum I select subject content and organized it's to motivate students.	70.11	26.78	3.11	
9	Students are interesting to learn ERA curriculum.	78.34	41.66		
10	Students actively participate STEM content in ERA curriculum.	79.11	20.89		

Above table depicts that a considerably higher percentage of primary teachers strongly agreed with item 1 to 10 statements. The dispersion of percentage of primary teachers' was 64.15 to 79.11. Primary teachers' awareness about STEM content in ERA curricula was significantly high. They obligate high awareness about students' STEM content in ERA curricula. According to the above data primary teachers' awareness was high. It also depicts that awareness data compared with perception data of student awareness were considerably high.

### Conclusions, Suggestions and Limitations

Primary teachers perceptions and awareness measured in the study have shown perceptions and awareness were excellent to teaching and learning STEM content in ERA curricula. Moreover, primary teachers did not use teaching methodologies effectively for teaching and learning STEM content in ERA curricula. Furthermore, teachers showed lack of knowledge about using information and communication technology for ERA curricular. Primary teachers have high perceptions and awareness about STEM related content in ERA curricular. Awareness is great compared with perceptions.



This research makes important suggestions for future STEM related activities. Primary teachers have a great role to deliver STEM content in ERA curricular. Teachers should empower STEM related activities through workshops. Though this study is conducted in Sri Lanka, Tamil medium teachers and considerably higher percentage of Sinhala medium teachers were not included. Therefore, it is not possible to generalize. It is suggested to conduct an in depth study and with large sample size in order to enhance the reliability of the findings.

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## **The Effectiveness of Online Learning of English Language in Sri Lanka**

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### **Abstract**

With the global emergence of the COVID-19 pandemic, online learning has grown unprecedentedly as all educational institutions have switched to online learning to provide access to education. In many countries, online learning is widely utilized in English language learning too. Educators and researchers have revealed that online learning can improve learners' language skills in English. In the Sri Lankan context, there was a shift for online education to provide uninterrupted education during the Covid-19 pandemic as schools and other educational institutions were closed. By employing the mixed method research, this study investigated the effectiveness of online learning of the English language in Sri Lanka. The opinions of students and teachers were examined and the findings revealed that interaction, collaborative work and discussions were low while less attention was given on listening and speaking skills. Students and teachers both had to confront issues of connectivity, lack of devices and high cost. Furthermore, the majority of teachers were competent in using presentation software but most of them lacked training in online teaching. It was suggested to reduce the content load, increase interaction, provide training to teachers, utilize authentic assessment, institutional support, provide devices and good internet connection to facilitate online learning.

**Keywords:** Online learning, synchronous and asynchronous, accessibility, digital literacy, effectiveness

## **Introduction**

With the progress of advanced technologies and the internet, online learning has become widespread in the world. With the global emergence of the COVID-19 pandemic, it has grown even more as almost all educational institutions switched to online learning. In many countries, online instruction is widely utilized in the contemporary English language learning. Educators and researchers have revealed that online learning can improve learners' language skills, learner performance, interaction, communication skills and motivation (Abu-Ayfah, 2020; Shadiev & Huang, 2020).

In Sri Lanka, schools were shut down nationwide due to the pandemic and the education authorities shifted to online education to provide uninterrupted education to the children. Therefore, measures were taken to deliver online learning through platforms like Zoom and Teams as well as through e-thaksalawa, the learning management system of the Ministry of Education.

In this backdrop, this study examined the effectiveness of online instruction in English language learning and teaching context in Sri Lanka.

The objectives of the study were,

1. To find whether online learning develops English language skills.
2. To study the perceptions of learners regarding online instruction.
3. To study the perceptions of English teachers regarding online instruction.
4. To explore ways to make online English classes more engaging, motivating, and innovative.

## **Method**

This research study employed the mixed research paradigm combining both qualitative and quantitative research designs. In this study, two separate questionnaires (for students and teachers) were used with closed and open ended questions. Moreover, five online English language lessons were observed by the researcher. In this study, probability sampling method was used. The student sample included 100 grade 11 students studying English language in all three types of schools (1AB, 1C and Type 2) representing all the provinces except two. Furthermore, a sample of 20 English teachers was selected for the study following the same procedure. The questionnaires designed for students and teachers comprised of basic

information of the respondents along with statements categorized under several areas to answer them in a scale. Furthermore, open-ended questions were given to express their opinions on different aspects of online learning and suggestions for improving the effectiveness of online learning.

The qualitative data gathered using the above mentioned instruments were analysed using descriptive method. The responses were examined carefully to identify the perceptions of the learners and the teachers. Moreover, the notes made during the observations of the lessons were also examined. The data were then coded to identify patterns and similar categories. On the other hand, quantitative data gathered were statistically analysed and represented in the form of tables, charts and/ or graphs. Finally, conclusions were drawn from the data to answer the research questions.

## **Findings**

The findings related to areas of accessibility, usefulness, communication and interaction, skill integration included in the questionnaire given to students are analysed below.

### **Accessibility**

72% of students claimed that they have participated in online classes indicating a good amount of accessibility in online learning. It was also evident that many of those who have not participated in online learning were from remote areas. Moreover, half of the students did not have a device on their own and a good internet connection to access online lessons. They often had to participate in group online sessions conducted with one device or had to ask for a device of a friend or a relative. Thus, the lack of a proper internet service and devices seemed to have an impact on online learning. In addition, there was an issue in accessing lesson materials sent online. Only 41% have easily accessed the learning materials. Furthermore, a majority easily navigated through the online learning platform and were comfortable in using the computer and the conferencing software. However, a majority stated that they did not find online learning easier than face to face learning and did not prefer online learning and for 70%, online learning was too expensive.

## **Usefulness**

Among the student sample, a majority agreed that the lessons were well-planned. However, they were not satisfied with the delivery of the lesson. It was observed that the teachers engaged in traditional methods of teaching and students were not paying attention and most of the time video was turned off to save data. Additionally, most of the students stated that they did not receive sufficient feedback from the teacher. Furthermore, the objective of the lesson was not clearly communicated to the students as 62% were not aware of what they were supposed to learn. Only 38% agreed that they learnt what they really wanted to learn. This was evident as students displayed a low enthusiasm to connect with the teacher. Moreover, a small number of students stated that lesson materials were useful. This may be due to the fact that students found it difficult to spend money and get them printed out. Thus, they were forced to read them on a small screen. On the other hand, 69% agreed that their teacher helped them to resolve any technological issues confronted during the lessons. Conducting assessment was low to measure the performance of the students which is a huge drawback. Specially, there were summative assessments but little or no formative assessments to enable them to progress in their work. However, in order to provide support for self-paced learning, lessons were recorded most of the time to watch later.

## **Communication and Interaction**

According to the responses, it was evident that there was a very little communication and interaction in the online classes. The focus of the teacher was to cover the content within the allocated time. Therefore, there was a lot of teacher talk and little or no student talk. Students were passively listening or most of the time completely distracted. This state of affairs has a very negative impact on developing language skills as communication and interaction is essential to learn a language. The purpose of learning a language is to communicate with each other. Thus, the entire purpose is lost.

## **Skill Integration**

It was visible that similar to face to face classes, only reading and writing skills were focused during online classes. This could have been caused by the fact that at G.C.E. O/L examination, only these two skills would be focused. During the observation sessions, it was observed that teaching grammar took an important place.

## **Perceptions of Online Learning**

Additionally, the students expressed their views on online learning experience in the open-ended questions. Accordingly, students' experience of poor internet connection and lack of device was particularly concerning. Although students had a device to access online lessons, most of the time they used a phone or a laptop of a family member or a relative. Student responses also showed a preference for in-person classes. The data also revealed that COVID-19 aggravated the financial difficulties experienced by some students, consequently affecting their online learning experience. Conclusively, some students stated that the learning environment was the greatest challenge that students needed to win over particularly distractions at home, learning space and facilities.

The findings drawn from the questionnaire given to the teachers are analysed below.

### **Accessibility**

55% of the teachers stated that they did not have a good internet connection at home. This was a concerning situation as it directly impacts the teaching and learning process. However, 55% of the teachers had a device to conduct online lessons. Thus, the lack of a proper internet service and devices seemed to have an impact on online learning. In addition, 80% of the teachers provided lesson materials and during the observations, the researcher discovered that lesson materials were sent as bulks via WhatsApp or Viber in PDF format. In the teacher questionnaire, it was revealed that only six teachers were using Google classroom to send lesson materials. Furthermore, 65% easily navigated through the online platform. However, the majority stated that they did not prefer online teaching compared to face to face teaching and for 60%, online teaching was too expensive.

### **Technical Skills**

According to the findings, 60% of teachers were competent in using presentation software for teaching purposes. However, using technology in classroom teaching revealed a divided perception as only 50% of them used technology to support the teaching and learning process. Similarly, 45% did not use any technology at all.

### **Readiness for Online Instruction**

According to the results, it can be stated that 40% of the teachers have obtained required training related to online teaching. On the other hand, 50% of the teachers have not received any training on online teaching and thus were not competent enough to teach online. This finding emphasizes the fact that it is essential to provide training on online teaching for teachers as a part of continuous professional development.

### **Lesson Delivery**

Due to the heavy content load to be covered before the exam, teachers tended to avoid using quizzes and online discussions to save time to cover the content in time. Thus, there was less interaction in these online classes and more teacher talk was visible. Moreover, different conferencing software was used by teachers and chat was heavily employed to ask questions and provide answers. Furthermore, teachers managed time fairly well during online classes and most of the teachers planned the lessons in advance. In addition, teachers were flexible in relation to assignment submission, due dates and absence. It was found that teachers discussed with students to set due dates for assignments and tests. This was a commendable approach. However, as teachers also conducted many online classes, the feedback and responding to queries and assignments was late than expected. Consequently, teachers were restricted from being creative and engaged in student centred education.

### **Communication and Interaction**

According to the responses of the teachers, it was found that communication and interaction in the online classes was low due to many reasons. The focus of the teacher was covering the content within the allocated time aiming for the examination. Therefore, there was a lot of teacher talk and little or no student talk. Students were passively listening. This can negatively affect the development of language skills in students as they do not get the opportunity to speak the language they are learning in the classroom.

### **Skill Integration**

When the responses of the teachers on the area of skill integration were considered, the findings were quite similar to that of the students. It can be stated that only reading and writing skills were focused during online classes by the teachers.

### **Attitudes Towards Online Instruction**

60% of the teachers stated that online teaching was as difficult as face to face teaching as it involves prior preparation, planning, making activities, research and assessment. Therefore, be it synchronous or asynchronous, both are rigorous activities. Furthermore, only 30% asserted that they used discussions as a means of teaching. In addition, the majority of teachers said that they supported the collaborative activities and interaction, however, in reality it is not practised due to the restrictions caused by the content overload and exam oriented education system. Besides, the authentic learning experiences were provided to students in a very low scale. Furthermore, lecturing was believed to be the popular mode employed by the teachers to deliver the content to students. Conclusively, teachers said that they developed activities that develop critical thinking but most of the time it was observed that lower level skills were catered to.

### **Perceptions of Teachers on Online Learning**

From the responses received, 60% of teachers did not have a high speed internet to conduct online classes and they faced abrupt dropping, signal failure and poor connection. During adverse weather, the condition is worse in Sri Lanka, even in urban areas. Moreover, a majority used a phone to conduct classes online while a few used laptops, tablets and desktop computers. Besides, the findings indicated that online teaching provided an opportunity for the teachers to work with children remotely during the pandemic. However, they experienced challenges regarding several aspects such as abrupt shift of the teaching modality, lack of prior training. However, they were able to adapt quickly and learnt the new ways of teaching. In addition, not seeing children's actions or progress created difficulty for the teachers to identify the appropriate time to step in. When the type of assessments is considered, traditional paper-pencil based testing was the popular assessment type. Secondly, the frequency of doing assessments in online classes was very low. Summative assessments were done frequently to report to the schools via Google Forms, however, formative assessments were not done to increase the progress of the students.

### **Recommendations**

Based on the findings of the study, recommendations for various stakeholders in the Sri Lankan government and schools are presented below in order to improve the quality and the effectiveness of online teaching and learning related to English.



- Conduct training on online learning for teachers
- Provide digital and technological infrastructure
- Increase the interaction and communication in language classroom
- Conduct blended learning in language instruction
- Further studies are recommended to cover more students, schools, and teachers.
- Create an inclusive learning environment
- Use authentic assessment for measuring the progress and reporting

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## **The Challenges Experienced by Students in Self-regulated Learning in Online Teaching Learning Environment**

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### **Abstract**

Online based teaching and learning process has become the most obvious after the Covid-19 pandemic period. Reducing the influence of traditional features of the face-to-face learning environment and increasing the impact of the e-learning environment place high demands on students' self-regulation. In e-learning, self-regulation becomes more relevant than ever. Self-Regulated Learning (SRL) promotes learner autonomy and successful academic excellence. The expansion of access to online learning technologies encourages this transition and the most important thing is that students have their own goals and strategies, and use the large resources of the electronic environment for development. Therefore, the impact of an e-learning environment technologically places higher demand than traditional features of the face-to-face learning. This study has identified the importance of SRL and difficulties students face in the online learning process, which can practically inform educational institutions about the necessary support that should be provided to facilitate students' self-regulated learning skills in the online learning context. A total number 20 students and 15 teachers were selected for the study and mixed method was used to analyze data. It was revealed that a student's motivation, family background, personality and teaching methods were directly affected for SRL and only few SRL strategies were implemented in the online teaching learning process. It was recommended that students should assist with the learning activities, systematic learning materials for the transitional learning and content of the syllabus need to upgrade with needed skills to improve SRL.

**Keywords:** Self-regulated learning, online teaching, self-efficacy, learning environment, metacognition

## **Introduction**

Self-regulated Learning (SRL) is a complex process including (meta) cognitive, motivational, and behavioral aspects (Järvelä & Bannert, 2021). SRL is useful for all levels of education and a prerequisite for lifelong learning (Bolhuis, 2003). Empirically, a significant impact of SRL on academic performance, well-being and the development of generic competencies has been demonstrated (Dignath & Büttner, 2008). Furthermore, SRL bestows the foundation for improving sustainable knowledge, monitoring and controlling the cognition, motivation and behavior in order to achieve certain goals.

The extensive nature and scope of the studies on self-regulated learning have led to the emergence and development of various SRL models and theories. Zimmerman (2002) maintained three cyclical phases in the SRL process: (1) forethought, (2) performance, and (3) self-reflection. The forethought phase is involved in task analysis processes (i.e. goal setting and strategic planning) and self-motivation beliefs (i.e. self-efficacy, outcome expectations, intrinsic interest or value, and goal orientation). The performance phase consists of the self-control and self-observation processes conducted by the students during the learning activities (i.e. imagery, self-instruction, attention focusing, and task strategies) and self-observation (i.e. self-recording and self-experimentation). Finally, the students' self-reflection phase self-judgment (i.e. self-evaluation and causal attribution) and self-reaction (i.e. self-satisfaction or affect, and adaptive or defensive). These phases occur repeatedly in a cyclical manner throughout the learning process engaging the process of self-evaluating their performance through a set of learning standards (Zimmerman, 2002). Each of these phases reflects several components and processes undertaken by students to regulate their learning, including metacognitive, motivational, and behavioral processes.

SRL is flexible and adaptable and students tend to construct their own repertoire of strategies (Paris, 2021). The technology reduces the difficulty and friction of all self-learning activities, while making it easier to learn in small slots of available time, whenever and wherever these occur. Zimmerman (1989), one of the most prominent researchers in SRL, defines SRL skills as the extent to which students are “metacognitively, motivationally, and behaviorally active participants in their own learning process.

Students who are self-efficacious in their self-regulated learning do not necessarily adopt mastery goals (Ferla, Valcke, & Schuyten, 2010). Students may not necessarily use appropriate SRLS given their academic needs, and the strategies used are not likely to improve while

enrolled in online learning (Barnard-Brak, Paton, & Lan, 2010). In some situations, students incorrectly attribute an undesirable outcome to an adapted strategy. The fact that teachers can implement various strategies in online learning to promote SRL is a central component of driving successful student usage of SRLS and it is of greater importance in online learning environment due to their more autonomous nature (Dabbagh & Kitsantas, 2004).

The current study concentrates on the teachers' and students' experience of SRL in online-classroom environment and the strategies used in the learning process. What types of difficulties are experienced by the students in SRL in online teaching-learning process?

### **Objectives**

1. To identify the problems experienced by students in SRL in an online teaching-learning environment.
2. To examine Self-regulated Learning Strategies (SRLS) in the online teaching-learning process.

### **Research Design/ Materials and Methods**

Different data collection methods were used to collect information in order to achieve the objectives of the study. With the intention of adopting mixed methodology for the study, quantitative and qualitative data gathering were carried out. The data collection instruments were designed to collect data in order to address the research questions. Mixed method research, which is considered to be more effective in the education field, employs strategies of inquiry that involve collecting data either simultaneously or sequentially for a better understanding of the problem.

In order to collect the required data for the study, three types of instruments; focus-group interviews with teachers and students via Zoom and an online questionnaire for teachers and observations were used. Sampling is described as the process of selecting units from a population of interest so that by studying the sample the findings may fairly generalize our results back to the population from which they were chosen (Trochim, 2006). There were fifteen bilingual and monolingual teachers and 20 students (age 16-17) included in the sample. The focus-group interviews were done separately with the teachers and students and data were collected. A questionnaire was administered online for teachers to collect accurate data. The questionnaire was designed using four-point Likert Scales; strongly agree (4), agree (3),

disagree (2), and strongly disagree (1). The validity and reliability of the questionnaire were maintained through the friendly and unbiased condition and observation was done to collect data. The researcher acted as an observer when other teachers were conducting online classes to the students.

## **Results and Discussion**

School students commonly enroll in online teaching and learning processes without knowing the effectiveness of SRL strategies or how to utilize them effectively. Some recent studies focused on students' online learning experiences amid the global pandemic, have revealed that students face considerable challenges in conducting their online learning activities (Adnan & Anwar, 2020; Dhawan, 2020). Moreover, the teachers who engage in e-learning platforms may not be aware of the ways of successful SRL that engage more curiously than memorizing. Further, students discover new knowledge and valuable learning and search informally to nurture motivation for intensive study.

The focus-group interview conducted for teachers' answers were recorded, and data triangulation was done to analyze the data. According to the analysis, most of the teachers were not aware of the SRL concept but, teachers had implemented some of the features of SRL in the teaching process. The teachers claimed that the student's family background, new technology, personality, motivation and teaching methods directly affected their SRL. Moreover, students did not have interest to learn new teaching methodologies, goal-oriented learning and they have become passive learners. Some bilingual teachers mentioned that it was very difficult to implement the scaffolding method and self-reflection because, students have become examination oriented and do not like to go beyond the horizon. The online environment may present a barrier to some students to pursue the help they need. Only a few teachers had developed the online reading, videos or links for the teaching process. Further, most of the teachers have not implemented the three phases of self-regulation such as forethought, performance and self-reflection.

Based on the thematic analysis the open-ended questions were analyzed in the students' interview. Even though students were not aware about the SRL theoretical background, they explained about the online teaching learning process and their motivation for SRL. There were six emerging themes related to students' problems: technical issues, material and task, time management, study space, consultation and communication problems, and motivation. The thematic analysis revealed that these technical issues were mainly related to connection

problems experienced during the online learning activities, and problems with the learning platforms. In addition, students reported that note taking tasks were very common in the online sessions and they are very reluctant to adjust with new learning process in the online teaching. Further, students did not have proper time management as they engage in private tuition sessions at the same time. Most of the students did not have proper learning environment for maintaining motivation for learning during the process. Some of the students claimed that they did not have proper study space for learning.

The Likert scale questions were included in the questionnaire which was given to the teachers and the result were analyzed. It was obvious that 35% teachers strongly preferred to use SRLS in online teaching learning process and, 25% of the teachers were not successful in the goal setting for SRL. The 35% of the teachers did not have enough technological facilities to conduct online sessions. Further, 50% of teachers lacked proper time management due to many students in a classroom and the scheduled time was not enough for the proper implementation of the SRL techniques and 5% of teachers had maintained students study logs for further references.

The online classes were randomly observed to collect data. There were major drawbacks in SRL such as the teacher's failure to maintain the enthusiasm of the learner, students 'merge' and 'submerge' during the lesson which make them unapproachable. Further, the English Language teacher used visuals as reminders to enhance SRL in the online classroom and the students actively participated in the session. It was noticeable that the Bilingual Science teacher did discuss scenario strategy and the Sinhala Language teacher incorporated it with a role-play. These SRL strategies were visible in the observation process and there was no implementation of shared journals, practicing self-control with games, moment break, mindfulness, and activities for self-reflection.

## **Conclusion**

In conclusion, self-regulated learning skills could still be improved by alleviating the problems they faced in the e-learning setting, including challenges with technology, materials and tasks, time management, study space, and motivation. From the current research, some implications and recommendations can be highlighted. First, the transition from traditional learning to online learning should be aligned with the amount of support provided by teachers, schools and other responsible bodies which equip the students to become self-regulated learners. In this regard, the learning activities, systematic learning materials should be provided by teachers



and content of the syllabus should be able to equip students with the skills needed to become more independent learners.

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## **ICT and English Language Teachers: Reflection on Continuing Professional Learning Needs**

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### **Abstract**

As a response to the development of educational technology, teachers need to reconsider and transform their knowledge and skills to establish teaching platforms that integrate the use of ICT and the development of online materials into instructional practice. For this reason, teacher professional learning opportunities need to increasingly focus on how teachers can make the most of digital technologies to enhance teaching and learning processes. This paper presents a subset of findings from a larger study that investigates how teachers identify their professional needs. Particularly, the current paper focuses on how teachers make use of reflection as a strategy to identify their professional learning needs regarding the use of ICT in English language teaching and learning. The study adopted a qualitative case study design wherein twelve secondary school teachers of English in Yogyakarta, Indonesia were participants. Data were collected using semi-structured interviews. These were subsequently analysed thematically. A deeper examination of participants' views indicated how participants used their reflections on their pedagogical challenges identifying their current professional needs for future improvement. These are discussed in relation to the implications they have for teacher professional development, and professionalism in Yogyakarta, Indonesia.

**Keywords:** ICT for language teaching, teacher professional development, teacher needs, teacher professionalism

As a response to the development of educational technology, teachers need to reconsider and transform their knowledge and skills to establish teaching platforms that integrate the use of ICT and the development of online materials into instructional practice. For this reason, teacher professional learning opportunities need to increasingly focus on how teachers can make the most of digital technologies to enhance teaching and learning processes.

This paper presents a subset of findings from a larger study that investigates how teachers identify their professional needs. Particularly, the current paper focuses on how teachers make use of reflection as a strategy to identify their professional learning needs regarding the use of ICT in English language teaching and learning.

### **Teacher Reflective Practice**

Reflective practice has been endorsed as an integral part of English language teachers' professional development (Farrell, 2016; Richards & Farrell, 2005). Aligned with the definitions of reflection proposed by Dewey (1933) and Schön (1983), reflection for teachers in particular can be viewed as “the process of critical examination of experiences, a process that can lead to a better understanding of one’s teaching practices and routines” (Richards & Farrell, 2005, p. 7).

### **Teacher Professional Needs**

Needs are considered as a gap between what is existing at present and what is considered ideal (Altschuld & Kumar, 2010). Needs can be determined when differences between the current condition and the expected condition are analysed and evaluated (Altschuld & Kumar, 2010). In educational research, understanding the difference between teachers' present conditions and their ideal or expected situations can inform the effective design of teacher professional learning and development.

While the domains of teachers' needs for development of professionalism have been extensively researched, I would argue what teachers really require to build effective professional learning practices cannot be generically prescribed. The complexity of teaching practice, including educational theories, pedagogical knowledge, and technological advancement in education grows rapidly. This requires that identifying professional learning needs, and planning and then evaluating the effectiveness of teacher professional learning activities should be done frequently (Kabilan & Veratharaju, 2013). Teachers' needs should be

evaluated on a regular basis because teachers' interests and needs are known to be different across their teaching career and across changes in contexts, such as changes in policy, the development of educational technology, and the introduction of current educational theories (Kabilan & Veratharaju, 2013).

## **Method**

The study adopted a qualitative case study design wherein twelve secondary school teachers of English in Yogyakarta, Indonesia were participants. The use of the exploratory single-case study design has multiple benefits that relate specifically to the nature of this study. Moreover, the results that are extracted from case studies provide rich explanations of the situation (English teacher professional practice at senior secondary schools in Yogyakarta, Indonesia).

Data were collected using semi-structured interviews. All interviews were conducted face to face and conducted in the school where the teacher participants were employed. Interviews were conducted using participants' first language (L1), with the objective of full engagement of participants with the concepts and constructs explored in the study. Interviews were 40-50 minutes in duration. During the interviews, the researcher took notes on matters arising which were then followed up for clarification.

The interview questions were structured around 1) the existing professional needs of teachers regarding the use of ICT for English language teaching; 2) the extent to which teachers engaged in professional development activities to fulfil those needs; 3) the kinds of PD activities that they think are useful for improving professionalism; 4) what potential these needs have for contributing to improved levels of professionalism.

The interview data were subsequently analysed thematically. These themes were grouped into different nodes in NVivo12. Thematic Analysis (TA) (Braun & Clarke, 2006; Clarke & Braun, 2017) was used for data analysis to allow the researcher to systematically compare small units of conceptual meanings leading up to the "construction of a system of concepts that describes and explains the phenomenon under investigation" (Vincze, 2010, p. 3), which in this case is an exploration of professional development needs of a group of secondary English language teachers in Yogyakarta.

## **Results**

A deeper examination of participants' views indicated how participants used their reflections on their pedagogical challenges identifying their current professional needs for future improvement regarding the use of ICT for language teaching and learning. These are discussed in relation to the implications they have for teacher professional development, and professionalism in Yogyakarta, Indonesia.

The results indicated that most participants considered the knowledge gained at ITE was not only inadequate, but also irrelevant to the current demands of teaching, including that of the use of ICT in English language classroom. Considering that the study participants averaged 20 to 30 years of teaching experience, such a long time lapse created a gap between the English language knowledge they received in their initial preparation program and the knowledge that they were expected to teach. Also, their language learning experiences when they were student teachers was considerably different from their language teaching experiences at present. For example, they did not utilize electronic devices or communication technology such as the internet when they were learning English in their ITE, but now they are required to use the technology. The perceived knowledge gap regarding the use of technology in the classrooms was striking, especially ICT and digital technologies.

Technology develops rapidly, including that for educational purposes, and teachers admitted that in the current digital world they were digital immigrants, or as one teacher called herself, as “an old product” of teacher education. On the contrary, their students who were digital natives were more familiar with current technology use, and as consequence, had more enthusiasm for technology-based learning. The data indicated that despite the use of recent technology being encouraged and required in pedagogy, teachers still expressed difficulties to effectively utilize the ICT in their classrooms. Therefore, teachers needed more access to professional learning opportunities that helped them effectively respond to the educational demands of the use of technology in teaching. However, given continuous teacher learning to keep the teachers updated with current knowledge and skills in the area of educational technology is crucial, the data also demonstrated the issue in their continuing professional learning and development, suggesting that the teacher participants were ill prepared to respond to the rapid development of the use of ITE in education.

The study also found that teacher participants specified some CPD activities they thought were useful in providing a platform for their professional learning which develop their competence

in the use of ICT. These formal learning opportunities, such as workshops and seminars organized by the District Office of Youth and Education as well as other professional organizations, were perceived by participants as beneficial tools for teachers to enhance their knowledge and skills. Their participations in such activities helped them develop essential and relevant knowledge to enhance their teaching practice. Such knowledge, including the use of ICT in ELT, especially the utilization of ICT and social media in teaching and learning process, was considered beneficial to equip teachers to meet recent educational demands, including ongoing changes to the national curriculum.

## Conclusion

The use of ICT has arguably become integral in language classrooms, and English teachers therefore need to respond to this demand by equipping themselves with sufficient knowledge and skills to teach in ICT-based educational environments.

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## **A Study on the Relationship Between Written Examination Marks and Practical Test Marks Obtained by Students for Engineering Technology Subject in the G.C.E. Advanced Level Examination**

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### **Abstract**

Understanding the relationship between written exam marks and practical test marks will be more important for teachers, students, and decision makers. To understand the exact weightages and distribution of marks between the two types of tests, our first objective was to identify how written exams and practical tests conducted for engineering technology. The other three objectives are as follows; to find out whether there is any relationship between written exam marks and practical test marks; to identify the intensity and direction of relationship, if any; and to identify what should be done to achieve high performance in engineering technology. Marks of students who appeared for engineering technology in advanced level examinations from 2017 to 2020 were selected as the population. The research sample was the marks obtained by six hundred students during that period. Those marks were collected as secondary data. To overcome the final objective of this research, qualitative data were collected using a questionnaire. For this, ten teachers and three directors belonging to the subject were selected as sample. IBM SPSS and MS-Excel software were used as data analysis tools. It was found that weightage for written examination and practical test has been changed from 75:25 to 70:30. A regression model was created to analyze the data obtained; practical test marks =  $51.342 + (0.524 \times \text{written exam marks})$ . Accordingly, it can be said that a student who gets zero marks in written exam can get 51.34% marks in practical test. R-value is 0.431. The intensity of the correlation between the two variables is 0.431. The results showed a moderately positive correlation between written exam marks and practical test marks. The teachers and directors have mentioned that the weightage of the practical test should be increased to achieve high performance in the subject of engineering technology in the advanced level examination.

**Keywords:** Written exams, practical tests, correlation

## **Background**

At the end of the learning-teaching process, behavioral change is expected. This behavioral change in students is measured through assessment. In objective-based teaching, students' cognitive domain, affective domain, psychodynamic domain, personality traits, social traits are measured. Competency-based teaching is expected to produce citizens with the ability to interpersonally implement long-term life habits developed through knowledge, attitudes, and skills. A person who has developed all the above five areas related to objective-based teaching is also a competent person. It is truly questionable whether the assessment measures all student behavior. It is a strong accusation against the existing examination system that only knowledge is measured when students are measured. All national exams in Sri Lanka are written exams. Although written exams can measure lower-order thinking skills such as knowledge and understanding, it is difficult to successfully measure higher-order thinking skills. Moreover, it is an exceedingly perplexing task to assess students' motivational and psychodynamic domains or attitudes and skills through written examinations.

Sri Lanka's national examinations have introduced practical tests in addition to written examinations for various subjects after recognizing the need to measure students' affective domain and psychodynamic domain, i.e., attitudes and skills. Practical tests will be conducted in G.C.E. ordinary level examination for aesthetic subjects and in G.C.E. advanced level examination for subjects such as aesthetics, home economics, bio systems technology, engineering technology, etc. The marks of the written examination as well as the marks of the practical test are considered in determining the final performance of these subjects.

Do students who score high in the written exam also score high in the practical test? Research on whether there is any relationship between written exam scores and practical test scores is particularly useful for increasing students' performance. The cognitive domain and the psychodynamic domain can provide insight into how students' competence is determined. It will be more important for teachers, students, and decision makers understanding the relationship between students' marks on written and practical tests when deciding which amount of weight to give each. This study was conducted to identify the relationship between written exam marks and practical exam marks.



## **Objectives**

1. To identify how to conduct written examination and practical test for the subject of engineering technology in G.C.E. advanced level examination.
2. To find out whether there is any correlation between written examination marks and practical test marks obtained by the students in engineering technology subject of G.C.E. advanced level examination.
3. To identify the intensity and direction of correlation, if any, correlation between marks which the students obtained for the written examination and the practical test in the subject of engineering technology of G.C.E. advanced level examination.
4. To identify what should be followed to achieve high performance in the written examination as well as in the practical test of the engineering technology subject of the G.C.E. advanced level examination.

## **Research Design/Materials and Methods**

Our first objective was to identify how written exams and practical tests are conducted for engineering technology. It is especially important to have a clear idea regarding the weights between written exams and practical tests for the purpose of identification of relationship between variables. Found information about the written exam and practical test for the subject of engineering technology through documents. For this, teacher guides, syllabi, and evaluation reports were used.

To achieve the second and third objectives of this study, the population considered was the marks of students faced to G.C.E. advanced level examinations of 2017, 2018, 2019 old syllabus, 2019 new syllabus, 2020 old syllabus and 2020 new syllabus. The research sample was the marks obtained by six hundred students during 2017-2022 period. Analyzing students' marks obtained from secondary sources. Identified the marks obtained for written examination and practical test separately.

IBM SPSS and MS-Excel software were used as data analysis tools. Data analysis determines whether there is a relationship between practical test marks and written exam marks and if any, it considers whether the correlation coefficient is positive or negative. Also, its intensity is examined here. It examined what can be done to achieve high performance in engineering technology. Also, there is the question whether the weightage given to written test and practical test is acceptable or not. Cronbach's Alpha value was used to evaluate the reliability and

determine whether the research instrument was suitable for achieving the research objectives. A regression model was created to analyze the data collected.

$$Y = \beta_0 + \beta_1 X$$

$$\text{practical test marks} = \beta_0 + \beta_1 \text{written exam marks}$$

A regression analysis of variance (Regression ANOVA) was conducted based on the developed regression model. As the first step, a hypothesis test was conducted.

H<sub>0</sub>: jointly insignificant

H<sub>A</sub>: jointly significant

Here, the Pearson Correlation Coefficient was used to determine the correlation between the written exam marks and the practical test marks of the engineering technology subject in the G.C.E. advanced level examination.

The fourth objective of the research was to identify what should be followed to achieve high performance in the written exam as well as in the practical test of the engineering technology subject of the G.C.E. advanced level examination. Here, qualitative data were obtained using a questionnaire with twenty-five items on Likert scale. For this, ten teachers and three directors belonging to the subject were selected as sample. In here, MS-Excel software was used as data analysis tools.

## Results/Findings

The first objective of this study was to identify how to conduct written examination and practical test for the subject of engineering technology in G.C.E. advanced level examination. According to the reviewed literature, the engineering technology subject has two main parts, a written examination, and a practical test.

**Table 1**

*Weightages for Each Test*

Test	2020 old syllabi	2020 new syllabi
written exam	75%	70%
paper one	37.5%	35%
paper two	37.5%	35%
practical test	25%	30%
Total	100%	100%

As per the old syllabus 2020, 75% percentage was reserved for the written exam and 25% for the practical test to decide the final marks. But according to the new syllabus 2020, the percentage has been revised. Accordingly, the allotted percentage for the written examination has been reduced to 70% and the allotted percentage for the practical test has been increased to 30%.

The total number of marks allotted for the second paper of the written examination is six hundred. But since the new syllabus of 2020, that figure has been increased to seven hundred. Practical tests consist of three areas namely civil technology, mechanical technology, and electronic technology. It is mandatory for a student to appear for practical tests under all these three fields.

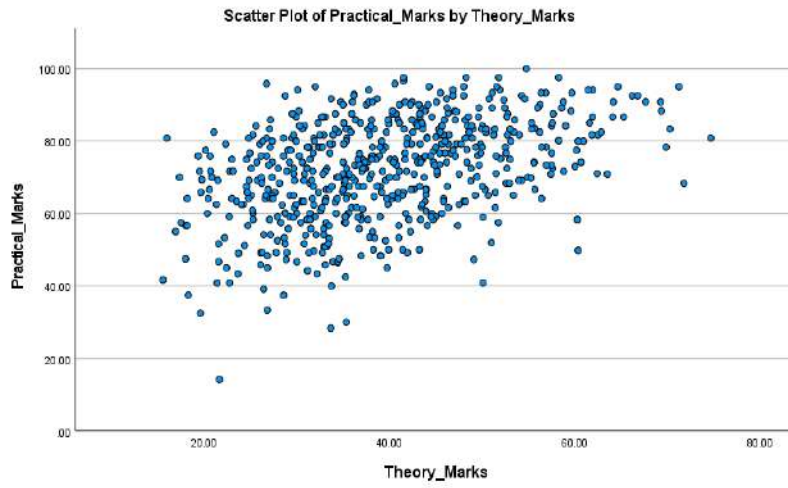
To overcome the second and third objectives; the appropriateness of the data provided, and the research methodology were assessed. For this purpose, a reliability test was conducted using SPSS software. The results were as follows.

**Table 2**

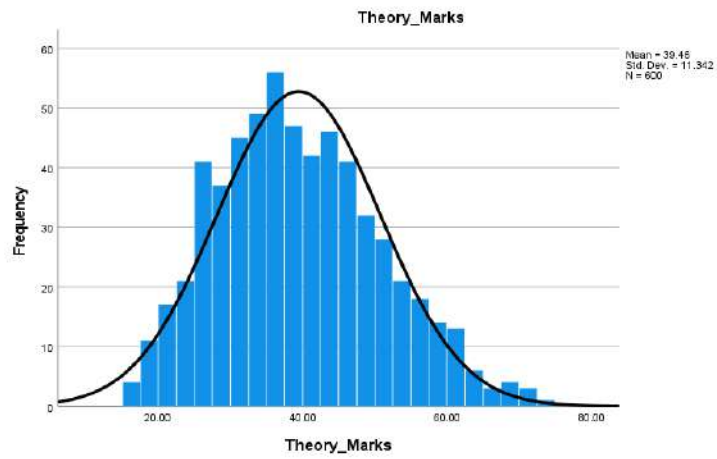
*Reliability Statistics*

<b>Reliability Statistics</b>	
Cronbach's Alpha	N of Items
.595	2

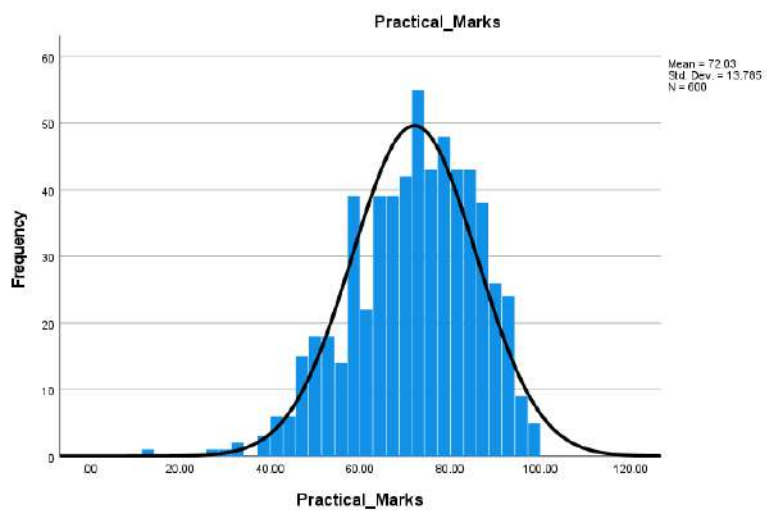
Cronbach's Alpha value is 0.595. That means the reliability is 0.595. Normally, Cronbach's Alpha value should be greater than 0.7. But since it is difficult to obtain such a high value when the number of items used is two, it was assumed that a value greater than 0.5 is sufficient. Accordingly, it can be stated that this research tool is suitable for achieving the research objectives. A scatter plot diagram and normal distribution curves are used to show the distribution of marks.



*Figure 1.* Scatter Plot Diagram



*Figure 2.* Normal Distribution for Written Exam Marks



*Figure 3.* Normal Distribution for Practical Test Mark

The regression model was created as follows to analyze the data obtained.

$$Y = \beta_0 + \beta_1 X$$

$$\text{practical test marks} = \beta_0 + \beta_1 \text{written exam marks}$$

**Table 3**

*Coefficients*

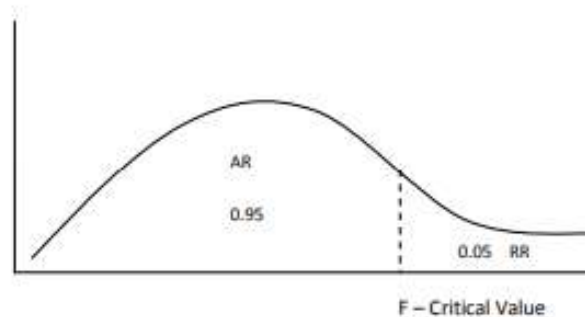
<b>Coefficients<sup>a</sup></b>						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	51.342	1.841		27.892	<.001
	Theory_Marks	.524	.045	.431	11.694	<.001

a. Dependent Variable: Practical\_Marks

The regression model was built after assessing the coefficients as follows.

$$\text{Practical test marks} = 51.342 + (0.524 \times \text{written exam marks})$$

The reliability level was considered as 95%. The accepted region and the rejection region which have the right side skewed are represented by figure 4.



**Figure 4.** Right Skewed Marks Distribution

**Table 4**

*Analysis of Variance*

<b>ANOVA<sup>a</sup></b>						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	21184.996	1	21184.996	136.759	<.001 <sup>b</sup>
	Residual	92634.620	598	154.907		
	Total	113819.616	599			

a. Dependent Variable: Practical\_Marks

b. Predictors: (Constant), Theory\_Marks

Significance value (P) = P<.001

Critical value = 3.857

The test value (F) is situated in the rejection region. Hence,  $H_0$  is rejected. It means that the regression model is jointly significant or has integrated regression. That is, the model we built is a valid model to find whether there is a relationship between the written exam marks and the practical test marks obtained by the students for the engineering technology subject in the G.C.E. advanced level examination.

Pearson Correlation Coefficient is used to study the relationship between the selected two variables and to identify the intensity and direction of the relationship if any.

**Table 5**

*Correlations*

		Theory_Marks	Practical_Marks
Theory_Marks	Pearson Correlation	1	.431**
	Sig. (2-tailed)		<.001
	N	600	600
Practical_Marks	Pearson Correlation	.431**	1
	Sig. (2-tailed)	<.001	
	N	600	600

\*\* . Correlation is significant at the 0.01 level (2-tailed).

**Table 6**

*Model Summary*

<b>Model Summary</b>				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.431 <sup>a</sup>	.186	.185	12.44618

a. Predictors: (Constant), Theory\_Marks

R<sup>2</sup> value of 0.186 means that 18.6% variation in the practical test marks is explained by the written examination marks obtained by the students for the engineering technology subject in the G.C.E. advanced level examination. R-value is 0.431. The intensity of the correlation between the two variables is 0.431. The results showed a moderately positive correlation between written exam marks and practical test marks.

A questionnaire was used to collect data on the final objective of this study. Most responses have been suggested to increase the weightage for the practical test. Table 7 represents the analyzed responses for each item as percentages.

**Table 7**

*Item and Responses for Questionnaire*

Item	1- strongly disagree %	2- disagree %	3- neutral %	4- agree %	5- strongly agree %
1. It is most suitable to have a practical test as in addition to written exam	0	0	0	38.5	61.5
2. The weightage allotted to written examination and practical test is sufficient	7.7	53.8	0	30.8	7.7
3. The weightage allotted for the practical test should be further increased	0	23.1	7.6	23.1	46.2
4. More attention should be given to teaching practical sessions rather than theories	0	30.8	0	61.5	7.7
5. Conducting extra sessions after school hours can help boost student performance	7.7	15.4	23.1	38.5	15.4

Item	1- strongly disagree %	2- disagree %	3- neutral %	4- agree %	5- strongly agree %
6. Repetition of past papers helps to achieve high performance	0	0	0	53.8	46.2
7. Improving the equipment and facilities needed to complete the practical activities will help in enhancing the performance of the students	0	0	0	69.2	30.8
8. Supplying knowledge about the mark distribution system between written exams and practical tests will help in increasing the performance of the students.	0	0	0	61.5	38.5
9. The student can get authentic experience by watching the videos when difficulties arise during the practical sessions.	15.4	15.4	15.4	46.2	7.7
10. Performance in practice tests can be enhanced by supplying opportunities for all students to repeat practice tests after being guided by the teacher.	0	0	0	30.8	60.2
11. Student achievement can be boosted by lightening the burden on students such as assignments and homework	0	38.5	23	38.5	0
12. Student achievement can be enhanced by guiding students to develop a regular schedule/period for studying.	0	0	0	38.5	61.5
13. As a school, establishing a formal program to improve student performance increases student performance.	0	0	0	46.2	53.8
14. Higher academic achievement by constant reference to assessment can be raised	0	0	7.7	53.8	38.5
15. Supplying continuous feedback in the classroom can increase student achievement	0	0	7.7	46.2	46.2



Item	1- strongly disagree %	2- disagree %	3- neutral %	4- agree %	5- strongly agree %
16. Giving students the opportunity to ask questions in the classroom and respond positively to them can increase student achievement.	0	0	0	30.8	69.2
17. By supplying equal opportunities for all students in the classroom to engage in learning activities, student achievement can be enhanced	0	0	7.7.	46.2	46.2
18. After teaching a new concept or skill, making sure students have mastered it, then moving on to the next concept can improve student achievement.	0	15.4	0	53.8	30.8
19. By presenting the teacher's lesson plan to the students at the beginning of each term Students' achievement can be enhanced	0	30.8	23.1	46.2	0
20. Regularly informing parents about student performance and making suggestions can improve student performance	0	7.7	0	76.9	15.4
21. Student achievement can be boosted by finding students' interests and designing lessons accordingly	0	0	0	61.5	38.5
22. Directing students to self-study after classroom instruction may increase student achievement	0	0	0	53.8	46.2
23. By keeping effective communication between the teacher and the students, student achievement can be enhanced	0	0	0	46.2	53.8
24. Student achievement can be enhanced by supplying opportunities for knowledge exchange among students	0	0	0	53.8	46.2
25. By applying their knowledge to design after learning, students can achieve high performance in the exam	0	0	0	33.3	66.6

Respondents thought that priority should be given to developing students' affective domain and psychodynamic domain than the cognitive domain.

## **Conclusion**

The weightage for the written exam and practical test has been changed from 75:25 to 70:30. It can be considered a better way towards evaluating students' higher-order thinking skills. It will contribute to the assessment of students' affective domain and psychodynamic domain than the cognitive domain.

According to the findings, it can say that a student who gets zero marks in the written exam can get 51.34% marks in the practical test.

The intensity of the correlation between the two variables is 0.431. Commenting on this, a moderate positive correlation is identified between the written exam marks and the practical test marks obtained by the students in the engineering technology subject of the G.C.E. advanced level examination. The two variables change in the same direction as there is a positive correlation. It indicated that there is no strong correlation between written marks and practical test marks in the engineering technology subject of the G.C.E. advanced level examination, but a moderate amount of correlation there.

According to the information obtained through the questionnaire, the teachers and directors have identified the following points as the things to be followed to get high performance in the engineering technology subject of the G.C.E. advanced level examination.

- It is highly advisable to conduct a practical test in addition to the written examination in engineering technology.
- The weightage given to the practical test of the engineering technology subject needs to be further enhanced.
- In the classroom, more attention should be given to practical activities rather than teaching theories.
- Practice tests can be enhanced by supplying opportunities for all students to repeat practical tests after teacher guidance.
- Student performance can be enhanced by.
  - Informing parents about student performance and making suggestions.
  - Finding students' interests and planning lessons in depth.
  - Directing student self-study after classroom instruction

- Teachers keeping communication with students.
- Supplying opportunities for knowledge sharing among students.
- Guiding students to develop a regular schedule/period for studying.
- Developing and implementing a formal test as a school
- Giving students the opportunity to question and respond positively in the classroom.
- Giving all students in the classroom a fair chance at learning.
- After teaching a new concept or skill, making sure all students have mastered it and then referring to the new concept.

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## Investigating the Comprehensiveness of Sexuality Education Curriculum in Sri Lanka

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### Abstract

According to UNESCO et al. (2018), Comprehensive sexuality education (CSE) is a curriculum-based process of teaching and learning about the cognitive, emotional, physical and social aspects of sexuality. The belief of the international human rights bodies is that the children and youth of the society have the right to obtain accurate, scientifically reasonable, detailed and culturally sensitive sexuality education in accordance with existing international standards. The subject of school-based sex education in Sri Lanka is controversial, and the failure to provide CSE to the students has resulted in severe consequences. The purpose of this study was to identify the key components of CSE and determine how the CSE components are formulated and implemented in the Sri Lankan school context. A descriptive content analysis was carried out to review five Teachers' Instructional Manuals and 18 textbooks using a standardized assessment tool (SERAT). The findings show that the intervention is not sufficient to cover all eight of the CSE core concepts recommended by UNESCO et al. (2018). The basic concepts have focused more on sexual and reproductive health, health and well-being skills. Sexual rights, sexual citizenship, and happiness did not appear to be adequate in the core curriculum. The curriculum was knowledge-biased, and it failed to provide suitable facilitation on affection and sexuality skills. Although students aged 12-15 received a moderate amount of CSE, the content did not satisfactorily address the youngest (5-8) and oldest (15-18) age groups. Further long-term follow-up studies are needed to review the comprehensiveness of sexuality education. In essence, this study offers a timely assessment of school-based sexuality education in Sri Lanka, as well as recommendations for reform and improvement of the intervention.

**Keywords:** Comprehensive sexuality education, curriculum, Sri Lanka, school

## Background

Comprehensive sexuality education (CSE) is becoming increasingly important in the process of creating a productive, safe, and successful life for the young generation. Nevertheless, few children and young people are prepared for life, enabling them to make free and responsible decisions about their sexuality and relationships, despite the clear and strong evidence for the benefits of high quality, curriculum-based CSE. Accordingly, the central cause of the above-mentioned issues is inadequate sexuality education.

The content in the sexuality education is required to be scientifically accurate, easily understandable, unambiguous, culturally relevant, gender-sensitive, age-appropriate, and context-relevant (Thomas & Aggleton, 2016; Nadeem et al, 2021). Also, the topics covered in the syllabus are needed to sufficiently address the contemporary issues relevant to adolescents (Pimpawun *et al.* 2019). Kirby D. (2007) mentioned that the existing curriculum in developing countries might be expanded to create a more comprehensive and successful program.

Despite the fact that various interventions are being made to improve sexual and reproductive health (SRH), school-based interventions for sexuality education are still insufficient in Sri Lanka, like many other developing nations. SRH curriculum in Sri Lanka has mostly concentrated on knowledge over the last two decades, rather than developing competency in SRH.

Hence the central theme of the study was to “Investigate the comprehensiveness of sexuality education curriculum in Sri Lanka” with its specific objectives to;

1. Identify the key components of comprehensive sexuality education.
2. Determine how the CSE components are formulated and implemented in the Sri Lankan school context.

The findings in this study would help in strengthening the CSE curriculum in Sri Lanka to properly address the sexual and reproductive health needs of young people. Additionally, findings from this study would serve as a wake-up call to researchers, stakeholders, policymakers, individuals, non-governmental organizations, and many more to address issues of youth sexuality and reproductive health in Sri Lanka.

## **Literature Review**

The lifelong process of learning the essential topics such as identity, intimacy, relationships as well as developing attitudes and perspectives about those areas can be known as sexuality education. The main goal of sexuality education is to provide children and young people with the knowledge, skills, and values they need to make responsible sexual and social decisions. (UNESCO et al. 2018). Currently, CSE has become critical in improving the well-being of children and youth. Accordingly, CSE can be identified as a structured and curriculum-based education that can be provided in formal and non-formal settings (IPPF, 2017).

CSE provides gradual education on human rights, relationships, reproduction, gender equality, sexual behaviour hazards, and disease prevention to children and teens using a learner-centred and age-appropriate method. According to a global assessment of CSE status in 48 countries (UNESCO, 2015), the majority of those countries have embraced the concept of CSE and are working to increase its implementation at the national level. However, it is fair to say that CSE is still a long way from being implemented in most low- and middle-income nations (Haberland & Rogow, 2015).

In Sri Lanka, Health and Physical Education, Life Competencies and Citizenship Education, and Science are the three main subjects that include in the school curriculum to provide information and competencies linked to SRH. According to Amunugama (2008), Health and Physical Education is the key subject in which SRH-related content can be found. Maintaining health and preventing disease, child protection, forming relationships with others, growth and development, and acceptable behaviour are all covered in this subject. Nevertheless, it is not included as a G.C.E (General Certificate of Education) Advanced Level subject. The development of competencies linked to the human reproductive system is included in the course objectives for grades 6-11 general science, and more particularly biology in higher grades, however complicated areas such as sexual behaviour, pleasure, and contraception are not covered in any of these contents.

The International Guideline on Sexuality Education is intended to guide education, health, and other relevant authorities in developing and implementing CSE programs and materials in schools and out of schools. This same amended Guideline provides a single, widely agreed-upon definition of CSE; strengthens and broadens basic elements, subject areas, as well as learning outcomes; spots a greater emphasis on sexual identity and human rights; gives guidelines on creating a framework and planning the deployment of CSE programs; and

represents CSE's involvement to several Sustainable Development Goals (SDGs). In order to make sexuality education more comprehensive in Sri Lanka, strategies to address implementation difficulties are required.

## Methodology

Quantitative content analysis is a research method that involves categorizing and recording textual elements in order to examine them (Coe, K., & Scacco, J. M. (2017). This was a descriptive content analysis, conducted with the aim of understanding the CSE practices in the Sri Lankan school level curriculum. The statistical population of the research includes Teachers' instruction manuals (1-5), Science textbooks (6-11), Life Competencies and Citizenship Education textbooks (6-11) and Health and Physical Education textbooks (6-11). Required data for this study were collected and coded using a standardized tool named The Sexuality Education Review and Assessment Tool (SERAT). This tool is specially designed to use international evidence and best practices to evaluate comprehensive sexuality education programs in schools.

## Results

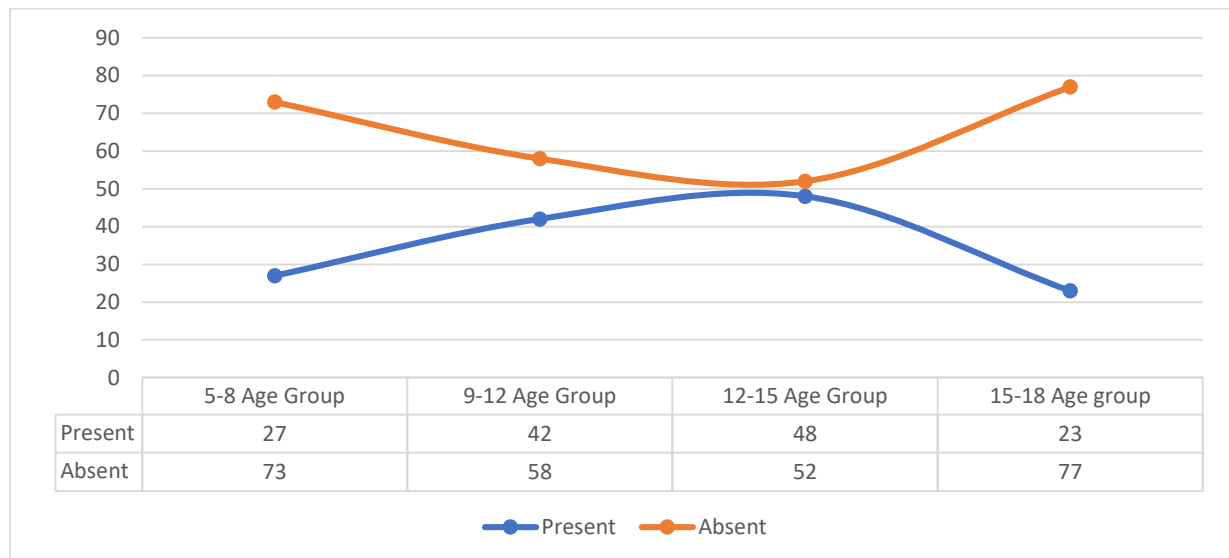
For learners in primary and secondary school, the technical guideline for sexuality education is divided into eight main essential concepts, and each is divided into four age groups (15-18+ years, 12-15 years, 9-12 years, and 5-8 years). The percentages of CSE-related concepts in the curriculum are summarized in Table 1.

**Table 1**

*Content by Key Concept*

Key Concept	5 - 8 Years		9 - 12Years		12-15 Years		15-18 Years	
	Present	Absent	Present	Absent	Present	Absent	Present	Absent
Relationships	48%	52%	50%	50%	54%	46%	31%	69%
Values, Rights, Culture	46%	54%	52%	48%	61%	39%	21%	79%
Understanding Gender	30%	70%	45%	55%	47%	53%	25%	75%
Violence and Staying Safe	34%	66%	40%	60%	49%	51%	14%	86%
Skills for Health	37%	63%	52%	48%	46%	54%	24%	76%
Human body and Development	9%	91%	32%	68%	54%	46%	30%	70%
Sexuality and Sexual Behavior	6%	94%	28%	72%	36%	64%	24%	76%
Sexual and Reproductive Health	8%	92%	38%	62%	34%	66%	21%	79%

For the 5-8 age level, the curriculum has particularly strong content surrounding relationships, values, rights and culture. Relevant themes for the human body and development, sexuality and sexual behaviour are significantly absent from the content. Compared to the 5-8 age level, all the key concepts are considered progressively in the 9-12 age level, but still not convenient (below 55%). The overall score is high for the 12-15 age group compared to other levels. As for content by key concept, six of them range from 45-65%, with a comparatively greater proportion of intermediate features. In this group, two of the key concepts do not have strong features: Sexuality and Sexual Behavior (36%) and Sexual and Reproductive Health (34%). In the 15-18 age level, several of the key concepts do not possess any strong value. These topics are largely absent from the curriculum and do not contain adequate information on youth development.



**Figure 1.** Overall Content of Key Concepts

According to Figure 1, the presence of CSE components in 5-8 and 15-18 age groups were exceedingly low compared to other age groups. The most frequent CSE intervention emerged in the textbooks related to the 12-15 age group. The eldest age group (15-18) could obtain only 23% of sexuality education from the total package. One of the major findings was that the CSE curriculum failed to achieve at least 50% comprehensiveness across all age groups.



**Table 2**

*Content by Domain*

<b>Type</b>		<b>5-8</b>	<b>9-12</b>	<b>12-15</b>	<b>15-18</b>
		<b>Years</b>	<b>Years</b>	<b>Years</b>	<b>Years</b>
Knowledge	Present	22%	40%	48%	38%
	Absent	78%	60%	52%	62%
Attitudes	Present	20%	26%	44%	21%
	Absent	80%	74%	56%	79%
Skills	Present	18%	25%	41%	20%
	Absent	82%	75%	59%	80%

When compared to other age groups, the sexuality education curricula provide significant mediation in all three domains for the 12-15 age group (Knowledge - 48%, Attitudes - 44%, Skills – 41%). It is evident that the SE curriculum has a slight knowledge bias, as it is at the top of the standings of every age group. Among a study of sexual and reproductive knowledge, attitudes, and behaviours in a school-going population of Sri Lankan teenagers, Rajapaksa et al. (2015) discovered that the sexual and reproductive knowledge and attitudes of Sri Lankan teenagers are significantly low. According to the study, no domain had a coverage level of more than 50%, revealing that sexuality education, as currently provided in Sri Lankan schools, is insufficient, leading us to assume that the findings of Rajapaksa et al. (2015) are reliable.

The study also discovered an imbalance in the realm of CSE content in teaching curricula. The excessive emphasis appears to be focused on knowledge-type learning objectives at the expense of attitudinal and, in particular, skills-based learning. This indicates that the learning objectives took a prescriptive, didactic approach to pedagogy, with less emphasis on introspective and applied to learn approaches, which would be required for attitudinal and skills-type content.

## **Discussion**

Some progress has been made in SRH education in Sri Lankan schools, but there are also many setbacks, resulting in insufficient activities related to sexual and reproductive health education. To some extent, this has clarified the covering of sexuality education subjects in the core curriculum of basic education (UNFPA, 2017). However, the findings of this study show that

sexuality education in Sri Lanka is still lacking. Gender, Safe Relationships, Sexual Rights, Equality, and Sexual or Gender diversity, all of which are considered major CSE subjects, are also found to have significant gaps in coverage, with this study.

In a study conducted in Kenya and Ghana, Panchaud et al. (2019) found that, while the policy framework supports school-based CSE, sexuality education is not defined comprehensively enough and focuses primarily on life skills and reproductive systems, ignoring topics such as contraception, sexual orientation, and rights. Madhuwanthi *et al.* (2021) stated in their research that SRH content included in the present Science and Health and Physical Education curriculum in Sri Lanka covers only general health and biological matters like reproductive health components, preventive diseases which do not address the contemporary SRH information that young generation should be aware of. The results of the present research are in line with the findings of the above-mentioned studies. A significant number of students will drop out of postsecondary education, leaving them with few opportunities to learn about sexuality in the future (Rajapaksa *et al.*, 2015). De Silva *et al.* (2014) discovered that teenagers in the 15-17 age groups lacked a thorough understanding of sexuality, which is similar to the findings of this study.

## **Conclusion and Recommendations**

This research has helped to fill several crucial gaps in our knowledge of CSE practices in Sri Lanka. The findings must be translated into meaningful action at the policy and practice levels, but the challenges are significant. It is critical to establish and implement a comprehensive and coordinated program of action to fulfil the needs of students in all levels and protect vulnerable communities. The UNESCO guidelines suggest a diverse range of sexuality education learning objectives. Sri Lanka should work with the international standards to improve the quality of sex education. The establishment of a CSE national policy will aid in the coordination of resources and activities, as well as the monitoring and evaluation of implementation at the national, regional, and local levels as needed. It is strongly recommended to create a strategic action plan for incorporating age-appropriate CSE into schools.

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## **Impact of Flipped Learning on Student's- Academic Achievement, Engagement, Critical Thinking Skills, Motivation, and Perception: A Review of Relevant Literature**

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### **Abstract**

Advances in technology, demand in society, and changes in ideology, have led teaching methods to embrace technology as a medium of instruction. Flipped learning is an approach that is grounded in active learning pedagogy, which has transformed face-to-face learning. In Flipped learning, students learn the content at home by looking at online videos provided by the teacher, and in-class activities, the students have active interaction and discussion with the teacher. It has revolutionized the way teachers teach and how students learn. This paper aims to present a review of the impact of flipped learning on students- academic achievement, engagement, critical thinking skills, motivation, and perception. A full range of social science citation-indexed journals was surveyed through the website, and a total of 41 research articles were selected for the review. The findings revealed that flipped learning has a positive impact on student's academic achievement in comparison to the traditional method of teaching, it also helps in motivating students towards learning. Various studies also support the finding that flipped learning is active learning which aims to increase student engagement and develops students' creative thinking skill by conducting various impactful in-class activities. But some studies report that flipped learning has no impact on academic achievement and critical thinking skills. However, with regards to students' perspectives towards flipped learning, it was found that students develop a positive attitude towards flipped learning.

**Keywords:** Flipped learning, students learning, academic achievement, creative thinking skill, motivation

## **Background**

Educators have been working to change the lecture-centered model into a student-centered learning environment where students are given the opportunity to engage actively in high-order thinking activities (Kim, et al., 2014). According to Livingstone (2015), student-centered approach should replace teacher-centered approach and one way of doing that is by introducing a blended learning approach. With the advance in technology, the demand in societies, and the change in ideology, many have learned to embrace the usage of technology as a medium of instruction. Flipped learning is a type of blended learning that emerged as a strategy that is trying to pursue a desire to provide an enriched learning environment for students laying more emphasis on students' engagement and experience (Zhai, et al., 2017). It is known by various names like inverted classroom (Garza, 2014), Flipped classroom (Thai, et al., 2017), or simply flipped.

Flipped learning is an approach that is grounded in active learning pedagogy, constructivist theory (Kurt, 2017), experiential learning (Flummerfelt & Green, 2013), and differentiated instruction (Kurt, 2017). It is an instructional strategy that reverses traditional classrooms. It includes in-class activities and out-of-class activities. In the out-of-class activities, students learn the content at home by looking at online videos posted by the teacher, and in-class activities are designed to have more active learning activities (Hwang & Lai, 2017) and spend more time on collaborative inquiry-based learning (Kurt, 2017) such as problem-solving, discussions, games (Leo & Puzio, 2016), etc. The students have active interaction and discussions with the teacher (Herried & Schiller, 2013; Lim & Wilson, 2018). This has transformed face-to-face learning and it has revolutionized the way teachers teach and how students learn. Since the concept is introduced to the students through a video, presentation, podcast, or some other multimedia format before the class starts. Therefore, this gives freedom to the students to learn when, how, where, and as many times as they want.

Flipped learning is surrounded by four fundamental pillars known by the acronym F-L-I-P where F- Flexible environment, L- Learning Culture, I- Intentional Content, and P-Professional Educator (Sletten, 2017). The first pillar, Flexible environment, refers to the flexibility that students have to access the content at any time and anywhere and where they can watch the content at their own pace and as many times as they want. It also highlights that students learning is not confined to the four walls. The second pillar, learning culture, refers to active learning, which constructs knowledge, that is student-centered and not teacher-centered. The

third pillar, Intentional Content, refers to the teacher, where the teacher determines what they need to teach and what materials students should learn on their own. The last pillar, Professional Educator, again refers to the teacher. Here the teacher needs to be more active and more observant. Even though in the flipped classroom the role of the teacher is less visible but they play a very prominent role in the successful implementation of flipped (Marshal & Kostka, 2020; Sletten, 2017).

### **Objectives**

The conceptual background of flipped learning is quite impressive. The researcher, therefore, is intrigued to find out whether flipped learning has any impact on students' learning-like academic achievement, developing and increasing students' engagement, developing students' critical thinking skills, and motivating students to learn. Also, what perception do students have toward flipped learning? The findings of this paper can serve to help for future researchers and also give a better perspective to instructors about this approach.

### **Research Design/Materials**

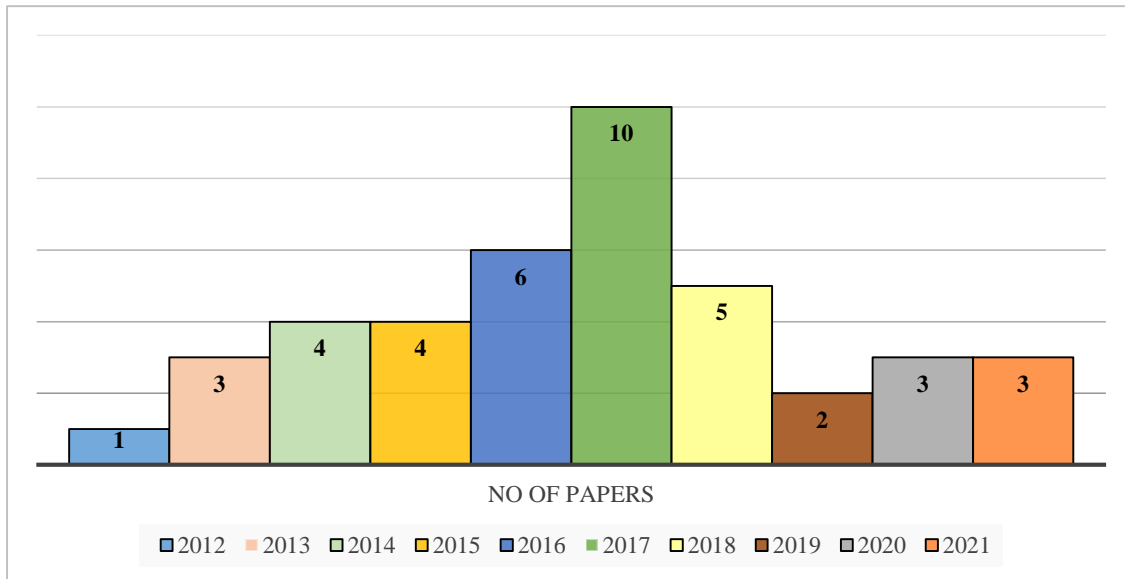
The present study is qualitative in nature and the entire study is based on detailed literature surveys from studies done at national and international levels. For the literature survey, the researcher used multiple search engines and a full range of social science citation-indexed journals for collecting data as shown in Table 1. A total of 41 conceptual and empirical literature that was relevant and published during the year 2012 to 2021 (Figure 1) was downloaded, recorded, and analyzed. The researcher uses keywords like flipped learning, flipped classroom, flipped, flipped approach, inverted classroom, academic achievement, critical thinking, student engagement, motivation, and student perception.

**Table 1**

*Database Source for Conceptual and Empirical Literature Used for the Study*

<b>Impact of Flipped Learning</b>	Background	Conceptual	Google Scholar (2)	
		Empirical	JSTOR (6) Google Scholar (1)	
	Academic Achievement	Conceptual	Google Scholar (2)	
		Empirical	SHODGANGA (6) ERIC (1) Springer open (1) JSTOR (4) MOJET (1) Google Scholar (3)	
			Conceptual	JSTOR (2)
			Empirical	ERIC (3) JSTOR (3) Google Scholar (5)
				Conceptual (0)
	Critical Thinking Skills	Empirical	JSTOR (2) ITSE (1) Google Scholar (1)	
		Motivation	Conceptual	JSTOR (2) Google Scholar (1)
			Empirical	Springer open (1) MOJET (1) JSTOR (6) SHODGANGA (1)
Perception	Conceptual	JSTOR (1)		
	Empirical	Google Scholar (3)		





**Figure 1.** Number of Papers Reviewed for the Study from the Year 2012-2021

## Results/Findings

After reviewing various studies, the researcher found out that majority of the studies revealed that flipped learning has a positive impact on student’s academic achievement in comparison to the academic achievement of students who are being taught using the traditional method (Gayathri, 2019; Ligi, 2019; Chen, 2021; Polat & Karabatak, 2021; Sirakaya & Ozedemir, 2018; Zhai et al., 2017; Leo & Puzio, 2016, Clark, 2015; Peterson, 2016; Hwang & Lai, 2017). Priyadharshini (2019) also agreed that flipped learning enhances students’ academic achievement and the study further reported that male students perform better in marks compared to female students. However, Elian & Hamaidi (2018) report that there is no difference in gender in terms of academic achievement. In another study conducted by Leo & Puzio (2016), they concluded that flipped learning can reduce the difference in performance between male and female students.

Even though flipped learning proves to be much better in improving students’ academic achievement, Saunders (2014) & Clark (2015) highlighted that no significant changes were demonstrated in academic achievement between students who are exposed to flipped learning and traditional classroom. Furthermore, when flipped learning is compared to blended teaching, it was also documented that there is no significant difference between the two (Cabi, 2020; Kim et al, 2014).

Flipped learning primary motive is to provide time for students for active learning. It encourages students to engage in deep and active learning. In this regard, various studies reported that flipped learning increases students' engagement and communication (Clark, 2015; Chen, 2021; Assi., & Cohen; Barkley, 2015; Lim & Wilson, 2018; Brownlow, 2017; Wu, et al., 2017) and students are found to contribute in classroom discussion with enthusiasm and knowledge (Gaughan, 2014). The teacher conducts various activities to engage students in a series of in-class activities during the session for active engagement (DeLozier & Rhodes, 2017; Assi, A & Cohen, A) and maximum student participation (Basal, 2015).

Flipped learning is also found to help students develop 21<sup>st</sup>-century skills like critical thinking (Chis, et al., 2018). In some studies, it was reported that flipped helps to enhance students' critical thinking skills (Chis et al., 2018, Latorre, et al., 2021, Chang, et al., 2020). However, Saunders (2014) reported that flipped learning has no impact on students' critical thinking.

Furthermore, various studies reported that flipped learning increased students' motivation and also help in developing positive attitudes of students toward learning (Nouri, 2016; Sirakaya & Ozdemir, 2018; Lim & Wilson, 2018). This finding was also supported by Gayathri (2019) who reported that flipped learning not only helps in motivating students to learn but it also develops a desire to excel through the creative use of time in collaborative activities, and personal interaction between the teacher and student as well as with peers. Ligi (2019) and Talley & Scherer (2013) also agreed that flipped helps students to retain information and this further motivates students towards learning (Ligi, 2019). This approach also motivates students for self-directed learning (McLean, et al, 2016; Lo & Hew, 2017; DeLozier & Rhodes, 2017; Lin & Hwang, 2018; Chyr, et al., 2017) and hence this led to increased studying time of the students (Talley & Scherer, 2013).

With regards to student's perception of the approach, it was found that students have a different perception than teachers towards flipped learning, and the phrase-Teaching ourselves is commonly used by students to describe flipped learning. This leads to students believing that they have extra work after school to keep up with the pre-class activities. But it was found that after students experience the practice of flipped learning their attitude changes which turn out to be in favor of flipped learning approach. Studies reveal that students prefer flipped learning when students get the opportunity to learn by participating in hands-on activities, problem-solving activities, etc., in class which is the opposite of the traditional method of teaching (Marlowe, 2012; Rotellar, et al, 2016). It was also documented that students find favor towards

flipped learning and their overall satisfaction with flipped learning was high (Peterson, 2016; Jeong, et al., 2016).

## **Conclusions**

By reviewing various related kinds of literature, it is witnessed that majority of the studies report that flipped learning has a positive effect on students' academic achievement, it also increases students' engagement, it increases students' motivation, and also helps in developing students' critical thinking skills. The above review also highlights that students have a positive perception towards flipped learning and also flipped learning encourages students to take responsibility of their own learning.

Despite the positive impact that flipped has on various learning outcomes, some studies reported that there is no significant difference between flipped learning and academic achievement, and also flipped learning has a negative impact on critical thinking skills. However, while searching for the impact of flipped learning on students' critical thinking skills the researcher found that there are relatively few studies that exist. One of the reasons for a negative correlation that was reported in some studies may be because there is no specific model on flipped learning and there is a lack of effective learning guidance strategies that can guide teachers who are interested in adopting flipped learning in their classrooms (Chang, et al., 2020).

From the findings and discussion in this study, it can be suggested that when studying the impact of flipped learning on students' learning outcomes needs to be examined taking other factors, more studies should be conducted to examine the right model for implementing flipped learning and more papers should be examined to study the impact of flipped learning. It is important to note that when using flipped learning both teachers and students should have access to technology and have some knowledge on how to use technology. Flipped learning as an approach is quite promising as we can witness from the review that flipped learning has a positive effect on various learning outcomes. Despite the negative reports on its impact, flipped learning does show a promising impact on active learning which supports academic achievement and motivation.

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## **Quantity vs. Quality of Participation: Stakeholder Perceptions about School Based Participatory Decision Making in Sri Lanka**

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### **Abstract**

The study focused on identifying stakeholder perceptions about the quality of their participation in school – based participatory decision making (PDM). As the literature maintains that the quality of adequate stakeholder participation in Sri Lankan public school governance is questionable, the study examined the perceived reasons behind the stakeholder participation in school decision making. Based on a questionnaire survey (n=62), individual and focus group interviews conducted among the principals, teacher, parent, and past pupil representatives of school governing committees of public schools in Colombo, Sri Lanka, the study attempted to answer following research questions; (i) what are the perceived levels of stakeholder participation in Sri Lankan school decision making? (ii) what are the perceived reasons behind the levels of stakeholder participation in Sri Lankan school decision making? (iii) what are the challenges faced by stakeholders in participating in Sri Lankan school decision making? The majority of internal stakeholders perceived that their participation in school-based PDM is influential in most of the school decisions whereas the external stakeholders often perceived that their participation is limited to consultation in many school decisions. Based on the stakeholders' level of expertise about school decisions, bureaucratic influence, trust and loyalty towards other stakeholders, and statutory requirements, the majority of the participants were satisfied with the current arrangement of school-based PDM. Lack of proper training and education regarding school decision making, time and budget constraints, lack of support from authorities to translate policies into action, overburdened role of the school-principals and lower educational and socio-economic levels of school community members were identified as the challenges faced by stakeholders in participating in school-based PDM.

**Keywords:** Participatory decision making, levels of participation



## **Background**

Over the last few decades, decentralising educational management through the introduction of participatory decision making (PDM) has been a major concern for Sri Lankan educational authorities. The recent effort in educational decentralisation, the Programme for School Improvement (PSI) is designed to transform the school culture through establishing administrative structures and providing training and support services to enhance the participation of principals, teachers, parents, past pupils, and well-wishers from the local community in the school-based decision-making process. Under the programme, two main participative decision-making bodies are established in each school, namely, the School Development Executive Committee (SDEC) and the School Management Committee (SMC) (Ministry of Education, 2018). The SDEC, which is the main school-based decision-making body, consists of the principal (as chair), a deputy principal, and representatives of teachers, parents, past pupils, and the education authority whereas the SMC consists of all the school staff members of the SDEC, the other deputy principals, assistant principals, and sectional heads. PSI has provided specific guidelines to involve all stakeholders in school-level decision-making through SDEC and SMC (Ministry of Education, 2013).

However, studies maintain that there is evidence of inconsistency in understanding and implementation of PSI from school to school (Aturupane et al., 2013, Wehalla, 2014) and that each school practices its own unique way of implementing PSI guidelines (PDM) (Wehalla, 2014). PSI's objective of PDM has seemingly been hindered by drawbacks in the decision-making process such as principal dominance in school decision making, lack of democracy in selecting members for PDM bodies and the inability to obtain sufficient stakeholder participation (Aturupane et al., 2013; Kasthuriarachchi, 2014; Perera, 2006; Parakramawansa & Kodithuwakku, 2018; Wehella, 2014). Thus, even though the schools attempt to comply with the PSI guidelines by maintaining the school governing bodies as required, the actual quality of adequate stakeholder participation is questionable.

Studies have emphasised various levels of PDM from non-participation to full participation typically hypothesised as a continuum (Hoy & Tarter, 1993; Locke & Schweiger, 1979; Somech, 2002) and several personal, social, technical, cultural and political factors affecting the quality of school based PDM (Buthelezi, 2016; Mokoena, 2011; Shagholi et al., 2010; Somech, 2010). Thus, an investigation of stakeholder perceptions regarding the school-based

PDM implementation in Sri Lankan Public Schools will provide insight into the limited body of Sri Lankan school-based PDM literature.

### **Objectives of the Study**

1. To identify the perceived level of stakeholder participation in Sri Lankan school decision making
2. To examine the perceived reasons behind the levels of stakeholder participation in Sri Lankan school decision making
3. To examine the challenges faced by stakeholders in participating in Sri Lankan School decision making

### **Research Design**

The study employed a phenomenological and interpretivist approach in its methodological design. The scope of study was limited to public schools in Colombo district, Sri Lanka. The study employed a two phased approach. During the first phase, 10 public schools were proportionally selected representing all school types as units of analysis based on convenience of access and willingness to participate. An online Likert Scale questionnaire survey was conducted among SDEC and SMC members of the selected schools to examine the level of stakeholder involvement in school based PDM. Even though the questionnaire was distributed among ten schools targeting 101 committee members, only 62 of them have responded assuring a 61% response rate.

Based on the results of the first phase data analysis, 3 schools with higher levels of participant involvement and PDM implementation were selected for the second phase of the study which was an in-depth study regarding stakeholder perceptions about their level of participation in school decision making. Accordingly, 3 semi structured interviews with the principals and 7 separate focus group interviews with each stakeholder group consisting of 18 teachers, 14 parents and 3 past pupils who represent the SDEC and SMC were conducted during the second phase. Survey data were analysed using descriptive statistics and interview data were analysed using thematic analysis. All data were collected online due to inability to travel as per the Covid – 19 border restrictions.

## **Findings of the Study**

The study identified how different stakeholder groups ranked their perceived contribution towards the school decision making. Accordingly, stakeholders' levels of participation in school-based PDM were examined under several categories namely, participant's contribution to different decision areas, perceived importance of each stakeholder group in school decision areas, participation in levels of decision making, and perceived influence in school-based PDM. All the principals and the majority (92%) of teachers perceived that they often contribute to all the decision areas whereas parents and past pupils perceived that their contribution is mostly limited to maintenance and development of school premises, annual school planning, school finance, extra and co-curricular activities. Examining the perceived importance given to each stakeholder group in school-based PDM, the majority (92%) of teachers perceived that the contribution of their stakeholder group is often considered important in all school decision areas specially student learning whereas the parents and past pupils perceived that their stakeholder groups receive more importance in maintenance and development of school premises, annual school planning and extra and co-curricular activities.

The study also examined the participation of stakeholders in various stages of school-based PDM, namely, raising the issue, clarifying the issue, generating alternatives, evaluating alternatives, and choosing the best alternative to finalise the decision. The principals, and teachers perceived that they frequently contribute to all levels of decision making. The principals and the majority (77.8%) of teachers agreed that they always contribute to all stages of decision making whereas the parents and past perceived that they more frequently contribute to the last stage of decision making which is choosing the best alternative and lesser contribution to the earlier stages of decision making. As the participants ranked their perception about the influence they have in school-based PDM, the principals perceived that they are always influential, the teachers perceived that they are often influential whereas the parents and past pupils perceived that they are rarely influential the school-based participatory decisions.

Confirming the survey findings, interview data analysis revealed the perceptions of different stakeholder groups about their participation in school-based PDM. An analysis of participant's perceptions about the general process of decision making in SDEC and SMC, revealed that even though the schools comply with the statutory guidelines (Ministry of Education, 2018) to include representatives of all required stakeholders in committees and assure their presence in

every meeting, the external stakeholders' (parents and past pupils) participation is often limited to consultation whereas the majority (66.7%) of internal stakeholders (principal and teachers) perceived that their participation is more than consultative in most of the school decisions. Furthermore, despite the differences in each stakeholder group's contribution towards school PDM, all participant groups perceived that they complement each other's' contribution and the majority (59%) of external stakeholder representatives were satisfied with the current arrangement of school-based PDM. Stakeholders' level of expertise about the decision in hand, their knowledge about school administration, their trust and loyalty towards the other stakeholders, bureaucratic influence, and statutory requirements regarding school based PDM were revealed as the major reasons for the above levels and patterns of stakeholder participation in school-based PDM. Lack of proper training and education regarding school decision making, time and budget constraints, lack of support from authorities to translate policies into action, overburdened role of the school-principals and lower educational and socio-economic levels of school community members were identified as the challenges faced by stakeholders in participating in school-based PDM.

## **Conclusions**

Despite the schools' adherence to PDM policy guidelines by including internal and external stakeholders in school governing bodies, the quality of participation perceived by the stakeholder representatives varies among the different stakeholder groups. Accordingly, the majority of internal stakeholders perceived that their participation in school-based PDM is influential in most of the school decisions whereas the external stakeholders often perceived that their participation is limited to consultation in many school decisions. Based on the level of expertise about school decisions, bureaucratic influence, trust and loyalty towards other stakeholders, and statutory requirements, the majority of the participants were satisfied with the current arrangement of school-based PDM. Increasing awareness, education and proper training in school governance and proper decentralisation of school authorities should be considered as strategies to improve the quality over the quantity of the stakeholder participation in school governance.

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## **Relationship between the Principals’ Demographical Characteristics and Students’ Academic Achievement in the Secondary Schools of Jaffna District**

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### **Abstract**

The schools play an important role in the development of the country through education. The core goal of schools is to enhance the student achievement. The national level exam results in the Northern Province was poor. According to literature, some of the demographical characteristics of the principals were imperative in contributing towards student achievement. However, they were not identified and there were no evidence-based findings in Jaffna District to prove it. The purpose of this study was to examine the relationship between Principals’ demographical characteristics and students’ academic achievement. Furthermore, it intended to investigate the effectiveness of the principals’ specific demographical characteristics on students’ high achievements. This study used a quantitative method and survey design. Jaffna district was the research area of this study. Two stage stratified random sampling technique was used to select the schools. 54 schools out of 218 schools were selected for this survey. Students’ academic achievement was measured by the percentage of the pass rate at the G.C.E (O/L) examination during the past two years. Data analysis was done using the SPSS package which includes t – test, ANOVA and post-hoc tests.

Findings of this study show that, the principals’ specific characteristics such as Gender ( $p=0.238$ ), age ( $p=0.179$ ), educational qualifications ( $p=0.417$ ), professional qualifications ( $p=0.891$ ), years of experience in teaching ( $p=0.308$ ), years of experience in principal service ( $p=0.367$ ), principal’s grade ( $p=0.540$ ) and students’ academic achievements had no significant difference between them. When taking the statistical analysis results for consideration it was observed that the demographic Characteristics of the principal have no direct influence on the performance of students in the public exams. These results were confirmed by triangulating data through interviews with the senior education administrators, and the director of education.

**Keywords:** Principals’ characteristics, student academic achievements

## **Problems Arising Due to Teacher Shortage and Teachers Transfer Among the Government Schools**

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### **Abstract**

The role of teachers in the learning and teaching process of schools is inevitable. There are many problems related to teacher recruitment in Government schools in Sri Lanka and also there is a shortage of teachers. Furthermore, not only the teachers but also the schools are facing crisis regarding the teacher transfer taking place between the schools. The purpose of this study was to investigate the problems arising due to the teacher shortage and teacher transfer among the Government schools in Vadamarachchi Education Zone of Jaffna district. Objectives of the study were: to examine the teacher availability in schools, to examine the problems faced by teachers and schools due to teacher transfer, to examine the problems faced by teachers and schools as a result of teacher shortage. The research sample included 100 teachers and 10 principals in Vadamarachchi Education Zone. Convenient sampling method was used. The study was carried out using mixed method survey. Data were gathered using questionnaires from teachers and semi-structure interviews with the principals. Secondary data were used to examine the teacher availability in schools. Lack of teacher resource was found in most of the rural schools. In some schools inappropriate placement of teachers was observed to a certain extent. Even though the Education Department asked for three schools in order of priority, teachers were not satisfied when other schools were given. Some of the schools have faced with the problem of unsuitable teachers. These have affected the management activities of the schools and the teaching learning activities of the students. Many problems have arisen in the schools with teacher shortage, namely, teaching learning activities, co-curricular activities and administrative support.

**Keywords:** Government schools, learning, teacher shortage, teacher transfer, teaching



## **Background of the Study**

Many scholars have mentioned the importance of human resource management in an organization. Teachers are the most important stakeholders in the day-to-day activities of a school, which involves learning - teaching process. The number of public schools in Sri Lanka had decreased to 10155 in 2020 from 10165 in 2019, while the total number of teachers had increased to 249,387 in 2020 from 246,592 in 2019. Nationally, the teacher student ratio is 1:16 in government schools in both years (Central Bank Annual Report, 2020). It is necessary to allocate teachers according to the different student populations found in schools. However, it can be observed that factors such as teacher appointment, teacher transfer policy, trade union activities, influence of politicians and teacher resource allocation by Department of Education influence these. The circular of the Ministry of Education No. 2007/20 dated 13.12.2007 has explained the National Teacher Transfer Policy. It states that this circular has been prepared to benefit both students and teachers.

## **Problem of the Study**

Many problems are faced by schools and teachers during teacher resource allocation. When it comes to teacher appointment and transfer, it is often administratively impossible to satisfy all parties. In this case, it can be observed that many problems arise due to teacher shortage and transfer in government schools.

## **Objectives of the Study**

1. To examine the teacher availability in schools
2. To examine the problems faced by teachers and schools due to teacher transfer
3. To examine the problems faced by teachers and schools as a result of teacher shortage.

## **Literature Review**

Transferring teachers between schools is a form of teacher exchange. This does not reduce the total number of teachers in a particular area. So the influx of new teachers does not contribute to teacher turnover. Transfer of school teachers is not a solution to the overall shortage of teachers in a particular region. However, this transfer cannot be said to have the same effect on those who are transferred from a particular school and those who are inducted instead (Ingersoll, 2003).

A separate issue is teacher shortages across regions. Educational policies in force in a particular region, national policies related to teacher supply, and variations in them affect matters related to teacher appointment. There is an uneven trend in this regard among the regions (Nat Malkus, 2015).

Transferring teachers between regions can affect a region's ability to retain teachers. But when such activities are carried out, it is inevitable to face the crisis related to shortage of teachers. This will create an adverse environment in the teaching – learning process of the particular area or school (Stephen Sawchuk, 2013).

“In 2010, the overall excess of Sinhala-medium teachers in national schools was more than 615, and the overall deficit of teachers in Tamil-medium national schools was less than 483. The deficit in Tamil-medium national schools was a common feature in all the provinces. In Sinhala-medium provincial schools, the excess of teachers was more than 19,052, while in Tamil-medium national schools, the figure was more than 2,488. The student-teacher ratio (STR) varies by province. This is largely due to the lack of proper teacher deployment practices in the system. Furthermore, when studied by subject as well as qualified STRs, the situation may be even worse. According to education economists, these STRs are unaffordable” (Balasooriya, 2012, p.143).

Teachers who stay in the same school for too long are affected by their performance. Teacher turnover may occur because of their personal lives related to housing, the lack of independence of new schools, students' concern about new approaches to teaching in new schools, and the adverse effect of transferring from a long-term school on their sense of duty (Wijayatunga, 2018).

“Principals said that they did not get excited when they manage conflict. A few principals seemed to have abilities to use the conflict to develop the schools. Transparency in management and clear communication were best and basic tools to manage the conflict. But frequently principals used their powers to get a solution for the conflict. Principals transferred the teachers who had conflict with them frequently” (Paunanthie, 2018, p.417).

## **Research Methodology**

This is a mixed method survey study. Both qualitative and quantitative data were used.

## Sampling

100 teachers and 10 principals were selected by Convenient sampling in Vadamarachchi education zone in Jaffna district.

## Data gathering and analyzing

Questionnaires with five-point Likert scale ranking closed-ended questions were used with teachers and semi-structured interviews were used with the principals and secondary data were also collected.

Data analysis had been carried out with SPSS. The mean and percentage were calculated and discussed with tables and graphs.

## Findings of the study

Teacher and students ratio of 1:14 is found three of the five Educational Zones in Jaffna district. It is 1:13 in Thenmarschchi and Island Education Zones. So it can be observed that the number of students in Jaffna district is 1:14 in Jaffna, Valikamam and Vadamarachchi Educational Zones where the number of students is high.

**Table 1**

*Teachers Disruption in Jaffna District Among the Five Education Zones*

Zone	Approved	Available	Deficiency	Performance	Students Per Teacher
Jaffna	2672	2991	-319	16	14
Valikamam	2720	2520	200	22	14
Vadamarachchi	1705	1707	-2	3	14
Thenmarachchi	1155	1115	40	7	13
Islands	998	811	187	18	13
Total	9250	9144		66	

Source: EMIS –NP 2022

According to Table 1, 319 teachers are excess in Jaffna Education Zone and 2 teachers in Vadamarachchi Education Zone. But there is shortage of teachers in Valikamam, Thenmarachchi and Island Education Zones. It is to be noted that there is a shortage of 200

teachers in the nearby ValiKamam Education Zone while 319 teachers are excess in Jaffna Education Zone.

Karaveddy, Maruthankeny and Point Pedro Education Divisions are in the Vadamarachchi Education Zone. 14:1 is students – teacher ratio is established in these are. 22 teachers in Karaveddy division 7.5 teachers in maruthankeny division are excess and shortage of teacher is found in Point Pedro division. Distribution of teachers has not been carried out equally in the educational divisions in Vadamarachchi Education Zone which is shown by Table 2.

**Table 2**

*Teachers in Vadamarachchi Education Zone*

Divisions in Vadamarachchi Edu. Zone	No. of Teachers		
	Approved	Available	Deficiency
Maruthankerny	282.5	290	-7.5
Point Pedro	768	760	8
Karaveddy	635	657	-22
Total	1685.5	1707	

Source: EMIS –NP 2022

Although the situation of excess of teachers and shortage of teachers is seen as above without massive gaps, it has been observed that excesses of teachers are found for some subjects in secondary level classes. Teachers have been placed in excess in all zones, in Tamil language, English language, Saivaneri and Roman Catholic even for English-medium mathematics.

**Table 3**

*Teacher Available for Some Subjects in Five Education Zones*

Zone	Maths EM			Science EM			Tamil			English			Saivaneri			Catholic		
	AP	AV	DE	AP	AV	DE	AP	AV	DE	AP	AV	DE	AP	AV	DE	AP	AV	DE
Jaffna	7	22	-15	159	164	-5	138	150	-12	128	141	-13	24	61	-37	15	40	-25
Valikamam	12	19	-7	152	132	20	149	126	23	126	115	11	29	60.5	-31.5	16	36	-20
Vadamarachchi	9	14	-5	89	112	-23	86	89	-3	74	79	-5	11	41	-30	13	19	-6
Thenmarachchi	2	6	-4	75	65	10	69	71	-2	50	58	-8	7	34	-27	5	4	1
Islands	2	4	-2	64	38	26	64	55	9	40	51	-11	24	54	-30	4	13	-9

Source: EMIS –NP 2022

*AP= Approved, AV=Available, DE= Deficiency*

Table 4 shows how the teacher strength for the same subjects is found in all the three Educational Divisions under Vadamarachchi Education Zone. It can be observed that there is an excess of teachers for specific subjects as in five Education Zones in Jaffna District.

**Table 4**

*Availability of Teachers for Some Subjects in Vadamarachchi Education Zone*

Zone	Maths EM			Science EM			Tamil			English			Saivaneri			Catholic		
	AP	AV	DE	AP	AV	DE	AP	AV	DE	AP	AV	DE	AP	AV	DE	AP	AV	DE
Maruthankeny	0	0	0	0	1	-1	15	18	-3	12	15	-3	1.5	7	-5.5	3	6	-3
Point Pedro	5	7	-2	5	5	0	40	38	2	34	39	-5	7.5	17	-9.5	6	7	-1
Karaveddy	4	8	-4	6	5	1	30	32	-2	27	29	-2	3	17	-14	4	6	-2

Source: EMIS –NP 2022

*AP= Approved, AV=Available, DE= Deficiency*

Excess of teachers are observed in all five Education Zones in Jaffna District for the basket subjects namely: Commerce and Accounts, Carnatic Music, Art, Drama and Theater in secondary level classes. As per Table 5 excess of teachers for Carnatic Music in Jaffna Education Zone is shown as 73.5. Excess of teachers for above named subjects can also be observed in the same table.

**Table 5**

*Teacher Availability for Some Subjects in Five Education Zones*

Zone	Business Studies			Music Carnatic			Art			Drama		
	AP	AV	DE	AP	AV	DE	AP	AV	DE	AP	AV	DE
Jaffna	37.5	75	-37.5	50.5	124	-73.5	47	70	-23	14.5	44	-29.5
Valikamam	32	50.5	-18.5	58.5	107.5	-49	47.5	77.5	-30	24	57	-33
Vadamarachchi	34	59	-25	45.5	56	-10.5	25	40	-15	4.5	15	-10.5
Thenmarachchi	12.5	256	-12.5	34	53	-19	11	22	-11	4.5	8	-3.5
Islands	12.5	16	-3.5	28	29	-1	19	15	4	5	7	-2

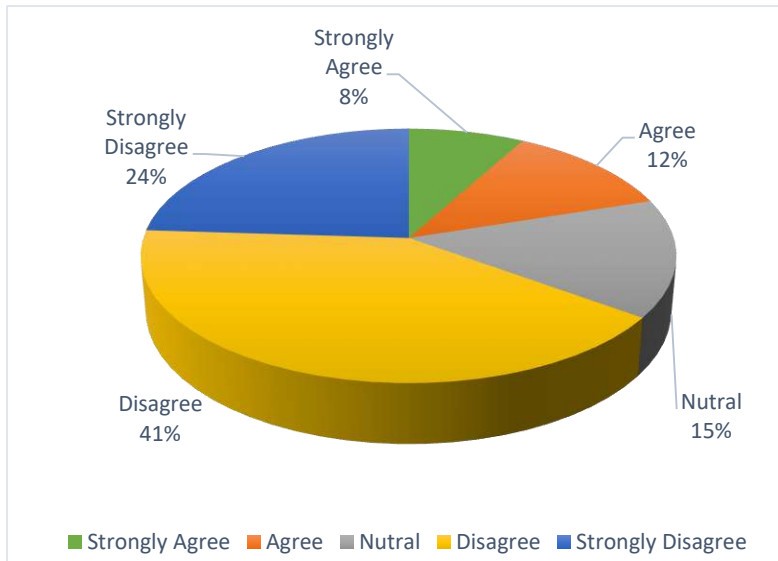
Source: EMIS –NP 2022

AP= Approved, AV=Available, DE= Deficiency

It has been observed that the teachers are in excess for Commerce and Accounts (25), Carnatic Music (19), Art (11), Drama and Theater (3.5) in the schools under Vadamarachchi Education Zone.

According to the data collected from 10 principals, there were a shortage of teachers for specific subjects and in their schools and 8 principals have also reported that there were excess of teachers for some subjects. Similarly, 7 principals reported that they were facing administrative problems due to shortage and excess of teachers.

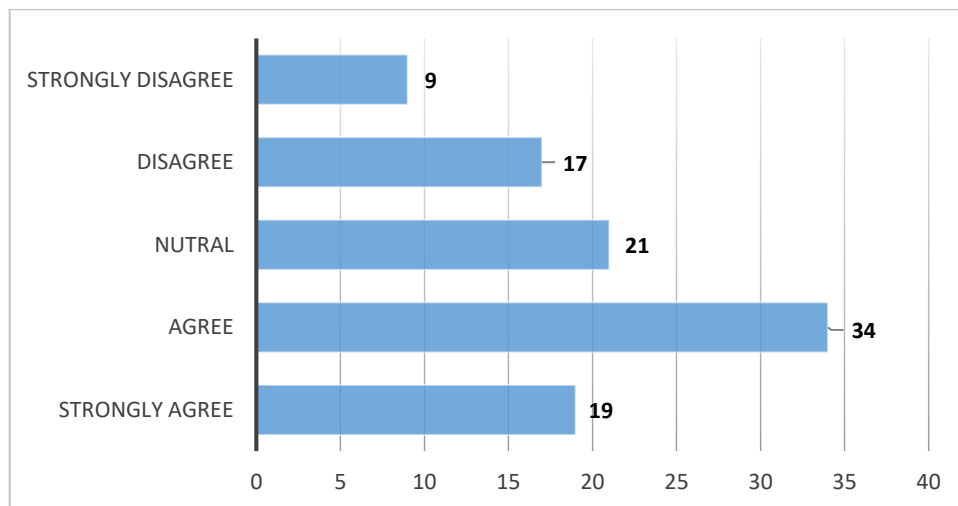
Teachers were requested to mention three schools name for the compulsory teacher transfer in the transfer application by the Zonal Education Office.



**Figure 1.** Transfer for Applied Schools

According to Figure 1, it can be observed that 41% of respondents disagreed that they were transferred to the schools requested by them, while 24% of respondents strongly disagreed it.

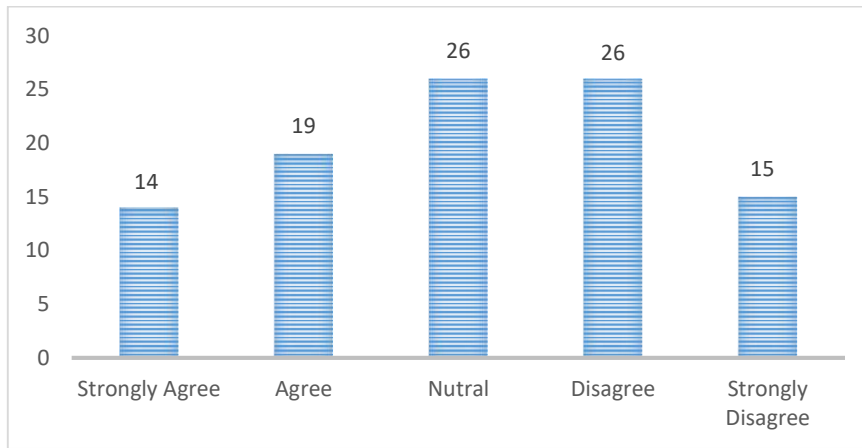
When asked about the allocation of suitable subjects for the appointment of teachers in schools, it was reported by the majority of teachers that the allocation was adequate.



**Figure 2.** Allocated Suitable Subject

About a quarter of the teachers have reported that suitable subjects were not allocated in timetable. It should be noted that this situation would affect the learning-teaching activities of certain subject teachers and administrative activities in the school.

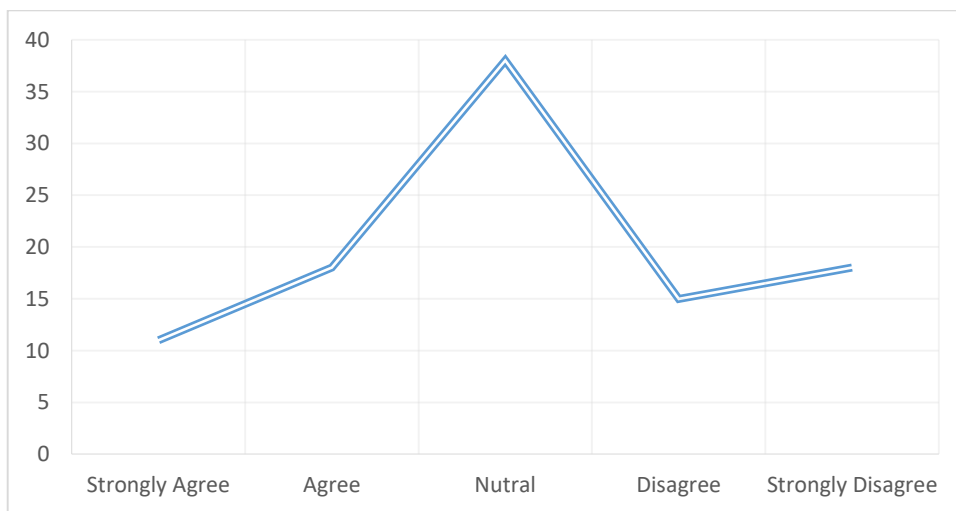
The transfer circular states that teachers cannot continue teaching in the same schools for more than seven years. He/She should be transferred compulsorily from a school to another school. Figure: 3 shows the responses given by the teachers for transferring before the completion of 7 years.



**Figure 3.** Earlier Transfer Before 7 Years

It was also observed that ‘Strongly Agree’ and ‘Agree’ were mostly reported by urban school teachers.

Some of the teachers reported that due to shortage of teachers, heavy workload was imposed by the schools. It can be seen in figure 4.



**Figure 4.** Over Workload due to Shortage of Teacher



11 teachers strongly agreed and 18 agreed that more workload were given by schools due to the shortage of teachers in schools. However, it has also been observed that there is no significant shortage of teachers in schools under Vadamarachchi Education Zone.

## Conclusion

In terms of total number of teachers in the schools under Vadamarachchi Education zone, no massive shortage of teachers has been observed. However, teacher shortage has been observed for Commerce and Accounts, Carnatic Music, Art and Drama and Theater. This situation means that there is a shortage of teachers for other subjects. Principals reported that their administrative activities were affected due to inappropriate teacher allocation. Dissatisfaction has been expressed by some of the teachers with the transfers offered earlier than the specified period. Also, the teachers have said that it cannot be accepted when transfers are given without their concern. Therefore, it has been observed that due to teacher shortage and inappropriate transfers of teachers in schools, not only specific teachers but also the functioning of schools are affected.

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## **Interest of Teachers Towards Professional Responsibility Who Teach Tamil as First Language**

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### **Abstract**

This study explores the interest of teachers who teach Tamil as first language towards professional responsibility. As the first language teaching influences the achievement of other subjects as well, it was expected that these teachers should have professional responsibility. However, a lack of this interest was reported in some forums. A mixed method approach was used in this study to explore the situation. The study sample comprised of 181 Tamil teachers who teach Tamil as first language and 25 principals. Stratified random sampling was used to select the participants from Type 1AB, 1C and Type II School of five educational zones in Jaffna district. Five In-Service-Advisors (ISAs), and five Additional Directors (ADs) are also selected as convenient sampling representing all five Educational zones. Questionnaires are used with teachers while focus group discussions are carried out with the principals. Semi-structured interviews are conducted with the ISAs and ADs for in-depth understanding of the problem. Quantitative data collected with the questionnaires are analysed using descriptive statistics, t-test, ANOVA, with the facilitation of the SPSS software. Significant differences in the interest of teachers towards professional responsibility are shown among the factors such as type of school, qualification, type of degree (internal or external), and Tamil as subject for degree. The factors gender, age group, civil status, teaching experience, residential place and mode of travelling have variation in the interest. Among the three levels of interest, namely high, middle and low, considering teacher-related, school-related and student-related factors, the interest of many teachers towards professional responsibility are spread over the middle range.

**Keywords:** First language, interest, professional responsibility, teachers

## **Background of the Study**

Language teaching is being carried out on many bases such as first language teaching, second language teaching, and other languages. In the current school curriculum of Sri Lanka, the first language, the second language, English language and some other language are taught in the secondary level classes. Tamil and Sinhala are taught as the first language at this level. Interest of teachers is influenced by teaching learning process in classrooms. Teachers are expected by school administration, parents, Departments of Education and the students to be responsible in their duty. Analyzing the results of the past G.C.E. Ordinary Level Examinations, it has been observed that a certain percentage of students who have chosen Tamil as their first language have failed to get pass marks. When they fail to do so, they have to drop out from school education and face difficulties to get a job in government sector. The teachers are also responsible to fail of students' learning of first language of eleven years in school. As a teacher is a member of the society, different factors influence the interest of teachers towards professional responsibility who teach Tamil as a first language.

## **Objectives of the Study**

1. To examine the interest of teachers towards professional responsibility who teach Tamil as a first language.
2. To evaluate the influence of gender, type of school, age range and service range of teachers in relation to interest of professional responsibility.

## **Literature Review**

Every profession has a set of ethics principles, guidance, responsibilities, and norms to guide the conduct and behavior of its profession. Accordingly, in teaching as a profession, there are various guidelines, principles, norms of morality, and accountability which a teacher has to follow in the teaching profession while dealing with the students, stakeholders, and community. Every teacher needs to follow these principles and should be accountable for his/her profession (Kanica, 2016)

At a time when the work and professional identity of teachers appear to be ever more circumscribed by external controls, and by a culture of surveillance, it is all the more important that critical analysis is undertaken transformation, not merely passive recipients of policies (something missing here) (Louise Poulson, 1998. p.431).

A person carrying the responsibility for the functioning of a system in an educational institution in which others participation may or may not be called to account for the functioning of the system for which he/she is responsible. Similarly, an individual member of the teaching staff carries the responsibility for their own actions influencing colleagues and may or may not be called to account for their influencing/leadership actions. It is an expectation associated with the professional nature of teaching and the individual may be called to account for their influencing actions. The obligation that these two facets of educational responsibility entail as a result of delegation and professional expectations cannot be respectively casually handed on to another or legitimately denied (Michael Connolly, Chris James & Michael Fertig, 2017).

Each teacher is accountable for the quality of their performance. Also, since educational investment and resources are provided directly or indirectly with expectations from society itself, responsibility or accountability to the entire society is a major challenge for teachers (Kalamani, 2016)

It is important to raise the professionalism of teachers and how the guidelines should be organized. If the teaching profession is to be considered as a professional job, the teachers are concerned about the learning and teaching activities of their clients, the students, and are responsible for their profession. Teachers should not escape from it (Sinnathampi, 2009).

Teachers' personal problems and weaknesses in school management, supervision, and motivation reduce the effectiveness of training. Teachers become reluctant to expand their responsibilities and roles beyond societal expectations and needs. Teachers must accept that concrete changes are necessary in such matters (Karunanithi, 2008).

## **Research Methodology**

Mixed method was adopted for this study. Both qualitative and quantitative data were collected from the sample. Stratified random sampling was used to select the samples from type 1AB, 1C and Type II schools from five Education zones in Jaffna district.

**Table 1**

*Selection of Samples*

Education zone	Number of the schools				Number of teachers	Sample of the teachers	Principals	ADs Tamil	ISAs Tamil
	1AB	1C	Type II	Total					
Jaffna	14	10	41	65	108	59	5	1	1
Valikamam	13	14	39	66	88	48	5	1	1
Vadamaradchi	10	8	29	47	61	34	5	1	1
Thenmaradchi	6	5	20	31	49	27	5	1	1
Island	4	7	20	31	23	13	5	1	1
<b>Total</b>	<b>47</b>	<b>44</b>	<b>149</b>	<b>240</b>	<b>329</b>	<b>181</b>	<b>25</b>	<b>5</b>	<b>5</b>

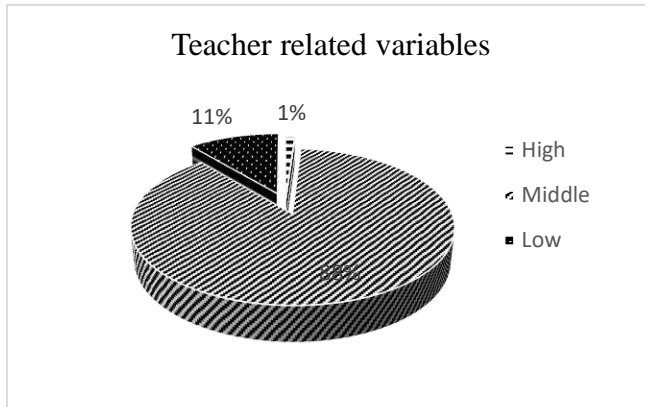
Source: EMIS Northern Province

Questionnaires consisting of open-ended and five-point Likert scale ranking closed-ended questions have been used for data collection from the teachers. Ranking was from 1 to 5 Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4), Strongly Agree (5). Focus group interview was conducted with the principals and Semi-structured interviews were arranged with Ads and ISAs.

The collected data were analysed with the help of SPSS software Descriptive data analysis was followed and interest was divided in three levels according to the Likert – scale, namely high (5-3.5), middle (3.5-2.5), low (2.5 – 1) and illustrated using t-test and ANOVA.

**Findings of the Study**

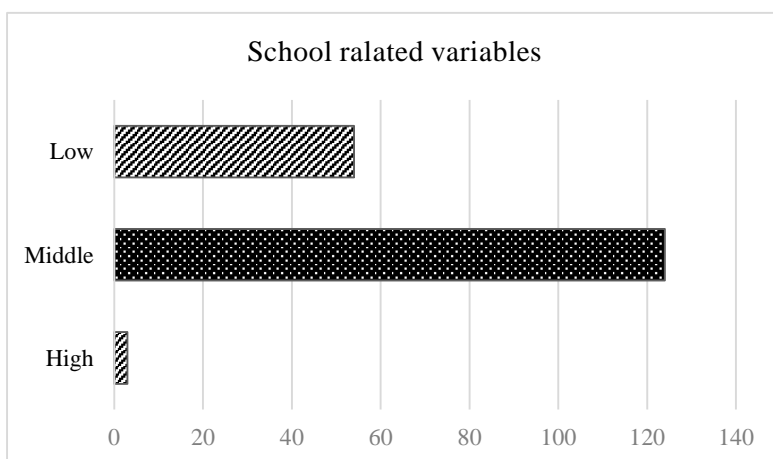
From the sample of the data collected to examine the interest of teachers who teach Tamil as a first language towards professional responsibility are found out. 12 questions related to the teacher related variables were included in the questionnaire.



**Figure 1.** Interest of Teachers - Teacher Related Variables

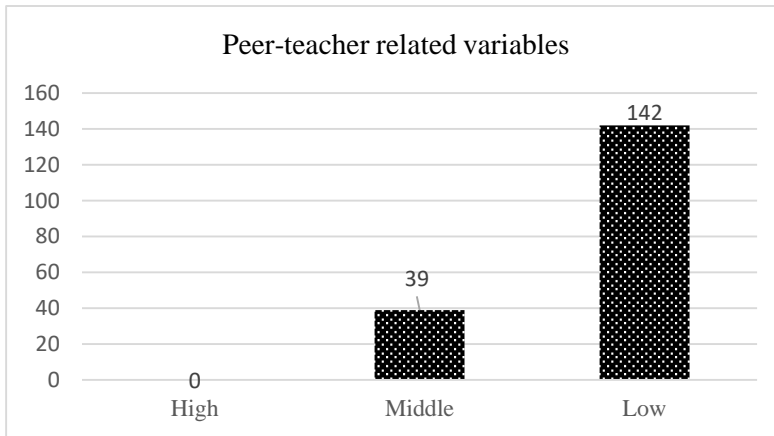
Both samples were reported high levels of response to questions asked to determine how teacher-specific factors influence the level of interest in professional responsibility and 88% of the sample were middle level of interest.

School related questions were asked about how to stimulate interest in teachers' professional responsibilities such as: notes of lesson is supervised by subject related qualified teacher in schools, tasking given them to do extra activities, cooperation given to co-curricular activities, cooperation given to teachers' professional development, other responsibilities given, internal supervision, quality circle activities, end-of-term workload etc. The scales are shown in the figure 2.



**Figure 2.** Interest of teachers - school related variables

It can be observed that the answers of most of the teachers were not satisfactory when asked about the support provided by the peer - teachers towards the professional responsibility of the teachers who teach Tamil as the first language.



**Figure 3.** Interest of Teachers – Peer-teacher Related Variables

According to figure 3, none of the teachers reported a high level of support from peer - teachers in their professional responsibilities and approximately 90% of teachers reported low levels of support.

10 and 14 questions were asked respectively regarding the support provided by the Department of Education and the students in increasing their interest in their professional responsibilities. It was revealed that the support provided by the Department of Education was at low level and provided by the students was at middle level.

**Table 2**

*Interest of Teacher – Department of Education and Students Related Variables*

Interest	Department	Student
High	0	1
Middle	39	108
Low	142	72

Poor responses were found in high level on both Department of Education and student related variables.

ANOVA and t-test were carried out to find whether there was significant differences related to the 10 factors namely: gender, age group, civil status, teaching experience, residential place, mode of travelling, type of school, recruitment qualification, Tamil as a subject for the degree and type of degree. 0.05 is taken as the significant level for the verification. It was found that there was no significant difference in relation to the above 10 factors.

## Conclusion

This study was carried out to find out the level of interest in the professional responsibility of the teachers who teach Tamil as a first language. Interest was divided into three levels namely, High, Middle and Low in the study. High level of interest in professional responsibility was shown by few numbers of sample and middle or low level responses were revealed by most percentage of the sample. Consequently, it is observed that their interest in professional responsibility could be increased by the Department of Education, schools, peer-teachers and students by providing effective support to increase the level of interest.

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## **Influential Factors in Interest of Teachers Who Teach Tamil as First Language Towards Professional Responsibility**

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### **Abstract**

Various factors influence the teaching of teachers as they have social bonds and personal preferences. With the development of technology, teacher role also have changed. There are several factors influence the interest of teachers' in professional responsibility. This study has identified the influential factors and how they have influenced in the interest of teachers who teach Tamil as first language towards professional responsibility of the Type 1AB, 1C and Type II schools in Jaffna district. This is a mixed method survey study. 181 teachers and 25 principals are selected by stratified random sampling method, 5 Additional Directors - Tamil language and 5 In Service Advisors –Tamil Language are also selected by facilitative sampling to represent all five Education zones of Jaffna district. Questionnaires with teachers, focus group discussions with principals and semi – structured interviews with Ads & ISAs are used to gather data. SPSS has facilitated the analysis using t-test, ANOVA, factor analysis, mean and percentages. Accordingly, the influential factors are identified: teacher-related factors, school-related factors, peer teacher-related factors, student-related factors, department-related factors. Department-related factors and peer teacher-related factors are more influential than other factors. Teacher-related factors, student-related factors and school-related factors are influential in the medium level. Peer teacher-related factors have high influence. Student-related factors are of low influence.

**Keywords:** Influential factors, interest, schools, teachers

## **Research Background**

Teacher education, teacher empowering, teacher professional development, and School Based Teacher Professional Development (SBPTD) opportunities are implemented in several ways to increase teaching learning process at school level. A certain portion of money are spent for education for this purpose. These are conducted with the basic objective of improving the learning achievement of students by increasing the professional responsibility of teachers. Teacher empowerment is a major topic of discussion in the field of education globally nowadays. It is obvious that the teachers are more interested in increasing their interest toward professional responsibility of teachers.

While concern for teacher development is increasing, student achievement is expected to increase. Especially, competency in first language of the students is also a necessity for their future life. Performance analyzes by the Ministry of Education reveal that the results of the G.C.E. Ordinary Level Examination have been declining in recent times as compared to the national results. G.C.E. Ordinary Level candidates with Tamil as their first language have a lower achievement level compared to Sinhalese students (Department of Examination, 2016, 2017 and 2018). Thus it can be observed that the chances of Tamil students getting into G.C.E. Advanced Level are relatively low. These should be given responsibility by the teachers who teach Tamil as a first language.

## **Objectives of the Study**

1. To Identify the influential factors in the interest of teachers in professional responsibility
2. To examine the influence of identified factors on their professional responsibility
3. To Compare the factors which have influenced the interest in professional responsibility

## **Related Literature**

Three aspects are important in the professional development of teachers: competency, performance and behavior. Teachers are agents of change. So they should develop the characteristic elements of profession. As the expectations on teachers have increased, the need for their accountability has been increased (Kalamany, 2014).

Four types of teacher competencies are:

1. Cognition and interpretation
2. Teaching, Classroom Management and Planning
3. Organizing, assessments, recording the data, and accountability
4. Other professional activities (Saba Jeyarasa, 2011)

Teachers need to improve their effectiveness in teaching, improving classroom climate and environment, improving classroom organization and management, improving learning-teaching opportunities, improving classroom-level communication, and improving student achievement and performances. Social background of the teachers, their age, gender, civil status, their educational background and interest in continuing education are important, their involvement in school work is based on their idea of profession, interest of profession, vision, and beliefs in values (Sinnathampi, 2009).

The need for new approaches in the teaching of Tamil language learning to change this situation, the qualifications of language teachers, and the role of language teachers in developing the ability of students are important. The role of language teachers in improving the skills of students and in simplifying the understanding of the difficult nature of education is also evident. It is expected to be very helpful to language teachers in teaching Tamil language learning. The teaching techniques used by the ancestors and the teaching techniques relevant to the contemporary context are mentioned. We must properly teach our students the pride and usage of the language (Bhakkialakshmi, 2021).

Socio-economic factors like attendance in the class, family income, and mother's and father's education, teacher-student ratio, presence of trained teacher in school, sex of student and distance of school have also affected the performance of the students. (Raychauduri et al., 2010)

Student is the most important pillar in any education system. Today, teacher should have concern on the total development of child's personality. To achieve the optimal learning of the child the teacher should take care of the students' progress according to their capability. Hence the motto of the teachers should be always for the benefits of their students because the success of the students depends essentially upon the competences of teachers, their sense of dedication and accountability (Kanika, 2016).

The teacher is the key person on which the future of children and humankind depends. This is to say that teachers play an important role in shaping and molding the personality of the individual not only in schools but in society at large (Ekundao, Omodan & Omodan, 2019)

Teachers should attend workshops, seminars and in-service training to upgrade their teaching activities, encourage students to improve their attainments and develop their personalities and make themselves available to students and guide them on difficult-to-learn topics (Olusola Bolarinwa Adeniyi, Odekunle & Oluwakemi Omowumi Amusa, 2019).

## **Methodology of Research**

### **Research Design**

A mixture of qualitative and quantitative survey research design was adopted in this study. The main purpose of the study is to identify the influential factors in interest of teachers who teach Tamil as a first language.

### **Sampling**

181 teachers were selected using stratified random sampling method.

25 principals, 5 In Service Advisors (Tamil language) and 5 Additional Directors (Tamil language) were selected using facilitative sampling method.

All samples were selected from Type 1AB, 1C and Type II schools in Jaffna district from all five Education zones namely: Jaffna, Valikamam, Vadamaradchi, Thenmaradchi and Island.

### **Instrumentation**

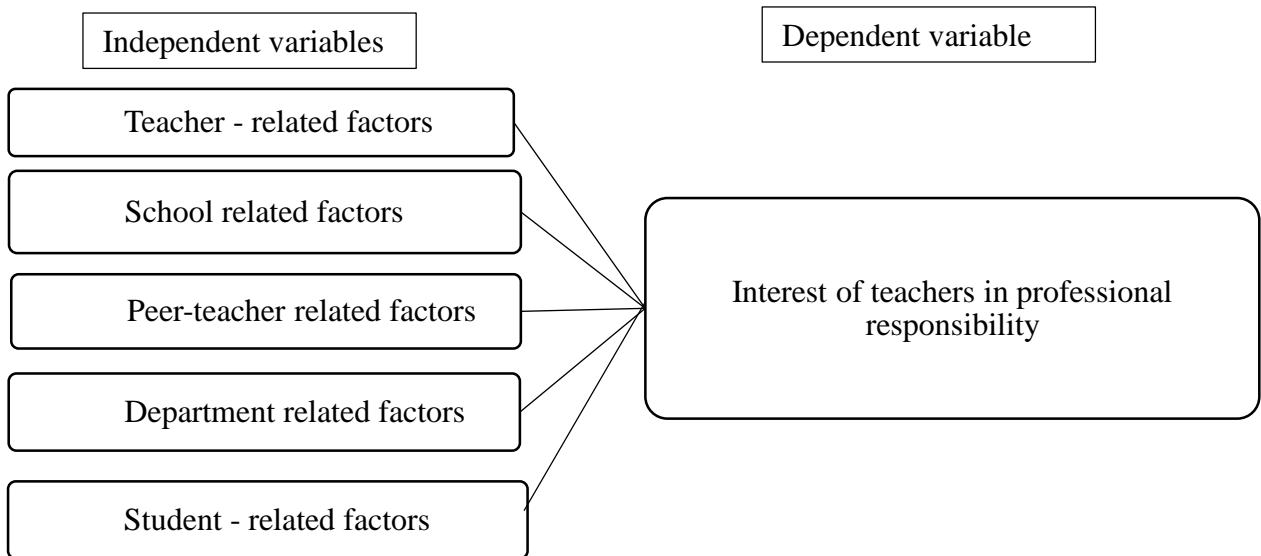
Questionnaire with teachers, focus group discussions with principals and semi – structured interviews with In-Service Advisors and Additional Directors were organized to collect data.

### **Data Analysis**

SPSS data analyzing software was used in data analysis. ANOVA, t-test, factor analysis were carried out. In addition, mean and percentages were also calculated in this study.

## Conceptual Framework

Dependent and independent variables were identified in relation to the research problem.



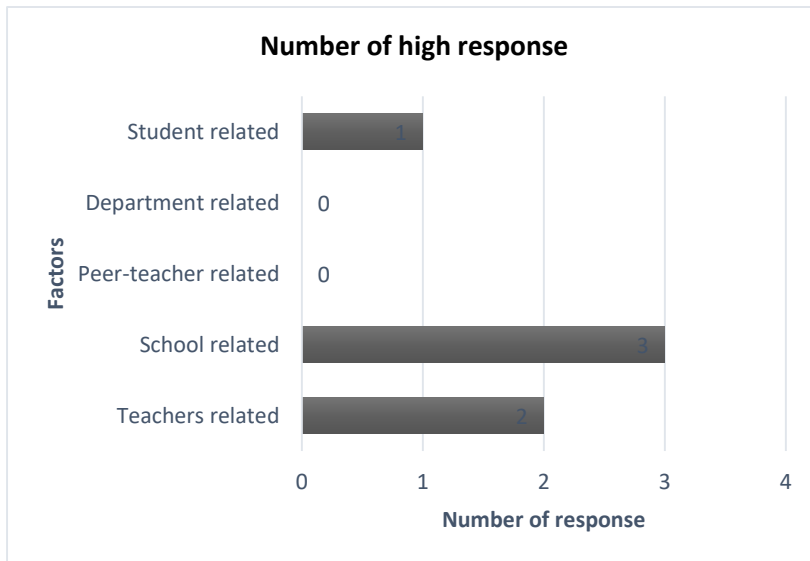
**Figure 1.** Conceptual Frame of the Variables

## Analysis and Discussion

Five influential factors have been identified through literature review in relation to the study. These are teacher related factors, school related factors, peer-teacher related factors, department related factors and student related factors.

The interest of teacher in professional responsibility was divided in to 3 levels namely: High, Middle and Low according to the mean values.

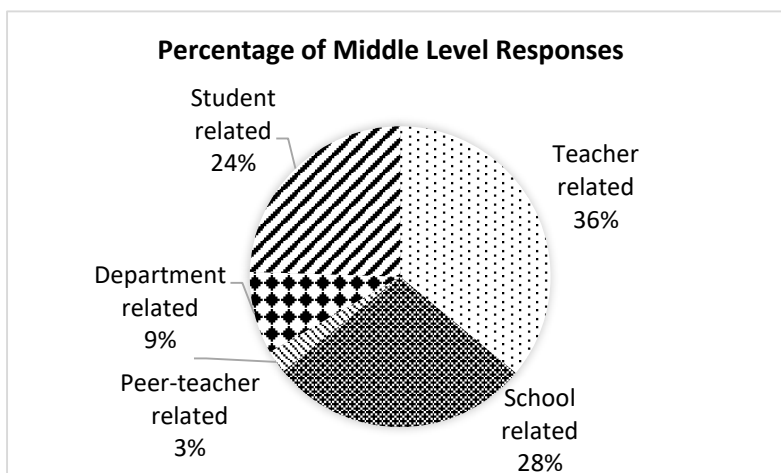
When the interest of professional responsibility is high, classroom learning - teaching activities can be expected to be effective. Teachers are expected in high level of commitment in class room activities such as lesson planning, organizing, implementing and evaluating, and in co-curricular activities. High level interest of teachers are shown in Figure 2.



**Figure 2.** High Level Interest

There is no any response in high level in relation to Department of Education related and peer-teacher related factors and out of 181 participants only 3 have responded for high level.

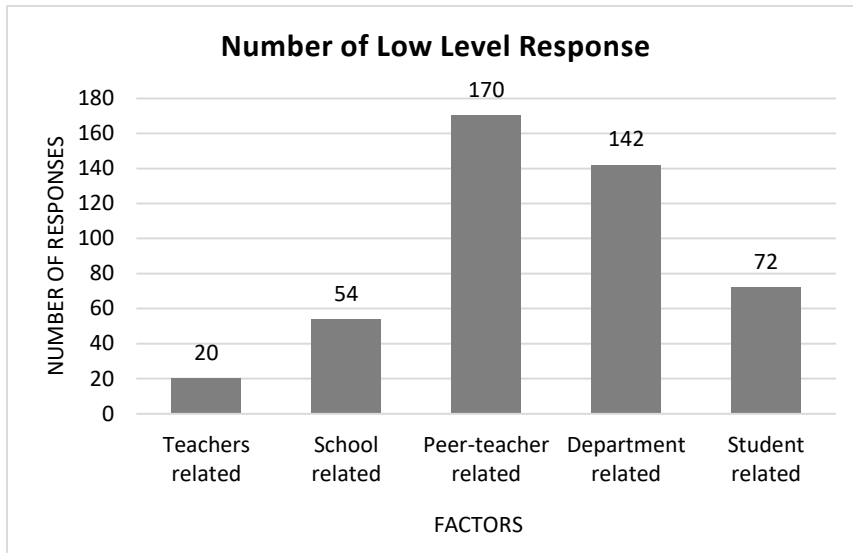
Most of the responses are observed in middle and low level of interest of teachers in professional responsibility who teach Tamil as a first language. Percentage of Middle level responses



**Figure 3.** Middle Level Interest

According to Figure 3, teacher-related factors had the most influence (36%) on the middle level of interest in professional responsibility. However, the school-related factor and the student-related factor are found to be 28% and 24% respectively. It is found that the factors related to the Department of Education and fellow teachers are less than 10%.

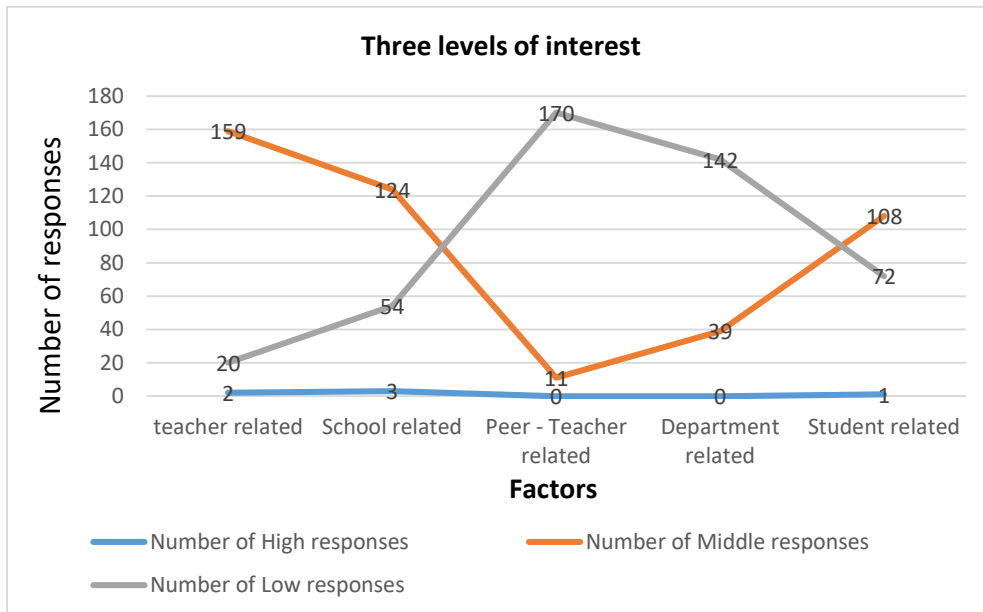
Figure 4 shows the low level interest of teachers in professional responsibility based on the data collected from the samples regarding the specific 5 factors (Teacher related factors, School related factors, Peer-teacher related factors, Department related factors and Students related factors).



**Figure 4.** Low Level Interest

Influence of Peer-teacher related factors in the interest of the teachers in professional responsibility who teach Tamil as a first language was reported by the majority of the sample to be low. That is, most of them stated that the support they provide is not enough to increase the interest in professional responsibility. And also, 142 participants have reported that the cooperation provided by Education Department were not enough. Most of the respondents exposed that the cooperation provided by teachers, school and students is above the low level.

The following diagram illustrates the interest of teachers comparatively.



**Figure 5.** Three Levels of Interest

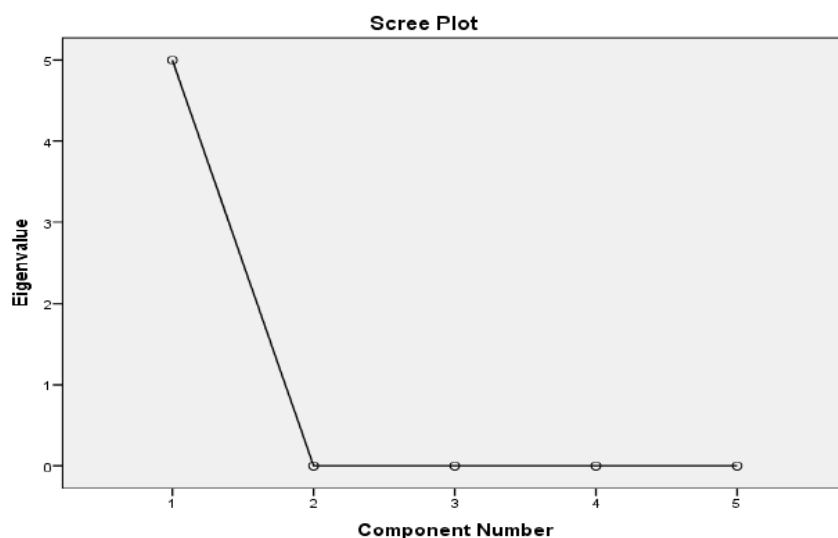
According to the extraction method: Principal Component Analysis, it is found only the factor 1 (Teacher related factor) has contributed to the total variance. The Eigen values and the Scree Plot show this result. That is, the teacher related factor as the most influence in the interest of teachers who teach Tamil as a first language toward professional responsibility.

**Table 1**

*Extraction Method: Principal Component Analysis*

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.000	99.994	99.994	5.000	99.994	99.994
2	.000	.002	99.996			
3	7.877E-005	.002	99.997			
4	6.866E-005	.001	99.999			
5	5.937E-005	.001	100.000			





**Figure 6.** Eigen Values and the Scree Plot

## Conclusion

In this study, the influential factors in the interest of teachers towards professional responsibility who teach Tamil as first language were identified through literature and the impact of them was found out. The interest was divided into 3 levels: High, Middle and Low. Only six respondents had their interest at high level in relation to the said factors. The teacher related factor has contributed mostly to the total variance.

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## **Inclusive Education, Implementation and its Impact on the Self-concept of the Students with Special Educational Needs: A Review of Literature**

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### **Abstract**

The inclusion of students with special educational needs in the regular mainstream classrooms has been a focal point of debate in education systems across the world (Schemit, 2008; Zakaria, 2017). Inclusive education is a new approach to educating children with disability and learning difficulties with those with normal ones under the same roof (Singh, 2016). It serves as the primary strategy to achieve education for all concepts put into attention in Jomtien, Thailand. This article is a literature review related to an ongoing research titled “Impact of inclusive education on the self-concept of the students with special educational needs.” Research papers, e-journals, educational reports, books and related articles have been analyzed to identify the themes related to the topic. Structurally, the article first establishes the concept of inclusive education with strong evidence based on scholarly articles discussing the main aims and features of inclusive education. Then the theoretical perspective of inclusive education is presented by reviewing the theories related to inclusive education. Finally, the impact of inclusive education on the self-concept of students with special educational needs was given based on strong empirical evidence. The literature emphasizes that inclusive education is presented as an ideology that guides practice to respect the right of all learners to quality education. It aims to remove all the barriers and equip the students with special educational needs with skills that can be utilized in their life. Lev Vygotsky’s sociocultural development theory emphasizes that social interaction and cooperation with peers at school are essential in their development. Self-concept is an individual's perception of their worth and is valued as a desirable outcome in many educational and psychological situations. The empirical studies examining the self-concept of students with special educational needs yielded mixed results. Some studies indicated lower self-concept among students in inclusive settings while reporting higher self-concepts in some domains.

**Keywords:** Inclusive Education, self-concept, students with special educational needs

## **Background of the Study**

Inclusive education is a practice of strengthening the education system's capacity to reach all learners. It serves as the primary strategy to achieve education for all concepts put into attention in Jomtien, Thailand (UNESCO, 2009). Inclusive education provides students with special educational needs (SEN) opportunities to learn in a regular classroom environment with other average students apart from the special education classroom. Policies and legislation have provided the necessary background to implement inclusive education. According to Hofman&judith (2014), placing students with special educational needs in the inclusive classroom has become a primary educational mission in most countries. Educating students with special educational needs in regular classrooms has been practised for many years, and its impact on students and educators continues to be examined and debated.

Inclusive education provides students with special educational needs(SEN) opportunities to learn in a regular classroom environment with other average students apart from the special education classroom. "Students with special educational needs" is a broader concept that refers to disabilities or low intellectual capacity. Highly gifted children, as well as children with social and emotional problems, students with learning disabilities, or difficulties of the students who are in their schooling years that make it stiffer for them to learn other than most children of their age, are also determined under this term. Margaret A. Graham (2017) states four significant types of special needs children. They are as follows;

Physical- muscular dystrophy, multiple sclerosis, chronic asthma, epilepsy

Developmental- Down syndrome, autism, dyslexia, processing disorders

Behavioral/ emotional- ADD, Bi-polar, oppositional defiance disorder

Sensory impaired- Blind, Visually impaired, deaf, and limited hearing

If a student has special educational needs, they have a difficulty that makes it harder for them to learn despite other children and face specific difficulties in the school setting.

Inclusive education represents a fundamental paradigm shift in education all over the world today. With the concept of inclusive education, the educational practice became familiar to children with and without disabilities to participate and learn together in the same classes. By the end of the 20th century, inclusive education policy had drawn increased attention as an increasingly important aspect of providing equal rights in education to students with special educational needs. Not only did receiving equal rights, but it was evident that this concept was

a new approach to developing these students. The rationale behind inclusion is that a child with a disability will best be able to cope in a typical world by being able to adapt to a regular school environment (Eleweke & Rodda, 2002).

## **Methodology**

This section documents how the literature presented in this article was surveyed and evaluated in the study. The main objectives of the literature survey were to identify the concept of inclusive education, to examine the theoretical perspective of inclusive education and to examine the impact of inclusive education on the self-concept of students with special educational needs. To identify the evidence that ensures the validity of the main themes discussed in the article, the referencing focused on the research published mainly after 2000. The research papers, articles, e-journals, and reports were reviewed by accessing systematic searches of online journal databases (ERIC) and academic catalogues (such as SAGE and Taylor & Francis). In addition, broader investigations were carried out via general search engines, like Google Scholar Research papers, e-journals, educational reports, books and related articles. After reviewing the mentioned sources, the main themes relating to the objectives were identified. Identified themes were analysed using theoretical and empirical evidence.

## **Findings**

### **The concept of inclusive education**

“Inclusive education is when all students, regardless of their challenges, are placed in age-appropriate general education classes in their neighbourhood schools. It receives high-quality instruction, interventions, and support that enable them to meet success in the core curriculum” (Bui, Quark, Almszan & Valenti, 2010; Alquraini & Gut, 2012). Much empirical research emphasizes the need for equal opportunities and high-quality resources for students enrolled in an inclusive classroom. Research indicates that students in an inclusive classroom are placed with their chronological age mates within mainstream classrooms (Weiman,2001; Swart,2004; Sharma& Singh,2007; Sing, 2016; Furuta & Alwis,2017).

According to Singh (2016), Inclusive education is a new approach to educating children with disability and learning difficulties with that normal under the same roof. It brings all students together in one classroom and community regardless of their strengths or weaknesses in any

area and seeks to maximize all students' potential. It is one of the most effective ways to promote an inclusive and tolerant society.

The literature identifies that the inclusion of students has two primary goals. The first goal of inclusion is to remove all the barriers that prevent participation and learning for students with special educational needs and disabilities. The second aim focuses on the detailed development of cultures, policies, and methods in the educational settings to equip students with special educational needs and disabilities with skills that can be utilised inside and outside the school (Booth & Ainscow, 2002). According to the theoretical and empirical research regarding inclusive education, there are two types of inclusive education. They are full inclusion and partial inclusion. Full inclusion of students with special educational needs is practised in most schools. Through this, students get all the unique services they need in the regular classroom, and students spend all their school time in the regular classroom. Partial inclusion means students with special educational needs are educated in regular classrooms most of the time in the school, and the rest of the time they spend with their special education teacher in the special education classroom. They have the opportunity to build up their academic and behaviour goals there (Aucioin, Porto & Korotkok, 2020; Gibson, 2006; Haug, 2017). Weiman (2001) proclaims that the basis for inclusionary education has been brought about from the belief that students with exceptional education needs would benefit socially and academically in a learning environment with their age-appropriate peers instead of being separated.

### **The theoretical perspective of inclusive education**

Lev Vygotsky's Sociocultural development theory of cognitive development (1978) provides an appropriate foundation to support the inclusive education concept. According to Vygotsky (1962), learning takes place through social interaction and engagement with the environment, and concepts evolve with the aid of strenuous mental activity. In developing skills and knowledge, the difference between the learner's mental age and the level he reaches in solving problems with assistance indicates the zone of his proximal development. Social development theory stresses the ultimate role of social interaction in the development of cognition (Vygotsky, 1978). Kinney (2007) argues that students with special educational needs should get opportunities to inter with their peers. Allowing all the students to learn together in the same classroom environment, students receive the opportunity to get interact with each other. These interactions will enhance the learning of every student.

“Every function in the child’s cultural development appears twice: first on the social level, and later, on the individual level; first, between people and then inside the child. This applies equally to voluntary attention, logical memory, and the formation of concepts. All the higher functions originate as actual relationships between individuals.”

(Vygotsky, 1978, p.57)

Vygotsky (1978) indicated that schools must push intellectually disabled children to develop their abstract thinking and further pointed out that this will not develop on its own but need to have an intervention. He emphasized that the zone of proximal development is essential to this. “learning awakens a variety of internal developmental processes that can operate only when the child is interacting with people in his environment and in cooperation with his peers” (Vygotsky, 1978). As interpreted by Rodina (2006), Vygotsky believed primary disorders like visual and hearing impairments, language and speech-related problems, and motor and CNS [central nervous system] related impairments lead to child exclusion from the educational environment will cause secondary (socio-cultural) disability. As McLeod (2014) analysed, Vygotsky’s theories run with the indication of collaborative learning, which incorporates grouping students of various ability levels so that more-advanced students can help less-advanced students in learning. As reported by Begg (2015) Vygotsky’s view of instruction was that interaction with adults or more advanced peers was necessary for development.

Research has also indicated that the social cognitive theory emerged from the social learning theory. Presented by Albert Bandura is related to the inclusive education policy. Bandura (1986) posits that learning occurs in a social context. He explains there is a dynamic and reciprocal interaction with the person, behaviour and environment. Bandura (1986) posits that virtually all learning phenomena can occur by observing other people’s behaviour and the consequence of it. In an inclusive setting, students with special educational needs will get the ability to interact with normal students. They get the opportunity to observe the behaviour of their peers, and to identify the thoughts and feelings of others which influence their learning. According to Singh (2016) inclusive education is a better way to help all students to succeed. Children do better academically when an inclusive setting and inclusion provide opportunities to develop relationships. Singh (2016) pointed out some of the benefits students get from inclusive education. It includes friendship, social skills, personal principles, comfort level with people who have special needs, and caring classroom environments.

## **The impact of inclusive education on the self-concept of students with special educational needs**

Self-concept is defined by Eccles et al. (2005) as people's general composite or collective view of themselves across multidimensional sets of domain-specific perceptions. These perceptions are based on self-knowledge and evaluation of the value or worth of one's capabilities formed through experiences with and interpretations of the environment. Self-concept is the perception that individuals have of their own worth. This includes a composite of their feelings, a generalized view of their social acceptance, and their personal feelings about themselves (Belmore & Cillessen, 2006). Much empirical research was found regarding the self-concept development of students with special educational needs.

Gans, Kenny and Ghany in their research in 2003 found that students with learning disabilities scored significantly lower on the Intellectual and School Status subscale. This is significant because these students were in separate classes with other students in the special education classrooms including students with emotional disturbances and cognitive impairments. Separating students can have a negative effect on their self-concept. This, in turn, can have a negative effect on their self-esteem and academic achievement (Troutwein et al, 2006). Mrug and Wallenmder (2002) in their study compared the self-concepts of young students with physical disabilities in the Czech Republic and the United States of America with that of a normative sample of Czech students without disabilities. They found that the self-concept of young people with a physical disability integrated into regular classrooms did not differ from the self-concept of their peers. Marsh (2005) found that a student's self-concept partially depends on their surroundings. He describes this as the big-fish-little-pond effect (BFLPE). If the average ability of classmates is high, equally able students will likely have a more negative academic self-concept. However, if the average ability in a given student's class is low, then they are likely to have a positive academic self-concept. This academic self-concept is very important during a child's middle school years because much of a child's daily interaction is related to school. Once these academic self-concepts have been established, it can be challenging to alter them (Sternky, 2010). According to Zeleke (2004), the majority of the studies found no change in academic self-concept with age: however, some studies indicated lower self-concept among students in inclusive settings (Cambra & Silvester, 2003; Montgomery, 1994; Schmidt & Cagran, 2008; Hofman & Judith, 2014).



## Conclusion

This article provided evidence that the empirical studies examined on the self-concept of students with special educational needs yielded mixed results. In an inclusive educational setting, students with impairments can interact with normal peers and gain many experiences. When schools correctly identify students with special educational needs, appropriate considerations need to be taken to provide those students with the best learning environment possible.

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## **Developing Essential Learning Skills in First Key Stage Students Through Online Education**

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### **Abstract**

In the year 2020 schools in Sri Lanka were closed due to the pandemic. The students who entered the Grade 1 in 2020 can be mentioned as a group of students who were heavily affected. The students in that first key stage were a group of children who got a completely different experience from online education instead of classroom teaching. Students of that age must achieve 48 essential learning skills. Evaluation reports showed that some of those essential learning skills were not achieved through online education. This research has been conducted to empirically investigate how to identify a new online methodology for unreached essential learning skills. Research has shown how mobile games, video shows, internet are being used for primary education and their effect on students' academic performance. By nature, any students above the age of five have a great interest in cartoons, computer games. This research investigates how that interest can be utilized for online education. The target population was the students enrolled in Grade 1 in the year 2020 and the sample was 34 students in a class of a 1C school in Sri Jayewardenepura education zone. Based on the essential learning evaluation reports ten students were selected as the participation group and also five essential learning skills lessons were chosen from the subject of mathematics. Three online intervention programs were implemented for those five skills and for that program, PowerPoint related learning, video-based learning and computer/telephone game-based learning had been used. Through this action research post-intervention evaluation showed that most students in the intervention group were able to reach the target proficiency level. Also, the ability to keep the students' attention throughout the lesson, the enthusiasm and activity of the students were evident in the active research. This was confirmed by the teacher who was previously involved in online education.

**Keywords:** Essential learning skills, First Key Stage, evaluation report, online education

## **Introduction**

In the year 2020 many schools in the world at large were closed due to the Covid-19 pandemic. Also, it was decided to close all public schools and other schools from March 12<sup>th</sup>, within two days of the first Covid patient being reported in Sri Lanka. Closure of schools in Sri Lanka also had a challenging impact on education (UNESCO, 2020). One of the most affected groups of students was the first Graders in 2020. These students attended school only for three months. Grade 1 students had to get education through online instead of active experience-based learning. The engagement in active experience-based learning activities took place with the teacher for a short period of time. This was a great challenge for both the students and the respective class teachers.

Primary education in Sri Lanka has three main parts as the first key stage, second key stage and third key stage. Grade 1 and Grade 2 belong to the first key stage. The first key stage can be called as the crucial stage from the primary aspect. The first key stage provides the foundation for the child's adaptation to school environment and the learning process. The first key stage has forty-eight essential learning skills that all students must achieve. An essential learning skill is a skill that every student must achieve at that stage. Essential learning skills comprise of three main components. There are subjects which meet the development needs of students, subjects which help to continue learning and subjects which lay the foundation that is absolutely necessary to live as a good citizen (National Education Commission, 2016). The main challenge faced by the teachers in the first key stage is, not knowing a specific guide or method on how to deliver this skill-based learning via online. Therefore, what happened to the teacher was to engage in learning and teaching methods in a method that was prepared by the teacher himself. The teacher was not prepared for online education in the unexpected school closure. It was understood that technology is necessary, but there was no specific understanding on how to incorporate the technology in the teaching learning process appropriately for the child. It is doubtful whether teachers used the learning software effectively, because many teachers simply shared the traditional blackboard with the students (Priyadarshini & Jesuiya, 2021). The learning devices in the software are not used effectively and the teachers were not aware about the online tools used for online education. Therefore, studying such methods have become an urgent need. The student in the first key stage is a child born in the Alpha generation of the technological age. Hence, they have a natural thirst for technology (QUEST Journal, 2018). However, traditional learning through technology can make the learning process boring for them.

Due to 2D vision through 3D learning equipment in the classroom, technical issues like low reception of signals affect the audibility, continuity and the visual imagery in the teaching process. Therefore, the first graders were immensely distracted and the constant attention which is developed at this stage was badly affected. However, at the end of the year, these students who entered the first year in the year 2020 were promoted to the second year in the year 2021, even though the schools were still being closed. Therefore, this research is conducted to experimentally investigate how students in the first key stage can achieve essential learning skills through online learning and to identify new online methods. By nature, any student at the age of five prefers the computer and the phone. They are fond of cartoons and video games. This research investigates how these preferences of students can be applied to online education according to the latest online theories. It is expected through this research to identify online learning methods that can develop the essential learning skills of the first key stage, as well as to implement an intervention program through the identified methods. This research comprises four main objectives.

### **Research Objectives**

1. Identifying essential learning skills that cannot be achieved through online learning methods related to first Key Stage
2. Identifying online learning programs that can be implemented in the first key stage
3. Implementation of student intervention program that can be successfully used online
4. Find the positive differences achieved by the student as well as the teacher through the intervention program

### **Research Design**

The action research has been done based on a real problem faced by the first key stage in the classroom learning and teaching process. For about 90% of the two years of the first key stage, the teacher was engaged in online education without formal technical training. There is very little research on the exploration of learning methods that can be done using information technology and the Internet in Sri Lanka. It is very important to conduct research in such a background. According to the essential learning skills evaluation report, ten students were selected as the participation group and five essential learning skills in mathematics. All three intervention programs follow the online learning model proposed by Si Zhang, et al., (2017). Accordingly, three intervention programs were implemented for the five skills of mathematics. The first intervention program was the PowerPoint-based online learning teaching method

identified from the interview conducted with the teachers of the 1AB school. Second intervention program, was the video-based learning proposed by Ronald in 2009. Internet games, phone games and computer games were used for the third intervention program.

## **Sample**

The population of this research was the students who studied through online education in 2nd grade of the first key stage in year 2021. Since it is an action research focused on online education, a 1C school in Sri Jayewardenepura educational zone of Colombo district was selected as the participation group. The student sample was a classroom of thirty-four students studying in that class in Grade 2 in 2021. Accordingly, all the parents and guardians of those students became the sample. Four teachers from a 1AB school and two teachers from a research school engaged in online teaching in first key Stage comprise the sample.

## **Data Collection and Analysis**

Six main tools of data collection have been used in this research. Data were obtained in three ways to identify essential learning skills that could not be achieved through prevailing online education. First of all, by analysing the essential learning skills evaluation report, the students' skills in which they were not proficient were identified. Among the forty-eight main essential learning skills, there are 13 skills related to mathematics. Five skills in mathematics where students showed the most weakness have been selected for the research. Ten students were selected as the participation group. The data obtained from the parents' questionnaire and the teacher in charge of the classes were helpful. Through the essential learning skills evaluation report, the respective ten students were again assessed. The skills acquired accordingly are shown below:

1. Skill No.36

The value and places

2. Skill Number 22

Identify and name geometric shapes.

3. Skill No. 28

Write the sum of two single digit numbers.

4. Skill No. 29

Subtract a number less than nine from a number and write the answer.

5. Skill No. 34

Recognizes and declares that the quantity contained does not change even if the shape and position change.

All five of these competencies establish students' continuous learning. The students selected for this will be referred to as AB, AC, AD, AF, AG, AK, AL, AO, AS and BF. These 10 students can be described as near or far from being proficient for the 5 selected skills. Before implementing the intervention program, the proficiency level of the students must be identified. Three intervention programs were implemented for these five skills. The history of online research was considered to identify appropriate online methods that could be used for the three intervention programs, and the methods used by teachers in a neighbouring 1AB school were also considered. Based on this data, three online intervention programs were implemented by including electronic peering, computer video technology and computer phone game technology. The identified online methods were conducted with the participation of two teachers according to the Si Zhang model. During the intervention program, the teacher was not visible on the computer screen as in typical online learning process conducted by teachers. Only pictures, videos and games related to the lesson were shown. The researcher led the lesson and the teacher in charge of the participant group did the observation. The observation criteria used in the intervention program are as follows:

- Voluntarily ask questions from the teacher.
- Contribute to the lesson in discussion at the entrance.
- The learner contributes to the discussion by asking questions and answering questions in the teaching process.
- Number of correct answers given in oral assessment
- Attentively participate throughout the lesson
- Moments of distraction

Accordingly, a series of lessons using PowerPoint were implemented for the first intervention program. PowerPoint was also used for access, learning and teaching process and evaluation. Attractive pictures and motion pictures were used for those programs. At the end of each lesson there were a written and oral evaluation. At the end of each intervention program there were written and oral evaluation. For the second intervention program, the video technology learning proposed by Carr, et al., (2009) was used. The lesson series was designed to match each skill with YouTube and NIE channel. In it, various video scenes were used for the introduction, learning and teaching process as well as oral evaluation. Game-based learning was used for the



final intervention program. Three computer games related to each skill were used for access, teaching and learning process and evaluation. Games for learning websites such as tinytap.com and education.com were used.

## Results

Positive change could be seen in the students through the summative assessment conducted at the end of the three intervention programs.

All students except two reached proficiency on the summative assessment. Every student reached a higher level of proficiency than they had before the intervention program. During the interview with the students after the intervention program, they enthusiastically expressed their preference for game-based learning. The Table shows the performance level of the students.

**Table 1**

*Analysis of each student's overall achievement level before and after the intervention program*

Achieved ✓	Close to proficient ●			Far from proficient ●						
Skill No.	AB	AC	AD	AF	AG	AK	AL	AO	AS	BF
36 Before the intervention program	●	●	●	●	●	●	●	●	●	●
36 After the intervention program	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
22 Before the intervention program	●	●	●	●	●	●	●	●	●	●
22 After the intervention program	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
28 Before the intervention program	●	●	●	●	●	●	●	●	●	●
28 After the intervention program	✓	✓	✓	●	✓	✓	✓	✓	✓	●
29 Before the intervention program	●	●	●	●	●	●	●	●	●	●
29 After the intervention program	✓	✓	✓	●	✓	✓	✓	✓	✓	●
34 Before the intervention program	●	●	●	●	●	●	●	●	●	●
34 After the intervention program	✓	✓	✓	●	✓	✓	✓	✓	✓	●

Source: Evaluation reports

## **Findings and Discussion**

There are many challenges faced by the teachers in Sri Lanka while teaching online. Among them, the main challenge is the problem of technical literacy. It has also been shown in the research conducted in 2014 by Haloluwa on the activities that can be done to use the computer-related activities in the primary sector. Accordingly, in online education, it has been revealed that even reluctant children can be retained for education through online video-based learning, online game-based learning, and it has made online education successful through collaborative learning theories.

Several researches are being conducted on many teaching methods related to online education globally (Singh & Thurman, 2019). Being able to identify websites, games, videos that can be used as the latest methods is a positive characteristic from the teacher's aspect. Zhang (2017) and AL Kurdi (2020) have shown how the collaborative learning theory, and constructivism theory can be adapted to online education. Learning and teaching methods are available for those derived from the above two theories for the age groups parallel to the primary first key stage. Also, the latest technology learning and teaching methods used in schools with such educational patterns in foreign countries can be explored online. Trying to adapt the application of software to their classroom effectively is another positive outcome the teacher has found through this research. The collaborative learning model introduced by Picciano (2017) and Si Shang's model for online education have shown positive characteristics by teacher and students rather than the online learning teaching method conducted by the individual teachers on their own.

## **Conclusion**

Carr 's (2009) research has confirmed that videos help the student to retain more memory than the learning and teaching process in a normal classroom. Therefore, video-based learning should be developed in Sri Lanka as well. It can be used for both online learning and regular classroom learning. Through game-based learning, the student can go a long way through self-learning, in particular, the key skills in major mathematical concepts. Online games are now widely available in the Internet. Some computer and phone games are helpful to develop their brains. The mind should proceed logically by solving maths problems. It creates self-motivation of the student. This is indicated by the research that has been done (Fortaris, 2017) to develop the educational achievement of primary students using AR technology. Today, students have surpassed the teacher in terms of information technology, technical skills and

computer literacy. Therefore, the technical classroom with modern technology is more important than the ordinary classroom. Online education has created a good platform for it. Among the facts revealed by the above research, the student's willingness for online learning is very important. Dimensions that can be used for new research have been identified in the literature research. As a whole, all the students in the participation group were able to reach a higher level of proficiency than the proficiency level they had prior to intervention program.

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According to this research, the online education system can keep attention of the students and construct the lessons in such a way that the students are motivated. Through this, it has been shown that the education of primary students in the first key stage can be brought to a positive level by online education.

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## **Participation of Stakeholders in Programme for School Improvement in Developing Reopened Schools**

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### **Abstract**

In enhancing the development and transparency of school-based management, the participation of stakeholders is considered as one of the most important factors. The school-based management is being implemented in Sri Lanka as the Programme for School Improvement (PSI). Even though the equity in education policies prevail, there are reopened schools that need to implement such policies effectively. These neglected schools are gradually developing, while trying to fulfil its resource needs. This study was based on the inquiry of the support given by the stakeholders for the development of such schools. The objectives of the research were to investigate how much school stakeholders in reopened schools are aware of the PSI, to examine how committees related to PSI are functioning, to find out how stakeholders have supported in implementing the PSI, to examine the challenges faced by the stakeholders, and to investigate the strategies used to overcome the challenges faced by the stakeholders of the reopened schools. Descriptive survey method was employed under quantitative research approach. The sample consisted of 22 randomly selected reopened schools. 319 stakeholders were selected to collect data through a questionnaire survey and 281 of them responded. The quantitative data was analysed according to the descriptive statistical method by using the SPSS software and the qualitative data was analysed by using thematic analysis. According to findings, school development committees of these schools are functioning well. Further awareness of PSI circulars and training on responsibilities of School Development Committee are required. The findings further revealed that the stakeholders have been supporting at high achievement levels. Challenges faced by the stakeholders are; lack of resources and infrastructure facilities. The schools have introduced various strategies by implementing PSI with the help of stakeholders. It is suggested that special programmes should be implemented by the authorities to provide additional resources to schools in order to overcome the challenges schools face in implementing PSI program and thereby developing the schools.

**Keywords:** Programme for School Improvement (PSI), school stakeholders, school development, reopened

## **Introduction**

For the development of education, parents and community's support has been taken by many institutions. An important factor that has helped to achieve the desired results in education is mainly parental and community participation in school-level educational activities (Perera, 1997; De Silva, 2004; World Bank, 2007; Wijekoon, 2021; Kumari, 2021; Malkanthi, 2021; Pihillegedara, 2021). According to Ministry of Education, (2005, 2014, 2018) making decisions about school management and financial management under the program for school improvement has been strengthened by decentralizing the powers to the school level. In particular, decentralizing the stakeholders of the school act to reach the goals of the school (Cheng, 1996; World bank, 2007, Nir, 2010; Kumari, 2021; Kumari, 2022; Wijekoon, 2021). The school enhancement program is an important mechanism to create efficient and effective schools with transparency and participatory management, by getting the participation of the entire school stakeholders including former students, parents and education officials. For the development of the school, the School Development Committee has been assigned the responsibility of making decisions and implementing them.

Existing literature highlighted that different countries have been using different strategies in obtaining support from the school stakeholders for effective school management and development (Gunasekera, 1997; Govinda, 1997; Leithwood and Menzies, 1998; Caldwell, 2005; Gamage, 2009; Kumari, 2019, 2021, 2022a, 2022b). The programme for school improvement (PSI) based on the school-based management concept has been introduced to the education system of Sri Lanka in 2006 (Kularathna, 2008; Ministry of Education, 2013, 2014). It is also known as the Balanced Control Model. This has laid the foundation for making decisions from the ground level as well as making it possible to use the community as an educational resource (Perera, 2006, 2011).

Equitable education policies are implemented for all 10164 schools in Sri Lanka (Ministry of Education, 2018). There are many rural schools with fewer students. There is a potential for resource sharing between rural schools and urban convenient schools in disadvantaged areas (Ekanayake, 2013; Kularathna and Kodituvakku, 1991; Roopasingha, 2004). Some schools have been closed (National Education Commission, 2003, 2004; Pattiyagodage, 2005; NIE, 2009; Wakishta, 2015). Some schools that were closed due to multiple problems are reopened and maintained in the same unfavorable environment. These resources that were left behind are being developed in the face of challenges. In this development, the necessary background

has been created to obtain parental and community participation through the PSI. The process of school improvement must be continued to establish sustainability of schools. Practices of different schools have been implemented satisfactorily amid various difficulties and constraints, including resource shortages in rural disadvantaged environments (Gunasekera, 1997; Baker, 1998; Wakishta, 2015). Even though the country is planning to implement equity policies to bring the goal of equal opportunities to underserved schools, these rural disadvantaged environments are strained with various difficulties and shortcomings (Gunasekera, 1997; Baker, 1998; Wakishta, 2015).

In developing such schools, the school development committee is able to make decisions about school management according to the characteristics and needs of the school. The school planning program will improve the relevance and speed of this decision-making. By promoting parental and community participation, people's participation will be increased and democratic schools will be strengthened. This has provided opportunities for parents and the community to participate in school development activities in improving schools and becoming successful. Because of this, wealth and community relations develop.

Thus, this study is important to bring new knowledge to the research literature as there is freedom of knowledge about school stakeholders or support and participation in the implementation of the PSI in closed and reopened schools. It is challenging to restart and develop rural schools closed due to multiple problems in the same environment. Therefore, this study attempted to find out how school stakeholders extended their support in fulfilling challenging tasks of the schools.

### **Research Objectives**

- To investigate how school stakeholders in closed and reopened schools are aware of the PSI.
- To examine how committees related to PSI are functioning in reopened schools.
- To find out how stakeholders have supported in implementing the PSI in reopened schools
- To examine the challenges faced by the stakeholders in developing the reopened schools
- To investigate the strategies used to overcome the challenges faced by the stakeholders in developing the reopened schools



## **Methodology**

Descriptive survey method was employed under quantitative research approach. The population of the study was all the schools which have been closed and reopened in Sri Lanka. But due to practical problems, the sample was limited to 22 schools that were reopened and are being developed. The sample was selected randomly. The sample consisted of zonal representatives, principals and all the teachers of the 22 schools and six members of the school development committee. Questionnaires were administered under the themes prepared based on the objectives of the research to collect qualitative and quantitative data. Quantitative data was analyzed according to the descriptive statistical method using the SPSS software. Qualitative data was analyzed using thematic analysis.

## **Results and Discussion**

Stakeholders of schools are the community members who are directly involved in the school activities.

Stakeholder awareness on PSI of closed and reopened schools is as follows. 98% of the stakeholders are aware of PSI and relevant concepts. However, only 54% of the stakeholders have been trained on implementation of PSI. 46.2% of stakeholders have responded in agreement on the training provided is sufficient. Accordingly, 76% of the stakeholders have mentioned that following training requirements are needed on PSI. It has been mentioned that there is a need to educate about the PSI programme and relevant circulars, the role and responsibility of the committees and the overall functions of financial management with training on building schools with community support and training on new trends in education.

The PSI Committees in the schools' function in the following way.

In accordance with circular 26/2018, the principal, deputy principal, teachers, former students, regional office representatives of regular schools are members of the school development committee. Accordingly, the total numbers of development committee members are 11 to 22.

The main function of PSI is performed by the school development committee. Apart from that following committees given in the table 1 are also implemented in the schools.

**Table 1**

*Committees related to PSI in schools*

<b>Percentage of functioning school committees'</b>	<b>%</b>
1. School Management Committees (SMC)	99.2
2. Technical Evaluation Committees (TEC)	90.2
3. School Procurement Committees (SPC)	96
4. School-based professional teacher development Committee	69.5
5. Physical Resource Management Committee	84
6. Environment Committee	86.9
7. Health Promotion Committee	84.2
8. Religious Committee	79
9. Sports Committees	25

Source: Survey (2020)

According to the above data SMC, TEC, SPC and other committees are functioning well in schools.

As a result of decisions taken at the School Development Committee meetings, School-based planning, curriculum implementation, curriculum development, school-based professional teacher development programs, school plant maintenance and development, maintenance of community relations and physical resource development have been carried out.

The percentage of maintaining the records of School Development Society is 98.5%, implementation of alternative methods of obtaining community ideas is 95%, establishing methodical procedures for parents to meet the principals and teachers is 98.25%, maintaining information on community needs is 95.75% and identifying the services that the school can provide to the community is 96.5%

Schools have identified income generating programs such as crop cultivation programs, conducting fairs, renting out school buildings, conducting vocational training courses, conducting various concerts and donations from well-wishers and guests. On the whole, the functions of school development committee have been performed at a high achievement level. The table 2 shows the contribution of stakeholders in school development.

**Table 2**

*Stakeholders' Support in School Development*

Parents	Teachers	Principals	Well-wishers	School Community	Educational Officers	Government Officials	NGOs	Religious places	Political Authority
91.3%	91%	90.1%	83.6%	80.5%	81.9%	66.6%	30.7%	3.23%	0.2%

Source: Survey (2020)

Teachers and principals as internal stakeholders and parents, well-wishes, school community and educational officers as external stakeholders have contributed in school development at high levels.

The support given by the stakeholders towards school development is depicted by the Table 3.

**Table 3**

*Support Given to Schools by Stakeholders*

	Activities	%
1	Providing learning equipment to students	60
2	Contribution on event organizing	58.2
3	Ensuring the safety of the school	46.4
4	Renovation of existing classrooms and buildings	46.4
5	School Plant Development – (School Grounds, Garden)	45.5
6	Financing	26
7	Providing educational equipment to the school (computers, technical equipment, sports equipment, multimedia projectors etc.)	28.8
8	Provision of water facilities	23.6
9	Supply of electricity	16.6
10	Playground Development	15.4

Source: Survey (2020)

The stakeholders mostly supported the school by providing the physical resources required for students and supporting event organizing.

The challenges faced by the stakeholders in implementing PSI and the strategies used to overcome them in developing reopened schools are given in table 04.

**Table 4**

*Challenges Faced and Strategies Used to Overcome by Stakeholders in the PSI in Developing Reopened Schools*

	<b>Challenges Faced</b>	<b>Strategies to Overcome Challenges</b>
Common problems	1. Lack of financial facilities	Providing financial, physical resources, infrastructure from the past students, getting community contribution, from the education office, from the friends, from the NGOs, getting the support of well-wishers,
	2. Lack of physical resources	
	3. Lack of infrastructure	
	4. Lack of human resources	
	5. Inadequate parental contribution	Parents are informed and supportive, parents' views and suggestions are sought. Assigning responsibilities to parents conducting meetings and discussions at various levels including class circles.
	6. Declining community support	Getting community input
	7. Problems about students	Discussion with school development society, parents, teachers and make programs to increase the number of students, Informing the local residents, improving the quality of the education process, making the school uniform similar to the popular schools in the city, maintaining a pre-school,
	8. School location and transportation difficulties	Arrangement of road facilities, use of private cars, obtaining a bus service
	9. Personal attitudes	Always work to fulfill the needs of the community, inform the parents and get support, inform the temple lords, dignitaries, changing attitudes and building confidence

<b>Challenges Faced</b>	<b>Strategies to Overcome Challenges</b>
10. Problems related to School Development Executive Committee	School Development Society and School Development Committee have been informed and necessary training has been done. Plans are prepared by taking their ideas and suggestions. Study and plan for school, gaining experience, initiating small activities
11. The need to create a new school culture	Creating a new school culture, a new school song, flag and uniform have been prepared for the school
12. Conditions associated with higher authority	The school development society informs the authorities and obtains the necessary resources.

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Source: Survey (2020)

## **Conclusions**

In schools that have been closed and reopened, PSI is functioning at a satisfactory level. Further awareness and training on PSI and community support is required. The school development committees of these schools are functioning at high achievement levels with the contribution of principals, teachers, parents, former students and zonal office representatives. Other committees related to the PSI are established and functioning in the school at a satisfactory level. The functions of development committee have been performed successfully. Various income generating programs have been implemented and the stakeholders mainly contributed in school development by providing physical resources.

Challenges faced by the stakeholders in the development of the reopened schools are, lack of financial facilities, lack of physical resources, lack of infrastructure and lack of human resources. The schools have implemented various strategies by implementing PSI with the help of external stakeholders. As an external stakeholder, community participation in the development of the reopened schools has been ensured by PSI.

Opportunities for community participation, including parents, as an educational resource in school improvement, should be further expanded. Special programmes from Ministry of Education should be implemented to provide additional financial capital, physical and human resources to schools in disadvantaged areas. Multiple factors have affected the development of

reopened schools, so multiple supports from stakeholders should be needed in the development of those schools.

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## **Students' Use of Translanguaging and Pedagogical Implications in an EMI Institution in China**

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### **Abstract**

The premise underlying English as a Medium of Instruction (EMI) institutions is that students develop concepts for their future careers through English, which will then foster intercultural skills. However, such institutions often adopt an English-only policy, which represents an ethnocentric view that marginalizes any other language, neglecting the use of plurilingual resources. This seems aggravated in science classes, which employ deep conceptual information. This paper draws on the observation of how a native English-speaking instructor who does not speak the local language administers a scientifically rigorous undergraduate course in the field of Applied Psychology (Prado & Huggins, in progress). As part of a larger project that examined the use of technology in EMI institutions, this study made use of ethnographic tools such as class observation, interviews with students, material analysis (textbook and e-learning platform) and meetings with the teacher. As the course unfolded, class observations and student-participant interviews revealed that students were deploying translanguaging strategies for note-taking by utilizing various instructional resources including the instructor's PowerPoint slides, textbooks, online encyclopedias (both in English and Chinese), and dictionaries. Drawing on Moment Analysis (Li, 2022), a linguistic method that searches for the mundane, ordinary moments in which the action of translanguaging takes place, this study analyzed students' note-taking practice. The findings disclosed students' strategic and creative translanguaging practices including codemeshing, collecting information from online search engines, adding illustrations, and deploying their semiotic multilingual resources. We conclude this paper by suggesting ways that EMI instructors may use to promote pedagogical translanguaging in their classes.

**Keywords:** EMI institutions, English-only policy, translanguaging, translanguaging pedagogy

## **Background to the Study**

The premise underlying English as a Medium of Instruction (EMI) institutions is that students develop the knowledge and skills required for their future careers through the English language, which will then foster intercultural competence and language skills beneficial for entering the global job market. Despite such practical benefits that an EMI university can offer to students, it is also problematic that such institutions often adopt an English-only policy, neglecting the latent and possible benefits of encouraging the students' use of plurilingual resources (Li, 2022). Just as language becomes an asset in such environment, so does knowledge, perpetuating the Western conventions imposed by the internationalization of higher education through English (Liyanage, 2018). Pursuing English-only policies seems to be more challenging in non-language related courses such as sciences and math, in which students are required to develop a profound understanding of deep conceptual and technical information (Tai, 2022) and do not usually reflect on linguistic features. For this reason, in an attempt to explore how concepts are built in non-language related courses, we carried out an ethnographic study of a scientifically rigorous undergraduate course in the field of Applied Psychology at an EMI university located in mainland China.

## **Study Objective**

As it has been suggested that the students use their own strategies to draw on plurilingual resources to cope with the challenges of understanding abstract and sociohistorically built concepts in lectures delivered in the English language only (Li, 2018), this study particularly focuses on the students' agentic use of translanguaging in their note-taking practice. The focus of our examination is to examine how students employ strategies that assist or foster their knowledge building and develop their understanding of academic concepts that were explained and discussed in the EMI classroom.

## **Research Design**

The current study draws on data from a larger ethnographic project investigating Chinese students' translanguaging practice at an EMI university (Prado & Huggins, in progress). In the present study, translanguaging is regarded "as a multilingual, multisemiotic, multisensory, and multimodal resource that human beings use for thinking and for communicating thought" (Li, 2018, p. 26). Rather than compartmentalized, languages are seen as actions – languaging – that (re)organize meaning-making and, thus, the "continuous becoming of ourselves and of our

language practices” (Garcia & Wei, 2014, p. 8). Drawing on the moment analysis (Li, 2022), a research method that searches for the mundane, ordinary moments in which the action of translanguaging takes place, this study analyzed students’ note-taking practice to understand how students use translanguaging to develop and organize their ideas. The students were asked to provide the materials they produced in class such as digital notebooks and screenshots. Some of them were individually interviewed about some of the materials they produced and asked to comment on their thought processes during the notetaking practice.

### **Preliminary Findings**

Preliminary data analysis reveals that, upon the introduction of a new concept, the students follow the teacher’s lecture while looking for terms both in Chinese and international search engines; they then gather their key findings either in the PowerPoint slides shared by the teacher, or in their digital notebooks. Some students make use of electronic books, both in English and Chinese, trying to parallel the concepts through copy and paste or highlights. At the same time that these strategies occur, many of them simultaneously share their findings through WeChat, complementing each other’s ideas. The findings disclosed students’ strategic and creative translanguaging practices, including codemeshing, and deploying their semiotic multilingual resources.

A few voluntary students were interviewed; we intended to understand their process of meaning-making, particularly focusing on their note-taking practice. They chose their own material while elaborating on their notes, explaining when and how they translanguaged, and exemplifying the choices they made based on their own linguistic repertoire. Here we suggest a few examples of our preliminary moment analysis of students’ use of translanguaging.

While taking notes about psychological concepts explained during the lecture, students made use of codemeshing to elaborate the meaning. One of the examples we found interesting is the following message: 强调信仰 faith不是理由. This would be equivalent to saying, “emphasize faith is not reason”. During the interview, when asked about the word *faith* in English splitting a sentence in Chinese, the student emphasized that she felt the need to explain – to herself – that the concept of the polysemic word 信仰 (which could also correspond to the English words *belief*, *religion*, or *conviction*) in that case was *faith*. The interview data suggest that the student was using English to select the best choice for the Chinese concept she was

trying to convey, more than merely translating. That is, translanguaging was used as a means she used to deploy multilingual resources to make meaning of an abstract concept.

Canagarajah (2013, p. 10) warns of the danger of treating translanguaging as a “solitary mental activity”. Translanguaging studies often prioritize cognitive competence, disregarding the social practice involved. While the aforementioned example of data analysis is more focused on examining how the use of translanguaging facilitated students’ internal knowledge-building, students’ translanguaging practice was also closely related to their social practice, more specifically their career aspirations in the glocalized contexts. Another example we list here is some of the students’ use of external, plurilingual resources. When interviewed, the students mentioned the use of reference materials such as China-based search engines and books written in Chinese during their note-taking practice as a means of enriching their understanding of the concepts in both languages. According to the students, allowing their languages knowledge to converge during their concept-building would affect their future professional careers. They did refer to named languages; however, the elaboration on their notetaking process brought to light aspects related to plurilingualism, and to the internationalization of knowledge. To illustrate, one of the students paralleled two books on her digital device – one written in Chinese by a local scholar, and one in English adopted by the institution. She opened both books and tried to connect the concepts that the teacher was lecturing. A screenshot of her work reveals highlights on both English and Chinese books, bridging the information between both. While discussing this screenshot in a later interview, she mentioned that she was learning those concepts in English, but she would use them in China, where she would pursue her career as a psychologist. The student was asked whether it would not be more suitable to study at a Chinese-speaking institution, to which she replied that she would like to learn European modern psychology concepts and contrast them with those propagated in China. This, according to her, could only be afforded due to her competence in communicating in more than two languages. We identified this moment as an explicitation of her agency enactment, as she chooses what and how to acquire and takes possession of the psychological concepts that will be part of her future profession.

### **Pedagogical Implications**

Based on the preliminary findings, we suggest several implications for EMI lecturers and policymakers to facilitate and encourage students’ learning through translanguaging practices. Drawing on Ishihara, Porcellato and Prado (in progress), we put together pedagogical strategies

that would benefit translanguaging in the classroom, while we dialogically and reflexively enact our agencies as teacher learners – an important condition for professional development (Gurney & Liyanage, 2016)

First of all, a teacher can make use of pedagogical activities that enhance and, most importantly, value the translanguaging that already takes place in students' meaning-making process. By enabling students to deploy their multilingual resources, teachers may foster their “repertoire building” (Canagarajah, 2011, p. 1), considering the wealth of possibilities and opportunities that such adoption can elicit. Particularly in environments that EMI institutions (should) promote as a consequence of the rich encounter of a diversity of languages and cultures, teachers may employ tasks that facilitate the understanding of the content addressed through the promotion of translanguaging. Moreover, more than translating or contrasting a pair of languages, the teacher may attempt to uncover strategies that students already deploy in their own meaning-making (use of a dictionary, search engines, crosschecking of information in two different sources – and different languages).

We believe that such work does not only benefit translanguaging, but also fosters critical thinking (c.f. Liyanage, Walker, & Shokouhi, 2021), as it helps students depart from pre-established concepts and observe how their worlds, multilingualism and cultures intertwine. Students' notetaking process and their elaboration on it sheds light on a more internal translanguaging, that of knowledge-building or -constructing. We call it reflexive and dialogical because there is the active participation of the teacher, the internet sources and the students' choices and selections while they are reorganizing and making sense of the content addressed in classes. Understanding this process highlights the importance of a translanguaging pedagogy that boosts the meaning-making that occurs among students and teachers, enabling knowledge to take place dynamically and in a non-essentialist manner.

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## Students' Performance in Van Hiele's Levels of Geometrical Thinking in Secondary Schools in Jaffna

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### Abstract

Geometry concepts are very essential to the study of mathematics and geometrical thinking. In this regards Van Hiele's theory helps both students as well as teachers to develop geometrical thinking by creating a much simpler environment in teaching and learning geometry. Since the Van Hiele levels of thinking offers an explanation and a remedy for student difficulty with higher-order cognitive processes, the purpose of this study was to analyse the performance of Van Hiele's level of geometry of senior secondary students in Jaffna district. A mixed methods design was used in this study. A sample of 379 students, 50 teachers, in-service advisors of mathematics, additional directors of mathematics and subject coordinators of mathematics was drawn from Jaffna district. Data for the study was collected through questionnaire, interviews and a geometry achievement test which includes all five levels of Van Hiele's theory. In analyzing process, quantitative data were analyzed with descriptive survey and qualitative data were analyzed with thematic analyzing techniques. Findings of the study revealed that the students' performance in Van Hiele's levels of geometrical thinking in senior secondary students is poor. Furthermore, it was also revealed that the first two levels of geometrical thinking were achieved successfully by senior secondary students. From the third level, they began to struggle and in level 4 and 5 their performance was poor.

**Keywords:** Van hieles levels, geometric thinking, concepts, higher-order cognitive processes

## **Introduction and Background to the Study**

Geometry is a major component in mathematics and geometrical thinking is a fundamental way to engage with mathematics. Geometrical thinking should be developed systematically to understand geometric concepts meaningfully. Geometrical thinking is a meta cognitive thinking. Van Hiele's level of thinking helps both students and teachers to develop geometrical knowledge and skills. It creates a much simpler environment in teaching and learning of geometry. Van Hiele (1986) established an enabling framework to interrogate the development of cognition in geometry. The Van Hiele theory offers an empirical description of relatively stable stages that can provide educators with guidance on structuring learners' experiences appropriately. In learning geometry, students progress through a sequence of five reasoning levels of Van hiele, from wholistic thinking to analytical thinking to rigorous mathematical deduction.

According to Van Hiele theory, there are five major steps to understand geometry topics, namely:

**Recognition-** Level 1: The student identifies, names, compares and operates on geometric figures according to their appearance.

**Analysis** -Level 2: The student analyzes figures in terms of their components and relationships among components and discovers properties/rules of a class of shapes empirically.

**Order-** Level 3: The student logically interrelates previously discovered properties/ rules by giving or following informal arguments.

**Deduction-** Level 4: The student proves theorems deductively and establishes interrelationships among networks of theorems.

**Rigor** -Level 5: The student establishes theorems in different postulational systems and analyzes/compares these systems.

Van Hiele states that the levels are "characterized by differences in objects of thought". According to Van Hieles, the learner assisted by appropriate instructional experience, passes through the above five levels, whereas the learner cannot achieve one level of thinking without having passed through the previous levels.

Therefore, to bring about improvements in geometry teaching and learning, first of all, it is important to assist the learners to pass the five levels of Van Hieles. This study attempts to



identify the students' performance in Van Hiele's levels of geometrical thinking and find out the areas where students face difficulties in relation to Van Hiele's theory in secondary schools in Jaffna.

### **Objective**

To fulfill the purpose of the study the following objectives were targeted.

- To analyze the students' performance in Van Hiele's levels of geometrical thinking in senior secondary students.
- To find out the areas where students face difficulties in relation to Van Hiele's theory.

### **Method**

Quantitative dominant mixed method was utilized in this study. Here, both quantitative and qualitative approaches had been used to investigate the students' performance in Van Hiele's levels of geometrical thinking in secondary schools in Jaffna. Descriptive survey research was employed using questionnaires and interviews.

Purposive sampling technique was utilized to select informants based on the particular needs. As the purpose of the study was to analyze the students' performance in Van Hiele's levels of geometrical thinking in secondary schools in Jaffna, students were selected from the schools which produced a minimum 50 pass percentage. If the students failed to attempt this exam, the students' performance in Van Hiele's levels of geometrical thinking would not be analyzed.

The sample consisted of students, teachers, in-service advisors of mathematics, additional directors of mathematics and subject coordinators of mathematics from senior secondary schools in Jaffna district. As Jaffna district has 5 educational zones, this study was targeted to the teachers and students from senior secondary schools from each educational zone. Moreover, the participants were chosen from all types of schools: 1AB, 1C and type 2 schools. 50 teachers and 379 students from 22 senior secondary schools were selected from all 5 zones of the Jaffna district.

Quantitative data were collected through teacher questionnaire and Van Hiele's levels of geometry achievement test. Qualitative data were collected through interviews.

The teachers' questionnaire was designed to find out the difficulties they face when teaching geometry, prior knowledge on geometry and the students' performance in Van Hiele's levels of geometrical thinking.

A question paper was formed including all five levels of geometrical thinking. Altogether twenty-five questions were included in the paper, questions were divided into five sections and under each section, five questions were included on each level of Van Hiele's geometrical thinking. All the questions were formed based on Usiskin's geometrical test items but with slight changes to suit the Sri Lankan Syllabuses. Semi-structured Interviews were conducted with different types of groups (subject coordinators, mathematics teachers and Additional Director of Education- mathematics) to explore the views, experiences, and the performance of students in Van Hiele's levels of geometrical thinking. Quantitative data was analyzed with descriptive analyzing techniques while qualitative data was analyzed with thematic analysis techniques.

## **Results**

### **Objective - 1**

#### **To analyze the students' performance in Van Hiele's levels of geometrical thinking in senior secondary students**

The results of the study were obtained through Van Hiele's levels of geometry achievement test, teacher questionnaire, and interviews.

#### **Results of Teacher questionnaire**

The students' performance in Van Hiele's levels of geometrical thinking was analyzed through a teacher questionnaire by considering the achievement level of geometry of the students in the present, achievement level of geometry of the students in the previous class and students' struggle in Van Hiele's levels of geometrical thinking.

The questionnaire was given to 50 teachers and the findings of the teacher questionnaire revealed that:

According to 90% of teachers, most of the students are good in basic level of geometry as the students identify, name, compare and operate on geometric figures (e.g., triangles, angles, intersecting or parallel lines) according to their appearance. 85% of teachers said that the students analyze figures in terms of their components and relationships among components and

discover properties/rules of a class of shapes empirically. 62% of teachers said that most of the students performed below average in their previous class where as only 6% of teachers said that students performed well in their previous class.

Nearly 85% of teachers agreed that students feel difficulty in understanding proofs and theorems deductively and establishes interrelationships among networks of theorems.

Therefore, the teachers' opinion revealed that most of the students struggled in proof type sums in geometry.

On the whole, the findings of the teacher questionnaire revealed that achievement level in understanding the relationship between definitions, theorems and axioms of students is poor.

### **Results of Interview**

The interview was done with provincial and zonal mathematics A.D. Es, in-service advisers and subject Co-ordinators.

From the interview transcripts, the opinions were put together and thematic analysis was done to reach the objective 1.

The following opinions were put forward by them regarding students' performance in Van Hiele's levels of geometrical thinking in senior secondary students.

- Though Jaffna students are keen on mathematics, they don't pay much interest in proof type sums in geometry.
- They ignore the theorems and axioms type sums in geometry.
- The overall performance of the students in geometric proof is poor.
- Especially in geometry students show low performance than other sections in mathematics
- Mathematics teachers also fail to pay attention in the geometry portion especially in theorems and axioms.

So the interview transcript also revealed that basic levels of geometrical thinking were achieved successfully and the high order geometrical thinking was achieved very poor.

## Objective - 2

**To find out the areas where students face difficulties in relation to Van Hiele's theory.**

The results of the study were obtained through Van Hiele's levels of geometry achievement test, teacher questionnaire, and interviews.

### Results of Van Hiele's levels of geometry achievement test

The marks obtained by the students were calculated in the following way:

Van Hiele level	scheme	marks
Level 1 : Visualization	1x5	05
Level 2 : Analysis	2x5	10
Level 3 : Informal Deduction	3x5	15
Level 4 : Formal Deduction	4x5	20
Level 5 : Rigour	5x5	25
		75

The marks for each level of Van Hiele geometrical thinking was given through the above marking scheme.

### Percentage of achievement of Van Hiele level

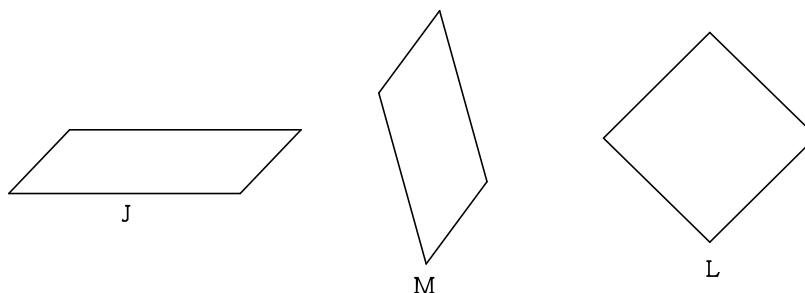
Van Hiele level	percentage
Level 1 : Visualization	90%
Level 2 : Analysis	70%
Level 3 : Informal Deduction	55%
Level 4 : Formal Deduction	37%
Level 5 : Rigour	05%

Questions from each level were analyzed separately and the percentage of each level of achievement was calculated to identify the students' performance in each and every level.

### Level 1: Visualization

For the following question, all the students identified the triangles, parallelograms and squares. However, 10% of the students could not give the correct answer for the final question of level 1.

Which of these are parallelograms?



- (A) J only
- (B) L only
- (C) J and M only
- (D) None of these are parallelograms
- (E) All are parallelograms

Among 10% of the students, most of them gave the answer as (C). It reveals that they don't have knowledge of 'square is also a parallelogram'. Hence, it was found that a few students have difficulties in identifying the figure even at the level 1.

In Sri Lanka, students are given knowledge to identify geometrical figures at the junior level and they are capable enough in this level. As even students from the junior level have the capacity to identify geometrical figures, answering the first level questions by senior secondary students was not tough.

However, it is clear that students from the Jaffna district have easily achieved the first level of Van Hiele geometrical thinking.

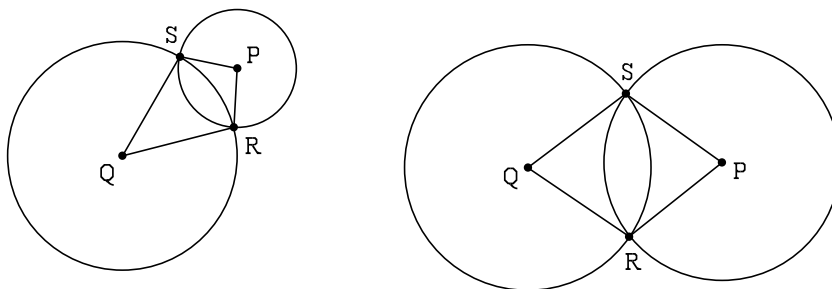
### Level 2: Analysis

The second level contained 5 questions. 70% of the students got more than or equal to 4 correct answers.

Questions from 6 to 9 directly deals with the properties of figures emerge where as the 10<sup>th</sup> question deals with abstract concepts.

(Q-10 ) Two circles with centers P and Q intersect at R and S to form a 4-sided figure PRQS.

Here are two examples.



Which of (A) – (D) is not always true?

- (A) PRQS will always have two pairs of sides of equal length.
- (B) PRQS will have at least two angles of equal measure.
- (C) PQ and RS will be perpendicular.
- (D) Angles P and Q will have the same measure.
- (F) All of (A) – (D) are true.

Students were struggled to answer the above question. As this sum has some abstract concepts they found it difficult to understand. They were unable to give the correct answer with the knowledge of the properties of quadrilateral only. If the student wants to answer this question, they have to critically analyse the sum. Because this quadrilateral is formed by intersecting two circles. If they related the properties of the circle to find the properties of quadrilateral only they could give the correct answer. But unfortunately, most of the students did not have a clear figure about this.

“If any two circles intersect, a line which joins the intersect points of two circles is perpendicular to the line which joins the centre of the circle”. This is one of the important theorems in the previous curriculum. If the students know this theorem, they could have answered the question very easily.

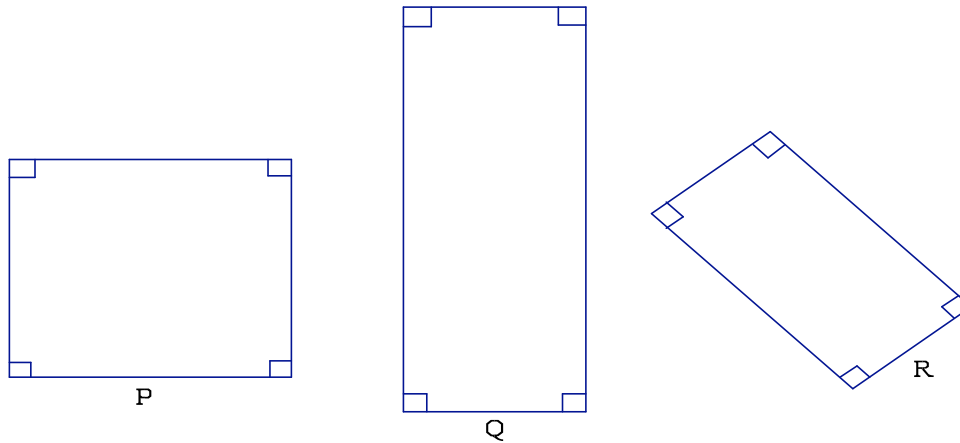
### Level 3:-Order or informal deduction

At this level, students can distinguish between necessary and sufficient conditions for a concept. They identify a hierarchical order of connection between groups of different shapes according to their properties and definitions. Definitions and axioms are meaningful for the learners but ordering levels have not been understood by them. For example; they can say ‘ Each square is a rectangle’ but they cannot organize necessary lists in order to prove this

observation. However, at this level, they are incapable of proving claims related to the properties of the geometric shapes.

For example in the question below:

Which of these can be called rectangles?



Which is correct?

- (A) All can.
- (B) Q only
- (C) R only
- (D) P and Q only
- (E) Q and R only

To this question, 70% of the students were capable enough to give the correct answer. Therefore, at this level most of the learners understand the relationship of connection between a rectangle and a square – ‘every square is a rectangle but not every rectangle is a square.

What do all rectangles have that some parallelograms do not have?

- (A) Opposite sides equal.
- (B) Diagonals equal.
- (C) Opposite sides parallel.
- (D) Opposite angles equal.
- (E) None of (A) - (D).

For this question, only 30% of the students gave the correct answer. As the highest number of learners were still unable to prove that the diagonals of a rectangle are the same, they struggled a lot at this level.

#### **Level 4: Formal deduction**

At this level, learners understand the roles of basic concepts, axioms, definitions, theorems and proofs and their interrelations. They can use assumptions in order to prove theorems and understand the meaning of necessary and sufficient conditions. At this level, learners are able to provide reasons and arguments for the various levels of the proving process. Moreover, they comprehend the importance of discussing the proofs, the deduction from the particular to the general and even the need for a proof of any kind.

As a result, this level captures the most valuable role in geometry. At this level, students practise to,

- Think and argue deductively
- Understand the relationship between definitions, theorems and axioms
- Construct a formal geometric proof

In the geometry achievement exam paper the questions for level 4 were included in order to analyse the above concepts among Jaffna students.

The results indicate that Jaffna students were incapable to think and argue deductively, understanding the relationship between definitions, theorems and axioms and constructing formal geometric proof.

The question given below also supports this.

Which of the following statements always applies to an isosceles triangle but not to all the triangles?

- a. The mid line is parallel to one of the three sides of the triangle.
- b. The mid line is equal to half of one of the three sides of the triangle.
- c. The mid line creates a triangle that is similar to the original one.
- d. The mid-line creates an isosceles trapezium.
- e. The mid line creates a trapezium.

In the above sum, students should have the knowledge of mid point theorem with the knowledge of how this proof constructs in isosceles too. Students with only mid point theorem



knowledge too struggled since they were with the lack of knowledge in how to apply the theorem in different situations.

The results of other sums also revealed that students faced difficulties in applying other theorems too. So, it is obvious that unless students know the theorems with their application, deduction and conversion, they cannot reach this level.

### **Level 5: Rigor**

At this level, students understand the necessity for rigor and are able to make an abstract deduction. It is the highest level of geometrical thinking. In the Sri Lankan syllabus questions from level 5 are included in some portions of geometry. If a student got 3 out of 5 (3/5), it is considered that he/she reached level 5. But in the study, only 18 students from a total sample (379) got three or more than 3. It indicates that our students are not with adequate knowledge to understand the concepts of this level.

Therefore, the overall analysis of the Van Hiele's levels of geometry achievement test reveals that first two levels of geometrical thinking were achieved successfully and from the third level students began to struggle and in the level 4 and 5 they showed poor performance.

## **Conclusion**

### **Students' performance in Van Hiele's levels of geometrical thinking in senior secondary students**

The analysis done through questionnaire and interview revealed almost similar findings. It was revealed that the students' performance in Van Hiele's levels of geometrical thinking in senior secondary students is poor. The overall analysis indicates that the first two levels of geometrical thinking were achieved successfully by senior secondary students and from the third level, students began to struggle and in the levels 4 and 5 they showed poor performance.

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## Teacher Self-efficacy in Teaching Electronics in Grade 11 Science Curriculum in Sri Lanka

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### Abstract

Electronics is an essential subject content of science which is included in Grade 11 and it provides practical and theoretical knowledge of current electronics applications. The problems related to students, teachers and the instructional process of teaching Electronics in secondary classrooms is reported mainly due to the lack of teachers' competency and Self-efficacy. This study attempts to determine the teacher's self-efficacy in teaching electronics along with their demographic variables of academic qualification in teaching Electronics, teaching experience and the school type. This research employed mixed methods for Science teachers of Grade 11 of state schools in the Homagama educational zone of the Western province in Sri Lanka. The data gathered using questionnaire and interviews were analyzed using SPSS and content analysis. The findings on respondent's academic qualification revealed that 35% of respondent science teachers with Postgraduate Diploma, 33% with general Degree and 35% with Special Degree. The majority (68.4%) reported more than five years of teaching experience, out of which, 63.2% of science teachers had more than five years of teaching experience in Science teaching. Furthermore, 54.4% of science teachers had more than five years of teaching experience in teaching Electronics. Therefore, it emphasizes that most science teachers do not have proper conceptual understanding and practical experiences in electronics. Teachers in 1AB type of schools had the most confidence among the groups ( $M = 3.44$ ,  $SD = .629$ ) in terms of their capability while 1C school type teachers appeared to be the least confident ( $M = 3.0$ ,  $SD = .816$ ). Domain wise, Type 2 school teachers reported to be the most confident for the efficacy in student engagement ( $M = 3.32$ ,  $SD = .871$ ) while the least confident group was from 1C school type ( $M = 2.9$ ,  $SD = .738$ ). With respect to efficacy in classroom management, it was found that the same results with the highest mean score was among Type 2 ( $M = 3.45$ ,  $SD = .995$ ) while the least mean score was among the type 1C ( $M = 3.2$ ,  $SD = .919$ ). In contrast, the teachers belonging to 1AB type of schools had high belief in their ability in instructional strategies ( $M = 3.62$ ,  $SD = .719$ ) while those from type 1C reported the least efficacy ( $M = 3.1$ ,  $SD = .994$ ). One-way ANOVA results revealed no statistically significant difference in teachers' total self-efficacy among and between the three groups of school types ( $F(2, 54) = 0.934$ ,  $p = .399$ ).

**Keywords:** Electronics, self-efficacy, student engagement, classroom management, instructional strategies

## **Background**

Electronics is an essential subject content of science which includes in grade 11 and it provides practical and theoretical knowledge of current electronics applications. The problems related to students, teachers and the instructional process of teaching Electronics in secondary classrooms is reported mainly due to the lack of teachers' competency and Self-efficacy. This study attempted to determine the teacher's self-efficacy in teaching electronics along with their demographic variables of academic qualification in teaching Electronics, teaching experience and the school type.

The concept of self-efficacy is grounded in the framework of social cognitive theory, which emphasizes the involvement and exercise of human agency (Bandura, 2006). Bandura (1977) first introduced the cognitive social learning theory, which examines the human capacity to exercise control over the nature and quality of one's life (Bandura, 2001) through intentional actions. Bandura further defines self-efficacy as judging one's ability to produce desired results and forestall detrimental ones (Bandura, 2001). Bandura (1997) stated that people's conceptions of their self-efficacy, regardless accurate or misjudged, are developed through four sources of influence which he termed as (1) mastery experience (2) vicarious experience (3) verbal or social persuasion and (4) physiological arousal or emotional state. The first, and most effective, is through "mastery experiences", or successes tasks. Mastery experiences increase one's self- efficacy, while failures may inhibit its development. Bandura (1977, 1997) identified vicarious experience as the second- most potent influence on one's sense of efficacy.

Hoy (2000), as cited in Vadahi and Lesha (2015) also mentioned that teacher self-efficacy is teacher's confidence in the ability to promote student learning. The idea that teacher's self-beliefs are determinants of teaching behavior is simple, yet powerful idea (Henson, 2001). Teacher self-efficacy plays a role not only in student success but teacher success as well. Tschannen-Moran and Hoy (2001) explained the efficacy as a teacher's judgment of his or her capabilities to bring about desired outcomes of student engagement and learning, even among those students who may be difficult or unmotivated. Teachers with high efficacy tend to experiment with methods of teaching to meet their students' needs, spend more time planning, persist longer with students who struggle, and promote achievement, efficacy, and motivation in their students (Henson, Kogan, & Vacha-Hasse, 2001 cited in Ferreira, 2013). Teacher self-efficacy varies in different contexts as teachers may exhibit different levels of efficacy depending on the subject, student population, or school environment (Tschannen-Moran &

Woolfolk Hoy, 2001). Kaufman and Ireland (2015) explained that teacher's competency is most influential factor on student learning and teachers are expected to have a wide range of knowledge, dispositions and skills, including subject matter knowledge, pedagogical knowledge and skills, supportive and caring attitudes, professionalism and skills in planning and in managing diverse groups of students. Therefore, this study attempted to identify the teacher self-efficacy related to teaching electronics of the science curriculum in Grade 11 in state schools in Sri Lanka along with their demographic variables of academic qualification in teaching Electronics, teaching experience and the school type.

## **Objectives**

The main objectives of this study were,

- Determine how academic qualifications associated with teacher's self-efficacy in teaching electronics
- Determine how teaching experience associated with teacher's self-efficacy in teaching electronics
- Determine if the teacher's self-efficacy level in teaching electronics differs by school type

## **Research Design/Materials and Methods**

This research employed the mixed methods with a survey questionnaire and interviews. The sample was selected from Science teachers of grade 11 of state schools in the Homagama educational zone of Western province in Sri Lanka. The total population was considered as the sample and it was a purposive sample. The criteria for selecting the Homagama zone was, it had less performance for the G.C.E. (O/L) Examination among other educational zones in the Colombo district in Sri Lanka.

In the data collection process, an online survey was conducted for all the science teachers of grade 11 in Homagama educational zone. The data was gathered using questionnaire and interviews. The questionnaire consisted of checklists and short answer questions were related to the participant's demography variables like gender, school type and name, teaching service period, teaching subjects and grades and educational qualification. The second part of the questionnaire consisted of short answer questions with a few checklists were focused on the teacher's educational background, trainings, teaching experiences, physical facilities and teaching learning process. Also, open ended questions were used to identify the student's

attitude and a competency towards electronics content and the teacher's suggestions for improving the effective teaching learning process for electronic content. The final part of the questionnaire consisted with a Likert scale questions. The Likert scale was a standardized teacher efficacy scale developed by Tschannen-Moran & Hoy (2001) which was useful for measuring the teacher's self-efficacy in the electronic learning teaching process. This standardized teacher efficacy scale was used by getting permission from Professor Anita Woolfolk Hoy and used with slight modification.

The gathered data were analyzed using SPSS and content analysis. One-way ANOVA was used to analyze the data. Content analysis as a qualitative data analysis method was used to analyze the responses on open ended questions.

### **Results/Findings**

89% of the respondent teachers were female teachers while 11% of respondent teachers were male teachers. The findings on respondent's academic qualification revealed that 35% of respondent science teachers with Postgraduate Diploma, 33% with general Degree and 35% with Special Degree. At the degree level, 10.5% of respondent science teachers have done the Physics subject and the majority of the respondent science teachers have done the subjects related to the Biology. However, 61.4% of the respondents mentioned that they have studied Electronics and 38.6% of the respondents mentioned that they have not learned Electronics. The majority of the respondents mentioned that they have learned electronics as subjects of degree level, science workshops, private courses, seminars, subjects of G.C.E. (A/ L) and (O/L), and subjects at the National College of Education. 54.4% of respondents mentioned that they have not gained practical experiences related to electronics.

The majority (68.4%) reported more than five years of teaching experience. Out of which, 63.2% of science teachers have more than five years of teaching experience in Science teaching. Furthermore, 54.4% of science teachers were with more than five years of teaching experience in teaching Electronics.

Teachers in 1AB type of schools was the most confident among the groups ( $M = 3.44$ ,  $SD = .629$ ) in terms of their capability while 1C school type teachers appeared to be the least confident ( $M = 3.0$ ,  $SD = .816$ ). Domain wise, Type 2 school teachers reported to be the most confident for the efficacy in student engagement ( $M = 3.32$ ,  $SD = .871$ ) while the least confident group was from 1C school type ( $M = 2.9$ ,  $SD = .738$ ). With respect to efficacy in classroom

management, it found the same results with the highest mean score among Type 2 ( $M=3.45$ ,  $SD=.995$ ) while the least mean score among the type 1C ( $M= 3.2$ ,  $SD=.919$ ). In contrast, the teachers belonging to 1AB type of schools found to be with high belief in their ability in instructional strategies ( $M = 3.62$ ,  $SD=.719$ ) while those from type 1C reported the least efficacy ( $M= 3.1$ ,  $SD=.994$ ). One-way ANOVA results revealed no statistically significant difference in teachers' total self-efficacy among and between the three groups of school types ( $F(2, 54) = 0.934$ ,  $p = .399$ ).

## **Conclusions**

The findings on respondent's academic qualification emphasizes that most science teachers do not have proper conceptual understanding and practical experiences in teaching electronics. Although 68.4% of science teachers in the sample have more than five years of teaching experience, 63.2% of science teachers have more than five years of teaching experience in Science teaching. Furthermore, 54.4% of science teachers have more than five years of teaching experience in teaching Electronics. It is noteworthy to indicate that the percentage of science teachers who are less experienced in teaching Electronics is comparatively high. Therefore, less teaching experience emphasized that there is a lack of teacher's self-efficacy in teaching electronics.

Teachers in 1AB type of schools was the most confident among the groups in terms of their capability and 1C school type teachers' appeared to be the least confident. In terms of efficacy for student engagement, Type 2 school type teachers seemed to be the most confident in their ability and the least confident teacher's group is the 1C school type. With respect to efficacy for classroom management, teachers from Type 2 schools had the highest confidence among the three groups while the least confidence was found in 1C type of schools. Concerning efficacy for instructional strategy, teachers from 1AB possessed the highest mean scores, indicating that they were with a high belief in their ability to teach their students very well and teachers belonging to 1C type of schools appeared to show the least confidence among the three groups. 1C school type teachers seemed to show the lowest efficacy among the groups in all dimensions and overall.

One-way ANOVA results indicate that there were no significant differences in teacher self-efficacy among and between the three groups for overall, efficacy for student engagement, efficacy for classroom management, and efficacy for instructional strategy.

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## **L2 Learning via SNSs: A Study of Learner Engagement in a Closed Facebook Group**

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### **Abstract**

Social Networking Sites (SNSs) are known to be highly interactive and user-friendly which bears evidence of their global visibility. Researchers have investigated the pedagogical potential of SNSs as an educational tool and how learning activities on these social networking sites can lead to an increment in learner engagement. With regard to language learning, the utilitarian purpose of a social networking site such as Facebook has been highlighted by many researchers over the last decade. The interaction on Facebook provides language learners support with regard to cognitive, metacognitive, and even socio-affective aspects of L2 learning. With its multiple features such as uploading, tagging, commenting, personal information sharing, connecting with other users, and creating groups with common interests, Facebook has become one of the most tension-free platforms used by L2 learners to enhance their language learning. In this context, learner engagement plays a major role as it is an indicator of L2 learners' accelerated learning process as it signifies the learners' extent of commitment and dedication to learning activities. This study examines the engagement levels of a group of young adult ESL learners in a closed Facebook group created by the researcher at a Higher Education Institute (HEI). The researcher designed two main activities for this purpose which were to be completed by the learners outside the regular teaching hours. The primary data collection methods were narrative data and learners' behavioural data on the platform. Subsequent to the analysis of the data it was revealed that the online activities had enhanced the learners' engagement levels in a substantial manner while the participants highlighted the need to provide more linguistically demanding activities in the closed Facebook group where they could collaborate extensively.

**Keywords:** Closed Facebook group, L2, Learner engagement, behavioural data

## **Background & Significance of the Study**

Social Networking Sites (SNSs) are known to be highly interactive and user-friendly, which had led to their global visibility. Researchers have investigated the pedagogical potential of SNSs as an educational tool and how learning activities on these Social Networking Sites can lead to an increment in language learning; Second language learning in particular. Baralt (2009) claims that SNSs present remarkably conducive environments for the process of language learning, especially regarding foreign language learning. Today, Social networking sites (SNSs) like Facebook and Twitter have become an integral part of social interaction. Facebook has become one of the main communication mediums of the 21<sup>st</sup> century, especially among young adults worldwide whose primary vehicle of communication is Facebook. Facebook is the most popular SNS in the world with 2.85 billion users (<http://www.statista.com/> 2021) and there are 3 to 3.5 million Facebook users in Sri Lanka. These statistics prove that Facebook has become a powerful platform and its use is widespread and its dominance has penetrated vital domains such as Commerce, Health, Finance, Law, and Education.

Even though Facebook is a highly informal space for interaction, it is being increasingly utilized by academics as a pedagogical tool mostly in informal learning scenarios. Its potential as a learning tool in language learning has become an extensively researched topic in the field of English Language Teaching (ELT). The advantage of using Facebook as a tool is its unchallenged popularity and the array of options as Luo (2013) states “SNSs, are non-threatening, community-based, identity-masking interpersonal interaction environments, that are digital resources with great potential for language learning, affording low-risk language and social practices, and identity construction and performance”. However, a paucity of research is visible in the research studies that investigate how Facebook facilitates learner engagement and increment in the context of language learning. Therefore, this research study examines how a closed Facebook group facilitates learner engagement and the nature of such learner engagement.

## **Theoretical Framework**

Learner engagement has been one of the most widely researched topics across several disciplines in general and it has been given multiple definitions and is further corroborated with learner agency and motivation as well. The theory of engagement was initially introduced by Alexander Astin in 1984 and he later reconceptualized it as “Engagement theory”. In his view

engagement is “the amount of physical and psychological energy that the student devotes to the academic experience” (Astin 1993). According to Astin (1993) “a more successful student is the one who has more engagement, and the higher the engagement, the more the learning”. He emphasizes the importance of active participation in the learning process on the part of the learner and has constructed his theory upon 5 tenets as given below.

1. Involvement requires physical and psychological energy
2. Involvement occurs along a continuum
3. Engagement has both quantitative and qualitative features
4. Development is proportional to the quantity and quality of involvement
5. The effectiveness of any educational practice is directly related to the ability of that practice to increase student engagement.

Ball & Perry (2011) define engagement as “students’ involvement in activities and conditions that is likely to generate high-quality learning” whereas Cole & Chan (2014) explicate engagement as “the extent of students’ involvement and active participation in learning activities”. Fredricks et al (2004) explain three core dimensions of engagement as below.

1. Cognitive
2. Behavioral
3. Affective

Mercer (2019) further corroborates the above claim by stating that a positive correlation can be identified between the levels of engagement and both cognitive and affective outcomes. In other words, these dimensions are significantly intertwined, and their relations are in a volatile state as they are socially situated. In addition to the above dimensions, there can be other variables that may influence the engagement levels of the students. For example, according to Blasco-Arcas et al. (2013) task design plays a critical role in determining the engagement levels of the students regarding web-based learning activities.

Furthermore, a significant number of studies have established the positive impact Web 2.0 technologies and SNSs have on L2 learning and learner engagement. (Buzzetto-More, 2012; Wang & Vasquez, 2012). It is the participatory features such as commenting space, and spontaneous discourse space that motivate Facebook users to engage in learning through

interaction. This participatory atmosphere can be exploited by second language teachers, especially ESL teachers to motivate learners to use L2 among themselves by incorporating Facebook-based teaching /learning activities which are different from traditional audio-lingual method-inspired drills and compositions. In fact, according to Sigala (2007) schools and universities have a potentially effective platform with Facebook and all the Web 2.0 technologies that can be utilized to educate their cohorts in unorthodox learning spaces that are more learner-centered. In addition, SNSs are exceptionally popular among young learners as they are easily accessible, entertaining, and tension free. In addition, a platform like Facebook also provides space for collaboration, personalization, and customization which are attractive to young adult learners.

Furthermore, Minocha (2009) explains how Facebook private groups can be effective as Feedback platforms where learners feel more encouraged to express themselves concerning their peers' work and the teachers have a more learner-friendly environment to provide feedback as well. Most importantly, this kind of stress-free platform may lead to reserved and reticent learners becoming vocal and collaborative, generating more engagement.

Another theory that is applicable to this context is the social constructivist theory developed by Vygotsky (1978). As Vygotsky illustrates, individuals construct knowledge more via social interaction than any passive reception of information. "Through collaborative elaboration, learning takes place in meaningful contexts in negotiation and collaboration with others". (Bruner, 1999). Therefore, it is evident that learning is more meaningful and effective when corroborated in shared learning spaces as provided by Facebook groups.

## **Objectives**

1. To explore the engagement levels of the learners in responding to Facebook Group activities
2. To examine the factors that affect the learners' engagement in response to Facebook Group activities

## **Materials and Methods**

This was a qualitative study conducted at a private Higher Education Institute (HEI) using a sample of 30 students from a General English course. The study program was a one-year General English program and the research was conducted after 6 months in the course for a group of young adult learners who joined the institute after their Advanced Level Examination.

The primary data collection methods were narrative data and learners' behavioural data on the platform. Narrative data was gathered using the focus group interviews while behavioural data was collected by analyzing the posts the learners posted in response to the activities posted by the teacher.

Convenience Sampling was used to select participants for the research. Their first language is Sinhala and all of them had passed the General English paper at GCE A/L. The researcher who was also the teacher in this context designed two main activities for this purpose which were to be completed by the learners outside the regular teaching hours.

### **Research Procedure**

1. Creating a closed Facebook group for the students
2. Activities were posted on the Facebook group
3. Students respond to the activities via comments/posts
4. Members of the group share ideas and comments and give feedback

The teacher designed the following activities.

1. A chain Story: The teacher provides a prompt for a narrative and the students continue adding posts and narrating while extending and commenting on classmates' posts
2. Sentence race: The teacher provides a set of vocabulary items with which they make as many sentences as possible within a deadline and the winner gets the chance to provide the next set of vocabulary items

### **Data Analysis and Findings**

Focus group interview data was transcribed verbatim and a cyclical process with open, axial, and selective coding was used. Open coding was adopted to identify the main types of engagement emerging from the transcribed interviews. Axial coding was subsequently used to identify the levels of engagement as explained by the participants. Finally, selective coding was utilized to compare and contrast the participants' responses for the two tasks. All 30 participants responded to the first task which exhibited 100% participation. However, the second task did not elicit 100% response. The engagement levels differed due to the following factors.

1. Confidence
2. Linguistic competence
3. Access to the Internet

The analysis of behavioural data was conducted and given below are the findings.

- a. All the participants were highly motivated in response to the Chain Story
- b. Their reaction to classmates' posts was 100%.
- c. Everyone did not respond to the Sentence Race
- d. First, the more proficient students responded
- e. Students reached out to the teacher for grammar and vocabulary assistance

Subsequent to the analysis, the researcher was able to identify a few interesting developments regarding their engagement. Significant improvements in the classroom interaction levels and the frequency of response were observed after the Facebook Group activities were created. However, while Chain Story elicited a response rate of 100% from the participants, the second activity "Sentence Race" had neither equal participation nor the same level of engagement in comparison with the Chain Story. At the initial stage, only the more proficient students responded to the activity as it required them to construct a sentence using the adjectives given in the grid on their Facebook group wall. Nevertheless, students consulted the researcher/teacher more often as they required certain words' meanings clarified and the accuracy of their sentences verified.

The levels of engagement were determined using the following indicators

1. Number of posts
2. Frequency of posts
3. Relevance of the posts to the task

However, another predominant comment that surfaced in the focus group discussions was some participants' belief that they needed more confidence to comment publicly. However, they also mentioned that they enjoyed liking their friends' comments and posting motivating emojis and highlighted that they felt being part of the Facebook learning community and appreciated the stress-free environment.

## **Conclusion**

After systematic analysis of the narrative data and learners' behavioural data, it can be concluded that the Facebook group activities were able to facilitate ESL learning by providing the learners with a safe space as the activities were able to enhance the learners' engagement levels in the General English class. Facebook activities seemed to promote interaction and the

learners got actively engaged in the learning process and enjoyed the collaboration and a sense of community learning. However, these Facebook group activities need to be longitudinal in addition to being consistent and systematic regarding the language components incorporated online. Moreover, additional scaffolding is needed for linguistically demanding activities so that lesser competent learners would also engage more in the learning process. In addition, further research is required to examine the aspect of academic distraction created by Facebook engagements and the need for ESL teachers to be adequately tech-savvy.

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## **Contribution of Educational Technology in Teaching and Learning of Agriculture Science**

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### **Abstract**

The purpose of this study was to determine the influential technological aids in teaching of Agriculture science in the classroom. The target study population consisted of G. C. E (A/L) Agriculture science students (325) in Jaffna district. A random sample of 228 Agriculture science students was selected from identified 32 secondary schools in Jaffna district. The questionnaire survey and structured interviews were adopted to collect primary data. Data analysis includes percentages, and Pearson correlation. The main findings of this study are the teachers did not use technologically advanced equipment such as interactive board, multimedia projector, etc. in day-to-day teaching of Agriculture science in the classroom. Further, the electricity and internet facilities of the classroom, and educational technology knowledge of the teacher limit the use of modern teaching aid and teaching method in classroom teaching. Teacher interest in teaching Agriculture science is also influenced by the classroom facilities. Student interest and achievements in Agriculture science are influenced by the use of educational technology such as interactive simulations and mobile devices used in classroom teaching.

**Keywords:** Agriculture science, educational technology, learning, teaching

## **Introduction**

Technology is an important part of each sector in the era. Education is no exception. Educational technology plays a vital role in classroom teaching and learning to distance learning. Educational technology is not only modernized equipment. Techniques that are used to facilitate teaching and learning are also called educational technology (Jotform, 2022). Educational technology is changed towards digital technology from traditional technology. Traditional educational technology was used to facilitate the teaching activity like the chalk and talk method. Nowadays teachers take a role as facilitators of students' learning. Students have a lot of facilities to learn and develop their knowledge other than in the classroom. Even though teachers should guide them in the right way and motivate their learning activity in the classroom (Garrett, 2008). So teaching to the growing generation requires the adoption of modern technology.

Each and every classroom has a diversity of students. Each student has a different degree of ability in learning (Kannathasan, 2015). Modern educational technology is useful to teachers to easily disseminate their knowledge to students and also useful to students to gather and develop their knowledge easily and quickly. Traditional educational technology is used to teach Agriculture science in Sri Lankan classrooms, especially in Northern Province. Most foreign countries use modern educational technology to deliver Agriculture science knowledge and skills to their students. Researches focus that the student's achievement will be higher when using modern educational technology in the classroom. Educational Technology is as a media to solve problems in learning that can improve learning performance. So that it can increase learning interest for students. Educational technology also helps teachers in making media used in the learning process, so that students can attract the desire to learn (Ketut et al, 2019). The question is what are the strategies needed to enhance the students' effectiveness for the use of proper educational technology in learning Agriculture science. This study was developed based on this background. This research finding will help to improve the Agriculture science students' achievements through educational technology in the future.

## **Objectives**

The overall purpose of the study is to determine the influences of various technological aids in classroom teaching of Agriculture Science in line with the following specific objectives:

1. Find out the various technological aids used in classroom teaching of Agriculture science.
2. Identify the contribution of modern teaching aids in the learning of Agriculture science in the classroom.

## **Materials and Methods**

The population for this descriptive study consisted of G. C. E (A/L) Agriculture science students (325) in the Jaffna district. 32 schools which offer Agriculture science according to the EMIS database were selected as the research sample. Based on Krejcie and Morgan's formula for a 5% margin of error, a random sample of 228 Agriculture science students was selected from sampled secondary schools in the Jaffna district. The questionnaire is the main instrument used for this research work to collect the primary data. Additional data were collected from selected schools principals via interviews, and secondary data (EMIS database – Northern Province). The questionnaire was categorized as student-related, family-related and school-related sub sections. The survey instrument was found to be valid with Cronbach's Alpha value of each sub sections is respectively 0.710, 0.702 and 0.748. Data were analyzed using the statistical package for social science (SPSS). The first objective of the study was analyzed in percentages and Pearson correlation. The data collected from respondents such as technological aids used in classroom teaching, teaching methods, educational technology knowledge of teachers, classroom facilities and laboratory facilities were used to analyze the first objective of this study. The second objective of the study was analyzed in percentage, Pearson correlation and multiple regression analysis. Teacher interest and student interest in using technologically advanced teaching aid in classroom teaching and learning, and student achievements were used to analyze the second objective of this study.

## **Result and Discussion**

### **Various Technological Aids Used in Classroom Teaching of Agriculture Science**

Teachers of Agriculture science use various technological aids in teaching the subject (Table1). According to the interview held with the principals of the schools, it reported that teachers usually use writing boards and sometimes smart boards or projectors in classroom teaching.

**Table 1**

*Teaching aids used in the classroom teaching of Agriculture science*

Teaching aid	Frequency	Percentage (%)
White board/ Black board	195	85.5
Projector	9	3.9
Smart board	13	5.7
OHP	0	0
Computer	11	4.8

Table 2 shows that 40.4% of the respondents said that their teachers used the discussion method and 22.4% of them agreed teachers used the lecture method in teaching Agriculture science. However, under the interview of principals is identified as most of the teachers are using lecture methods in their classroom teaching.

Educational technology knowledge of teachers and teaching aid used by teachers in classroom teaching show a positive Pearson correlation (0.510) and a level of significant 0.002 at  $\alpha = 0.01$ . It means teacher have sound knowledge in educational technology prefer to used technologically advanced teaching aids.

**Table 2**

*Teaching methods used to classroom teaching of Agriculture science*

Teaching method	Frequency	Percentage (%)
Lecture method	51	22.4
Question and answering	69	30.3
Discussion	92	40.4
Practical	14	6.1
Other methods	2	0.9

A low level of technology advanced teaching aid was mentioned by 41.2% of the respondents and a moderate level of technology advanced teaching aid was mentioned by 46.5% of the respondents. A permanent classroom for learning Agriculture science is important to increase the classroom facilities. Principals of the selected schools faced several problems in distributing the teaching aids among the subjects. Almost the Agriculture student population is very low

compared with other subjects. Technologically advanced teaching aids are limited resources in schools. There is an issue to allocate resources to a small group of the population without proper classroom facilities. 32.45% of the student said they do have not a proper classroom and Agriculture science laboratory to learn Agriculture science. This is the reason the Agriculture science students receive fewer amounts of technologically advanced teaching aid to their classroom learning from the administration of the schools.

### **Contribution of Modern Teaching Aids in the Learning of Agriculture Science in the Classroom.**

Majority (72.8%) of the student respondents reported that their teachers highly express their interest to use the technologically advanced teaching aids in the classroom teaching while 3.1% reported that their teachers were not so. 82.5% of student respondents express a high level of interest and 16.2% of the student respondents express the interest in moderate level. It was noteworthy to reveal that majority (65.4%) of the students have high interest towards practical in Agriculture science using technologically advanced equipments while 8.3% of them have expressed low interest in this regard. The rest of the students express a moderate level of interest in practical with modern equipments.

Student interest in classroom learning of Agriculture science has a positive correlation with technologically advanced teaching aids ( $r = 0.161$ ), and technologically advanced practical equipment ( $r = 0.160$ ). It found this correlations between student interest and use of technologically advanced teaching aids and that of technologically advanced practical equipment significant at  $\alpha = 0.05$  level. This result clearly shows that the students' interest in the classroom learning of Agriculture science can be induced via changes in using technologically advanced teaching aids in classroom teaching and laboratory practical.

Teacher interest and involvement in classroom teaching of Agriculture science has a positive correlation with classroom facilities ( $r = 0.168$ ), technologically advanced teaching aids ( $r = 0.282$ ), and technologically advanced practical equipment ( $r = 0.435$ ). These relationships also found to be significant at  $\alpha = 0.01$  level. Teacher interest in teaching Agriculture science increases with the changes of educational technology from traditional to technologically advance equipments. Correlations between the teacher interest and classroom facilities is 0.168 and 0.011 level of significant at  $\alpha = 0.05$ . Teacher interest in classroom teaching of Agriculture science with technologically advanced teaching aids, and technologically advanced practical equipment also significant at  $\alpha = 0.01$  level. This concludes that the teachers prefer to teach

Agriculture science using modern teaching aids. It was also evident that the facilities available in the classroom might limit the teachers' use of technologically advanced teaching aid and different teaching methods in the classroom teaching.

The teaching methods of a teacher vary with the classroom facilities. The Pearson correlation between the teaching method and technologically advanced practical equipment is 0.156 and the significant level is 0.019 at  $\alpha = 0.05$ . But student interest in classroom learning depends on the teaching method. So, the technology integration in the classroom induces the activity of the teachers and students in teaching and learning. Interview results strengthen the result further as the technologically advanced equipment used in classroom teaching the students actively participated in classroom learning. Teachers also express their interest in using technologically advanced teaching aids in classroom teaching. Teacher interest in classroom teaching and student interest in classroom learning depend on each other.

Student interest in learning enhances the students' achievement which is measured by term exam performance in Agriculture science. Correlation  $r = 0.478$  reveals that student achievement positively correlated with the teacher's interest in classroom teaching and it is significant at  $\alpha = 0.01$  level. Student interest in classroom learning and student activeness which is measured by the Likert scale in classroom practical also have a positive Pearson correlation ( $r = 0.593$  and  $r = 0.576$ ) with student achievement and significant at  $\alpha = 0.01$  level.

According to the results it is evident that various technological aids in the classroom teaching-learning influence the teacher's interest in teaching, teaching method, student activeness in classroom learning and practical activity, and student interest in classroom learning. Further, these factors directly influence the students' achievements.

## **Conclusion**

The findings of the study show that classroom of Agriculture science have very low facilities to use modern teaching aids. Teachers used writing boards for their day-to-day teaching. Teachers sometimes used smart board or other technologically advanced teaching aid for teaching Agriculture science. The use of modern teaching aids in classroom teaching increases with the educational technology knowledge of the teacher. The teacher interest in teaching, student interest in classroom learning and student activeness in classroom activities are increase with use of modern teaching aids. The student achievement influenced by the adaption of modern educational technology. Recommendations made highlighted that the administration

of school, department of zonal education and teachers' center should provide proper guidance on use of modern teaching aids and educational technology to the teachers, and increase the classroom facilities as technologically advanced.

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## **A Shift with a Twist: Transforming Experiences of Teaching and Learning Music Online**

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### **Abstract**

Most of the teaching and learning in the performing and visual arts subjects occur in traditional classroom settings with face-to-face instruction methods, but the University of Visual and Performing Arts (UVPA) swiftly switched the delivery of all undergraduate courses to an online format in response to the COVID-19 pandemic. Similar to other universities in Sri Lanka, the UVPA started using modern technology and tools like Zoom and a Learning Management System to conduct online instruction and learning during the COVID-19 period. The purpose of this study was to understand how academic staff and students felt about teaching and learning Music online. A case study approach was used as the method for this investigation. An online questionnaire was used to collect feedback on their online learning experiences from a sample size of 425 students comprising third and fourth year undergraduates of Bachelor of Performing Arts (Music). Semi-structured interviews were conducted to collect feedback from randomly selected eight academic staff members from the Faculty of Music in the 2018/2019 academic year, at the UVPA. Responses revealed that most teaching staff were new to teaching online but have managed to learn strategies for teaching online and have improved their technical and pedagogical skills in a short period of acting under compulsion. It was found that the student participants have also developed their knowledge and skills in online learning. All participants have indicated their willingness to engage in technology-enhanced online teaching and learning in the future as a result of these transformative experiences.

**Keywords:** COVID-19, educational values, new skills, transformative experiences, teaching and learning music online

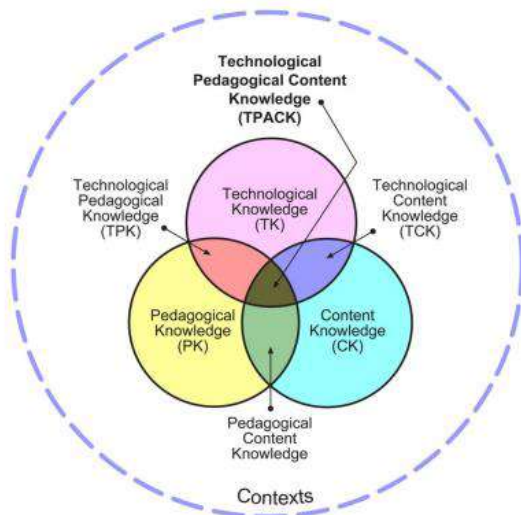


## **Background**

University of Visual and Performing Arts (UVPA) is the only university solely dedicated to visual and performing arts subjects in Sri Lanka. The university's four faculties include Graduate Studies, Dance and Drama, Music, and Visual Arts. Due to the impact of the COVID-19 pandemic-related lockdowns, the UVPA swiftly switched all its undergraduate courses including music education to an online delivery mode (Samarasinghe & Nethsinghe, 2022). Most of the teaching and learning in courses at the UVPA occur in traditional classroom settings, with face-to-face instructions. Although several other educational institutions in Sri Lanka had firsthand experience with online delivery before the pandemic, this was the first encounter of the UVPA with the notion of complete online delivery. To support the faculty members in the transition to online delivery, the UVPA offered a series of intensive online professional development (PD) sessions with the engagement of the second author who has prior experience in online delivery of Performing Arts courses as a consultant. The first author was the director of the Centre for Online and Distance Learning (CODL) of the UVPA at the time and who continues to work as a senior lecturer in Information Technology, teaching technical skills to the students undertaking educational programs in the discipline areas of Visual and Performing Arts. With the engagement of several experts assisting the teaching faculty, the UVPA started delivering all its courses online in November 2020. Hodge et al., (2020) pointed out that “the speed with which this move to online instruction is expected to happen is unprecedented and staggering” in such a narrow preparation window (para. 2). In contrast, the students who joined from their homes participated in online learning swiftly with minimal preparation and support. Their teachers (faculty members) who undertook PD were the only source of assistance for these students. Therefore, it was vital to investigate the experiences of both educators and learners for a variety of reasons including providing the required support and making various enhancements needed.

There is an increasing demand for online education as technology develops globally. Day et al. (2020) explained that the transition to online learning for students who have first registered in on-campus mode is inspiring, and online delivery has affected the nature of teaching practices of academic staff throughout the pandemic. A range of specialized skills, such as "understanding of student thinking and learning, knowledge of subject content, and increasingly, knowledge of technology" (Koehler & Mishra, 2009, p. 61) is required to prepare students for future teaching. According to Koehler & Mishra (2009), three primary areas of knowledge that academic staff should possess are content knowledge, pedagogical knowledge,

and knowledge of technology (p. 62). Technological Pedagogical and Content Knowledge (TPACK) is a framework introduced by Koehler & Mishra (2009) that combines all three recommended areas of teaching knowledge. Figure 1 displays the components of the TPACK framework. Therefore, the TPACK framework was considered as the theoretical foundation for activities developed and for UVPA faculty members to assist with online course design and delivery. Considering the appropriateness, two knowledge components of the TPACK framework were selected and used by the providers of PD as a new model for faculty development (Koehler et al., 2004) for preparing UVPA staff for online delivery. The Technical Content Knowledge (TCK) and Technological Pedagogical Knowledge (TPK) were the selected components as the expert art educators already possess the other knowledge component, Pedagogical Content Knowledge (PCK).



**Figure 2.** TPACK Frameworks and Its Knowledge Components.

*Note:* TPACK framework. Copied from “What is technological pedagogical content knowledge?” by M. Koehler and P. Mishra, 2009, p.63.

The relationships that exist between and among these bodies of knowledge, represented by PCK (pedagogical content knowledge), TCK (technical content knowledge), TPK (technological pedagogical knowledge), and TPACK (technological pedagogical and content knowledge), are equally important to the approach (Koehler & Mishra, 2009, p. 62–63). Academic staff and students have learned that engaging in online activities for performing arts disciplines, particularly music and dance which also entails collaborative tasks, is an incredibly challenging endeavor due to different reasons such as internet-related delays (Samarasinghe & Nethsinghe, 2021, 2022). These difficulties have direct and indirect impact on both academic

staff and students. Because of the sudden demand for 'Emergency Remote Education (ERE)' (Shin & Hicky, 2020), many music educators adapted to "a situation of social isolation where some type of online learning became the only way to continue any sort of music education practice" (Camlin & Lisboa, 2021, p. 134).

### **Objectives and the Research Question**

The main research question of this study is how staff and students experienced online teaching and learning of music, used as the emergency remote teaching method during the COVID – 19 pandemic? The purpose of this study is to understand how academic staff and students felt about learning music online in order to improve the strategies for blended delivery transformation. The objectives of the study are as follows.

1. To identify the effective strategies used for teaching and learning music online.
2. To investigate ineffective aspects, any barriers, and areas that require further improvement.

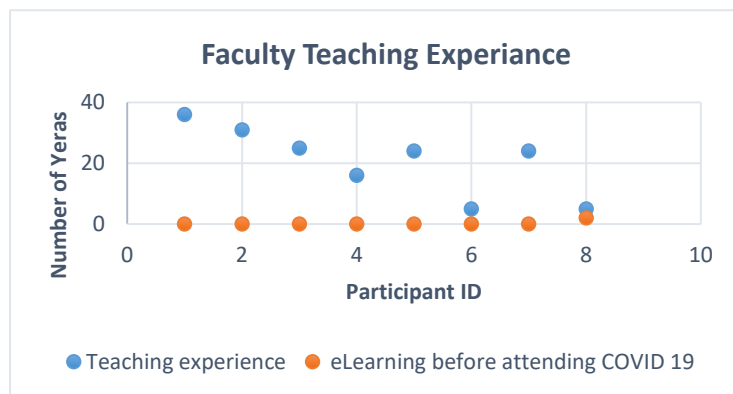
### **Research Design and Method**

A case study approach has been used as the method of this investigation (Crowe et al., 2011). Case studies explore a real-life, contemporary bounded system (a case) or numerous bounded systems (cases) through time by collecting detailed, in-depth data from multiple sources of information and reporting a case description and case themes (Creswell, 2006). Purposive sampling was used as a sample method when selecting academic staff members and random sampling was used for the selection of students to take part in this research. Semi-structured interviews were conducted to obtain feedback from carefully selected eight academic staff members at the Faculty of Music in the 2018/2019 academic year, at the UVPA, based on the goal of the research. In this study, data was also collected from 425 participants (3<sup>rd</sup> and 4<sup>th</sup> year students) utilizing a questionnaire survey created with Google forms to explore their learning experiences. Data collected from faculty members employing semi-structured interviews were transcribed, coded, and analyzed for identifying recurring themes, patterns, or concepts. The survey questionnaire data (used for student participants) were analyzed by calculating the percentages and providing qualitative descriptions for unpacking the background information offered for open-ended questions (Zinal, 2003). Multiple methods (a questionnaire survey that included open-ended questions and semi-structured interviews) and data sources (faculty staff and students) were used for validation of data (Patton, 1999) through cross verification.

The first author who currently works at the UVPA as a Senior Lecturer in Information Technology conceived the research and collected the data. Both authors contributed to the data analysis and wrote this paper, the second author undertaking a mentoring role in the process.

## Results and Findings

The analysis of responses in Figure 2 revealed that most teaching staff were new to teaching online but have managed to learn strategies of teaching online and have improved their technical and pedagogical skills (related to the TPACK framework) rapidly acting under compulsion.

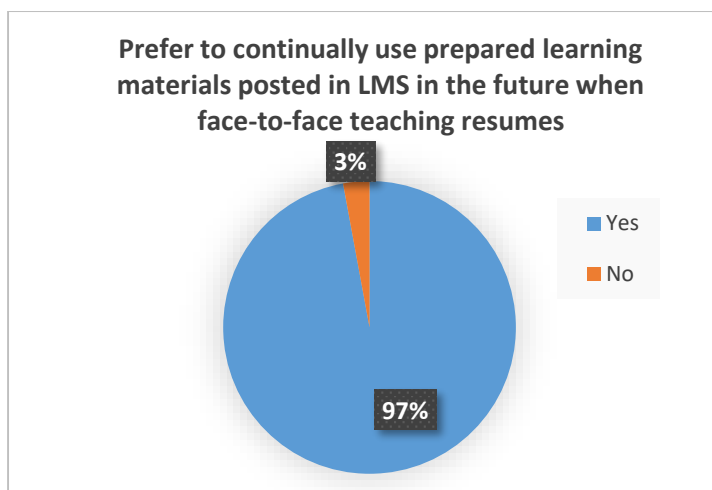


**Figure 3.** Academic Staff Teaching Experience

In response to the question “Did you face difficulties in conducting online classes at the beginning?”. Academic staff participants stated that at the beginning of online classes they faced difficulty in adapting but now feel very confident in teaching music subjects online. Also, participants illustrated that they tested and used different teaching approaches and strategies to teach music online during the process. Academic staff said that they encountered buffering, video and audio delays, and other disturbances while running Zoom online classes. Additionally, (Author2., 2019, 2021) indicated that it is exceedingly challenging to conduct online practice sessions for music vocal, and instrumental performing activities using Zoom technology because of different internet-related delays. Furthermore, participants stated that due to the numerous delays, it is quite challenging to follow the teacher to handle a musical instrument correctly, produce sound, and use the finger movement methods necessary for a better grasp of playing the musical instrument (Tabla, Sitar, Violin, etc.). The flipped classroom (Bergmann & Sams, 2012) is an educational strategy for inverting the sequence of learning meaning “events that have traditionally taken place inside the classroom now take place outside the classroom and vice versa” (Lage et al., 2000, p.32). Providing recordings of instructions

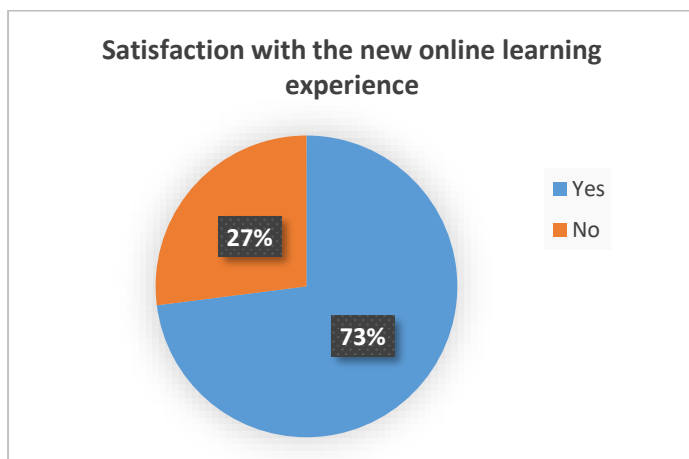
and content for students is one of the important strategies used in a flipped classroom using a Learning Management System (LMS) for “presenting all activities in an organized way” (Basal, 2015, p.33). At the UVPA, Moodle is used as the LMS presenting learning resources, assignments, and assessment information and activities including submission. This was a brand-new experience for both staff and students as the use of an LMS to assist the delivery of all programs was not previously feasible. Participants of this research used recorded lessons as a substitute for traditional in-class/face-to-face teaching and learning. All teaching/academic staff participants claimed that they obtained unique online teaching experiences through this suddenly forced exercise and gained transformative knowledge and skills in using modern technology. They also found that the strategies used for teaching and learning music online as effective for students. Supporting this claim of their teachers, student participants explained that flexible access to learning material at anytime from anywhere (Hodges et al., 2020) has been a real benefit of online learning. Enfield (2013) pointed out that flipped learning facilitates “a more customized learning environment” (p. 27) for students. Teachers can select and include a variety of appropriate activities to address the needs of diverse learners when using the flipped classroom approach.

Therefore, the academic participants indicated that they are ready to incorporate online teaching into their teaching and technology-enhanced teaching will be a good transformation of their pedagogical practice in the future. While 35.8% of the 425 participants were third-year students and 64.2% were fourth-year students, 32% of participants had responded to the survey. Student participants were asked whether they prefer to continually use pre-prepared learning materials posted in LMS in the future when face-to-face teaching resumes. Figure 3 demonstrates students’ responses to this question.



**Figure 4.** Prefer to continually use prepared learning materials posted in LMS in the future when face-to-face teaching resumes.

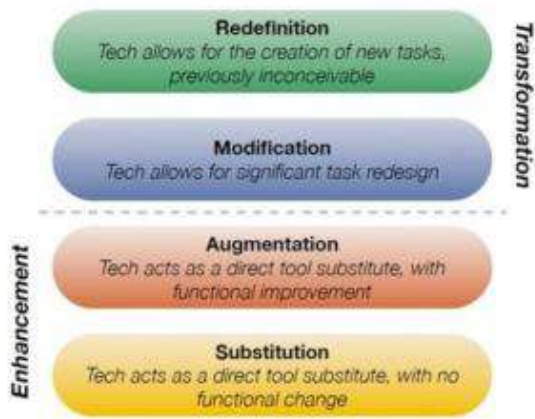
Student participants were asked about their satisfaction with the new online learning experience and following Figure 4 visualized responses. It is interesting to see the willingness of students at the UVPA to continually use the LMS for supporting their learning which is a common practice in contemporary educational settings in most countries of the world.



**Figure 5.** Satisfaction with the New Online Learning Experience

According to figure 4, 73% of the student participants were satisfied with the new online learning experience but 27% were not satisfied due to access issues to devices and the internet including the lack of technological knowledge and skills. Additionally, student participants indicated that using technology enhances their development of 21<sup>st</sup>-century skills and abilities and facilitates the transformation of learning processes. The majority of the student participants (90.5%) used their smartphones for the learning process. In this exercise, the SAMR framework, developed by Ruben R. Puentedura (2013) was also used in addition to the TPACK

framework to ensure that technology is effectively incorporated and used to make this transformation happen. Figure 5 explains the SAMR framework details. The four categories of technology utilization for learning activities make up the SAMR Model (Puentedura, 2013).



**Figure 6.** SAMR Framework

*Note:* SAMR framework. Copied from “SAMR: Moving from Enhancement to Transformation,” by R. Puentedura, 2013, p.3.

According to the SAMR framework:

*Substitution:* Technology offers a substitute for other learning activities without practical change.

*Augmentation:* Technology offers a substitute for other learning activities but with useful improvements.

*Modification:* Technology permits the learning activity to be reshaped.

*Redefinition:* Technology permits for the making of tasks that could not have been done without the use of the technology.

It is important to remind that the framework only applies to the uses of technologies but not to the actual technologies. The first two tiers are regarded as an improvement to learning experiences in which technology substitutes potential functional gains for specific tasks or functions. The latter two are considered transformative, meaning that they enable the redesign of existing tasks and functions as well as the development of brand-new ones that were not previously feasible. From the analysis of the practices of the selected teaching academic staff

for this study, it was possible to identify recorded instructional videos, PDF formatted lesson notes/content, and guidelines including Zoom lectures as components of the Substitution and Augmentation tier of the SAMR framework. The LMS discussion forum was used for messaging students and group discussions. In live Zoom classes, the text chat feature was used to communicate questions and answers. This use of features (of the LMS) can be recognized as the *Modification* tier of the SAMR framework. In this online environment, students were asked to record their presentations, performance rehearsals, and techniques (used for making music/singing) for reflections and monitoring progress. The use of technology (for audio/video recordings) permits such practice and the Redefinition tier of the SAMR framework was achieved by integration of technology.

Real-time involvement is required to develop advanced solo and ensemble performance skills, as well as participation in live music and stage performances. However, real-time interaction via the internet between students and instructors in an online context remains a constraint even though there are advantages of using pre-recorded material (e.g. aspects of the flipped classroom). This issue impacts stakeholders worldwide (Joseph et al., 2021) therefore improving online communication platforms and developing new technology is essential.

## **Conclusion**

There is a lack of previous research that explores the teaching of Performing Arts online including Music in Sri Lanka. A team of researchers from the UVPA has investigated and published perspectives of students on learning and assessing performing arts online (Ferdinando et al., 2021) that indicated a high satisfaction rate for learning Performing Arts online with a substantial positive attitude towards being assessed online. However, this student satisfaction also indicated students' desperate desire to complete the degree program to find employment (Ferdinando et al., 2021). It is important to emphasize the fact that this current research study also has some limitations such as research samples and participant selection. Exploring this topic by engaging the whole student and academic, teaching, and administrative staff population of the UVPA could have provided a more accurate picture of online educational experiences.

As a result of the forced change (shift to online mode), academic staff and students have obtained and developed a set of important 21<sup>st</sup>-century skills (that can be identified as the tilt towards using modern technology). Therefore, the words shift with a twist have been used as a part of the topic of this article. This transformative experience will be beneficial for all



stakeholders as a post-COVID shift toward online education is evident (Bashir et al., 2021). Wells et al., (2008) asserted that the advancements in technology have changed the ways of educators and learners. However, providing access to devices and reliable internet for online teaching and learning is a highly important consideration for authorities. The COVID-19 crisis has focused attention back on education technology, and the academic staff members have become acquainted with it to operate as effectively as possible in the future. This compelled shift to online delivery has contributed to the improvement of TPACK of the academic staff and teachers at the UVPA and beyond. Knowledge of using modern technology for planning, designing, and implementing lessons including for assessing can be considered an essential 21<sup>st</sup>-century requirement for educators operating in any setting globally. In conclusion, it is important to recommend conducting research related to teaching, learning, and assessing practical subjects through online modes, especially in the Sri Lankan context as the country starts utilizing modern, technology-enhanced education methods.

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## **Factors Affecting the Activity Based Learning (ABL) of G.C.E. Advanced Level Students to Promote Sustainable Development Goals: A Critical Review**

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### **Abstract**

Sustainable Development Goals (SDGs) are compartmentalization of sectors that provide a holistic and multidimensional view on development to transform our world to ensure well-being, economic prosperity, and environmental protection. Sustained society would be achieved through education by developing knowledge and attitudes of the young generations towards SDGs which in turn lead to favourable behaviours. However, extant researches have emphasized that the level of awareness, knowledge, and attitude towards the SDGs is not satisfactory not only among school children but also in the society. Furthermore, presence of Activity-based Learning (ABL) in the Sri Lankan classroom is also questionable. This study critically reviews the positive and negative factors affecting the ABL of G.C.E. Advanced level students to promote Sustainable Development Goals through multiple sources such as educational reports, text books, research papers, e-journals and related articles. Extant literature reveals that the examination- oriented mentality of senior secondary school students, lack of funds, lack of physical space in schools to carry out SDGs related programmes, the principals and teachers' perceptions reported inadequate on sustainability issues faced by the schools. Lack of learners' motivation, time constraints and a lack of teaching and learning materials and teacher centered approaches also found to be negative factors in implementing sustainable development related ABL in schools which primarily aims at knowledge and attitude change. On contrast, the literature evidences student-centered pedagogy, strong administrators, enthusiastic parents and past pupils, competent teachers, co-curricular activities such as sports, activities of environmental society, strong links with environmental agencies, special activities such as shramadana campaigns as positives in implementing ABL in the learning-teaching process of advanced level students to promote SDGs. This paper discusses the need of empowering the school children with knowledge and attitudes towards SDGs considering the available resources and literature precisely.

**Keywords:** Sustainable Development Goals, activity-based learning

## **Introduction**

At the dawn of the third millennium, open economic system with economic prosperity, industrialization and population growth contributing to unprecedented global issues such as economic crisis, environmental issues and social issues on our planet's environment (Anand, 2013). As a response in 2015 UN have proposed the Sustainable Development Goals (SDGs) to provide a holistic and multidimensional view on Sustainable Development (SD) aligning with developing and developed countries. Many researchers and organizations have identified that SD cannot be achieved by simply relying on state intervention, legislation, or new technologies, it requires that people actively participate in decision making, problem solving, and sustainable change with better knowledge and attitude towards SD (Welskop, 2013; UNESCO, 2012). Therefore, it is important to prepare students to address critical environmental, social and economic challenges arisen globally at present by educating them in the basics of Sustainable Development (McGifford, 2010). Extant literature reveals that Sri Lankan government has taken two main strategies to reach SD since its inception in 1992. These include (1) implementation of the national action plan on Education for peace and SD in order to make aware the principals, the teachers, the students and the overall society about methods of teaching and learning SD, and (2) implementation of an island wide campaign in the schools to raise awareness and promote SDGs among school children. However, many researchers have emphasized that the level of awareness, knowledge, and attitude towards the SDGs is not satisfactory not only among school children but also in the society. Furthermore, Jayasuriya (2000) has explained that school based research requires comprehensive understanding about school environment such as resource availability, community interaction, social condition and ordinary routine in schools and classrooms. This study aims at finding out the factors that affect the implementation of Activity Based Learning for G.C.E. Advanced level students to promote Sustainable Development Goals as per the extant literature.

## **Research Objective**

The main aim of this study is to examine the factors which affect the implementation of Activity Based Learning in learning-teaching process of G.C.E. Advanced level students to promote SDGs. Therefore, more specifically following research objectives guided this study:

1. Explore the positive factors affecting for Activity Based Learning in the learning-teaching process of advanced level students towards SDGs in the school

2. Explore the negative factors affecting for Activity Based Learning in the learning-teaching process of advanced level students towards SDGs in the school

## **Research Questions**

The following research questions have been built upon the research objectives.

1. What are the positive factors affecting for Activity Based Learning in the learning-teaching process of advanced level students towards SDGs in the school?
2. What are the negative factors affecting for Activity Based Learning in the learning-teaching process of advanced level students towards SDGs in the school?

## **Research Method**

Systematic qualitative literature review method was employed from existing studies, educational reports, text books and documents. Initially the articles were explored using key word searches and then inclusion criteria were used for selecting relevant articles as primary sources. Each educational report, text books, document and paper was initially screened using its title, abstract, introduction, methodology and conclusion to identify irrelevant publication and exclude them accordingly.

## **Findings**

### **Positive factors affecting for SDG related Activity Based Learning in schools**

Agirreazkuenaga (2018) has showed that key factors for successfully implementing education for sustainability programs as the involvement of the teaching staff, personal motivation and the leadership of the coordinator, the support of the school authorities (complementary focuses). Moreover, this study has explained the stability of the teaching personnel and their identification of the project towards sustainability are the ways that teaching staff affect for successfully implementing education for sustainability programs in schools. Chinedu, Wan Mohamed and Ajah (2018) conclusively emphasis was paid on the unique and significant role that teachers can play in contributing towards the transition to SD. Therefore, it was mentioned that teachers must be trained to develop understandings for SD, develop the pedagogies and competencies for teaching SD related concepts and reorienting their teacher training programs to reflect SD principles. Alexandar and Poyyamoli (2014) show the importance of active learning process (field investigations, learner centered education, group projects, problem based activities and interactive classroom sessions) in teaching learning process changes in

knowledge, skills and attitudes related to enhancing ecological and environmental justice to achieve SD properly. As described by Eames, Cowie and Bolstadu (2008) activity outside the classroom is an important aspect of schooling in New Zealand and most students get outdoor experiences such as forest walks, water activities and overnight camps as part of their school environmental education. Furthermore, they have explained that strong leadership, whole school support, availability of professional development, enthusiastic teachers and strong links to environmental agencies are strengths to schools to promote Sustainable development among school children.

### **Negative factors affecting for SDG related Activity Based Learning in schools**

Foreign researchers have shown a continued interest about challenging factors in implementing activities in learning-teaching process of students towards SD in the school for past years. (Anyolo et al., 2018; Filho et al., 2018; Sewilam et al., 2014). They have emphasized that there are number of factors within school such as content of the curriculum, administrators, teacher, student and physical resources related factors as well as outside school factors as the home environmental conditions, and occurrence of conflicts and disputes in the society affect the students' knowledge, attitudes towards SD practices. Filho, Pallant, Enete, Richter and Brandli (2018); Down (2006) have implied that curriculum that is poorly adapted to local problems, general lack of institutional commitment, poor and erratic government funding, lack of/weak performance assessment methods, lack of trained staff and teaching staff shortages and time constraints are challenging factors towards sustainable development. Anyolo, Karkkainen and Keinonen (2018) have emphasized that lack of learners' motivation, time constrain and a lack of teaching and learning materials are barriers for acquiring necessary knowledge and skills to understand the complexity of SD. Sewilam, McCormack, Mader and Raouf (2014) have investigated challenges for introducing education for SD into Egyptian schools and have identified lack of physical resources, teacher centered approaches to classroom learning due to overcrowded class rooms and perceptions of administrators.

In Sri Lankan context, Nithlavarani (2018) stated that the principals and teachers' perceptions are not sufficient on sustainability issues faced by the schools. Also, Kandangama (2018) has identified that awareness of SD concepts among teachers is very low, there are difficulties to include Education for Sustainable Development programmes in the formal school timetable and obstacles in carrying out Education for Sustainable Development programmes due to lack of funds, Examination oriented mentality of secondary school students, lack of physical space

in schools to carry out Education for Sustainable Development programmes, lack of resource persons to carry out workshops and Education for Sustainable Development programmes and obstacles which arise within the school community.

## Conclusion

According to the above mentioned literature, it is argued that strong leadership, whole school support, enthusiastic teachers, teachers' beliefs and attitudes, student-centered pedagogy, availability of physical resources and strong links to community are the strengths to implement Activity Based Learning in the learning-teaching process of advanced level students to promote SDGs. Examination oriented mentality of senior secondary school students and their parents, lack of funds, lack of physical space in schools and non-supportive curriculum to carry out SD related programmes found as the challenging factors in implementing the Activity Based Learning towards Sustainable Development Goals. Therefore, the ongoing research initiate a broader attention in the education system to develop proper knowledge, attitudes and skills of senior secondary level students to make them empower to contribute to sustainable development effectively by considering available resources and literature precisely.

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## **Challenges Facing the Teacher Professional Development Centre in the Implementation of the Efficiency Bar Examination Programme for Teachers**

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### **Abstract**

Several programmes have been implemented in Sri Lanka to develop the teaching profession. Opportunities have been created to improve the teaching profession through new teacher service minutes through modules. A teacher must pass the efficiency bar examination to be promoted from one class to another. It is conducted as a course to complete the modules prepared for each class. The course for completing a module of 20 hours is conducted over a period of 3 days. This module course is organized by the Teacher Education Administration Branch of the Ministry of Education and is conducted by the Teacher Professional Development Centre in each Education Zone. The main purpose of this study was to identify the challenges faced by the Teacher Professional Development Centre in Northern Province in implementing this course effectively. This study was conducted based on the descriptive survey design. Questionnaires and interviews were used to gather data from the 14 managers of these centres and 13 deputy directors in each educational zone. A descriptive analysis method was used to analyze the data. The following results have been obtained. The managers faced major challenges in conducting this programme effectively due to the limited and insufficient physical and human resources. Due to the recent reduction of funding for this course, managers faced challenges in paying the resource persons. Also, they faced administrative challenges as classes had to be conducted on weekends and after school. Also, they faced administrative challenges in conducting classes on weekends and after school and getting information about teachers' classes and grades.

**Keywords:** Teaching profession, Efficiency Bar Examination, Teacher Professional Development Centre.

## **Background**

Education is a learning cycle without an end. Continuing education helps career-minded individuals to continually improve their skills and become more professional at their work (Maria Kampen, 2019). Student achievement should be the ultimate goal of any teacher professional development activity. Effective professional development helps Teachers shape career-long learning. Researchers have recognized that teachers' professional development is essential to changing classroom practice, improving schools, and ameliorating pupils' learning outcomes. Professional learning often takes place in formal settings, such as professional development programmes, teaching research groups, and formal mentoring programmes (Britt Postholm, 2018).

Several programmes have been implemented in Sri Lanka to develop the teaching profession. Teacher Professional Development Centre plays a major role in implementing these. The objectives of the Teacher Professional Development Centre given in the guidebook incorporate the following functions which are expected to be performed by this centre:

- Improve and update teachers' professional and academic competencies
- Provide retraining programmes to teachers as stipulated in SLTS minute
- Provide a meeting place for teachers
- Provide all teachers continuing education
- Serve as a resource centre for teachers
- Provide residential interactive experiences to teachers who had received training only in the distance mode
- Provide opportunities for field training for student teachers

(NEC Report, 2014)

Opportunities have been created to improve the teaching profession through new teacher service minutes through modules. The new teacher service minute has been published in the Gazette extraordinary of the democratic socialist republic of Sri Lanka, numbered 1885/38 and dated 2014.10.23. According to this new Teacher Service Minute, in order for a teacher to be promoted from one class to another, he or she must pass the efficiency bar exam. It is conducted as a course to complete the modules prepared for each class. That is, a teacher belonging to a particular class can be promoted by participating in a module course and submitting a certificate of passing the E.B examination conducted for them.

This module course is organized by the Teacher Education Administration Branch of the Ministry of Education and is conducted by the Teacher Professional Development Centre in each Education Zone. The course for completing a module of 20 hours is conducted over a period of 3 days. An exam is conducted on the last day of the class and a certificate is awarded.

In this context, the study aims to identify the challenges faced by teacher centers in the Northern Province in implementing this course effectively and to propose strategies for them.

### **Objectives of the Study**

1. To identify the current status of the efficiency bar examination Programme
2. To identify the challenges faced by the managers in conducting the programme effectively
3. To propose suggestions to implement the efficiency bar examination programme effectively

### **Research Methods**

This study was a mixed methods and the descriptive survey design was used to conduct this research. A mixed methods approach is the type of research in which the researcher combines elements of qualitative and quantitative research approaches for the purposes of breadth and depth of understanding and corroboration (Creswell, 2010). Survey research is often used in the study of educational issues. This research is conducted as a solution to the problem by finding out the variables related to the educational problem and the relationship between them (Sinnathamby, 2007).

This study was conducted in the Northern Province of Sri Lanka. 14 Teacher Professional Development Centres in the Northern Province and 14 managers responsible for these centres were selected for this study. In addition, 13 deputy directors responsible for educational development in each educational zone have been selected for this study. Questionnaire and interview were used as tools for collecting data from the managers and deputy directors. The data were analyzed using descriptive analysis methods.

## **Findings**

Ten centers were very old buildings, with the exception of the four stations that were recently built. They have not been renovated for a long time. There were small lecture halls that could accommodate up to 30 participants. It was difficult in this instance to conduct this course with up to 50 teachers. There were old tables, chairs, the whiteboard, magnetic board and ceiling fans. As a result, teachers faced problems such as being unable to be engaged in activities efficiently for a long period of time. They also had difficulty getting clean drinking water and using the toilet.

The managers faced huge challenges in conducting this programme due to lack of computerized equipment. In particular, laptops, printers, multimedia and photocopiers were of old model and in poor working condition. At the same time, they were less than required. Also, telephone and internet facilities had not been provided to many of the centers.

Due to the shortage of human resources, managers faced significant challenges in implementing this program. Majority of the centers (almost 80%) only had one manager and one assistant. Despite the large number of vacancies, none of them had been filled. Thus, a resource person had to be recruited from outside. Additionally, because of the recent reduction in funding for this course, managers were having trouble paying resource persons. Also, they faced challenges as the classes had to be conducted on weekends and after school. Due to the teachers' files not being properly maintained, the managers also faced challenges in selecting teachers according to the class and the grade.

## **Conclusion and Recommendations**

Through this study it has been found that the managers faced major challenges in conducting this programme effectively because the physical and human resources were limited and insufficient. Due to the recent reduction in funding for this course, managers faced challenges in paying resource persons. Also, they faced administrative challenges as classes had to be conducted on weekends and after school. Also, they faced administrative challenges in conducting classes on weekends and after school and getting information about teachers' classes and grades.

The following were suggestions for solving these challenges and problems. Apart from the recently constructed 4 grade “A” centers, the remaining 10 were of grade “B” category. Adequate provision of new modern furniture and equipment should be provided. The financial allocations for the centers should be increased. A mechanism should be developed to keep the fund so that these centers can handle it themselves. Vacancies should be filled in a suitable manner. Effective communication should be established between the Ministry of Education, Provincial Education Department and Zonal Education Office regarding the planning and management of the Teacher Professional Development Centre.

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## **Access to and Use of Career Guidance and Counseling Services by Female Students in Secondary Schools in Sri Lanka**

### **(A Study Based on the Badulla District, Welimada Educational Zone)**

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#### **Abstract**

Students who get counseling and guidance are supported in developing stronger decision-making skills and in identifying both their personal needs and the needs of the society at large. Major aim of the study was to examine the availability of the guidance and counseling services in secondary schools and to determine female students' access to the guidance and counseling services provided in such schools. Types of counseling services available in secondary schools and factors affecting the improvement of guidance and counselling services in schools for an effective career choice are also examined. Survey design was used for the study and data were collected from four purposively selected secondary schools in the Welimada Educational zone of the Badulla District. Hundred female students were selected as the sample. Structured questionnaire and interviews were used for data collection. The collected data were analyzed using descriptive statistics. Due to the character of female students, guidance and counseling services are crucial for effective career choice at secondary schools in the of the Welimada Educational zone of the Badulla district. The study revealed that secondary schools' guidance and counseling programs had a positive impact on students' ability to make informed academic and career decisions. Findings show that providing proper orientation, enlightenment, and awareness will increase the efficacy of counselling services for the female students of the secondary schools. Guidance and counseling give pupils the necessary support to better understand and appreciate their personalities, endowments, attitudes, and value as distinct individuals. Students are also assisted in developing stronger decision-making abilities.

**Keywords:** Career guidance, counselling, female students, secondary schools

## **Introduction**

The secondary school education system in Sri Lanka demands that pupils be given appropriate guidance on their academic pursuits, career choices, and emotional and interpersonal issues. Therefore, guidance and counseling offers students the necessary aid to better understand and embrace themselves, their personalities, endowments, attitudes, and value as unique individuals. This helps students overcome life inadequacy. Through guidance and counseling, students are also assisted in developing stronger decision-making abilities and recognizing their individual needs as well as the needs of others and society at large. Conchi-Miriam Brown (n.d.) stated that the main drivers for the creation of guidance and counseling services are the current conditions in Sri Lanka's society and educational system. The aid provided to students or people using group tactics in order to help them perform better in their academic and professional environments is known as guidance and counseling. It enables students to understand their current and future educational requirements and possibilities and to take appropriate action. Peters and Farewel (2008) says that Female career development and education are crucial for the advancement of civilization because, if a female kid receives an education, she will pass that information on to her family, which is the basic unit of a society. The capacity of women to prepare, enter their chosen areas of work, succeed, and progress in those fields of work alongside their male counterparts without any stereotyped bias might thus be seen as having a significant impact on women's professional advancement. According to the Action Health Incorporated (2011) report, Women's professional growth and choice in Sri Lanka are greatly influenced by culture. This is based on the fact that Sri Lankan culture frequently holds the belief that women are subordinate to males. Some people believe that women should stay home to care for their children and cook, which makes it harder for them to succeed professionally. Career inequality is so commonly taken into account when selecting school curricula. The school for boys at those ages is often more equipped and more focused on science and technology. Boys at mixed-gender schools are further encouraged to enroll in and excel in these courses. Female schools instead provide domestic science and secretarial courses instead of technological areas like engineering. When students are ready to pick a job, they have already absorbed gender standards. Bamgbaiye (2000), stated the introduction of advice and counseling in secondary schools was inspired by current events in many nations of the world. The secondary school curriculum in our country has to be designed around the youngsters' developmental stage (Bamgbaiye, 2000). Learning occurs when instruction is tailored to each child's stage of cognitive development. But this also covers the sensory-motor,



pre-operational, concrete, and formal operational phases. Each stage has a unique set of learning outcomes that it is known for. Many people view a career as a benefit for finding work, aspiring for greater heights or opportunities in life, and being promoted to higher ranks in an organizational structure. However, it has been noted that many female students lack the motivation to continue their education after high school. Therefore, this study aims to ascertain the effect of guidance and counseling on career choice among female students in secondary schools in the Badulla district and Welimada Educational zone. Also, the availability of guidance & counseling services in the selected schools, the level at which female students access such services, and the nature of such services accessed by female students within the study area was addressed by the researcher. Additionally, there are other problems and difficulties that professional counselors in schools must deal with (Kithyo and Petrina, 2002). These problems include a lack of instruments for counseling evaluation, inadequate physical facilities, and poor counselor-to-teacher and administrator communication, among others. (Conchi-Miriam Brown, n.d.)

## **Literature Review**

By helping a person understand himself and his environment, Makinde (1983) characterized career guidance as a process. Knowing oneself well allows one to be aware of one's potential, weaknesses, and strengths. Understanding one's environment also involves being aware of what is going on in and around it, as well as being able to adapt to it. Prayitno and Erman (2004) defined guidance as the process of assistance provided by people who are experts on one or more individuals, including children, adolescents, and adults, so that people can be guided to develop their own abilities, to harness the power of individuals, and to utilize resources that can be developed based on the norms that are currently in place. Additionally, they regard counseling as the process of offering support to those who are having problems through therapy sessions conducted by a professional (counselor). Makinde (2005) stated that while counseling as a means of assisting the person to use his or her psychological resources by focusing on the individual's positive strength for growth and by focusing on the individual's personality conduct and emotional asset that might be mobilized (Prayitno and Erman, 2004).

## **Methodology**

Survey design was used for the study and data was collected purposively from four (4) selected secondary schools in Badulla District, Welimada Educational zone. The design of the study was Survey design and the study took place in the selected four secondary schools in the

Badulla district, Welimada Educational zone. The total population for the study was all the female students in the secondary schools in Welimada educational zone, but 100 female students were selected as the sample. Purposive sampling was used to select four schools in the first stage and simple random sampling was used in the second stage to select twenty-five students using a single proportion design to draw 100 female student samples. Structured interviews and a questionnaire was used as the data collection method. The questionnaire included socio-demographic characteristics such as the name of the school, age, gender, class, occupation of parents, and parents' level of education. The collected data was analyzed using descriptive statistics such as frequency, percentage, and average. Thematic analysis was used in the study to discuss the results.

## Results

### Availability of Guidance and Counselling Services in the Schools

The availability of guidance and counseling services at the chosen secondary schools is detailed in Table 1, where it is stated that the majority (82%) of respondents answered that these services are offered at their institutions. At addition, 13% of respondents said they had no idea that guidance and counseling services were offered in their schools, while 5% of respondents declined to give comments. According to the results, more than 10% of the respondents were unaware that guidance and counseling services were available.

**Table 1**

*Availability of Guidance and Counselling Services in the Schools (n = 100)*

<b>Variables</b>	<b>Frequency</b>	<b>Percentage %</b>
Availability of G/C	82	82
Unavailability of G/C	13	13
Not specified	5	5
Total	100	100

Source: Field Survey 2020

### Stages of Guidance and Counseling Services Accessed by the Respondents

Table 2 shows that in senior school one, 40% of the respondents used guidance and counseling services offered by their respective schools. 20% of respondents used the services while in junior secondary school, while 16% of respondents used guidance and counseling services.

And just 2% of the respondents used the senior school two Class services. Many responders remained silent about their opinions. The research reveals that many students in the study region utilize senior school classes to seek guidance and counseling services in their individual institutions.

**Table 2**

*Stages at which the Respondents Access Guidance and Counselling Services (n = 100)*

<b>Variables</b>	<b>Frequency</b>	<b>Percentage %</b>
Senior Secondary School One	40	40
Junior Secondary School One	20	20
Junior Secondary School Three	16	16
Senior Secondary School Two	2	2
Not specified	22	22
Total	100	100

Source: Field Survey 2020

### **Types of Guidance and Counseling Services for Students**

As shown in Table 3, over half (51%) of the respondents got career assistance and counseling recommendations. 13% of people abused drugs, whereas 8% attended marriage counseling. In addition, the results show that just 3% of respondents seek to advice on other services, such as family issues or other topics, and up to 19% have never sought any assistance from a guidance or counseling office.

**Table 3**

*Types of Guidance and Counselling Services Offers to Students (n = 100)*

<b>Variables</b>	<b>Frequency</b>	<b>Percentage</b>
Career Choice	51	51%
Drug Abuse	13	13%
Cultism	6	6%
Marriage	8	8%
Family	3	3%
Not specified	19	19%
Total	100	100%

Source: Field Survey 2020

## **Factors that Affect the Improvement of Guidance and Counselling Services in schools for an Effective Career Choice**

Many variables affect how effectively and efficiently secondary schools provide guidance and counseling services for female students in terms of their career choices. According to Table 4, a sizeable percentage (24%) of respondents agreed that giving students a proper orientation and informing them of their options will encourage them to seek out guidance and counseling officers in their institutions. On this issue, 7% of respondents said that giving regular working materials for the guidance and counseling services and assistance from the school administration may boost female students' profession choices. Another 8% of respondents, according to the results, believe that having more trained guidance and counseling service officers available in female schools will help female students make better career decisions and receive appropriate guidance and counseling. While 4% of the respondents opine that good relationship and motivation between the Guidance and Counselling Service Officers and Students will facilitate and improve Guidance and Counselling Services in the area of study. And 3% of the respondents opine that Professional Guidance and Counselling Officers should be employed in female Schools. While 2% of the respondents were of the view that Guidance and Counselling Services can be improved if the Guidance and Counselling Officers were allowed to focus and concentrate on Guidance and Counselling Services in the Schools. This also illustrates Denga's (2001) thesis that the public's understanding of the tasks and responsibilities of counselors is sluggish, unclear, and incomplete. The majority of the time, counselors assigned to certain schools may be required to assume the roles of vice principals, full-time instructors, guidance counselors, career master and mistress, and school, among other roles. Few respondents (2%) believed that developing guidance and counseling services would be beneficial. Clubs in both male and female schools might enhance counseling and guiding services.

**Table 4**

*Factors that Affect the Improvement of Guidance and Counselling Services in schools for an Effective Career Choice (n = 100)*

<b>Variables</b>	<b>Frequency</b>	<b>Percentage</b>
Orientation and Informative	24	24
Working Materials and Support	7	7
Trained Guidance and Counseling Officers	8	8
Good Rapport and Impetus	4	4
Focus on Guidance and Counseling Services only in the Schools	3	3
Forming Guidance and Counseling Services Clubs	2	2
No Comments	52	52
<b>Total</b>	<b>100</b>	<b>100</b>

Source: Field Survey 2020

**Impact of counseling and guidance services on respondents' behavior**

The result indicated in the table No.5 says that 41% of the respondents were with the opinion that guidance and counselling services has significantly changed their life in the area of guide. While 30% were with opinion that guidance and counselling services has change their life. Moreover, the result further illustrate that 5% of the respondents were of the view that guidance and counselling services had not affected their life in any away, and 3% of the respondents were with the opinion that guidance and counselling services had partly impact on their life while 21% of the respondents did not express their opinion.

**Table 5**

*Effect of Guidance and Counselling Services on Respondents behavior (n = 100);*

<b>Variables</b>	<b>Frequency</b>	<b>Percentage</b>
Change significantly	41	41
Change	30	30
Partly Change	3	3
Not Change	5	5
Not Specified	21	21

Source: Field Survey 2020

## **Discussion**

Due to the character of the female students, guidance and counseling services are crucial for effective career choice at secondary schools in the Badulla region of the Welimada Educational zone. This study sheds light on the need of guidance and counseling services for female secondary school students in making wise career decisions. The study has, however, looked at the demand for guidance and counseling services in a few particular secondary schools. The findings show that providing proper orientation, enlightenment, and awareness will increase the efficacy of guidance and counseling services for female secondary school students. This suggests that guidance and counseling service officers need to place greater priority on providing students with proper orientation, education, and career discussions in the classrooms. Jospeh, A. E. (2012), stated that there was emphasized that good guidance programs have not yet become widely available, even in the classroom context. This could be as a result of certain difficulties with counseling and assistance, a problem that the educational system is still grappling with. Funds are required for the purchase of counseling supplies, including psychological tests, information gathering, and storage. This concurs with Brown and Joshua's assertion that counseling services are those provided by a counselor to an individual or group of individuals in a formal context. A professional counselor is one who has received formal training in the fields of guidance and counseling from an accredited tertiary school. As a result, the counselor's educational counseling service addresses all facets of educational issues as they relate to the school environment. There are divided factors affecting occupational development into social accident and economic psychology. Through the Guidance and Counseling Services, which have grown more prudent in advising students on profession choice, drug misuse, cultism, marriage, and other areas of need, vocational development categorizes people

according to their standing in society. The outcomes also showed that after meeting with guidance and counseling service officers, the conduct of the students had changed favorably as result of guidance and counseling services.

## **Conclusion and Recommendations**

The importance of guidance and counseling services in schools was emphasized in relation to national policies on education as well. The students highlighted that, they changed their behavior with the support of the guidance and counseling programs conducted in their schools. Guidance and counseling give pupils the necessary support to better understand and appreciate their personalities, endowments, attitudes, and value as distinct individuals, which helps them overcome life inadequacy. Through guidance and counseling, students are also assisted in developing stronger decision-making abilities and recognizing their individual needs as well as the needs of others and society at large. The study's findings led to the following suggestions for improvement, including the implementation of effective guidance and counseling services in secondary schools and the need for management support across all educational institutions, including the Ministry, Schools, and Parents, as well as Donor Agencies. In secondary schools, more emphasis should be placed on orientation, educational, and awareness programs for guidance and counseling services. The career choices of students will be strengthened and improved, and counseling officers will receive training through enlightenment programs. All stakeholders in guidance and counseling services must show strong dedication, engagement, teamwork, positive relationships, and motivation in order to inspire and enhance services and career choice among female secondary school students. Since the majority of guidance and counseling service officers in secondary schools lack practical expertise, Therefore, in order to enhance career choice, it is strongly advised that qualified guidance and counseling officers be hired and encouraged to serve in secondary schools. Finally, guidance and counseling clubs should be established in all secondary schools with both students and professionals in study-related fields to encourage students to seek guidance and counseling services in female secondary schools.

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## **School Based Management and National Competency Framework for School Leadership and Management of Sri Lanka: A Comparative Perspective on Consistency in Policy and Practice in terms of Accountability**

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### **Abstract**

This study examines the two recent policy initiatives: Enhanced Program for School Improvement (EPSI) which is the Sri Lankan version of School Based Management (SBM) and the National Competency Framework for School Leadership and Management (NCFSLM): a framework for evaluating the managerial competencies of principals, to identify the conformity of the two initiatives in structuring the managerial system and functions of schools. Multiple case studies design was used to explore into the problem and explain the findings. Four school cases were selected through a purposive variant sampling technique from Jaffna district. In-depth interviews were held with the principals and structured interviews were held with two Zone Directors of Education (ZDE). To confirm the responses and for further insights, the documents related to the implementation of SBM and NCFSLM were reviewed. The qualitative analysis of this study was sequenced through thematic analysis for constructing a case study narrative and cross-case thematic analyses. SBM and NCFSLM, had very close conformity in the guidelines of circulars as the both policies had the similar objectives. SBM and NCFSLM are effective policies to improve the managerial functions of the schools and their guidelines to the school management are complying and mutually augmentative. Both policies have gaps in demarcating the accountability of the school programme. As a result the accountability for quality school outcomes was not properly assigned to the school level factors while the principals become solely accountable for the entire school process and performances. Such conditions contradict with the participatory management approach of the SBM. While the NCFSLM considers the principals as executive leaders of schools and are solely accountable for the outcomes of the school process. This approach of evaluating the principals' competency also confronts with the accountability of shared leadership and participatory decision making of SBM.

**Keywords:** School Based Management, accountability, National Competency Framework for School Leadership and Management, Enhanced Program for School Improvement.

## **Introduction**

The attempts to achieve the development objectives through the curricular changes have proven to be effective to only a limited extent and were observed to have reached a saturation point in producing the intended results, as the educational organization system remained intact (National Education Commission, 2014). Such conditions led to the need for the introduction of new policies to reorganize the education administration system in Sri Lanka.

This study examined the two recent policy initiatives: Enhanced Program for School Improvement (EPSI) which is the Sri Lankan version of School Based Management (SBM) and the National Competency Framework for School Leadership and Management (NCFSLM), which were introduced with the aim of improving the organization of schools' managerial system.

EPSI is the extended and updated version of Programme for School Improvement (PSI) which introduced the establishment of the balance control model of SBM in Sri Lankan schools since 2005 (MoESL, 2018a). SBM is an approach of decentralized education management through the devolution of certain level of authority to the schools for self- decision making on significant matters within a centrally determined framework of policies (Caldwell, 2005). In Sri Lanka, the SBM transfer significant decision-making authority to the School Development Executive Committee (SDEC) and School Management Team (SMT). These boards are presided by the principals who are expected to engage in participatory decision making for planning and implementing the school programme.

NCFSLM consists of a tool for evaluation of the principals' management performance with the purpose of enabling them to develop professional competencies to suit the needs of the educational system (MoESL, 2018b). NCFSLM has been constructed on four management areas of the school referred to as leadership and management competency domains: quality school governance, positive school environment, effective School management and quality learning outcomes. NCFSLM imposes an indirect pressure on principals to confirm the standard in performance of managerial functions as expected in the NCFSLM.

As SBM and NCFSLM are theoretically involved in regulating the school management there should be rational compliance and consistency between the two initiatives for achieving synergic impact for desired outcomes. Though, SBM theories are more inclined to participatory management of schools, based on group decision making and collective accountability for the

outcomes. The NCFSLM conceptualizes the principal as the sole executive officer of school entirely responsible and accountable to the overall performance and output of the school system. The participatory management of schools is included only as a part of the leadership domain of managerial skills of the principal. While, the balanced control model of SBM, as claimed to have been implemented in Sri Lankan schools by the Ministry of Education, on the other hand has been underpinned by the theoretical approach of sharing the decision making authority among the three school stakeholders: the principal; teachers and the external community. Such an organization of balanced control on schools management with equally shared authority should bind the three factions and hold them collectively accountable for the school performance and outcomes. Though there are no legal provisions or administrative regulations of MoESL to bind the other two factions, than the principal being solely accountable for the school management. Thus there may be some perceivable contradictions between the two policies at their conceptual level. Such incompliances may cause conflicts in school managerial practices and problems to the principals.

The EPSI and NCFSLM have been implemented for over five years in Sri Lanka. There are no previous studies explored in to the scenario of school management to find out the outcomes of these two policy initiatives in terms of their conformity and consistency in bringing out a synergic impact for strengthening school leadership. This study explores into the present practices and examine the consistency of the both initiatives and their mutual augmentative perspectives, through the perceptions and the practical experiences of the principals of schools.

### **Literature Review**

Though both documents, NCFSLM circular (MoE, 2018/ 05) and EPSI guidebook (MoE, 2018/06) prepared for two different purposes, their conceptualization of school management system and leadership functions are in compliance with the general functions of school leadership and management as identified by previous management theories (Gamage,2008).

As Wehella (2014) further pointed out, there can be contradictions between the objectives of PSI and other contemporary policies negatively influencing school management. The relationship between policy and practice critically depends on how the policy was disseminated to the implementation level. In the case of EPSI and NCFSL, the policies were disseminated in two main ways: (i) the guidelines of the MoESL Circulars (MoE, 2005; 2008a), and (ii) zonal-level awareness sessions led by the MoESL together with the Provincial Departments of

Education (PDE) for zonal officials and school principals however, most of these awareness sessions were confined to explaining circular guidelines.

The success of an educational organisation depends substantially on how the management has been able to develop its own image, own culture and traditions to meet the various challenges and to achieve the specific objectives (Mohanty, 2008). SBM allows the schools to organize themselves with such freedom to decide on their own priorities by the school stakeholders. These aspects are identified in SBM as institutional autonomy and participatory management (Bandara, 2018; Balasooriya, 2004; Zajda and Gamage, 2009; Caldwell, 2005; Gamage, 1993). The devolution of decision-making authority to the schools and involving the community in governance of schools has been emerging as a new culture in education systems (Briggs & Wohlstetter, 2003).

The studies conducted in developing countries show mixed results, that SBM as a managerial approach enables some schools to manage themselves successfully towards their organizational goals while others had no clear impact of SBM in the process of school management and their educational outcomes. Some studies have identified several problems in the praxis and implementation of SBM and several factors and underlying conditions related to them (Atturupane et al., 2022; Grauwe, 2005; Gamage & Sooksomchitra, 2004; Bandur, 2008).

### **The Objectives of the Study**

1. Examine the consistency between SBM and NCFSLM practices as experienced by the principals in the management of schools in Sri Lanka
2. Identify the problems caused by the discrepancies between the SBM and in NCFSLM by the practical experiences of schools.
3. Examine the factors that influence the discrepancies between the SBM and NCFSLM implementation at school level

### **Methodology of the Study**

This study employed multiple case study designs to explore into the problem and explain the findings of the study (Stake, 1995; Yin, 2003). Four school cases were selected through a purposive variant sampling technique from the schools of Jaffna district.

In-depth interviews were held with the principals of the schools and structured interviews were held with two Zone Directors of Education (ZDE). To confirm the responses of the principals

and to get further insights, the documents of the schools related to the implementation of SBM were reviewed. Triangulation of different data sources helps to provide the richness and the depth of the case description in case study analysis (Creswell, 2002; Stake, 1995).

Interviews were voice recorded and transcribed verbatim (Creswell, 2002). The analysis of the text data was performed manually on Microsoft Word by connecting, synthesizing and interrelating themes constructing a case study narrative composed of descriptions and themes; and cross-case thematic analysis.

## **Findings**

The Analyses of the data yielded three themes related to consistency of the two policy initiatives, SBM and NCFSLM: equifinality of guidelines, conformity in directions, and consistency in accountability.

***Equifinality of guidelines:*** Based on the interviews it became apparent that both initiatives: SBM of EPSI and NCFSLM, had very close conformity in the guidelines as the both policies had the same objectives. Equifinality is the principle that in open systems a given end state can be reached by many potential means (Gresov, & Drazin, 1997). The respondents of the four schools were well aware about the expectations of the two initiatives. The cases resembled more the administrative control model of SBM where the school case with strong socio economic background had some qualities in the managerial organization attributive to the balanced control model of SBM. The socio economic factors have strong influence in schools choosing their SBM approach. Schools from weak socio economic backgrounds are more inclined to lean towards the administrative control model of SBM. The SDEC and SMT of schools in Sri Lanka don't have a legitimate mandate to govern the schools through any legal acts or provisions as found in many other countries where the SBM is in practice to organize the education system.

The circular guidelines of SBM and NCFSLM were prepared by the MoESL and issued to the schools for two different purposes. All circulars on the two titles were found to be directing the school management to a common set of pre-identified objectives concerned with improving school effectiveness for ensuring quality outcomes of the school process.

The seven managerial areas of the school programme identified in (EPSI) SBM are corresponding with the four competency domains of NCFSLM. One respondent remarked. *“The (PSI) SBM prescribe participatory management and to share the decision making authority*

*among the school stakeholders in a democratic way. But the principals are solely answerable to the ZDE and Provincial Department of Education (PDE) for the outcomes of those decisions*". NCFSLM does not consider the responsibilities of other factions who take part in the school decision making.

**Conformity in directions:** The ZDE and PDE provide the directions to the schools mostly following the administrative circular guidelines of MoESL. These offices do not directly involve with the outside members of the SDEC and SMT. The principals are at the middle between these two factions and often have to engage in negotiations with them to bring them to common grounds to execute the school plans. While SBM and NCFSLM hold the principals accountable to the both factions as the chief executive officer of the institution. The respondent of case Valiga remarked:

*"We have to follow the directions of the ZDE and PDE in every activities of the school programme though, we are held solely accountable for outcomes. The SBM circular guidelines prescribe participatory decision making. The SDEC and SMT are assigned with the school based planning and implementing of activities through collective decisions in the committees headed by the principals. Though the principals are again held accountable to the stakeholders of schools whom the committees are representing while no other SDEC members are held answerable"*.

These contradictions cause problems in school management and often lead the principals to face enormous stress.

**Consistency in accountability:** There must be consistency in accountability in the SBM and NCFSLM as these two initiatives are concerned with the school management. EPSI identifies accountability for quality education outcomes as one of the component of management. Though the circular guidelines fail to define the how the accountability is established and who are accountable for the school outcomes. Thus, as the head of the institution the principals become solely accountable to the school community and higher offices for the entire school programme while the principal's accountability has to be dispersed within the school through delegation by the principal. The principal remain the focal point of contact at the school level for all stakeholders and superior officers. When such dispersion of accountability is found to be defective due to the lack of commitment of school level actors including the teachers and other board members, the principals have to bear the entire accountability alone. There are no

provisions in the MoESL circulars to bind the teachers or other SDEC members to collectively share the accountability at the school level.

## **Conclusion and Recommendations**

The SBM and NCFSLM are effective policies to improve the managerial functions of the schools and their guidelines to the school management are complying and mutually augmentative. Though, the both policies have gaps in demarcating the accountability of the school programme. As a result the accountability for quality school outcomes was not properly assigned to the school level actors while the principals become solely accountable for the entire school process and performances. Such conditions contradict with the participatory management approach of the SBM. NCFSLM views the principals as executive leaders of schools and are solely accountable for the outcomes of the school process. This approach of evaluating the principals' competency as an executive leader also confronts with shared leadership and participatory decision making of SBM.

In light of the conclusions the following recommendations are forwarded to alleviate the problems encountered in the implementation of SBM while enabling the school leaders to confirm the requirements of the NCFSLM.

- a) Provide legitimate rights through an act to the school stakeholders in SBM and legal recognition to the SDEC to manage the schools through participatory management while demarcating the authority devolved to the school boards and the accountability obligations as found in other countries.
- b) This study has identified that the intervention of principals in SDEC and their control debilitated the balanced control models' benefits. The principals and the committee members should be trained to practice the balanced control model of SBM.
- c) Strengthen the SDECs to achieve school autonomy. Transfer reasonable authority to make democratic decisions and implement them independently. Promote the participation of teachers, parents and students in decision-making in a democratic way.

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## **Mathematics Teachers' Perceptions in Creating Online Learning Environment during the COVID-19 Pandemic Period**

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### **Abstract**

The COVID - 19 pandemic affected all educational systems with the closure of schools in both developed and developing countries and undesirable effects will be resulted on education in future (UNESCO et al., 2020). The traditional classrooms were changed to virtual classrooms suddenly by an unexpected situation. All school systems including teachers, students, principals, parents and other systems related to schools adopted the new systems of online. This study explores the perceptions of secondary school mathematics teachers in using online learning environments during the COVID-19 Pandemic. A qualitative research strategy was adopted in the study. The data were collected through semi-structured interviews with 15 teachers who taught mathematics to secondary education in government schools. The teachers were selected using a convenient sampling technique. Nine themes revealed from the data through thematic analysis, those were issues faced by teacher in developing online environment; poor internet connection, lack of knowledge of technical matters, lack of computer devices among teachers and students, lack of students' interest to attend online class, lack of pedagogical knowledge to teach mathematics concept in online mode, lack of skills to assess students' progress in online mode, limited ways to encourage students and lack of ways to monitor students like a traditional classroom. In general teachers were satisfied with their instructions but not satisfied with the quality of knowledge received by students. Hence, the majority of teachers did not agree in teaching mathematics concepts to secondary school students via online mode.

**Keywords:** Pandemic, perception, online mode, mathematics concept

## **Introduction**

The COVID-19 pandemic has infected almost every country, including Sri Lanka. Moreover, it impacted many aspects of life, particularly the educational system. The United Nations Educational, Scientific, and Cultural Organization (UNESCO) reported in March 2020 that massive school closures had affected more than 1.5 billion students in 165 countries. Online learning approach published following the spread of the corona virus assisted teachers to minimize the impact of school closures on academic progress. It encountered various obstacles such as limited technical knowledge, inadequate and weak infrastructure, issues with online connectivity. In addition, inequalities of learning outcomes also occurred in rural areas due to issues related to reliable power supply and Internet availability. These barriers are known as external, although, teachers' perceptions in creating online learning environment are crucial to implement this approach in future education in coming critical situation like Corona pandemic.

## **Background of the Study**

In Sri Lanka, the provincial department and the Ministry of Education are responsible for the country's national education system. The Ministry of Education identified technology-based education interventions as a means to support learners through television, and online teaching applications such as Zoom, Google Classroom, and Microsoft Teams that are accessible via internet-connected computers and also via smart phone mobile technology. Additionally an application named as DP Education was introduced which was a free online learning platform.

This change of process from face-to-face classroom teaching to online teaching practice influences the school teachers' teaching norms, their professional role, and the teaching strategies they apply, with the virtual model of education a largely new experience for most school teachers in Sri Lanka. By introducing new way of teaching, teacher faced many difficulties to conduct online mode teaching due to the unfamiliar teaching methodology (Murphy, 2020). However, the school teachers are preparing to utilize the latest technologies for the purposes of continuing classroom teaching practices within an online environment. Hence, the current research explores school mathematics teachers' perceptions regarding online mode teaching during the COVID-19 crisis in Sri Lanka.

## **Literature Review**

The attitude of teacher in incorporating the technology in their classroom is a strong factor. For example, whether technology will increase students' interest in mathematics and will construct concept of mathematics correctly or not (Demuyakor, 2020). Danju (2020) identified two types of barriers that influence the use of technology, extrinsic and intrinsic barriers. The first one considers the structure of the classroom, the schedules, technical support, and the curriculum. The second includes the time that teacher invests in learning and preparing the class. This barrier also involves emotional aspects and beliefs about the use of technology, as well as attitudes, knowledge, and technological skills. In addition, he identified that the teacher used low level technology in the teacher centered method, and high level of technology was used in the student centered method. Nambiar (2020) focused to find out satisfactions of interaction among the teachers and students in online mode teaching. Teachers revealed that formal education was more successful than online education because of the opportunity for more communication and interaction.

## **Objectives**

The objective of study is to explore the perceptions of school teachers in creating online learning environment during the COVID-19 pandemic.

The research question and sub-question of the current study is as follows:

- What are the perceptions of school mathematics teachers in creating online learning environment during the COVID-19 pandemic in Sri Lanka?
- What are the common challenges that school mathematics teachers are likely to encounter during online teaching during the COVID-19 pandemic in Sri Lanka?

## **Methodology**

A qualitative research strategy was used in the study. An explanatory research design is deemed more appropriate in finding answers to the research objective where the study is exploratory in nature. In the current study, data were collected through semi-structured interviews with 15 teachers who teach mathematics to secondary education in the government schools, located in the Jaffna district, Northern Province. In the selection of sample, teachers were selected using convenient sampling technique.

## **Analysis and Interpretation**

The collected data were analyzed using thematic analysis. This thematic approach is aimed at understanding “what is being told,” and at identifying problems and experiences based on themes. Nine themes revealed from the data through thematic analysis, those were issues faced by teacher in developing online environment; poor internet connection, lack of knowledge of technical matters, lack of computer devices among teachers and students, lack of students’ interest to attend online class, lack of pedagogical knowledge to teach mathematics concept in online mode, lack of skills to assess students’ progress in online mode, limited ways to encourage students and lack of ways to monitor students like a traditional classroom.

In identified themes, some of themes were stated by more teachers; poor and unstable internet connection and limited resource and limited pedagogical knowledge in adopting new technology. Teachers stated that poor signal of internet connection and unstable of signal are barriers to conduct the classes in online mode especially in some geographical location. Online learning implemented by schools during the COVID-19 pandemic is a new experience for teachers. They have experience teaching through face-to-face opportunities with students. However, during the quarantine (lockdown), teachers were asked to abruptly adapt to online learning. They have minimal knowledge in accessing e-devices and limited resources are the barriers to adopt new trends of teaching.

## **Discussion and Conclusion**

The present study was designed to explore teachers’ perceptions and barriers in teaching mathematics to secondary students via online mode during COVID-19 pandemic, in the schools located in the Jaffna district, Northern Province. Due to minimal Internet access, teacher faced challenges in conducting classes via online unlike the traditional classroom. It was a challenge for teachers who were not accustomed to teaching online and students with minimal facilities for online learning. In general teachers were satisfied with their instructions but not satisfied with the quality of knowledge received by students. Hence, the majority of teachers did not agree to teaching mathematics concepts to secondary school students via online mode.

Thus, policy makers should consider pedagogy training for teachers to carry out online teaching effectively and provide ample facilities for students’ online learning. In addition, teachers have to adapt to change their career to effective online pedagogy in their teaching in future.

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## **Problems and Challenges Experienced by Home Science Teachers in Sri Lanka**

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### **Abstract**

Home Science integrates the application of various science and humanities to improve the human environment, family nutrition, Home management, Child development, and Textile and Clothing. Since Home Science is a broad subject area, to develop this subject the teaching-learning resources should be increased and enhanced. In our country, due to the lack of awareness of the subject, the teachers who are involved in teaching Home Science have faced various problems and challenges in developing this subject at the school level. This study highlights the problems and challenges experienced by Home Science teachers in government schools in Sri Lanka. The sample was collected randomly and used a semi-structured questionnaire to collect data. The findings show that there are several problems and challenges experienced by Home Science teachers, most of the problems are related to resource availability for teaching-learning activities of Home Science. Therefore, the teachers face difficulties to improve Home Science education at the school level. The study found that nearly 70% of teachers faced difficulties in teaching textiles and clothing because of lack of teaching - learning resources. Further, the findings reveal that the teachers face challenges related to a wide range of syllabus, assessment procedures, challenges with instructional resources, and other general challenges such as lack of motivation, and lack of interest of students in the subject. These problems and challenges will affect the quality of teaching and learning activities at the school level. So the present study aims to find the problems and solutions to improve Home Science Education at the school level.

**Keywords:** Home Science, teachers, problems, challenges, teaching – learning

## **Introduction**

Today, Home Science is said to be a diverse learning program in which both boys and girls participate. Home Science education at home has now reached a new dimension. It helps to develop skills and competencies for successful careers, professions and careers on national and international level, taking into account individual needs and interests. As such, it has become an essential tool for empowering women at home and in her community, as professionals in various science and humanities to improve the human environment. Family nutrition, resource management, child development and clothing style. Home is the beginning of life and school is the beginning of formal education. In this way, what is learned at home can be further enhanced at school. In the recent scenario, Home Science is gaining popularity among students. Those who choose a career in this field must be equipped not only with a logical mind, but also with a realistic approach and a balanced attitude. More and more people are opting for building career in this field. Home Science teachers play an important role in student development. Increasing awareness of educational quality, increased competition, increased pressure on teachers, and shifts from other factors make education stressful. Besides, Home Science teachers must be qualified in all subject areas. There are several factors that influence the improvement of science education and the quality of teaching and learning activities. The most important ingredients for teaching Home Science education are resources for teaching-learning activities and teachers knowledge in all areas of Home Science. This present study identifies some of the main problems and challenges experienced by Home Science School teachers. These Problems and challenges may hinder the teaching-learning activities of Home Science. This study aims to find problems and challenges experienced by Home Science teachers at the school level.

## **Objectives of the Study**

1. To find the availability of teaching-learning resources for Home Science Education.
2. To find the problems and challenges experienced by teachers in teaching.

## **Statement of the Problem**

Home science education helps to build in learners the necessary scientific attitudes to achieve greater efficiency and bring a qualitative change in life and homes. The objectives of home science education are to help each learner lead a more satisfying personal, family, and



community life. Home science is the application of many sciences and arts towards achieving better, healthier, and happier homes. It includes knowledge of basic sciences, arts, and applied sciences, such as nutrition, food, clothing, and child care, home management, and human relationships. The majority of the subject's areas are tied to practical work, materials for teaching and learning activities are must require to teach this multidisciplinary subject at the school level.

According to Smith and de Zwart (2010), Home Science as a discipline has been recognized and included in educational systems in almost all continents. Consequently, Home Science is a subject that requires teachers with the relevant skills and experience required to empower individuals with requisite functional skills. It is however noted that, Home Science education continues to be faced with challenges in most nations. Because of a lack of awareness of this subject, the teachers face a number of issues and difficulties when delivering Home Science Education in the classroom. The learning environment has been recognized as the physical, psychological and instructional atmosphere that supports the learning process (Maina, et al, 2019). This study focuses on the issues and difficulties faced by Sri Lankan school teachers.

### **Limitation of the Study**

Home Science subject conducting both in Tamil and Sinhala mediums in various schools in Sri Lanka. The study was limited to Tamil medium Home Science teachers in government schools in Sri Lanka. The present study is limited with the Problems and Challenges faced by Tamil medium Home Science teachers in Sri Lanka.

### **Methods and Materials**

In this study, data collection and data analysis were done to achieve the objectives. Primary and secondary data sources are used for data collection. The framed questionnaire helped to collect the required primary data. Published and unpublished literature sources, books were used for secondary data collection. The sample included hundred Home Science teachers working in various government schools in Sri Lanka. Sample was selected randomly. All respondents were female teachers. The questionnaire was distributed to two hundred Home Science teachers and the investigator selected hundred from the filled in questionnaires. The analysis was conducted under the descriptive method by using data tables, graphs, and percentages in excel software.

## Result and Discussion

Table 1 shows that the respondents had various educational qualifications but all had background knowledge in Home Science. The findings indicate that 34% of teachers qualified in G.C.E advanced level (General Certificate Examination), they have not taken any attempt to get a degree in Home Science, but they were experienced teachers with more than 20 years of work experience in the field. 17 % of teachers were experts in all areas of Home Science and held bachelor's degrees in the field. 17%, had post-graduate degrees in various fields, while one-seventh, or 27.7%, had diplomas. 4.3% of the teachers were qualified through different programmes pertaining to the teaching profession. The respondents pointed out that there aren't enough courses available in Sri Lanka for those who want to hone their skills and raise their educational credentials in the field of home science.

**Table 1**

Educational Qualifications of the teachers

<b>Educational qualification</b>	<b>Percentage</b>
G.E.C Advance Level	34 %
Diploma	27.7%
Under graduation	17 %
Post-graduation	17 %

Table 2 shows that the difficult area in teaching Home Science. According to the study, 9.5% of teachers had trouble teaching human development and home management, while 23.8% had trouble teaching nutrition and food. The results show that due to insufficient training and practices, 66.7% of teachers have trouble teaching textiles and apparel.

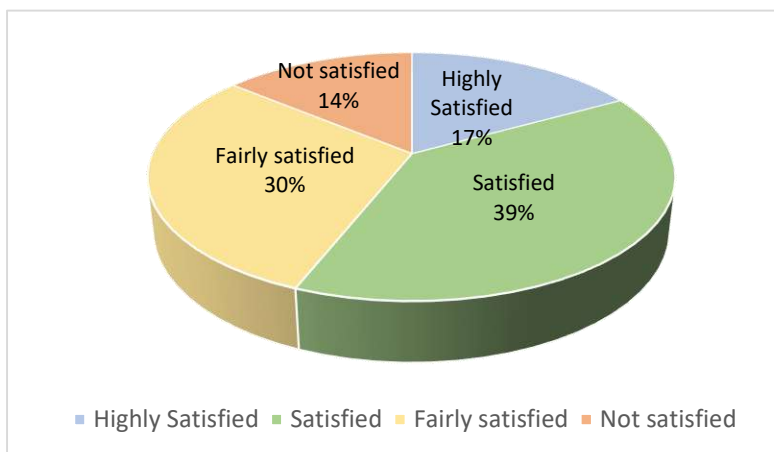
**Table 2**

The areas which are feel difficulties to teach Home Science

<b>Educational qualification</b>	<b>Percentage</b>
Food and Nutrition	23.8 %
Textiles and Clothing	66.7%
Human development	5.5 %
Home Management	4 %

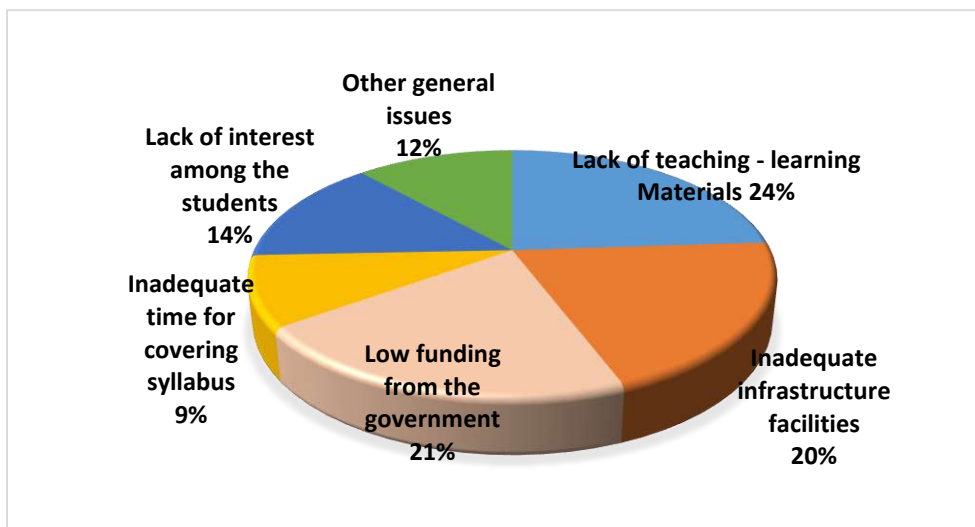
The study found that, there aren't enough home science books in the school library, and lack of training programme conducting for textile practical part to teachers in their zonal education. And 95.2% of teachers prefer to use Tamil-language textbooks as references. Additionally, 63.6% of instructors found it challenging to refer English-medium texts, while 59.1% of teachers used the internet to search materials for their subjects. Seminars and workshops should be held in each departmental zonal area to increase teachers' knowledge across all subject areas. Teachers should also hold lectures for students at the same time. The study's findings indicate that 84.1% of teachers held seminars and workshops for their students right before final exams, however the majority of institutions did not allocate the necessary funds for such activities. According to the study's findings, 73.3% of instructors attended seminars and workshops held by their district's zonal education. The paucity of seminars held by their zonal education was cited by 42.2% of respondents.

The most crucial tool in the teaching and learning processes of Home Science is the laboratory facilities. According to the study's findings, 37.8% of respondents said they lacked the necessary lab space for conducting food science and textile and apparel practical, while the remaining respondents said they had a lab for conducting teaching and learning activities in Home Science. 39 % of respondents stated their satisfaction with the availability of resources for the teaching and learning of Home Science, compared to 30% who expressed fair satisfaction, 14 % voiced their dissatisfaction, and 17% articulated greater satisfaction. Only a smaller number of respondents expressed extreme satisfaction. This indicates that an improvement in Home Science education at the school level is essential. Figure 1 represents the level of satisfaction expressed by the respondents towards the available resource and materials to teach Home Science.



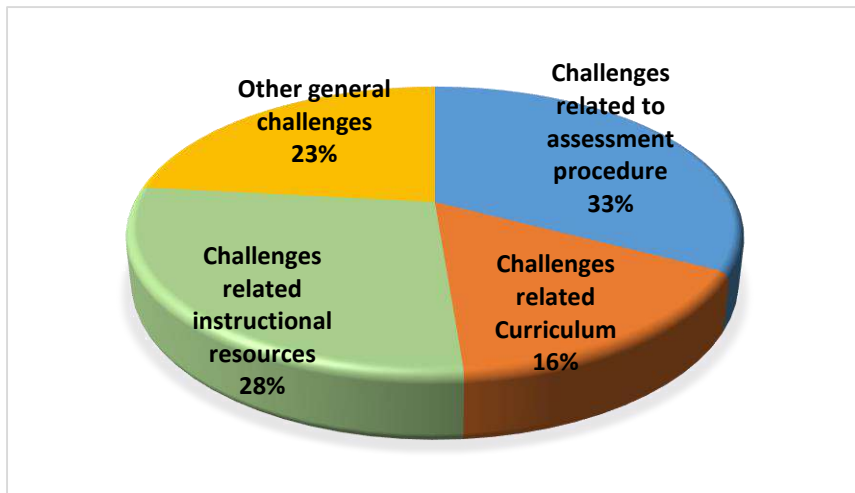
**Figure 1.** Level of Satisfaction on Resource Availability

Teaching-learning activities and improving Home Science Education at the School level. There are several problems and challenges experienced by teachers in Home Science. The results shows that 24% of teachers experienced by lack of teaching-learning materials, and 20 % related to inadequate infrastructure facilities. 21% of respondents mentioned low funding to improve facilities for Home Science, 9% of respondents mentioned lack of time for covering the syllabus, 14 % of respondents mentioned lack of interest among the students to learn Home Science, and 12 % of respondents mentioned other problems such as internal problem, lack of supportive staffs and lack of motivation. These information are represented in Figure 2 below.



**Figure 2.** Problems Experienced by Home Science Teachers

The findings of the survey indicated that the majority of instructors had difficulties with assessment methods, such as translation issues, an excessive number of examiners, and questions that deviated from the course outline. 33% of respondents brought this up. 16% of respondents cited curriculum-related challenges, and 28 % cited instructional resource-related challenges, such as lack of teaching resources, inadequate support and funding, inadequate equipment and tools, and lack of motivation, as the most significant obstacles in Home Science Education at the school level. Additionally, many general obstacles are highlighted as impacting Home Science Education. 23 % of respondents highlighted general obstacles such as internal obstacles, student interest in the topic, etc. Figure 3 shows the challenges faced by Home Science teachers.



**Figure 3.** Challenges Faced by Home Science Teachers

### **Suggestions for Enhancing School-level Home Science Education**

In addition, respondents were requested to provide proposals for improving Home Science Education at the school level. All the respondents were interested in implementing Home Science Education in schools. The following recommendations were provided by the Home Science instructor.

1. Allocate the necessary time for Home Science practical tasks, such as food and nutrition, textiles and apparel, and interior design.
2. There should be an increase in the number of seminars and workshops offered to Home Science instructors by their education zone.
3. Management should provide more resources to the advancement of Home Science.
4. The pupils should be made aware of the subject matter and employment options.
5. Home Science teaching-learning activities should get more funding.

### **Conclusion**

The findings of this study revealed that Home Science educators struggled with a wide range of concerns, including a lack of support from administration, a dearth of resources to use in the classroom, a lack of student interest in the subject matter, a general lack of motivation, issues with lesson plans, teaching materials, assessment, and students' perspectives on the topic. The teaching-learning of Home Science in schools is constrained by these worries and constraints. The zonal education system is responsible for providing twice per semester workshops and seminars for teachers to improve the quality of teaching and learning. Educators should have

more hands-on experience with textiles and clothing. It was discovered through this study that textile and clothing education provide unique difficulties. That's why it's crucial to increase teachers' expertise. Providing students with a quality education necessitates finding solutions to problems in Home Science, which spans several disciplines. Perceptions need to be changed. If these concerns are swiftly addressed, then teaching Home Science in schools may be beneficial.

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## **An Investigation of Opportunities to Develop Soft Skills in the NCOE Primary Education Curriculum**

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### **Abstract**

The purpose of this research was to develop soft skills of NCOE teacher trainees for producing a teacher professional suitable for the world of work. An appropriate program was created for developing soft skills by studying the nature of opportunities available for developing the soft skills in the primary syllabus using the Embedded Model. Research objectives were identifying soft skills to be developed in the NCOE primary curriculum, investigating if learning strategies are being used for developing soft skills when implementing the NCOE primary curriculum, finding how soft skills could be implemented in teacher training and creating and implementing a program for developing soft skills of primary teacher trainees. The sample consisted of 196 people including presidents, vice presidents, lecturers, teacher trainees and academic boards of Ruwanpura, Maharagama and Wayamba NCOE. Data collection and analysis were based on mixed method and descriptive analysis. Data collected through questionnaires, content analysis, interviews, observation, were analyzed through tables, percentages and median values. A program planned for developing soft skills was implemented as an action research. Soft skills related to communication, critical thinking, problem solving, team work, creativity and innovativeness, information communication technology, ethics, values, and leadership were developed in 20 teacher trainees as a participatory group through active learning methods, evaluation methods and activities. As revealed, a minimum number of soft skills were included in the curriculum, learning strategies and activities were not used for developing soft skills, there was no relationship between evaluation and soft skills and least amount of soft skills was being developed during teacher training. Including above mentioned soft skills in the primary curriculum, developing them through activity-based learning, implementing student centered strategies, including soft skills related criteria in evaluation, soft skills development programs in teaching practicum and positive intervention of the NCOE administration were recommended.

**Keywords:** Soft skills, embedded model, curriculum, National College of Education

## **Introduction**

Merit-based entry into today's professions has become a global trend. Accordingly, although the focus was on hard skills in the past, it appears that nowadays the focus is on soft skills. Accordingly, many countries have focused on soft skills in creating the relationship that should be built between a country's education and labor force.

Acquiring skills is very important in preparing the teaching professional to cope successfully with the changing competitive society. The teacher is the active factor responsible for adapting the current generation of students to the future needs and for that, the teacher should be more skilled. Only a skilled teacher can create quality human capital with human values. For this, in addition cognitive skills, the teacher has to acquire many soft skills. Only a skilled teacher can create a quality human pre-wealth with human virtues. Thus, research has confirmed that the needs of the world of work can be met through the development of soft skills in the teaching role. The research done by Tang (2013) on the acquisition of soft skills of teachers in higher education institutions has shown the importance of soft skills in the teaching profession. Accordingly, it is necessary to provide effective and quality learning, for the teacher's professional development and nurturing, as well as student skills. The importance of soft skills for development has also been shown. Teachers will make a difference in the quality of teaching and effective learning through the acquisition of soft skills. Quality is a critical factor in promoting effective learning and teaching processes in schools (Tang, 2013). In addition, a study by Ilango (2013) on "Teachers' Readiness to Integrate Soft Skills into the Teaching and Learning Process" has shown the importance of soft skills for a teacher to be successful in teaching his subject.

This implies that soft skills are essential to prepare the teaching role to meet the challenges of the world of work and the twenty-first century. This research studies the efforts made by the National College of Education system, which is the only institution of higher education that contributes the largest number of pre-service teachers to the system, playing a unique role in the field of teacher education in Sri Lanka. According to the Academy of Education Act No. 30 of 1986, the main objective of establishing the National Colleges of Education is to produce a teacher equipped with professional skills. It is the main responsibility of these institutions to ensure that the student teachers who are trained as extension teachers have the relevant skills for entry into the teaching profession.



However, the current curriculum in the National College of Education system was last revised in 2010 and has not been updated until now. This curriculum operates in the four main areas of professional curriculum, general curriculum, special curriculum and co-curricular activities. Through the research conducted by the National Institute of Education in 2017 regarding the quality of Sri Lanka's national colleges and online learning teaching process, it has been mentioned that there should be a vision and standard for the entire curriculum while preparing the curriculum, and there is no such thing in Sri Lanka. Thus, it is seen that the contribution to the development of soft skills through the college academic curriculum is at a minimal level. The National Institute of Education has indicated that the subject content related to the development of teacher skills related to communication and collective skills should be included. According to the facts stated above, this research was carried out to study the extent to which the soft skills that heavily influence in preparing the teacher professional to suit the twenty first century are included in the college curriculum.

The main Vision of National Colleges of Education is to introduce teacher trainees into the system with more effective and quality skills. During the first two years of institutional training, teacher trainees study a very broad academic curriculum. Here, the teacher-student studies six subjects under the professional subject area, unique to their course under the special subject area. Three other subjects are studied as the second main subject under the general subject area. Thus, the college teacher student receiving institutional training acquires theoretical knowledge from a large number of subjects. In addition, there is a forty-day group teaching training. During this period, continuous evaluations are carried out. It is confirmed that cognitive skills are developed at a very high level through the college curriculum designed in this way. However, the tendency the curriculum possesses for the development of soft skills is very low and it has been shown in a comprehensive study of the syllabus. Also, it appears that there are problems with lack of creativity due to the use of outdated curriculum and learning methods as students have become listeners only.

"In some subjects in the university curriculum, no skill is built and there is a breadth of subject areas that exceed the size of the subjects."

(National Education Commission, 2017 p.20)

The National Institute of Education is responsible for the curriculum reform of these National Colleges of Education and the Ministry of Education is responsible for the administrative affairs. The National Colleges of Education are not empowered to work independently in

these fields. Also in this way, the merger of many institutions and not being administratively independent has led to the formation of various confusions in the course and has also led to the lack of focus on developing soft skills.

Also, there is a lack of human and physical resources compared to the student population. Accordingly, due to meeting unlimited needs with limited human resources, it is often seen how studies are carried out according to common uniform timetables. The researcher has also observed for a long time how teachers and students are sitting and listening to lectures for many hours a day. This situation is non-creative. As such, the skill-rich learning environment has been affected.

In addition the academic curriculum, co-curricular programs are being implemented. However, these programs have failed due to excessive effort of teacher students, no formal evaluation process, low student participation, low interest of lecturers and minimal intervention of the administration. An investigative study on activities (Gunawardena, 1990) has also revealed that co-curricular activities have failed to achieve the desired skills of science faculty students. In addition, a number of aspects can be identified as challenges to the development of soft skills in the college curriculum. The number of students exceeding the size of one class, the limited time available to cover the syllabus, the negative attitudes of the students, lack of resources and administration problems are the main ones (Leelawathi, 2008). "The challenges faced by the National Institute of Education are that students have negative attitudes about it even before they enter the teaching profession and because there are no other professions, their entry into the profession without their request may have a negative effect on school education." (National Institute of Education, 2018). Accordingly, in order to provide effective and quality education for student teachers, this study expects to investigate the opportunities to develop soft skills in the primary education curriculum and create a suitable programme for it.

### **Research Objectives**

1. To identify soft skills that can be developed in the NCOE primary education curriculum.
2. To find out whether learning strategies are used to develop soft skills while implementing the primary education curriculum.

3. To find out how the identified soft skills are implemented in practical teacher training.
4. To design and implement a program to develop the soft skills of primary education teacher trainees.

### **Design of the Study**

This research is a descriptive sample survey study prepared based on the mixed method. This study examines the current situation and files information about it, and investigates opportunities for improvement, and the most appropriate descriptive research method is chosen. Sample survey techniques such as questionnaires, interviews and observation were followed mainly to obtain quantitative and qualitative data. In this way, it was possible to build more validity and reliability by collecting and analyzing quantitative and qualitative data through various methods. The data could be triangulated under 150 teacher students from Ruwanpura, Wayamba and Maharagama colleges, fifteen lecturers, three presidents and three vice presidents from all three colleges were selected for the sample. In addition, five subject planners representing the National Institute of Education were used for the sample. In addition, twenty intern teacher students were also selected for the sample and the total sample consisted of 196 participants.

Various methods were used to collect data related to the study. Accordingly, questionnaires, interviews, observation and written sources were used as the main measurement tools to collect data from the selected sample. In the preparation of these research instruments, the theoretical and empirical research knowledge obtained from the relevant literature investigation was used to prepare the measurement instruments with accuracy and validity.

### **Data Collection and Analysis**

Two of the questionnaires were used to collect quantitative data related to the research. Two separate questionnaires were prepared for lecturers and student teachers, respectively. The main purpose of this questionnaire was to provide quantitative data on the soft skills included in the college curriculum, the learning strategies and evaluation methods used, and the activities used. Interviews and qualitative analysis were used to provide qualitative data on barriers to and suggestions for implementing soft skills in the curriculum.

Out of the sample groups used in the study, apart from the teacher-student group, the other four sample groups were interviewed, including the lecturer and the dean. Relevant qualitative data were obtained by interviewing the sample groups of vice-deans and subject planners, taking into account what soft skills are included in the two subjects selected in the college primary education course and how often they are used in the respective syllabuses.

The data thus collected were analyzed separately using percentage mean, tabular graphs and simple frequency statistical analysis methods in relation to the objectives of the study. In the analysis of both quantitative and qualitative data, appropriate analysis methods were used and accordingly, quantitative data were analyzed using statistical methods and qualitative data were analyzed using descriptive methods. In the first three research objectives the data were analyzed as mentioned above and an experimental program was prepared for the fourth objective. Accordingly, under the fourth objective, the program designed for the development of soft skills was implemented as a functional research based on the integrated model.

## **Findings**

Seven soft skills were applied, namely, communication skills, critical thinking and problem solving skills, team work skills, creativity and innovation skills, information communication and technology skills, ethics and professional skills and leadership skills. Accordingly, it was investigated as to what extent these skills are included in the primary education curriculum, using the measurement tools such as interviews, observation sheets and questionnaires. It was revealed that the relevant soft skills are included in the curriculum at a very minimal level. It was found that two skills, communication skills, and working with teams, were included at a minimum level, but critical thinking and problem solving skills, information communication and technology skills were not included at all, and specific programs for skill development were not included. Also, it was revealed in the data analysis that specific programs for the development of soft skills are not implemented in curriculum and it was found that soft skills are not developed due to the nature of co-curricular activities. In addition, it was revealed that learning strategies are not implemented in order to develop soft skills in the learning and teaching process, and the activities used in the learning and teaching process under the relevant learning strategies are not used to develop soft skills and focus on the development of soft skills in the evaluation process. It was also found that no criteria were included to measure soft skills in evaluation process.

Also, it was revealed that the measures taken for the development of soft skills in the implementation of assessment in learning and teaching process are minimal. Apart from this, it was revealed that only some soft skills are developed through practical teacher training. It was confirmed that the cases where soft skills are displayed in the learning and teaching process of the student teachers are very minimal. During the practical teacher training period, the attention of the lecturers is very minimal for the development of soft skills of the student teachers. The learning strategy activities and evaluation methods used in the learning and teaching process of the teacher students do not have any effect on the development of soft skills.

## **Conclusions**

According to the findings of the data analysis, it was concluded that the 7 soft skills related to the research should be strongly included in the NCOE curriculum. Also, it was concluded that it is appropriate to implement special programs to develop soft skills in the NCOE primary education curriculum. It can be concluded that it is more appropriate to implement these programs as programs that develop soft skills related to teacher personality and professional development. Also, it was concluded that co-curricular activities should be implemented in a more planned and organized manner to develop soft skills along specific objectives. Lecturers should be sensitized about soft skills development and various workshops should be conducted in this regard. It is best to introduce more student-centered learning strategies in the learning and teaching process of the NCOE primary education curriculum. Accordingly, it was concluded that learning strategies should be prepared in the curriculum so as to build a labor force with soft skills needed for the labor market, and the activities used for the learning process should be used as live activities to build more participation. Suitable evaluation types should be used so that soft skills are developed, and the criteria for measuring soft skills should be included in the evaluation process. Also, a suitable program should be prepared for the development of soft skills during the internship period of the practical teacher training. It is very appropriate to set up the program in a way that it is implemented in the school environment. Accordingly, the revision of the internship syllabus should be done in such a way that the soft skills are implemented better through practical teacher training during the internship period. Lecturers should instruct students to implement student-centered learning strategies that affect the development of soft skills.

Appropriate workshops should be organized and implemented for this purpose and the activities and assessment methods used should be designed to develop soft skills.

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# **Application of the Student-led Classroom Technique for Third-year Bachelor of Technology (BTech) Undergraduates: A Study on a Small Classroom**

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## **Abstract**

The student-centred learning (SCL) technique is becoming popular over the teacher-centred teaching (TCL) technique due to its enabling of active learning. Despite some recent attempts to implement SCL in university education, such as in medical sciences, ethnic studies, language learning etc., the reported studies on the application of SCL is handful in the Sri Lankan university system science education. In this regard, we experiment with a SCL technique called student-led classroom (i.e., students teach themselves), which has been reported to have several benefits of active learning. Here, a small group ( $n = 14$ ) of level 300 undergraduates from the degree of Food Engineering and Bioprocess Technology of Uva Wellassa University was chosen. The experiment was carried out in 3-student groups on the module “heat transfer” and the groups were asked to teach one from convection, conduction and radiation to their peers. Their progress was assessed via a question sheet, and the feedback on the technique was recorded. Active participation of students was observed along with the achievement of low-level cognitive skills according to Bloom’s taxonomy. Such cognitive skills better develop when they workout problems. However, the SCL technique has a minimal impact on triggering higher-level cognitive skills. Most students prefer the technique under a minimal workload and when the scope of the task is defined. They further expect to have the guidance of the respective lecturer when “muddy” points are found. Overall, this technique can be recommended to awaken the active participation of students in the class.

**Keywords:** *Student-centred learning, SCL, Student-led classroom, BTech undergraduates, Sri Lanka*

## **Introduction**

In contrast to traditional teacher-centred learning (TCL), student-centred learning (SCL) technique is an active learning, collaborative group process in which students actively participate in the teaching-learning process both inside and outside the classroom (Jonassen et al., 2008). In an SCL setting, the teacher is a facilitator while the student is responsible for developing knowledge, skills and attitudes (Wright, 2011, Doyle, 2018). Several SCL approaches are applied appropriately to the situation such as problem-based, simulation-based, debate-based, student-led, and inquiry-based learning.

The SCL strategy was originated in the Western part of the world. As a result, when implemented in a different setting, such as in an Asian country, it may face various challenges, including attitudinal, cultural, and technological issues (Schweisfurth, 2011, Benlahcene et al., 2020). Therefore, it is critical for research to investigate the feasibility of SCL techniques before they are fully integrated into the education system of a country like Sri Lanka. In this context, there has been a strong emphasis on implementing SCL paradigms for university education in Sri Lanka (Navaz, 2014, Schweisfurth, 2011). Recent studies report on the application of applying SCL techniques in medical education (Rammiya, 2017, de Silva et al., 2017), inculcation of ethnic harmony (Jayaweera and Liyanage), study skills enhancement (Edirisinghe, 2016), foreign language teaching (Witharana, 2018) etc. However, no study has reported applying SCL techniques to science education in Sri Lanka. We, therefore, address this research gap through this study by experimenting with a small group of BTech third year (or level 300) undergraduate students. This manuscript is organized in such a way that the implementation of the SCL technique comes first. Following that is a discussion of the study results, which includes student assessment and feedback, followed by the conclusions and recommendations for future work.

## **Methodology**

In reported literature, the absorption of science education into students has been evaluated via several SCL techniques including debates (Narmaditya and Omar, 2019), flipped classrooms (Jdaitawi, 2020), and student-led classrooms/seminars (Bouman and Meiners, 2012, McMullen, 2014). Out of these, we selected the student-led classroom technique due to its ability to use the information with more sense, increase the retention of the concepts, and increase student participation (Bouman and Meiners, 2012, McMullen, 2014). To the best of our knowledge, this technique has not been reported in university education in Sri Lanka, which



was another reason to explore this topic. When applying SCL technique, the primary aim of the study was to assess the student's achievement in all cognitive levels of Blooms' taxonomy (i.e., memorizing, understanding, applying, analyzing, evaluating and creating). Therefore, the sample group should consist of either level 300 or 400 students. Herein, level 300 students were selected considering the capability of students to conduct a class by easily learning the concepts on their own. Out of level 300 students, the specialization batch of Food Engineering and Bioprocess Technology from the Faculty of Applied Sciences of Uva Wellassa University was chosen for this study considering the relative easiness of the modules that the proposed SCL technique applied for.

Accordingly, the selected sample consisted of 14 students with 11 females and three males. The teaching strategy was practiced for the heat transfer module in the course unit SCT 334-2 (Food Process Engineering and Modeling). The said module was chosen considering its easiness to follow with minimal instructions. Prior to the session, the lecture notes were distributed as Microsoft PowerPoint slides among students via the virtual learning platform of Uva Wellassa University (VLE). These comprised a short note on the fundamentals of conduction, convection, radiation and steady/unsteady-state heat transfer, and no solved problems were included. The intended learning outcomes (ILOs) of the sessions were informed to the students beforehand to prepare them for their respective sessions better. In 3-student groups, where students had the freedom to choose the team members, a topic to teach and the way of delivery. They were asked to teach the audience each topic by using Microsoft PowerPoint slides and/or posters. The students were given one week to prepare.

The "student" lecturer (i.e., when a student does this role) was instructed to get the attention of the audience and solve at least one problem in the class. All students were instructed to teach some portion of the assigned topic and a team was given 20 minutes to present. During each session, wherever applicable, the lecturer (i.e., the academic member assigned for the course) emphasized the importance of certain facts and clarified some difficult points (i.e., muddy points). At the end of all sessions, a question paper (seven questions and 20 min duration) was distributed to assess the effectiveness of the SCL technique. The questions represented low and high cognitive levels in Bloom's taxonomy, as shown in Table 1. Accordingly, four questions (i.e., Q1-Q4) focused on low-level cognitive skills of the student (i.e., memorize and understand) while the last three (i.e., Q5-Q7) focused on high-level cognitive skills (i.e., apply, analyze, evaluate and create). A Google Form was distributed via VLE to obtain students' feedback on their opinions on knowledge gained related to each topic, achievement of ILOs

and improvements to the teaching strategy. To obtain more insights, the knowledge that the student gained after the session was compared with the knowledge before the session.

**Table 3**

*Questions Distributed and the Expected Outcome by Students*

<b>Level on Bloom's taxonomy</b>	<b>Question number</b>	<b>Brief description of the questions</b>	<b>What student was expected to do</b>
<i>Remember</i>	Q1	Name two types of radiation	Write down the answers by straightway memorizing the contents discussed
	Q2	State four dimensionless numbers used in convection analysis	
<i>Understand</i>	Q3	Describe the mechanism of conduction	Describe the fundamentals of conduction
	Q4	Describe how important radiation is in food engineering	Write a short answer connecting the radiation fundamentals with its applications
<i>Apply and analyze</i>	Q5	Develop the Fourier's law when it is given on what parameters the conduction heat loss is proportional to.	Construct the mathematical equation when the dependency of parameters is given
	Q6	Find the maximum side length of a cubic food material when the maximum conduction heat loss is given	Find the unknown parameter in the Fourier's law subjected to the given inequality. The student needs to analyze the problem to find the area of the food material in terms of its side length
<i>Evaluate and create</i>	Q7	Give essential design steps of a vertical tube to minimize the forced convection heat loss. Here, the how tube dimensions are related to Nusselt's number and the definition of Prandtl number was given.	Evaluate how different parameters are connected in forced convection formulae and create a design based on the identified parameters

## **Results and Discussion**

### **Observations of Sessions**

The key observations included students' performance as teachers, behavior of the audience during the session, assessment techniques practiced and changes in students' interaction.

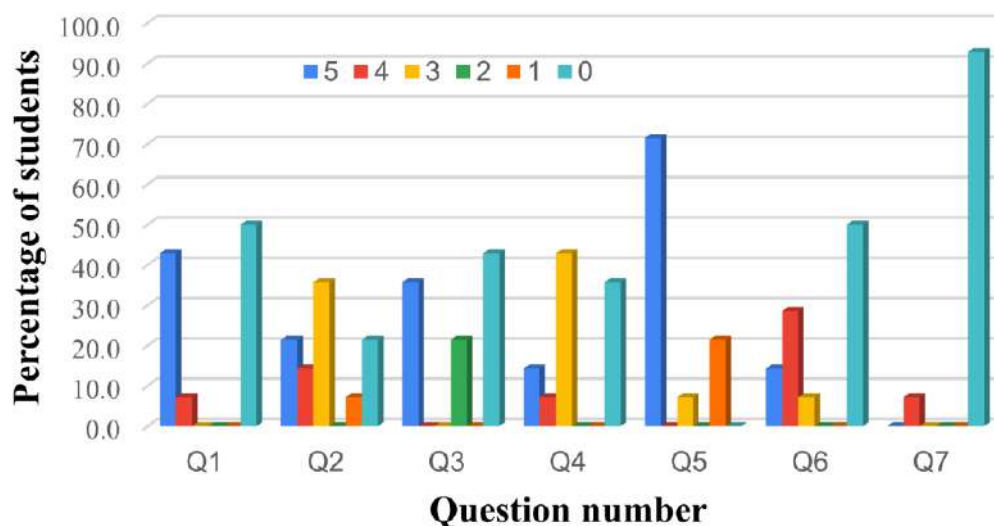
Accordingly, students studied hard to effectively convey the content, particularly when working out the questions with the audience. While playing the role of a teacher, they tried their maximum to deliver the content by utilizing effective communication techniques such as animations to reduce the denseness of the content. Game-based apps such as *Quizizz* and printed pop-up quizzes were used to provide formative feedback. Improved enthusiasm was observed in the audience when they were asked questions, and their motivation to answer the questions was superior compared to the usual TCL technique. When the lecturer (i.e., the academic member) helped the students with muddy points, they actively engaged with the lecturer who could be mainly due to provoked interaction and enthusiasm by their "student" teacher. These findings agree with reported studies on student-led seminars (McMullen, 2014).

Considering the observations made, students' progress was evident in team working, information retrieval and presenting concepts. They were also keen to engage in the activity and interact with the lecturer more. Despite the above advantages, it was also observed that students tend to skim through the mathematical equations/formula when presenting. That is, they only see an equation as a way of solving problems and do not investigate the formulation of the formula.

### **Analysis of Student Assessment**

Fig 1 shows how students scored for the questions in the assessment. Based on the results, about 50% scored zero for Q1, and the corresponding percentage was 20% for Q2. Even though both questions were based on students' memory, the performance greatly differs. One key reason behind this is the way of delivery. For example, in students' lecture notes, there was a written description of the radiation modes and a few pictorial depictions (this knowledge was tested in Q1). However, regarding dimensionless numbers as in Q2, students additionally worked few problems with their fellows. Thus, it emphasizes that working out problems increases the memory of the lecture content.

In Q3 and Q4, where the extent of understanding was tested, around 35-40% of students scored zero. In high-cognitive level questions, for example, in Q5, the analytical skill to develop a formula based on parameter dependency was tested. About 70% scored 5, demonstrating the skills to express the conduction heat loss in terms of material area, width and temperature difference. About 30% gave partially correct answers, which included some parameters only. However, all students scored at least one mark, which indicates that students are somewhat capable of constructing simple mathematical formulae based on parameter dependencies.



**Fig 1.** Performance of students for the assessment given at the end (note: marks vary on a 0 to 5 scale where 0 represents a completely wrong answer and 5 represents a perfect answer)

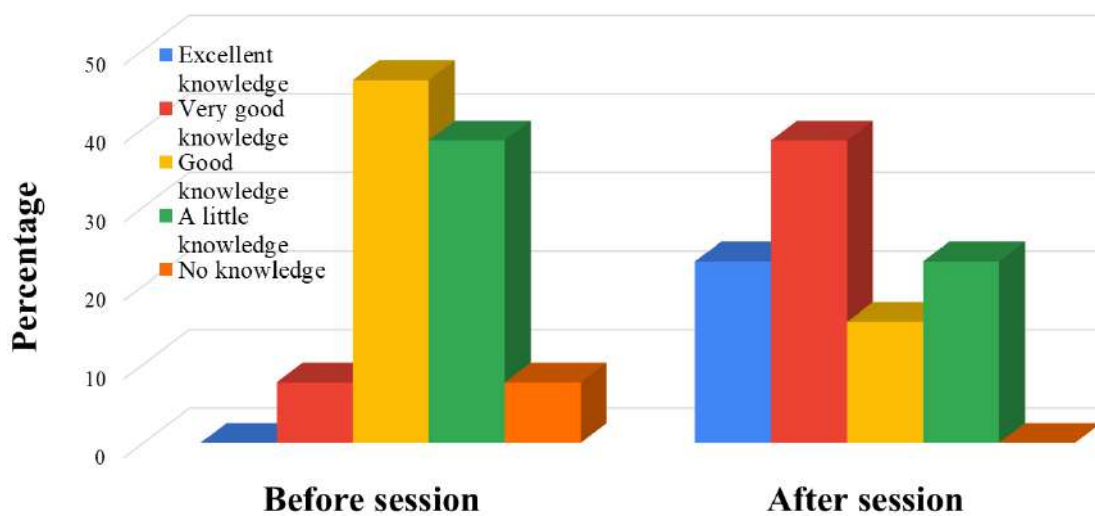
The next question (Q6) tested their capability to analyze a problem based on conduction heat transfer. Ironically, all students correctly wrote Fourier's formula in this question even though 30% of them were not able to construct the same equation in Q5 considering the proportionalities among parameters. Here, only 15% obtained the correct answer, and 23% developed the mathematical equation correctly and failed to solve it correctly. This means about 38% were able to analyze the heat transfer problem correctly. About 50% of students were lacking in analyzing in this regard. The final question (Q7) was based on proposing design ideas based on mathematical foundations. Here, one student (around 7% of the population) scored 4, and the rest scored zeros. In this context, even the students who excelled in previous questions failed in this question.

As per the analysis of Q7, there exists a critical weakness in students to obtain conclusions based on a mathematical formula and relating them to real-world applications. The research highlighted that asking questions again and again (to provoke critical thinking) and providing teacher and peer feedback after the assessment are essential to improve critical thinking skills (Limbach and Waugh, 2014). However, in their “assessment” sessions, students did not prepare on questions of critical thinking, and the lecturer nor students did not provide feedback *or discussion session* after correcting their answer scripts. The absence of these elements may lead to failure in development of critical thinking skills, which is anticipated to be addressed in a future work. It is also noted that the opinion of the improvement of critical thinking skills may depend on the purposive sample chosen. For example, if a different specialization area in the

same level 300 students was chosen, one might expect different outcomes, which again is a future area of study.

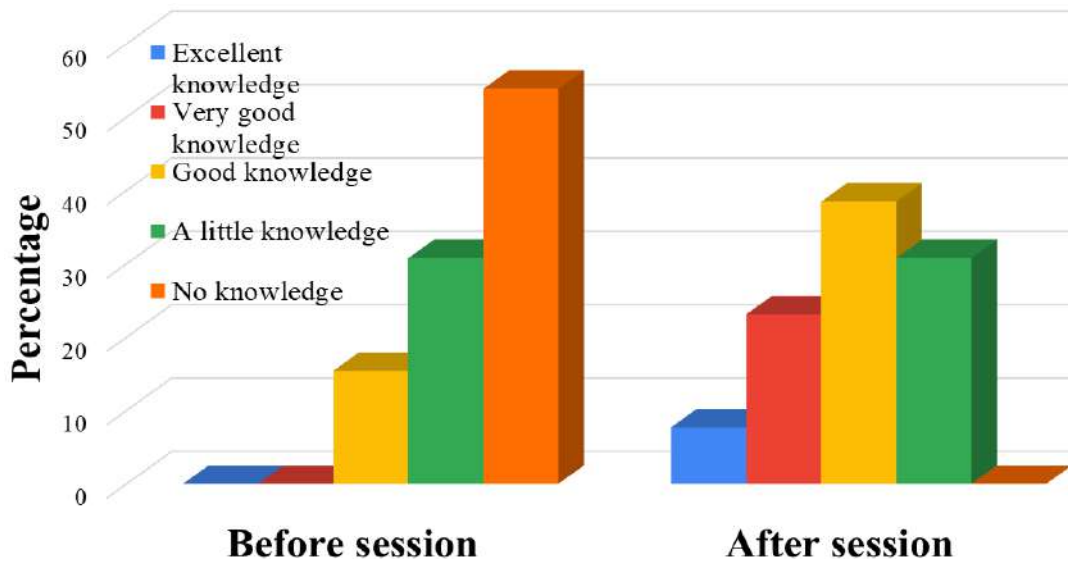
### Analysis of Student Feedback

Fig 2 compares their knowledge before and after the sessions on conduction/radiation and convection (natural and forced). As per Fig 2, more than 10% of them had some knowledge of conduction and radiation. This observation may be due to the early teaching of thermodynamics in level 200, and the GCE A/L curriculum also had a comprehensive lesson on conduction and radiation.



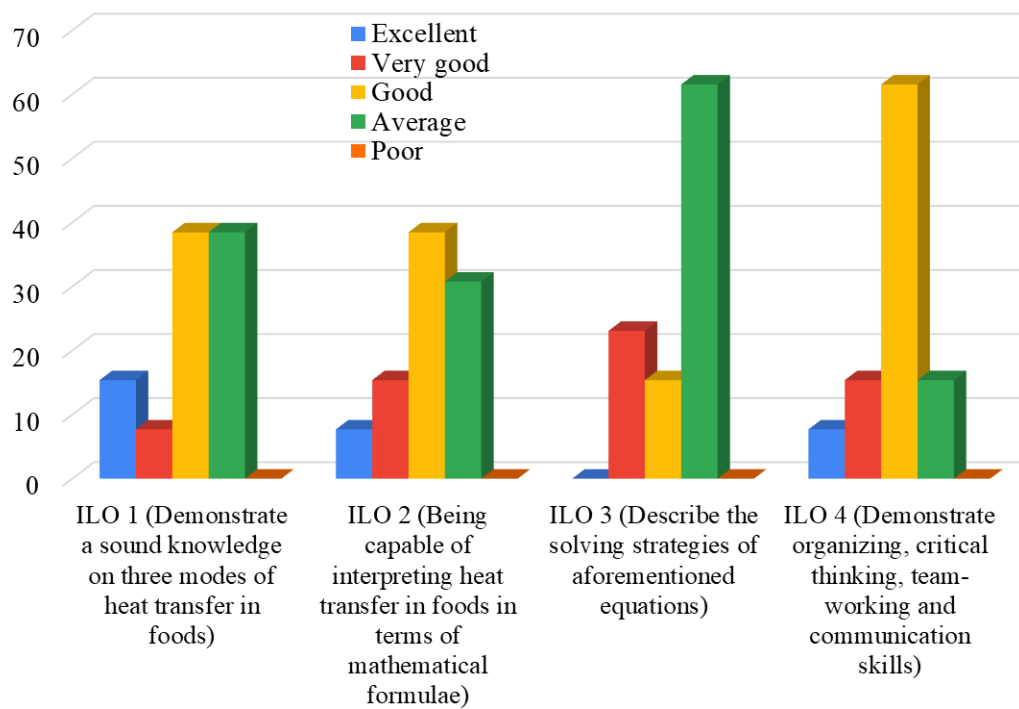
**Fig 2.** Comparison of students' knowledge before and after the session for conduction and radiation

Thus, it is evident that the concepts of conduction and radiation are quite easy to grab compared to convection. Nevertheless, students absorb the basic idea of convection well because the percentage of students with no knowledge becomes zero after the session. As evident in Fig 3, the initial knowledge of convection is comparatively low with 52% of the population having no knowledge. Furthermore, the population with a little, good and very good knowledge in this area is significantly lower than those of conduction and radiation. After the sessions, the knowledge of all students in each area was improved. The proportion of students who possess at least a very good knowledge of conduction and radiation after the session was around 62%, which is about a 55% rise compared to their initial knowledge. However, for convection, compared to initial level, only around 25% of increase is observed considering a minimum of very good knowledge.



**Fig 3.** Comparison of students' knowledge before and after the session for natural and forced convection

Fig 4 shows students' opinions on the achievement of ILOs at the end. Following that, all students were able to achieve the ILOs at least to an average level.



**Fig 4.** Achievement of ILOs from sessions (as percentages)

Around 15% of students claimed that ILO 1 has been achieved by acquiring a sound knowledge of three modes of heat transfer. Around 8% claimed as they were capable of interpreting heat transfer by using mathematical formulae. These two ILOs focus on the low-level cognitive capabilities of students (i.e., memorizing) and the assessment results also agree with the claims. For ILO3, none of the students was confident about "how to solve equations" in an excellent manner. 22% of students claimed they are "very good", 15% claimed they are "good" and 60% claimed they have an average understanding. This ILO corresponds to "apply" and "analyze" levels in Bloom's taxonomy and the achievement was assessed via Q5 and Q6. Out of these two, the performance analysis of Q6 agrees with their claim (i.e., 15% scored 5, 22% scored 4 and 8% scored 3). Next, ILO4 focuses on the development of soft skills, students claim that they inculcate such skills at least at an average level. Here, only about 20% agree that at least a "very good" achievement of soft skills occurred. When it comes to the achievement of critical thinking skills under ILO4, their claim coincides with the analysis of Q7, which was given to assess the "create and design" levels. There, only 7% was successful in achieving a score of 4 and the performance of the rest was at an average level.

### **Students' Feedback on the Teaching Technique**

The key advantages they identified regarding the new technique were the capability of engagement in activities (7%), easy to understand the content (14%), and improvement of soft skills (7%). Around 21% of them commented that allocated time was not enough to smoothly grasp the content, while 14% pointed out that this teaching technique is ideal with fewer courses in the semester. 14% of students highlighted that the scope of the presentation has not been given, which hindered the smooth organization of the content. Furthermore, 14% of students emphasized the need for the assigned lecturer to clarify difficult points (i.e., muddy points), particularly associated with mathematics. 7% of them emphasized the need for supporting materials to better move with the content, while 7% of students did not favor in this teaching technique. The latter portion was in favor of traditional instruction-based teaching by the lecturer (or TCL).

## Conclusions and Outlook

This study focused on applying student-led classroom technique to teach heat transfer to level 300 (third year) students who pursue Bachelor of Technology (BTech) degree. A sample of 14 students were selected from the Faculty of Applied Sciences, Uva Wellassa University. Based on the results, the following can be concluded.

- Students tend to refer to the lecture notes and related literature when a teacher role is assigned in a student-led classroom
- Student interaction and motivation can be improved followed by a student-led classroom session
- They better develop lower-level cognitive skills by working out problems rather than “looking” at the lecture note
- Students are in favor of following this SCL technique under fewer courseload, the scope is known, and the lecturer is available to clarify the muddy points

These results rely on the purposive group chosen. However, repeating the same SCL technique for different specialization groups in level 300 students would provide more insights on the student progress. In future work, the elements of the proposed SCL technique will be revised to improve the critical thinking skills of students and will be experimented with several small groups before expanding for large groups.

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