

School-related Factors that Favoured Significant Achievements in the Science Subject at the G.C.E (O/L) 2020: A Contextual Analysis on the Kilinochchi District, Sri Lanka

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Abstract

This study aims to investigate the school-related factors that favoured the students' Science achievement in the Kilinochchi district at G.C.E (O/L) 2020. The research was conducted through contextual analysis. Quantitative method research design was adopted. The samples for questionnaire survey were selected through random sampling method and to build up the conceptual framework for this study, interviews were conducted with the samples for the interviews selected through purposive sampling technique. A questionnaire was used as the data collection tool. The data collected were analyzed using the descriptive analyzing techniques: Frequency, Percentage, and Garrett Ranking Technique. The findings of the study indicate that the most dominant factors favoring achievement in Science were the target-oriented work of teachers and the use of appropriate learning-materials with the contribution of supervision, both external and internal, being at 8th and 10th in the Garrett Ranks. Furthermore, the factors such as time spent with students, scientifically well-planned zonal activities, continuous examinations, remedial activities, and motivated teachers were identified as secondary

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factors. Despite Science being a skill-oriented subject, the influence of laboratory work was also not considerable, as indicated by its Garrett Rank of 9. It is recommended that Science education in Sri Lanka be enhanced by specifically identifying the factors that are conducive to the development of Science achievement by conducting similar ground-level studies in the other districts.

Keywords: *Achievement, School-Related Factors, Science, G.C.E (O/L), Contextual Analysis*

Introduction

Science plays a dominant role in the modern world, which is subject to rapid changes due to technological advancements. In this technology-driven era, it is essential that everyone should have at least elementary level scientific knowledge and skills to lead a quality life. A country has to undertake many projects such as enhancing agricultural production, driving industrialization, providing better nutrition and improving health to ensure the welfare of people. For the effective implementation of these projects, a large number of scientists and technicians are needed. Science is therefore important to create enlightened citizens and train them to understand the benefits of science.

In this regard, it is imperative for a school to provide essential scientific literacy to students and motivate them to learn science. The schools could carry out their science programmes through science clubs, science fairs, field trips, and laboratory work, but most of the schools in Sri Lanka have not paid attention to these activities as science is not a compulsory subject to enter into the GCE Advanced Level stream and it is considered as a 'tough subject' to study by students. Many parents think studying science is costly because of the additional classes which are essential to succeed in science at national exams.

However, the G.C.E (O/L) examination held in 2020 the Kilinochchi district showed incredible achievement in the Science subject. The evidence for the achievement is presented in Figure 1.

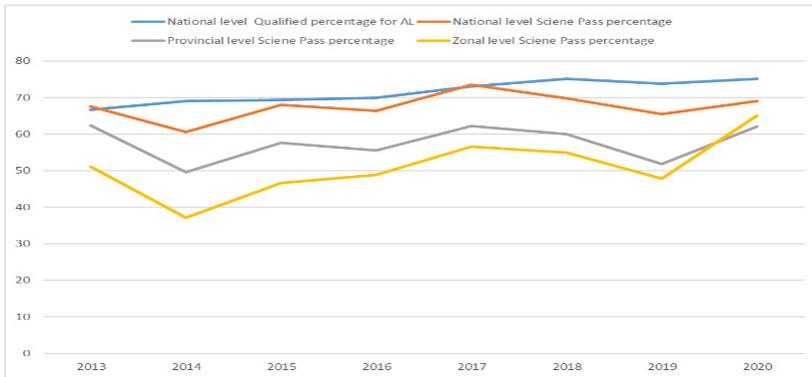


Figure 1. Comparison of the student performance in science subjects at the G.C.E O/L Examination at the national, provincial and zonal levels with the qualifying percentage for AL at the national level in the years 2013 – 2020

This Figure reveals that the national level Science subject passing percentage is continuously lower than the national level qualifying percentage for AL except in 2017. Also, the provincial level Science subject passing percentage of the Northern Province is also less than that of the national level, starting from 2013. Similarly, the zonal level Science subject passing percentage is also less than that of the provincial and national levels, but Figure 1 clearly shows that for the first time in the last 8 years, in 2020, the passing percentage of the Kilinochchi district exceeded the Science subject passing percentage of the Northern Province.

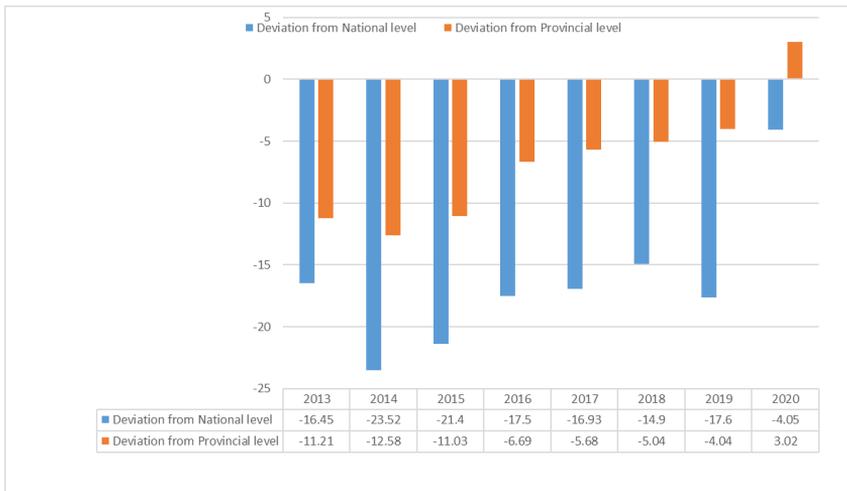


Figure 2. Deviation of the passing percentage from 2013 to 2020 of science subjects at the G.C.E O/L Examination from the national level and provincial level

Figure 2 shows that the Kilinochchi district continuously showed negative deviation from the national level and provincial level Science subject passing percentage. However, in 2020, it showed a positive deviation from the provincial level passing percentage.

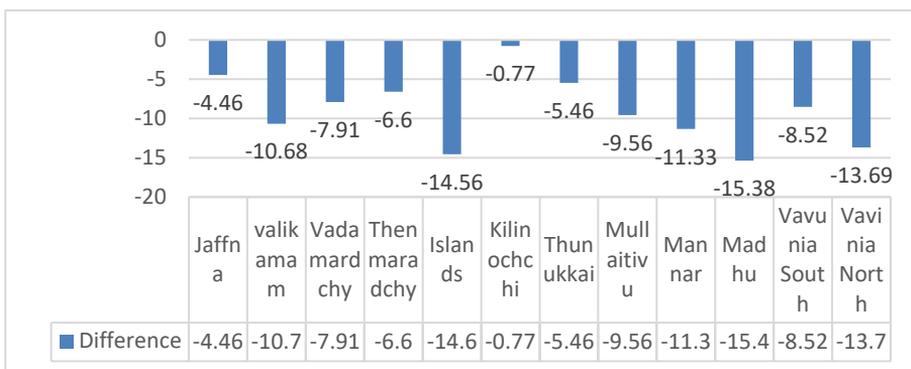


Figure 3. Deviation of the Science subject passing percentage of the 12 zones of the Northern Province at the G.C.E (O/L) - 2020 from the respective qualifying percentage for GCE Advanced Level

Figure 3 illustrates the fact that Kilinochchi district shows very little deviation (-0.77) among the 12 zones of the Northern Province. This reveals that the passing percentage of Science subject (65.02) is approximately equal to the qualifying percentage for the GCE Advanced Level.

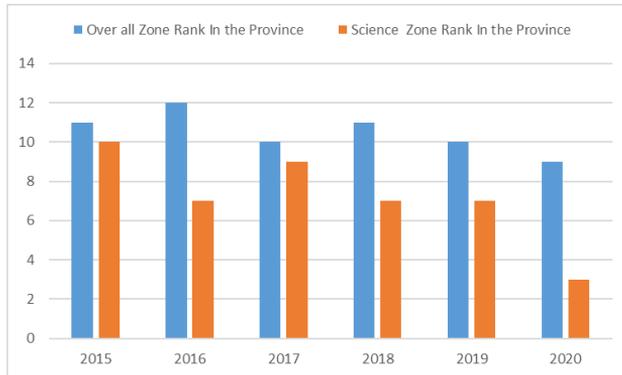


Figure 4. Ranks based on overall passing percentage and Science subject passing percentage

Figure 4 shows that the rank based on the overall passing percentage of Kilinochchi district in the Northern Province was nine (09) or below nine (09) from 2015, but in 2020, the rank of Kilinochchi district in the Northern Province based on science subject passing percentage was three (03).

These trends raise various questions: why is the achievement in the Science subject less common than the national level qualifying percentage for the GCE Advanced Level? What are the reasons for the less passing percentage in the Science subject of the Northern Province than that of the national level? And, how did the passing percentage of the Science subject in the Kilinochchi district increased in 2020?

Objectives

1. To identify the factors that favour the achievement of science in the Kilinochchi district at the G.C.E (O/L) 2020 examination.
2. To identify the most dominant factors that favour the achievement of Science in the Kilinochchi district at the G.C.E (O/L) 2020 examination.

Research Questions

1. What were the factors that favour the achievement of science in the Kilinochchi district at the G.C.E (O/L) 2020 examination?
2. What were the most dominant factors that favour the achievement of science in the Kilinochchi district at the G.C.E (O/L) 2020 examination?

Literature Review

For this study, literature related to the factors affecting the achievement of the Science subject at the secondary school level” is analyzed and presented in this part.

Obomanu & Adaramola (2011) posited in his study, that the factors that are related to underachievement in science-related subjects such as Science, Technology, and Mathematics are unqualified teachers, negative attitudes related to science-oriented subjects, and indifferent behavior of parents towards homework given by schools. Sibomana et al. (2021) revealed in their study that the education level of teachers, economic background of families, availability of teaching-learning materials, distance between schools and home, prior knowledge of students, education level of parents, and absenteeism of learners are the crucial factors for the low performance in science subjects.

The factors affecting students’ performance in science could be classified into two main categories: contextual factors and emotional factors. School-related factors are considered contextual factors. These factors are categorized as internal and external factors. Under the category of internal factors, school resources and teacher quality are considered as the factors that determine the students’ performance in science. Motivation towards learning science is considered as the factor that comes under emotional and motivational factors (De Silva, Khatibi, & Azam, 2018).

According to Darling Hammond (2020), certification status, years of teaching experience, knowledge of the subject matter, and teaching and years of education are some of the dimensions of teacher quality that affect students’

performance, and it was also reported that certification status and a degree in the field to be taught were positively correlated with students' achievements. Goe, Leslie, & Stickler (2008) also posited that teachers' expertise in their subject area showed a strong correlation with the students' performance. Among these factors, classroom practices have a great impact on students' performance, and the teachers with pedagogical content knowledge show the greatest achievement in students' performance (Wenglinsky, 2002). Goe, Leslie, & Stickler (2008) also reported that sustainable professional development activities aligned with the curriculum and focus on instruction have shown to positively influence school-level achievement in mathematics and science.

Fuller (1987), in his review, recorded that textbook materials, size of library and science laboratories are considered as the more influential factors affecting students' academic achievement.

De Silva, Khatibi, & Azam (2018) argued that motivation is an inherent desire that drives individuals to engage in activities due to the satisfaction derived from those actions. Motivation plays a crucial role in enhancing students' learning outcomes, as it taps into their innate drive to accomplish tasks. However, it is noteworthy that external factors, such as rewards and incentives, may exert an influence on motivation and subsequently impact students' learning. Therefore, students' learning is not solely reliant on self-motivation but is also contingent upon the role of teachers. Moreover, Caprara et al. (2006) revealed in their study that teachers with a strong sense of efficacy are likely to have a positive impact on students' performance.

Mary Sule (2013) asserted that school monitoring, whether internal or external, has evolved into a veritable instrument for evaluating teachers' job performance in response to criticisms of the quality of education and as a measure of improvement on the stark downward trend in educational accomplishments.

Overall, the factors such as quality of teacher, students'

attitude towards the science subject, the availability of teaching-learning materials, school resources, motivation, educational qualification of teachers, teaching experience, and instructional supervision have been identified as the school-related factors that influence students' achievement.

Conceptual Framework

In addition to the literature review, to construct the conceptual framework, interviews were also carried out with five (05) teachers who had taught the Science subject to those students who faced the G.C.E (O/L) examination in 2020 in the Killinochchi district.

Participant 1: A teacher who had taught the Science subject to those students who faced the G.C.E (O/L) examination in 2020 in the Killinochchi district reported:

“I presume the continuous supervision done by the zonal staff and the supplementary study guides given to the students were the prime factors for this achievement. The zonal education office organized seminars based on the needs of the teachers and only the teachers in our zone were used as resources in those seminars. It is because of these reasons that the teachers were self-motivated as they were experts in their fields. Setting a target for achievement and working towards that target in this instance was also a major factor.”

From this extract, the factors such as external supervision, supplementary learning materials, zonal activities, motivated teachers, and target-oriented activities were identified as the factors that favour the achievement in the Science subject.

Participant 2: A teacher who had taught Science to those students who faced the G.C.E (O/L) examination in 2020 in the Killinochchi district said:

“Self-learning materials that were distributed by zone, continuous exams that were conducted by the zone, and the remedial activities that were done by the teachers based on the analysis of the scores of the students in those exams are also some of the dominant factors for that achievement.”

From this statement, one could conclude that supplementary learning materials, continuous exams, and remedial activities were identified as the factors that favour achievements in the Science subject.

Participant 3: A teacher who had taught the Science subject to those students who faced the G.C.E (O/L) examination in 2020 in the Killinochchi district said:

“I presume Self-learning materials, Continuous exams, continuous supervision done by zonal staff and in the school, and motivated learners were the reasons for this achievement.”

From the above statement, one could conclude that self-learning materials, continuous exams, continuous supervision (both internal and external), and motivated learners were identified as the factors that favour the achievement in Science.

Participant 4: A teacher who had taught the Science subject to those students who faced the G.C.E (O/L) examination in 2020 in the Killinochchi district said:

“Motivated teachers and learners, a lot of time spent on remedial teaching, students’ interest in Science, the self-learning materials, and the excessive usage of laboratory works and practical exams are the prime factors.”

Participant 5: A teacher who had taught the Science subject to those students who faced the G.C.E (O/L) examination in 2020 in the Killinochchi district said:

“Students spent a lot of time with teachers, liking of students for Science teachers, the competitive feeling among teachers regarding attaining the expected target, young teachers, and decreased paper works given by the principal in addition to the teaching-learning process are the important factors.”

From the above statements it is evident that the factors such as motivated teachers and learners, time spent with students by the teachers, target-oriented activities, supplementary learning materials, laboratory works, and young teachers were identified as those that favoured the achievement in the Science subject.

In this respect, the school-related factors that favour the rapid increase in achievements in the Science subject in the Killinochchi district were identified through the interviews carried out with the teachers in that district who engaged in teaching the Science subject to 2020 G.C.E (O/L) students.

They are identified as follows:

- Subject-related external supervision
- Zonal level activities related to Science
- Target oriented work
- Teachers' motivation
- Time spent with students by teachers
- Remedial activities
- Continuous exams
- Frequent use of laboratory
- Supplementary learning materials
- Internal supervision

Based on the literature review and the data collected from the interview conducted with teachers, in addition to the factors identified through the literature, the following factors have been selected as those influencing the achievements in the Science subject by the students in the Kilinochchi district at the G.C.E (O/L) examination, 2020: zonal-level activities related to science, target oriented work, time spent with students by teachers, remedial activities and continuous exams.

Methodology

The study was conducted in the Kilinochchi district in January and February, 2022. It is important to say that the only district that functioned as a single educational zone till 2021 was Kilinochchi; but in the year 2021, it was divided into two zones: Kilinochchi South and Kilinochchi North. According to the Department of Census and Statistics of Sri Lanka, in 2012 this district consists of around 0.113 million population with 88.75/km² population density. In this district, 104 schools function. Among these, only 59 Schools conducted the G.C.E (O/L) classes in the year 2020. From these schools, 2241 students sat for the G.C.E (O/L) exam in 2020. In these schools, 119 teachers served as Science Teachers. The zone or district was selected purposively

among the 12 educational zones in the Northern Province as it showed an increase in the achievements in the Science subject at the G.C.E (O/L) exam 2020. In 2019, The Kilinochchi district achieved 47.85 as its passing percentage. In the year 2020, it achieved 65.02, an increase of 17.17. In that respect, this study aimed to investigate the school-related factors that favour the students' Science achievement in the Kilinochchi district at G.C.E (O/L) 2020.

Study Sample and Data Collection

Among the 119 Science teachers in the Kilinochchi district, demographical data were collected from 108 teachers by using a questionnaire. Among these 108, 86 teachers were selected randomly for the questionnaire survey, and five teachers were selected purposively for interview. The questionnaire consisted of 10 items with a five-point Likert scale and 10 items as rank-ordered items.

Research Design

The quantitative method was adopted and the factors favouring the significant achievements in the Science subject in the Kilinochchi district were identified through the interviews. At this level qualitative approach was adopted to build up conceptual framework for this study. Then, these factors identified were included in the questionnaire and a survey was conducted. At this level, quantitative approach was exploited by the researcher. For the interview, five teachers were selected and interviewed individually. The questionnaire survey was conducted twice, for collecting demographical data from the population and to get the opinion from the 86 teachers, selected randomly.

Data analysis

Analysis of Demographical Variables

Table 1. *Teacher Distribution Based on Gender*

Gender	Frequency	Percentage
Male	26	24.07
Female	82	75.93

According to Table 1 above, 75.93% of teachers were female while 24.07% of teachers were male.

Table 2. *Teacher Distribution Based in Residential District*

Residential District	Frequency	Percentage
Kilinochchi	42	38.9
Other districts	66	61.1

In Table 2 above, 61.1% of teachers travelled to schools from various districts (other than Kilinochchi), mainly from the Jaffna district. It is significant that 50 teachers (74.62%) are females and among these teachers 30 were (60%) married.

Table 3. *Teacher Distribution Based on Highest Educational Qualification*

Highest Educational Qualification	Frequency	Percentage
Advanced Level	35	32.4
Arts Graduate	3	2.8
Science Graduate	65	60.2
Master in Science	5	4.6

It was shown in Table 3 that 60.2% are Science graduates and 4.6% have a Master's degree in Science. Hence, they had sound subject knowledge, which was one of the reasons for the achievement in Science in the Kilinochchi district. On the other hand, it was significant that 32.4% of teachers had Advanced Level as their highest educational qualification.

Table 4. *Teacher Distribution Based on Professional Qualification*

Professional Qualification	Frequency	Percentage
Have	74	68.5
Do not have	34	31.5

Table 4 clearly shows that the highest percentage of teachers (68.5%) had professional qualifications. However, 31.5% of teachers did not have any professional qualifications. Among these professional teachers, 33.78% of teachers had the National Diploma in Teaching obtained from National Colleges of Education, 8.11% obtained Bachelor of Education degree from National Institute of Education, and 43.24% obtained Post Graduate Diploma in Education from various universities. It was also noted that only one teacher had a Master of Education degree. The teachers with the appropriate professional qualifications was one of the main reasons for the achievement in Science in the Kilinochchi district.

Table 5. *Teacher Distribution Based on Teacher Grade*

Teacher Grade	Frequency	Percentage
1	5	4.6
2-I	7	6.5
2-II	44	40.7
3-IA	33	30.6
3-I B	18	16.7
3-II	1	0.9

In Table 5, it could be seen that only five teachers are in the Teacher grade 1 and only seven teachers are in teacher Grade 2-I. It is noteworthy that most of the teachers, 48.14%, are grade 3 teachers, which reveals that there is a dearth of experienced teachers. Certainly, this will affect the Science subject achievements negatively.

Table 6. *Teacher Distribution Based on Teaching Experience*

Teaching Experience (In years)	Frequency	Percentage
0-5	69	63.9
6-10	26	24.1
11-15	3	2.8
16-20	3	2.8
21-25	4	3.7
31-35	3	2.8

Table 6 clearly shows that 63.9% of teachers have less than five years of experience and a total of 95 have less than 10 years of experience. Only 13 teachers were found with more than 10 years of service. Among the teachers with 6- 10 years of experience, 19 teachers lived in districts other than Kilinochchi. In line with national transfer policy, these teachers usually get the transfer to their district after six or seven years of service.

Table 7. *Teacher Distribution Based on Age*

Teaching Experience (In years)	Frequency	Percentage
26-30	47	43.5
31-35	38	35.2
36-40	9	8.3
41-45	5	4.6
46-50	5	4.6
51-55	4	3.7

Table 7 shows that most of the teachers were young teachers. 85 out of 108 (78.7%) were ranged between 26 to 35 years of age. Young teachers' agility also paved the way for the achievement of Science results.

Analysis of Questionnaire Data

The questionnaire consisted of 10 items with five points Likert scale. They are subject -related external supervision, zonal level activities related to Science, target-oriented work,

teachers' motivation, time spent with students by teachers, remedial activities, continuous exams, use of laboratory, supplementary learning materials, and internal supervision. These items were analyzed using descriptive statistics.

Table 8. *Analysis of Questionnaire*

<i>Item No</i>	<i>Item</i>	<i>N</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>	<i>Std. Deviation</i>
1.01	<i>External Supervision</i>	85	2	5	4.11	.802
1.02	<i>Zonal Activities</i>	85	2	5	4.51	.766
1.03	<i>Target-oriented work</i>	85	3	5	4.71	.531
1.04	<i>Motivated Teachers</i>	85	3	5	4.36	.705
1.05	<i>Time spent</i>	85	3	5	4.35	.719
1.06	<i>Remedial activities</i>	85	2	5	4.25	.785
1.07	<i>Continuous Exams</i>	85	3	5	4.28	.610
1.08	<i>Laboratory works</i>	85	2	5	3.69	.655
1.09	<i>Learning Materials</i>	85	4	5	4.79	.411
1.10	<i>Internal supervision</i>	85	2	5	3.62	.740
	<i>Valid N (list-wise)</i>	85				

The five-point Likert scale is considered as an interval scale. The mean is very significant. From 1 to 1.8, it means strongly disagree. From 1.81 to 2.60, it means disagree. From 2.61 to 3.40, it means neutral. From 3.41 to 4.20, it means agree. From 4.21 to 5.00, it means strongly agree (Table 8).

In the first statement, the mean is 4.11. Therefore, it means

that the majority of participants agree with that statement. In the second statement, the mean is 4.51. Hence, it means that the majority of participants strongly agree with that statement. In the third statement, the mean is 4.71. Therefore, it also means that the majority of participants strongly agree with that statement. In the fourth statement, the mean is 4.36. Hence, it means that the majority of participants strongly agree with that statement. In the fifth statement, the mean is 4.35. Hence, it means that the majority of participants strongly agree with that statement. In the sixth statement, the mean is 4.25. Hence, it means that the majority of participants strongly agree with that statement. In the seventh statement, the mean is 4.28. Therefore, it means that the majority of participants strongly agree with that statement. In the eighth statement, the mean is 3.69. Hence, it means that the majority of participants agree with that statement. In the ninth statement, the mean is 4.79. Hence, it means that the majority of participants strongly agree with that statement. In the last statement, the mean is 3.62. Hence, it means that the majority of participants agree with that statement.

Table 9. *Opinion Regarding the Effect of Subject-related External Supervision Done by Zonal Staff*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	3	3.5	3.5	3.5
	Neutral	14	16.3	16.5	20.0
	Agree	39	45.3	45.9	65.9
	Strongly Agree	29	33.7	34.1	100.0
	Total	85	98.8	100.0	
Missing System		1	1.2		
Total		86	100.0		

Among the 85 respondents, 29 respondents strongly agreed with this statement, while 39 agreed. 14 respondents remained neutral and only three respondents disagreed with

this statement (Table 9).

Table 10. *Opinion Regarding the Effect of Zonal Level Subject-related Activities*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	3	3.5	3.5	3.5
	Neutral	5	5.8	5.9	9.4
	Agree	23	26.7	27.1	36.5
	Strongly Agree	54	62.8	63.5	100.0
	Total	85	98.8	100.0	
Missing	System	1	1.2		
Total		86	100.0		

Among the 85 respondents, 54 respondents strongly agreed with this statement, while 23 agreed. 5 respondents were neutral and only three respondents disagreed with this statement (Table 10).

Table 11. *Opinion Regarding the Effect of Target-oriented work*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	3	3.5	3.5	3.5
	Agree	19	22.1	22.4	25.9
	Strongly Agree	63	73.3	74.1	100.0
	Total	85	98.8	100.0	
Missing	System	1	1.2		
Total		86	100.0		

Among the 85 respondents, 63 respondents strongly agreed with this statement, while 19 agreed. Three respondents were neutral and it is important to note that no one denied this (Table 11).

Table 12. *Opinion Regarding the Effect of Motivated Teachers*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	11	12.8	12.9	12.9
	Agree	32	37.2	37.6	50.6
	Strongly Agree	42	48.8	49.4	100.0
	Total	85	98.8	100.0	
Missing	System	1	1.2		
Total		86	100.0		

Among the 85 respondents, 42 respondents strongly agreed with this statement, while 32 agreed. 11 respondents were neutral and no one denied this (Table 12).

Table 13. *Opinion Regarding the Effect of Excessive Time Spent with Students*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	12	14.0	14.1	14.1
	Agree	31	36.0	36.5	50.6
	Strongly Agree	42	48.8	49.4	100.0
	Total	85	98.8	100.0	
Missing	System	1	1.2		
Total		86	100.0		

Among the 85 respondents, 42 respondents strongly agreed with this statement, while 31 agreed. 12 respondents were neutral and no one denied (Table 13).

Table 14. *Opinion Regarding the Effect of Remedial Activities Based on the Exam Scores*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	4	4.7	4.7	4.7
	Neutral	6	7.0	7.1	11.8
	Agree	40	46.5	47.1	58.8
	Strongly Agree	35	40.7	41.2	100.0
	Total	85	98.8	100.0	
Missing	System	1	1.2		
Total		86	100.0		

Among the 85 respondents, 35 respondents strongly agreed with this statement, while 40 agreed. Five respondents were neutral and only four respondents disagreed (Table 14).

Table 15. *Opinion Regarding the Effect of Continuous Exams*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Neutral	7	8.1	8.2	8.2
	Agree	47	54.7	55.3	63.5
	Strongly Agree	31	36.0	36.5	100.0
	Total	85	98.8	100.0	
Missing	System	1	1.2		
Total		86	100.0		

Among the 85 respondents, 31 respondents strongly agreed with this statement, while 47 agreed. 7 respondents remained neutral and no one denied this (Table 15).

Table 16. *Opinion Regarding the Effect of Frequent Use of Laboratory*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	5	5.8	5.9	5.9
	Neutral	20	23.3	23.5	29.4
	Agree	56	65.1	65.9	95.3
	Strongly Agree	4	4.7	4.7	100.0
	Total	85	98.8	100.0	
Missing	System	1	1.2		
Total		86	100.0		

Among the 85 respondents, only four respondents strongly agreed with this statement, while 56 agreed. 20 respondents were neutral and five respondents disagreed (Table 16).

Table 17. *Opinion Regarding the Effect of Supplementary Learning Materials*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	18	20.9	21.2	21.2
	Strongly Agree	67	77.9	78.8	100.0
	Total	85	98.8	100.0	
Missing	System	1	1.2		
Total		86	100.0		

Among the 85 respondents, 67 respondents strongly agreed with this statement, while 18 agreed no one denied this (Table 17).

Table 18. *Opinion Regarding the Effect of Internal Supervision*

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Disagree	6	7.0	7.1	7.1
	Neutral	27	31.4	31.8	38.8
	Agree	45	52.3	52.9	91.8
	Strongly Agree	7	8.1	8.2	100.0
	Total	85	98.8	100.0	
Missing	System	1	1.2		
Total		86	100.0		

Among the 85 respondents, only seven respondents strongly agreed with this statement, while 45 agreed. 27 respondents were neutral (Table 18).

Analysis of rank-ordered items

Table 19. *Mean ranks of the rank-ordered items*

Factors	Total Score	Garrett Mean Score	Mean Rank
External Supervision	3828	45.04	8
Zonal Activities	4624	54.4	4
Target-oriented work	5693	66.98	1
Motivated Teachers	4402	51.79	7
Time spent	4659	54.81	3
Remedial activities	4428	52.09	6
Continuous Exams	4482	52.73	5
Laboratory works	3004	35.34	9
Learning Materials	5363	63.09	2
Internal supervision	1932	22.73	10

Henry Garrett's Ranking method was used to analyze these items. On the basis of the ranks assigned by the sample respondents, the factors that favour students' achievement in Science were analyzed through Garrett Ranking

Techniques (Table 19). It was evident from the above table that target-oriented work (66.98) was the most dominant factor that favoured achievement in the Science, followed by supplementary learning materials provided by zonal education office (63.09), time spent with students (54.81), scientifically planned zonal activities (54.4), continuous exams conducted by the zone (52.73), remedial activities done by the teachers based on the exam scores (52.09), motivated teachers (51.79), external supervision done by the zonal staff (45.04), laboratory works (35.34) and internal supervision done in the school (22.73).

Discussion, Interpretation, and Findings

Findings

According to the results obtained from Likert scale data analysis, it was found that the teachers strongly agreed with the factors that favoured Science achievement in the Kilinochchi district at G.C.E. (O/L), 2020, they are: scientifically planned zonal-level activities, working towards the predetermined targets, highly motivated teachers, time spent with students, well-planned remedial activities, continuous examinations, supplementary learning materials. Teachers also agreed upon the influencing power of factors such as external supervision, laboratory usage, and internal supervision as those that favoured the achievements in Science.

Through Garrett Ranking techniques, it was understood that target-oriented work and supplementary learning materials were the most dominant factors that favoured the Science achievements in the Kilinochchi district at the G.C.E (O/L) examination in 2020, while internal supervision and use of laboratory were identified as the least influencing factors.

Discussions and Recommendations

The finding showed that the most dominant factors in the Science subject achievement were target-oriented work and supplementary learning materials. Targets were given to each teacher and they were motivated by the zonal staff to achieve the targets. That target was revised based on the continuous

exam scores. Two types of supplementary materials were distributed by the zone to each and every student. One was prepared for the students whose performances were identified as 'marginal' and the other was prepared for 'average' students. It was noteworthy that these were prepared with the contribution of the teachers in the zone. The results of this study were in line with the findings of the study carried out by Birch & Williams (2012) with regard to the positive correlation between students' usage of online materials and their marks in the particular unit.

Teachers and students were motivated during external supervision. Moreover, the results of the present study regarding the influence of supervision on the achievement in Science were in agreement with the findings of Usman (2015) in terms of non-regular instructional supervision and students' performance. Similarly, the study carried out by Makau, Ronoh, & Tanui (2016) revealed that there was a positive correlation between instructional supervision and academic achievement in Science. However, the teachers perceived that the internal supervision did not influence the achievement of students as expected, in contradiction with the view of Usman (2015) and Makau, Ronoh, & Tanui (2016).

A research study revealed that there was a positive correlation between practical work and academic attainment in Science (Shana & Abulibdeh, 2020). In contrast to this study, based on the finding of the present study, despite the frequent use of the laboratory being limited due to the COVID-19, it did not greatly affect the achievements in Science. This raises the question regarding the validity of the Science question paper of the G.C.E (O/L), 2020.

The teachers were dedicated and spent a significant time with the students. Most of the teachers engaged in teaching on Saturdays, Sundays, and even on holidays, including after-school hours. Plans were made by the zonal staff and executed according to a predetermined schedule. Preparation of learning materials, implementation of continuous exams, and continuous supervision especially on the

implementation of learning materials were executed, based on the well-planned time frame.

The achievement of students in Science could be increased by target-oriented work and using proper supplementary learning materials under well-organized supervision. It would be further enhanced by motivated teachers and dedicated administrative staff.

It is recommended that Science education in Sri Lanka be enhanced by specifically identifying the factors that are conducive to the development of Science achievement by conducting similar ground-level studies in other districts.

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