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Studying the Influence of Technology Stream on the Sri Lankan Education System: A Case Study of Technology Stream Graduates in Sri Lankan Universities

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Abstract - The technology stream implemented in Sri Lankan government schools aimed to bridge gaps in subject stream selection, providing students with theoretical and practical knowledge for success in the changing work environment. The objectives of this study were to (i) assess the employment status of university graduates from the technology stream, (ii) evaluate the curriculum, and (iii) examine the practical components in government schools. A questionnaire form was circulated among the first and second batches of graduates of technology faculties using email and WhatsApp, and the obtained 103 responses were analyzed through Microsoft Excel. The results showed that 41.7% chose the technology stream for university entry, with 36.9% aiming to enhance soft skills. A majority of 54.4%, valued practical knowledge over theory, and 91.3% secured university admission on their first attempt. Regarding objectives, 36.9% believed the stream developed problem-solving skills, while 10.7% felt none were met. 35% thought the stream equipped them with job market skills, but 83.5% identified shortcomings, with 61.2% dissatisfied with the curriculum and practical knowledge. About 16.5% struggled to apply knowledge to real-world issues, and 11.7% expressed dissatisfaction. Only 6.8% pursued master's or Ph.D. degrees, and 1.9% became entrepreneurs, indicating challenges in fostering problem-solving abilities. Outdated curriculum (65% desired more practical knowledge, 59.2% suggested a curriculum revision) hindered students' job market readiness. The inability to obtain IESL accreditation for Engineering Technology Degree programs limited job and study opportunities, competing with accredited Engineering graduates. Furthermore, while some objectives were met, the technology stream requires significant improvements to align better with the evolving job market and global technological advancements.

Keywords - Sri Lankan Education System, Technology Stream, Graduates, G.C.E. A/L, Professional Education, University Admission, Real-World Issues, Global Technological Advancements.

1 INTRODUCTION

The Advanced Level Technology Stream (A/L Tech. stream) was introduced to the Sri Lankan Government universities in 2013, with the primary aspect of producing a person with the skills to enter the future world of work, full of theoretical and practical knowledge. The Sri Lankan government expected to achieve following objectives introducing such a new stream;

1.1. Objectives that made by the Sri Lankan government

- To resolve the inequalities in the selection of subject streams at the G.C.E. A/L.
- To create science scholars from higher education to suit the demand in the current job market, providing the students with the technical skills needed for day-to-day life.
- To generate the skills within the students to find technical solutions for real-world problems
- To develop the skills that suitable for the job market within the students
- To direct the students towards professional education according to the national professional qualifications structure

When exploring the background of technological education in Sri Lanka, the report of the National Education Commission in 1997 and the Report of the Youth Unrest Commission (YUC) are historical literature resources and a foundation for the current technology stream. In the early stage of introducing the A/L Tech. stream to the government schools, the Minister of Education was Mr. Bandula Gunawardena and he said that the students who followed the new stream could be offered a Bachelor of Technology (BTech.) degree from the respective universities in Sri Lanka [3]. According to Mr. Gunawardena, the students who could not score sufficient marks to enter the universities could apply for admission to the University of Vocational Technology (UNIVOTEC), the Ceylon–German Technical Training Institute, Ratmalana or Automobile Engineering Training Institute at Orugodawatte, etc. Further, he said that if any student fails the examination under the technology stream, he or she could follow the National Vocational Qualification Level 3 (NVQ 3) certificate course and they could yet continue their technical education. Gunawardena [3]

The former Minister of Education Mr. Bandula Gunawardena has also said that the new subject combination would be introduced in association with the Ministry of Youth Affairs and Skills Development, the National Institute of Education, the National Education Commission, the Higher Education Ministry and the University Grants Commission in Sri Lanka.

Before introducing the A/L Tech. stream the G.C.E. (A/L) students learned in the Physical Science, Biological Science, Commerce, and Arts subject streams. Minister of Education said for the Sri Lankan students, “If you are sitting for the Advanced Level A/L Examinations in 2015, then you have an option of selecting a new stream of study; technological subject stream” Gunawardena [3].

The proposed stream included technical subjects such as information technology, electronics, civil and mechanical engineering, agriculture, bio-resources, and food sciences to give the students practical knowledge in preparation for employment after school education. This was announced at a press conference by Education Minister Bandula Gunawardena. He said that the new stream would be named the ‘Technology’ stream, mostly based on the skills of students. “We will introduce the new stream in collaboration with the Ministry of Youth Affairs and Skills Development,” Gunawardena said adding that the preliminary preparations for the new stream had already been completed.

According to the Minister of Education, “At the initial stage, the new stream was available at 50 schools in Sri Lanka and gradually expanded to cover every secretariat division as Engineering Technology and Biosystems Technology available schools in 200 schools in Sri Lanka. The Education Ministry was drafting the textbooks and teacher guidance for the new stream with the assistance of educationalists, intellectuals, and several other resource personnel.

Former Vice Chancellor of the University of Moratuwa, Vidya Jothi Professor Dayantha Sepal Wijeyesekera was also presented at the briefing and explained the benefits of the new stream of study. “The subjects include electronics, civil and mechanical engineering, agriculture as well as food sciences and information technology,” he said, adding that enrolment in universities would not be necessary, if this stream of study was followed at Advanced Levels, as students would acquire a very practical knowledge, which would enable them to find employment easily.

When investigating the history of the Technology stream, it contained in the initial stage; three subject categories; A, B, and C [1]. Candidates can select Engineering Technology or Bio-system Technology from category A with Science for Technology as category B subject, and Information communication technology, or any other subject from (Economics/Geography/Home Economics/English Language/Accountancy/Communication and Media Study/Information and Communication Technology/Arts/Business Studies/Agriculture) category C subject group. Science for Technology (Category B) is a compulsory subject for both Engineering and Bio-system candidates. Since the stream

is relatively new, the number of schools that have the facilities to teach the stream is limited or null in some areas for those who want to study those subjects. The first batch of students who sat under the Advanced Level Technology Stream, based on 2015 A/L Examination results, entered to the Universities in 2017. As same as the second batch who sat for the Advanced Level Technology Stream on 2016 A/L Examination results, entered to the government universities in 2018 respectively. Both batches have graduated with technology degrees from the respective Sri Lankan Universities now.

1.2. Background of the Research

Presently, two batches sat under the A/L technology stream in 2015 and 2016 as well and a technological degree in respective government universities have been graduated. Those pass-out students were included to collect the data using a Google form in 2023 and it was shared with nine selected universities in Sri Lanka; University of Kelaniya, University of Colombo, University of Sri Jayewardenepura, University of Ruhuna, University of Jaffna, Uva Wellassa University of Sri Lanka, Rajarata University of Sri Lanka, Wayamba University of Sri Lanka and South-eastern University of Sri Lanka.

1.2.1. The major objective of this research

- To check whether the five major objectives set by Sri Lankan government for introducing the A/L technology stream to the education system, have been achieved or not.

1.2.2. The specific objectives of the research

- To check whether those who left the universities have already been employed or not.
- To evaluate the status of the existing A/L technology stream's curriculum.
- To verify the current status of the practical components of the technology stream in government schools that want to be improved.

2. METHODOLOGY

The methodology, from the questionnaire preparation to final data analysis has been discussed as follows.

2.1. Preparation of Questionnaire form and Data collection method

A Google survey was conducted among the following nine universities; University of Kelaniya, University of Colombo, University of Sri Jayewardenepura, University of Ruhuna, University of Jaffna, Uva Wellassa University of Sri Lanka, Rajarata University of Sri Lanka, Wayamba University of Sri Lanka and South-eastern University of Sri Lanka, with the aspect of investigating the current statues of the A/L Tech. Stream and explore whether the objectives made by Sri Lankan government when introducing the A/L technology stream has been achieved or not. [6]

The questionnaire included 27 questions and multiple-choice answers [6]. Each question had been included multiple answers to select either multiple choice or checkbox answers following the option of "other" to provide their answers also. The respondents could have responded anonymously without giving names or email addresses. The questionnaire had two sections, except for additional information questions, each question must have been answered as the required field of getting answers. According to the pattern of the questions and the provided multiple answers, only the technology students who followed the A/L Technology stream in 2015 and 2016 could give the answers. Then the prepared questionnaire was shared with graduates in recent years and followed technological degrees in Sri Lankan Government universities (2015 and 2016 A/L Technology Students) through social media platforms such as WhatsApp and Facebook. The past technology graduate students at Uva Wellassa University of Sri Lanka were sent the questionnaire through emails also. Getting 103 responses from each selected university, the provided answers were examined for analysis.

2.2. Data Analysis

The proposed areas, to cover and obtain, the data including appropriate questions to the Google form, a comprehensive questionnaire was prepared as explained in the Preparation of Questionnaire form and Data collection method. When the research was launched two batches from government universities had been graduated. Those who have graduated with Bachelor of Technological degrees and have sat for A/L under the technology stream in 2015 and 2016 also. Getting 103 responses, those were categorized into two major categories of 2015 and 2016 A/L students. Those were also classified into two major categories according to the main subject that has been followed as Engineering Technology and Bio-systems technology under Advanced Level education. According to the prepared 27 questions in the Google survey and the provided answers by the graduate technological students, responses were also categorized and percentage values were calculated. Finally, the data were analyzed using the Microsoft Office Excel tool and, the analyzed data were stored in separate folders for the easiness of extracting data and make hypothesis to observe the objectives made by the Sri Lankan Government when introducing A/L technology stream, have been achieved or not yet.

3. RESULTS AND DISCUSSION

The introduction of the technology stream in Sri Lankan government schools aimed to produce individuals equipped with both theoretical and practical knowledge to thrive in the evolving world of work. This stream was introduced to address inequalities in subject stream selection at the G.C.E. A/L and create a pool of science scholars to meet the demands of the job market. The objectives also included providing students with technical skills for everyday life, cultivating problem-solving abilities, developing market-ready skills, and aligning students with professional education according to national qualifications.

According to the 103 responses and the answer to the third question in the questionnaire, the results indicate that 41.7% of students have chosen the A/L Technology stream to enter universities easily, while 36.9% aimed to enhance their soft skills following a new stream as shown in Fig. 1. Their prospect was to enhance and polish-up their innate soft skills with an expanded theoretical and practical knowledge.

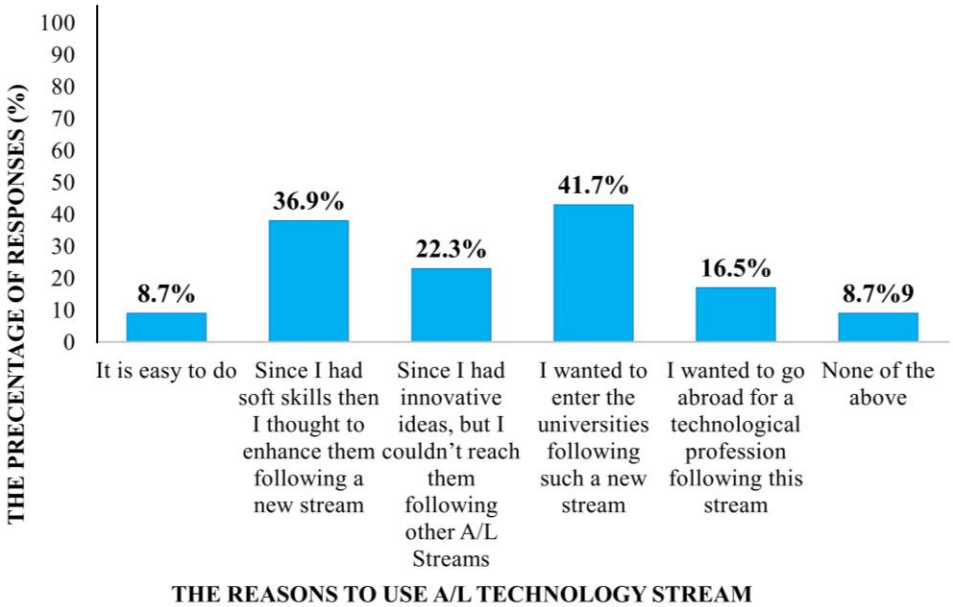

Fig. 1. The variations of the reasons to choose A/L Tech. stream of the respondents

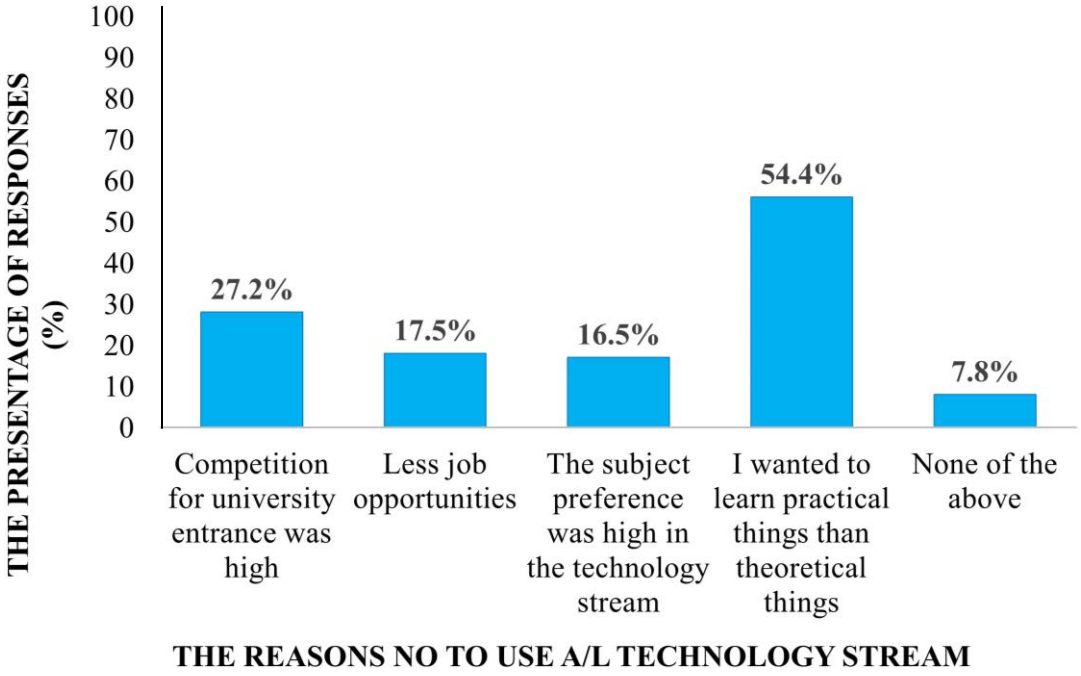

Fig. 2. The variation of the reasons not to use other A/L Streams rather than Tech. stream

Impressively, 91.3% of students had been selected for the Sri Lankan government universities in their first attempt as shown in Fig. 3. For the 8.7% who attempted university entry a second time, most had initially studied bioscience or mathematics. From those who selected technology as their A/L Stream, 54.4% of the students said they wanted a clear variation to study practical knowledge-based things over theoretical knowledge. The competition for university entrance is very high for the existing A/L streams before introducing the Technology Stream. The 27.2% of students say that, they chose this stream with a prospect of selecting for the universities easily rather than doing and waiting for the selection on other streams such as physical science and bioscience.

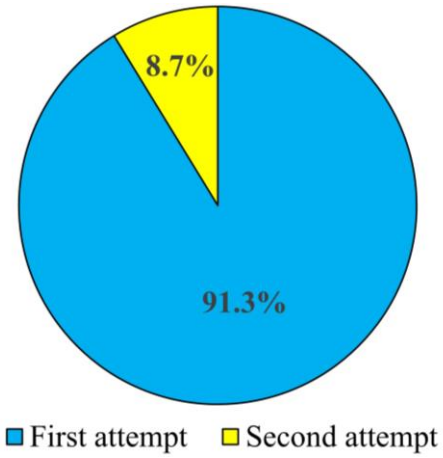

Fig. 3. The status of in which attempt the respondents were selected for the universities

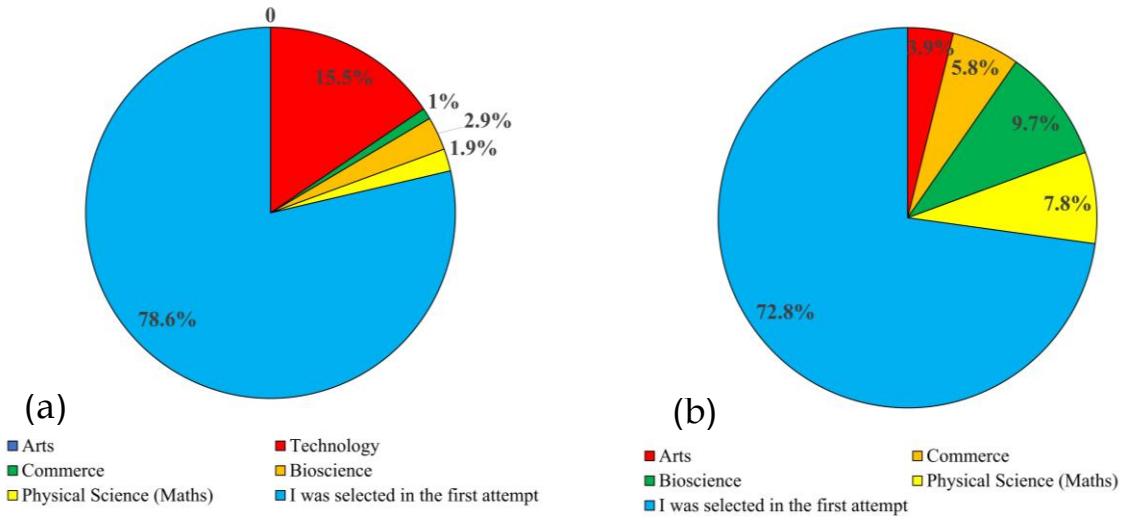

Fig. 4. The responds of (a) previously attempted streams and (b) previously studied streams (before moving to A/L Tech.) of the Tech. stream secondly selected respondents

As shown in Fig. 4. (a), out of the 103 responses, most of the students had been selected for the universities in the first attempt. But there are a few students who had been studying another stream before moving to the technology stream or have been selected for the technology stream in the second attempt, had been studying another stream, such as Physical Science, Arts, Bioscience, and Commerce. This implies that the technology stream eased their transition into universities. In other words, most of the physical science and bioscience followed students thought this stream will be easy for them rather than others they had followed. The 29.1% of students who switched to the technology stream recognized the growing demand for technology-oriented individuals as shown in Fig. 5.

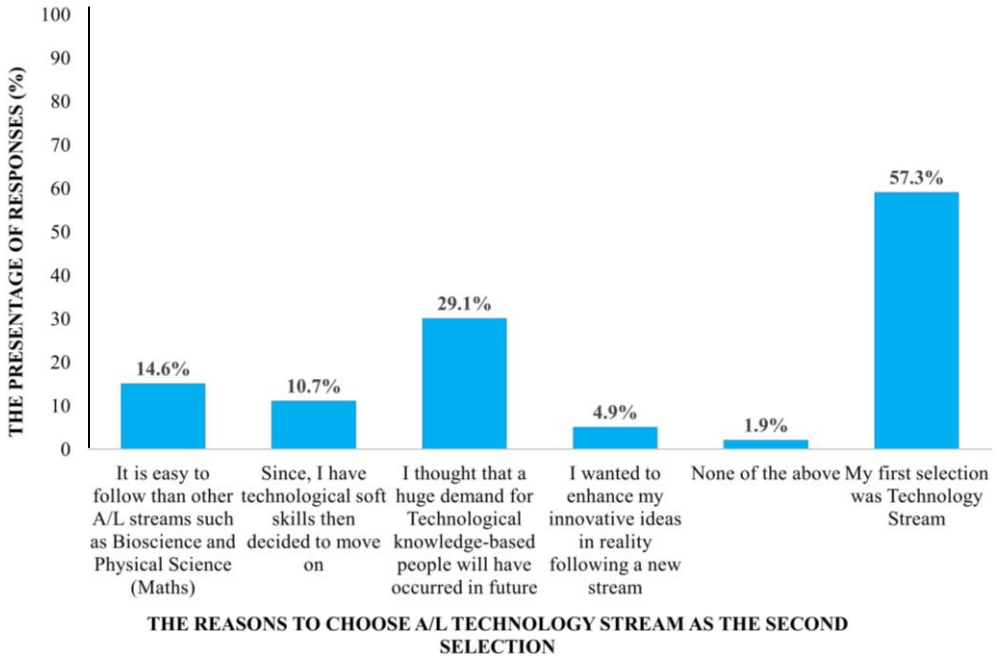

Fig. 5. The variation of the reasons to choose A/L Tech. stream for the second attempted students.

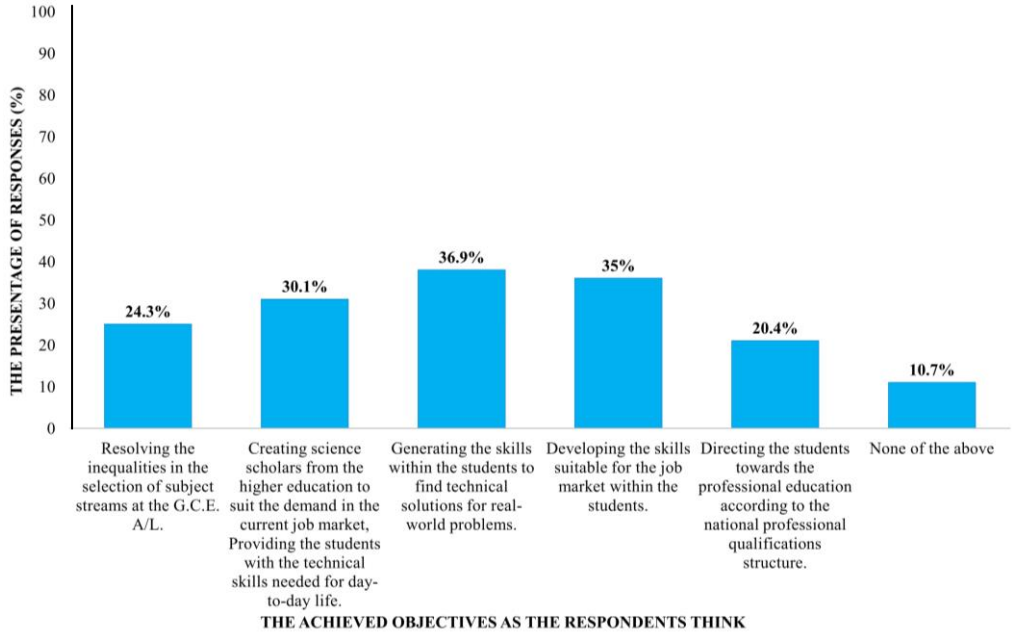

Fig. 6. Investigation of the achievement of the government objectives

Regarding the objectives that had been made by Sri Lankan government, 36.9% of students believed that the stream successfully generated problem-solving skills, while 10.7% thought none of the objectives were met yet. In contrast, 35% felt that the stream adequately developed skills for the job market as shown in Fig. 6.

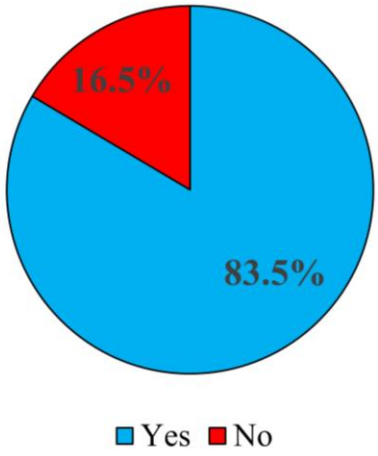

Fig. 7. The status of shortcomings in the A/L Tech. stream

As shown in Fig. 7, 83.5% identified shortcomings in the technology stream, with 61.2% expressing dissatisfaction with the curriculum and practical knowledge as shown in Fig. 8.

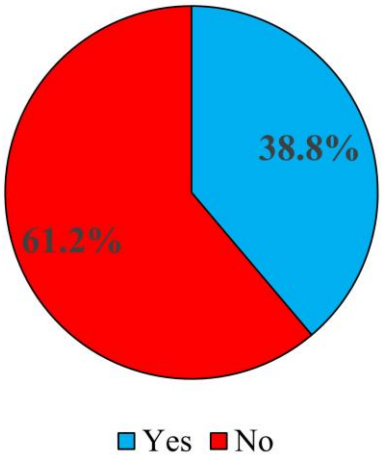

Fig. 8. Satisfaction or dissatisfaction of the curriculum and the practical knowledge gained.

While the government aimed to create science scholars with practical skills, challenges persist. A notable portion of students lacks the ability to apply their knowledge to real-world issues (16.5%) or express dissatisfaction with their knowledge (11.7%). Concerningly, 7.8% report being unable to apply their education to daily problems as shown in Fig. 9.

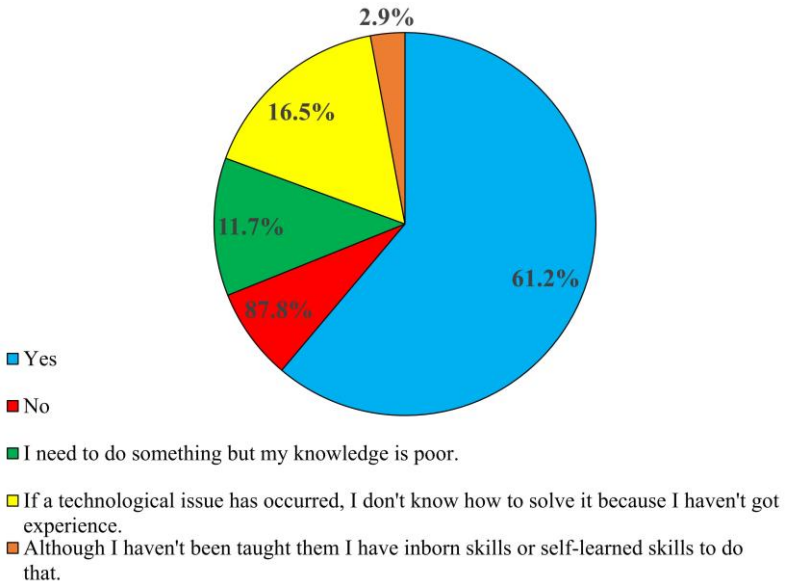

Fig. 9. Actionable statue of the knowledge gained of the A/L Tech. students

Moreover, the objective of fostering students' ability to find technical solutions for real-world problems faces challenges, with only 6.8% pursuing master's or Ph.D. degrees they have thought to enhance their high study qualifications that align with high qualification levels for the industries and academia. and 1.9% creating their businesses as shown in Fig. 10 they have started their career as entrepreneurs, but on small scale. Then it can be denoted as the technology stream has been created a few towards the creating and developing own businesses.

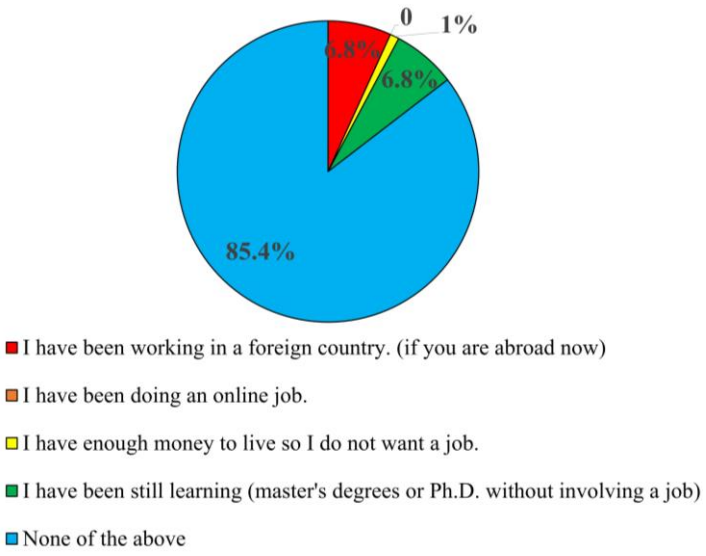

Fig. 10. The status of the job professions of the graduated Tech. students

The inability to adapt to new technologies limits students' job market potential. That means the technology stream curriculum is outdated, with 65% of students advocating for more practical knowledge and 59.2% suggesting a curriculum revision to reflect current technologies. From day to day, the technology of the world is going to be changed and developed. With the developing technology, the students who follow the technology stream should be taught them. It seems, that most of the theoretical and practical things in the existing A/L technology curriculum by 2023 is same as the old curriculum. The curriculum has not been improved with the new technologies. [7]

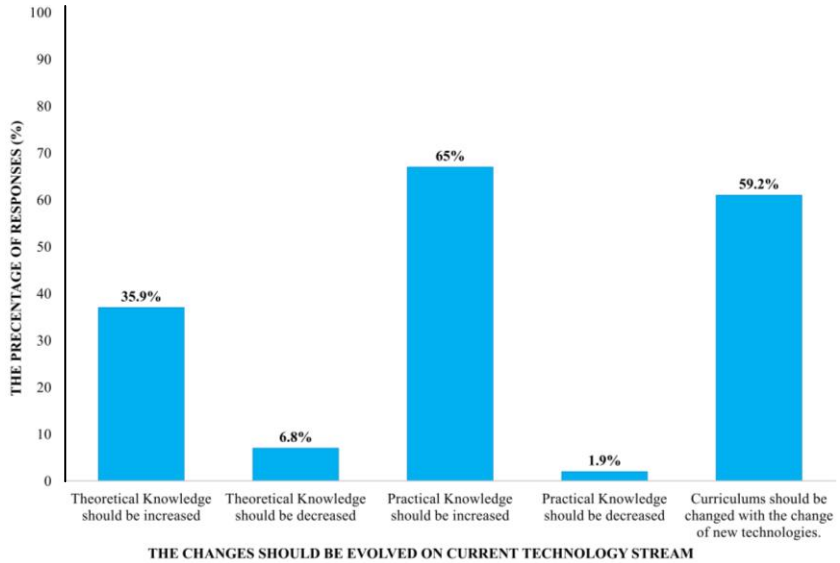

Fig. 11. The likelihood of changing the current curriculum in A/L Tech. stream

The inability of students to keep up with technological advancements restricts their readiness for the job market. The directive of preparing students for professional education within the national qualifications structure is also hindered by a lack of IESL accreditation for most of the Engineering Technology Degree programs, complicating job opportunities and postgraduate studies. As same as there is a competition for the bio-systems technology students with the same specialized areas with Bachelor of Science students such as food science and environmental science. Thus, while some objectives have been met, the technology stream requires significant improvements to better align with the evolving job market and global technological advancements.

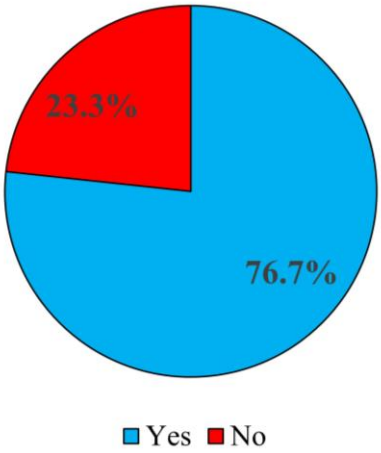

Fig. 12. The status and the probability of having a job profession

As shown in Fig. 12, out of the 103 responses, most of the graduates have permanent job professions. They are varied from government, semi-government, private, and self-employed jobs or Entrepreneurs. Most of their jobs are related to what they learned under the technology stream both in Schools and Universities.

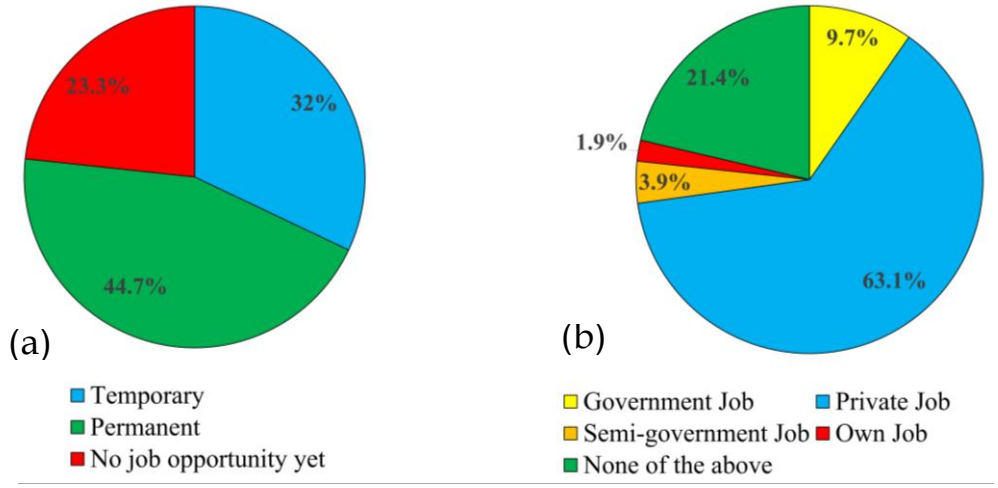

Fig. 13. The categories the job professions belong to Tech. graduates (a) Temporary or Permanent, (b) Government sector or other

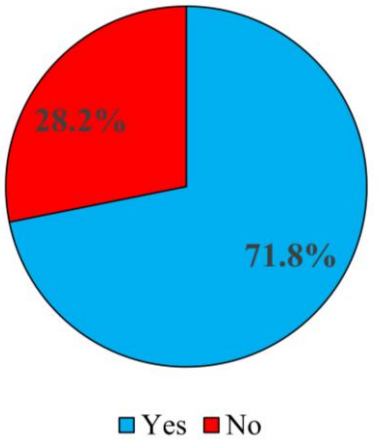

Fig. 14. Relation between current job profession and the knowledge gained

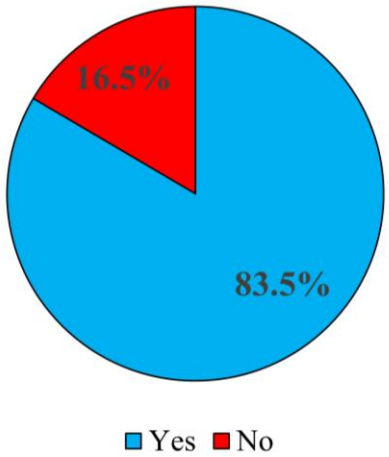

Fig. 15. Statues of the soft skills of A/L Tech. students

As shown in Fig. 15, 83.5% of graduates say that by introducing the A/L technology stream, the soft skills of the students such as computer literacy and communication skills have been improved. With the variation of the main subjects and the bucket subjects in the A/L technology stream, a student with a mixture of knowledge is built. For the students who do Engineering technology with the bucket subject of Information and Communication Technology is easy to enhance his or her soft skills and also easy to enter for the Information and Communication Technology Degrees in the Universities, if they selected from the A/L results. For the bio-systems technology students who do agriculture is easy to continue his or her tertiary education in the field of agriculture too. Always there is a difference between a science student and an art student. An art student may be proficient in painting and drawing or from the side of media study. For a student of technology, they can do such art subjects as arts or communication and media study. Then their soft skills are enhanced simultaneously with the increment of technology-based knowledge.

4. CONCLUSION

According to the 103 responses. Most of the graduates from the first and second batches have been employed. However, some of the graduates have been working for nonrelated jobs that do not align with what they learned under the technology stream. Most of government schools, only focus on theoretical knowledge and the main focus thing is what the students learn for facing to the A/L examination. So, most of the students who follow A/L technology stream cannot implement what they learned in Schools even where they study bachelors. As a past graduate under the technology stream and an academic staff member, I have the responsibility to conduct practical experiments for undergraduate students. When I teach it can be understood that the practical knowledge of some basic things in undergraduate students are in zero level. Most of them claim as the solution of that, we haven't got the opportunity to implement the gained theoretical knowledge in schools due to lack of tools and machinery or the tools and machines were only for observation purposes and to save for next generations in those respective schools. Definitely the practical components should be improved and the knowledge resources should be enhanced simultaneously. The focuses from most of the students at the technology stream was they were thought, this stream will be very easy to do and will be also easy for getting opportunity to enter to universities. Then most of the students who don't have enough results to do Physical science or Bioscience turned on Technology. Although, most of the students didn't have enough results, they had soft skills, and were very essential to implement for day-to-day life problems. By 2023, it can be seen that the demand for technological graduates have been decreased. Most of the reasons are with the same skills and the knowledge of Bachelor of Science graduates and the less knowledge gained from Sri Lankan Schools and Universities also. For the Bachelor of Engineering Technology, BET students, due to lack of IESL accreditation certifications, it is difficult to find out a highly paid job profession or a high study opportunity. As same for Bio-

systems and Information and Communication Technology Students in Universities have a competition with those who followed the same degrees with the same specialized areas under Bachelor of Science. The optimal answer for the lack of job professions is, for most of the recruitments in Sri Lankan companies, most of the times they only ask for BSc students with high qualifications. As a suggestion without confining the technological school and undergraduate students in to normal classes where theoretical knowledge is provided, theory and the practical knowledge could be given at the same time. Then it will be easy to understand the theory implementation in practical situations with the guidance of supervisors. Then for the skill-based graduates the demand will be high in future. Those who attend for practical classes in Uva Wellassa University of Sri Lanka, shows an optimal growth rather than attending at a theoretical class. It is possible to implement. According to the new technologies with the world, the curriculums should be revised. Then it will be easy to understand new technologies and will be also easy to go with the technology. As a result of that new innovations will be made by the students also.

Here the total amount of the received responses for the questionnaire from the selected nine universities in Sri Lanka were limited into 103. As I think the reason for that may be most of the graduated technology students from 2015 and 2016 A/L are in industry and confined with their jobs. With the busy schedule they have, most of they couldn't devote their invaluable time to response. If I received more responses, this research would have been stronger.

5. ACKNOWLEDGMENT

The authors wish to thank the students who sat for A/L Technology Examination in 2015 and 2016, for their valuable responses.

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