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Study on technology education, technology education components and technology universities to understand the significance of Univotec in Sri Lankan domain

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Abstract: Technology education concept is misunderstood by majority as engineering studies or learning skills and theories related to technology. Technology universities are misunderstood with conventional science and engineering universities. In Sri Lanka also significance of University of Vocational Technology is clearly not identified being a leader in technology education due to the concept of technology education is not clear for many. From this study it is intended to observe the concept of technology education, components delivered in technology education, concept of technology university and how they are different from conventional universities and the significance of University of Vocational Technology in technology education considering Sri Lankan context. The study is conducted using existing literature. Technology education is providing education on technology theories, building skills on technology, human related knowledge and multidisciplinary knowledge related to the areas of application allowing students to solve issues and problems in social, economic and cultural domains. Technology education is not only theories on technology but many subject areas in economic, social, cultural, human and multidisciplinary areas. Technology universities are prominent in delivering technology education with standard technology education components to build students who arecapable with technology capabilities and with other capabilities which conventional universities rarely focus to deliver such as social, economic, human, cultural and other relevant area capabilities. By delivering unique education concept of technology education with unique set of components technology universities are actively take part in global and regional development. Being a well reputed university in both international and local domains University of Vocational technology plays a key role as a technology university by delivering technology education in Sri Lankan domain.

Key Terms: Technology education, Technology education components, Technology Universities, University of Vocational Technology

Introduction

The general definition about technology education is the study of technology. Under technology education,students are educated regarding knowledge and processes relevant to technology. Technologyeducation can be identified as experience-based instruction or an integrated program that isdeveloped to make students knowledgeable regarding technology (Adams, A.E., Miller, B.G., Saul, M. and Pegg, J., 2014). But if the context of the technology education studied further technology education is alsoreferred to as the purposeful application of skills, knowledge, and experience to use the resourcesto add or create value to the systems and products to meet the needs of humanity. Technologyeducation was introduced at various points in time to cope with technological, economic, andsocial development. Technology education contributes to the preparation of students to becomevaluable human capital by significantly improving students' technological capability awarenessand understanding(Edb.gov.hk.2016). There are different approaches of defining technology education that from definingtechnology education is just learning about the field of technology to, technology education is a human oriented filed of study applied in various social, cultural and economic dilemmas.

Technology universities are recognized as the main facilitators of technology education forstudents in a specific manner. In the world, there are many top-rated technology universities.These technology universities mainly focus on providing solutions and offering practicalapplications for economic and social needs. The educational programs provided throughtechnology universities are not bound to science, technology, and engineering. The educationprograms also offer social, management, and human-related education studies. Technologyuniversities are enriched with innovation and research-based cultures, which educate students to easily adopt technology innovations.

The University of Vocational Technology (Univotec) is a well-known university in Sri Lanka under the State Ministry of Skills Development, Vocational Education, Research & Innovations. The establishment of the Univotec was in 2008 according to the Act No. 31 (UVT 2022). Though Univotec seems to be like an ordinary

university which offers engineering degrees or technology degrees it is different from the structure, purpose and system of applications.

Problem statement

Technology education is not only regarding technology skills and theories; it has a broad rangeof components. This wide range of technology education components differentiates technologyeducation from other education systems. People do not understand the concepts of technologyeducation and technology universities. Technology education and technology university concepts are quite controversial. Many don't find the difference in technology education and technology universities. And the concept of technology education and technology education is categories mistakenly into engineering, science and business studies and conventional university system. There is a huge gap in the way most understand or derive technology education and technology universities. Even in Sri Lankan context being a leader providing technology education Univotec plays a different role and observing about the Univotec is significant considering the uniqueness of technology education and technology university concept.

Objectives of the study

Objective 1: Objective one of the study is to observe the concept of technology education.
Objective 2: Objective two of the study is to observe the components of technology education.
Objective3: Objective three of the study is to observeabout technology universities and the differences with conventional universities.
Objective 4: Objective four of the study is to observe the significance of Univotec in Sri Lankan domain

Methodology

The study is conducted by using existing literature to justify the objectives. By reviewing the existing literature technology education, components of technology education, and difference of technology universities with conventional universities and significance Univotec in Sri Lankan technology education context. Selection of the literature is done using only reputed websites such as university websites, professional association websites and research journals.

Technology education

Technology education refers to education provided in the streams of mathematics, engineering and science but the specialty is letting students understand the concepts and apply into real life situations and business situations (Hallak J 1990). Though it seems to be technology education is almost same as science, engineering and other organizational studies there is a clear gap between conventional education system. Technology education allow students to apply the knowledge rather than the other conventional education systems. For an example technology education-based engineering courses allow students to apply knowledge in practice than ordinary engineering education. Technology education aims to specially aims to address real world problems by enabling students to become more practical (Institute of Engineers Sri Lanka 2013). Another definition of technology education is it the field of study which allows students to mainly study about processes and knowledge about technology which make them feasible to apply in solving problems occurring in real life and business domains and most importantly technology education enhances human potential of students (International Technology Education Association 2000). Technology education can be utilized into various engineering and non-engineering domains such as medical, agricultural, biological, energy, communication, logistics, manufacturing and construction areas to make students aware and capable to apply the learnt technology effectively (St. Cloud State University 2022).

Technology education moves parallel to science education but it combines with natural environment which leads into multidisciplinary study approach. Rather than conventional education system technology education deals with human and environmental aspects (Old Dominion University 2020). Technology education is defined to be inter connected with various other independent disciplines to develop literacy and ability to use technology. Not only learning about technology it encourages to students to become familiar with resource monument, processes, social impact, and technological systems. Further technology education allows students to understand their role in society from the eye of technology by teaching them how technology contributed to the society in past, how technology contributes to the society in present and will contribute in future (Montana State University 2021). Technology education has an interconnection between technology, science, society and environment. Technology education is useful to apply the knowledge in human world. Hence the technology education should consider on delivering technology concepts while focusing on human, social and environmental facts as the technology has to be applied in such domain (St. Cloud State University 2022).

Technology education is not learning on only about a technology but how to use it to professionally considering community, cultural and economic values. Technology education is not just using technology but it allows the students to apply technology knowledge to address opportunities and needs through research and technology (Jones, A., 1997). For existing problems in the society and create opportunities by applying technology is the outcome of technology education. Technology education is more into providing innovative solutions with the base of technology. Technology education has the applications in various domains such as energy and power, multimedia, engineering, logistics, manufacturing and science to allow students how to use technology in those domains considering social, environment, and human aspects (Connecticut State Department of Education 2014).

Considering the definitions mentioned above on technology education, it is defined as a stream which influence students to apply technology to solve problems in real life and business domains. Also, technology education is not just delivering technology theories but with human, social and environmental related knowledge that technology applications must be done in human related, environment and other multidisciplinary knowledge which are related the context of apply. Hence technology education is a vast field of study that it can vary from studying technology from medicine, engineering, management, multimedia, fine arts to computer science and with many more applicational areas. Rather than conventional education system technology education provides the practicality and ability to use for practical domains by letting conventional education subject areas to apply in social dilemmas with the use of technology.

Components of technology education

Technology education is different from conventional education in universities (Fuchs, H., Yanay, G. and Blass, N., 2018). Most of the people define technology education is learning only about technology in general such as civil engineering, material engineering, quantity surveying, web engineering, software engineering and related to applicational technology fields. But technology education is not just consisted of technology theories but a with set of other multidisciplinary areas. It is better to study the components of technology education to clear the misunderstanding of calling technology is just educating technology theories and skills.

Technology education has broad level of components which make it more unique and different to conventional university education system modules delivered. Technology education has basic components of conventional education that it covers technology theories and skill development components with many other components conventional education does not contain. Human, environmental and other multidisciplinary subject components relevant to technology (Old Dominion University 2020).

The main component represented in technology education is the technology component according to the degree type which allows students to apply in relevant field of technology. Agricultural components are included if the degree is agricultural technology, business component is included if the degree is business technology, consumer science component is included if the degree is consumer science technology, engineering component is included if the degree is engineering technology, marketing component is included if the degree is marketing technology, trade and industrial component is included if the degree is trade and industrial technology, computer science component is included if the degree is computer science technology and etc. Based on the degree type main contextual component is the key subject area taught (R. D. Gordon, H. and R. Daggett, W. 2022).

Out of the many subjects and components other than the main technology components, decision making, problem solving, trade knowledge, innovation, material and resource management are the other needed human related components technology education should contain (Old Dominion University 2020). Class room-based activities, laboratory capabilities, job training, active student networks and committees are main components that can be identified in technology education system apart from the main technology theoretical component (R. D. Gordon, H. and R. Daggett, W. 2022). Technology awareness, project-based learning, industrial experience, practical skills, attitudes, knowledge on entrepreneurship, knowledge on businesses and economical knowledge are included in technology education (Unesco.org. 2020). Infrastructure specially stimulating technology, technology equipment and tools useful to encourage technology abilities and university environment in technology universities are main parts in technology education system (Williams, P.J. 2015). Barabasch, A. and Rauner, F. eds. (2011) name information and communication technology and leadership are main part of technology education. Philosophy on technology, mathematics, communication skills, creativity development and business ethics are included in technology education system (Old Dominion University 2022).

Allowing students to practice technology though practical sessions, hands-on experience provided through projects, application-based testing methods and career experience are main components of technology education apart from the technology learning (Stauffer, B. 2020). Technology education is divided into 4 main component groups. Class room learning, work-based learning, leadership development and laboratory-based learning. In class room-based learning technology theories, advanced knowledge in technology and technology

skilled are developed. This is the main technology aspect of technology education previously other researches have mentioned. In laboratory based learning the capabilities of using labs, project-based learning and skill demonstration are developed. In work-based learning it is mentioned about the exposure students get to explore practical learning, industrial exposure and career experience. In leadership development it is mentioned about the ability to lead, intra curriculum activities and student organizations are mentioned (michigan.gov 2022). Pule, S (2019) defines there are main 3 components of technology education which are research trends, technology philosophy and technology theoretical and practical components. From technology research trends it is mentioned about allowing students to gain practice and involve with modern trends in researches. The philosophy of technology stands for learning the nature of technology, human factor of technology and social aspects of technology. Technology concepts stands for the theoretical and skill levels relevant to technology. This definition of components of technology education combines a vast field of components in unified manner. Technology education has to offer following components to allow students to apply in addressing needs and opportunities. The components are communication skills, research knowledge, data processing and analysis, managerial knowledge, planning abilities and manufacturing (Jones, A., 1997).

Technology education have self-development, providing concepts of science, technology, engineering and mathematics, trade related knowledge and trade related skills components to make students in premium position in the business world by providing technology solutions (www.hdsb.ca 2022). Technology education consists of mathematical components, leadership, practical sessions, human psychology, social knowledge, information technology and laboratory skills while focusing on technology-based theories and skills (Montana State University 2021). Technology education consists of professional based structure. All the knowledge provided through technology education targets for building a competitor in professional world. Professional skills, professional context knowledge, professional ethics and practices are the main components apart from the main technology knowledge components (University of Strathclyde, 2022).

From the observation of components of technology education through various studies and various information materials a main component can be identified. The main component is delivering knowledge on technology field of study. There are various fields of technology education delivered in technology universities. Hence the technology knowledge is the theoretical and skill knowledge on the field of study. And there are many other supporting components such as leadership, social knowledge, economical knowledge, research knowledge, information technology knowledge, laboratory capabilities, university infrastructure, student clubs, student networks, industrial knowledge, industrial experience, planning, analysis, managerial subjects, project-based learning, practical sessions and etc. These components align with the definition provided by the experts and researches on technology education previously observed in this study. The components identified can be categorized into technology knowledge components, human knowledge related components, social based components, economic related components with multidisciplinary approach. Based on the facts, definitions provided on technology education to call it is not just technology theory learning but social, environmental and human aspects related to technology matches with the components identified.

Technology universities and their difference comparative to conventional universities

Technology universities are the main bodies of delivering technology education in most organized manner. There are many world-famous technology universities who provide technology education and became success in higher education world. Technology universities are mainly addressing solutions and practical applications on social and economic needs. Technology universities combines technology, engineering, science and human science contents to provide applications. Technology universities are allowing vocational scheme students and other ordinary students to complete their higher education (Technological Universities Bill 2015). Universities all around the world deliver qualification from diploma levels up to PhD level. Most on the technology universities aim to provide research and innovation-based solutions to modern world dilemmas. The specialty of technology university is to develop competencies of undergraduates related to industry and business orientation (Bridge 2021). According to South Africa study. co.za (2019) technology universities also provide undergraduate level up to postgraduate level education. Even the definition provides by the authors state technology universities has to provide innovative researches aiming industrial and commercial problems. Technology universities in modern era are not limited only for engineering-oriented education. According to the explanation provided Central University of Technology, South Africa provides degrees from engineering, science, technology, management, health science and communication streams.

Technology universities not limited to engineering, technology and science. They also align with other human, management and social related streams. When technology universities allign with social needs. Whatever the streams or studies delivered by technology universities they allow students to learn application in particular field of study. If the study is related to music technology universities encourage innovative and research base application on music. If the study program is management science technology universities

encourage to practice innovative and research base applications in the field of management science. Some of the main area mainly practice in technology universities are as follows, Agricultural Science Applied Electricity, Book-keeping and Accounting, Building Construction, Auto Mechanics, Commerce, Computer Education, Electronics, Clothing and Textiles, Food and Nutrition, Home Management, Metal Work, Technical Drawing, Wood Work, Fine Arts, music, health science and etc. (Seyi, D., 2014). The variety of degree courses offered by technology universities is vast that in Michigan Technological University there are 139 of degree courses in different fields of studies including management, engineering, arts, accounting, actuarial science, engineering, humanities and etc. (Michigan Technological University 2022).

Technology universities have differences with respect to the other conventional universities. Rather than conventional universities technology universities own more research and innovation-based culture which allows students to engage in technology-oriented innovations. While conventional universities engage with more theoretical studies and researches technology universities engage in providing applicational studies of technology. Some technology universities specially target at specific professional fields and others target toward wide range of fields. Technology university students are engaging with applied researches on campus comparatively to other conventional university students Stem Study (2019). Earning abilities and professional level conversion of technology university students are in higher level rather than conventional university students in United States US Census Bureau (2012). For an example technology university such as Illinois Institute of Technology have more than 90% career placement rates (Illinois Institute of Technology 2022). The facilities and infrastructure provided by conventional universities are in higher level with respect to the conventional universities. More technological tools and equipment are available for technology university students as they have to learn more action orient learning though the field of study is the same as conventional universities. Consider a conventional university which offers degrees in engineering and a technology university which offers degrees in engineering, technology university provides more practical sessions which allow students to be more application oriented by allowing them to use technology equipment and infrastructure provided by the university. The next difference between technology university and conventional university is the curriculum of technology universities changes frequently than the conventional universities. The reason is technologies changes and new technology emerges time to time. With the applicational needs curriculums must be changed rapidly (International Student 2022).

The gap of technology universities and conventional universities is clearly defined by Michigan Technological University (2022) that though the field of study is the same delivered in technology and conventional universities, technology universities more into make applications using technology in relevant field. As an example, engineering degrees in conventional universities provide theoretical knowledge to use for researches and professional context. Technology universities in delivering engineering technology degrees use practical approach in learning such as action-oriented learning to allow students to practice application of technology in the field of engineering. Basic difference in technology university comparative to conventional university is facilitating applicational and implementational methods of technology in the field of study to address problems.

Technology education concept is for solving social and economic issues through technology it provides options to solve global and regional issues more practically. Technology universities play a high significant role in global and regional issue solving than conventional universities. With the perspective of regional and global issues solving technology universities have formed groups as the general intention is the same. For an example European university of technology can be named. To provide innovative and research base applications to reach European demands Cyprus University of Technology, Darmstadt University of Applied Sciences, Riga Technical University, Technological University Dublin, Technical University of Sofia, Universidad Politécnica de Cartagena, Université de technologie de Troyes and Universitatea Tehnică din Cluj-Napoca are teamed up (CUNIN, N. 2022).

Based on the facts, technology universities deliver technology education to students and offer variety of qualifications from diploma level to PhD level. Technology universities offer variety of courses in variety of fields such as engineering, science, social science, management science, health, digital media, IT, accounting, agriculture, quantity surveying and etc. Many technology universities are performing in global level that their rankings are in higher level. Many countries tend to use the technology university structure for providing technology education. There is a difference in conventional universities and technology universities. Though technology universities offer same courses as conventional universities, technology universities allow students to use technology knowledge in the relevant field to find technology-based solutions to problems in economic and social domains in real world. Technology universities offer more research, innovation facilities and infrastructure for students than conventional universities. Syllabus and curriculum in technology universities are rapidly changing to adapt technology changes and global needs. Applications of technology for global and

regional development is comparatively higher and many technologies universities form collaboration to form bigger technology university systems.

Significance of Univotec considering technology education delivered in Sri Lankan domain

Univotec is the onliest government institute which provides the opportunities to allow students who are coming from vocational education system. University Grant Commission has given recognition to the degrees awarded by Univotec by providing equalant status of degrees as other government universities (UoVT, 2021). Though there are many private and government universities which offer technology stream education only few batches have been passed out or yet they have to pass out the 1st batch. With respect to the other degree awarding bodies through technology education Univotec is the main player with highest experience and highest number of passed out batches. To study the impact of technology education makes on entrepreneurship intention of undergraduates most appropriate body in Sri Lanka is Univotec based on the degree quality is approved by university grant commission and with highest number of passed out batches that proves the experience of the institute has related to delivering technology education.

Even the technology-based degrees provided by Univotec are internationally recognized that Association of Commonwealth Universities and International handbook of universities included Univotec into their list of trusted universities (UoVT, 2021). Technology education provided by Univotec is praised by many other institutes and it Univootec is named a unique university due the quality of technology education delivered (Sri Lanka Institute Of Engineers Sri Lanka 2013). Univotec also recognized by professional bodies in local and international domains. Sri Lanka Institute of Engineering has given affiliation status and in Sydney, Australia Univotec degrees are given affiliation status for careers (dailymirror.lk 2019).

The path way Univotec provides is a significant one that it allows students who comes from National Vocational Qualifications systems and students who have reasonable Advance level qualification and technology enthusiasm. Univotec allows to mix the students who comes from vocational education system and advanced level education from schools to learn technology to complete the degrees (Institute of Engineers Sri Lanka 2013; dailymirror.lk 2019.). The education structure provided by Univotec is similar to the world top technology education delivering institutes like Massachusetts Institute of Technology in United States, Indian Institutes of Technology in India and Asian Institute of Technology in Thailand (Institute of Engineers Sri Lanka 2013). Califonia Institute of Technology and Unitech universities in both Australia and New Zealand are in the same model too related to technology education providing as Univotec (www.dailymirror.lk. 2019). Above mentioned technology education unoiversities are in better positions in their country rankings and world rankings. For an example Califonia Institute of Technology and Massachusetts Institute of Technology are ranked among top 20 universities of the world and India Institute of Technology ranked the top university in India for years. Based on the facts it is proved that Univotec practices the model of education of world leading technology universities. Rather than other universities, faculties and institutes univotec is significant regarding technology education.

The objectives of Univotec derives how much Univotec is towards technology education. Univotec amins to provide growth of students through technology education and technology-based training. Not only the theoretical knowledge the aptitudes and abilities related to technology and businesses will be developed (UoVT, 2021; dailymirror.lk. (2019). Based on the objectives of Univotec, it defines how attached Univotec into technology education and it justifies selecting Univotec to study technology education impact on undergraduates' entrepreneurship intention. Theoretical education provided by conventional universities also can be seen in Univotec. Even rather than conventional universities in Sri Lanka Univotec practices own way of technology training and distance learning strategies adapted through technology education system (Institute of Engineers Sri Lanka 2013).

Technology universities are the key in delivering technology education for students. They provide higher education for both vocational and conventional path students. Rather than government university technology faculties and other private institutes who offer degrees in technology Univotec can be consider as a technology university category. The academic structure delivered in Univotec matches with technology universities' structure. Infrastructure, research facilities and innovative culture of Uniotec is align with technology university expected levels. Mainly this research is based on technology education. Technology education is defined as a field of study consists with technology applications, technology theories, human related contents, managerial contents and technology related multidisciplinary components. Rather than any other government universities, faculties and private institutes, Univotec has much more aligning educational components with technology education. Even the degrees delivered by Univotec is similar to the degree list offered by leading technology universities who are leaders in technology education delivery (Old Dominion University. 2020). Variety of technology-based degrees are offered in Univotec. Bachelor of Technology in Building Services Technology, Bachelor of Technology in Manufacturing Technology, Bachelor of Technology in Mechatronics Technology,

Bachelor of Technology in Construction Technology & Resource Management, Bachelor of Technology in Food Process Technology, Bachelor of Technology in Quantity Surveying, Bachelor of Technology in Film and Television Production Technology, Bachelor of Technology in Media Arts Production Technology, Bachelor of Technology in Industrial Management Technology, Bachelor of Hotel Management, Bachelor of Technology in Multimedia & Web Technology, Bachelor of Technology in Network Technology, Bachelor of Technology in Software Technology, Bachelor of Education in Technology and Bachelor of Education in English Language Teaching degrees are the set of degrees delivered in Univotec (UVT, 2022). Rather than other universities which deliver few technology based degrees the significancy of Univotec is high and this variety of degree types is similar with international level technology universities set of courses offer (Ontario Tech University, 2022) .

Univotec has local and foreign recognition from professional bodies and reputed universities. Univotec has the experience of delivering technology education for undergraduates for years and created few batches to serve Sri Lanka and international domain. Univotec allows both students from vocational pathway and after OL and AL completions. Univotec allows students to use research and infrastructure facilities for encouraging students to conduct applied researches. The technology education provided by Univotec is compared to be similar to world leading technology university structure that variety of field of studies are included from engineering to multimedia covering multiple components of technology education components. Univotec also aims to provide national and international level development through technology education. Based on the facts Univotec is significant considering the technology education delivery in Sri Lankan domain.

Conclusion

Technology education is a stream which influence students to apply technology knowledge and skills to solve problems in real life and business contexts. Role of Technology education is not delivering technology theories that technology educationis enrich with human, social and environmental knowledge, human knowledge and other multidisciplinary knowledge to allow the application of technology have to be done in human oriented nature.Technology education is a vast field of study that from medicine, engineering, management, multimedia, fine arts to computer science and many more areas are included to cover technology applications.

Technology education deliverers variety of components in variety field of studies. The main component is the knowledge on technology field of study mainly focused covering theoretical and skill knowledge on the field of study. Oher supporting components are leadership, social knowledge, economical knowledge, research knowledge, information technology knowledge, laboratory capabilities, university infrastructure, student clubs, student networks, industrial knowledge, industrial experience, planning, analysis, managerial subjects, project-based learning, practical sessions and etc.The components identified can be categorized into technology knowledge components, human knowledge related components, social based components, economic related components with multidisciplinary approach and etc.

Technology universities deliver technology education by offering variety of qualifications from diploma level to PhD level. Variety of courses in different fields are offered by technology universities that engineering, science, social science, management science, health, digital media, IT, accounting, agriculture, quantity surveying and etc. Many technology universities have betterglobal rankings.The difference in conventional universities and technology universitiesis though the same course is offeredby both the universities technology universities allow students to use technology knowledge in the relevant field to find technology-based solutions to problems in economic,social and cultural domains in real world. Technology universities offer more research, innovation facilities and infrastructure for students than conventional universities to encourage research and development. Syllabus and curriculum in technology universities are rapidly changing to adapt technology changes and global needs. To apply technology for global and regional development technologies universities form collaborations.

Univotec has local and foreign recognition from professional bodies and reputed universities for the academic and students' development structure. Univotec has served Sri Lanka and international domain from few passed out batches as a prominent technology university in Sri Lanka. Univotec has student base representing vocational pathway, after OL and AL completions. Univotec allows students to use research and infrastructure facilities to conduct applied researches. The technology education provided by Univotec is compared to be similar to world leading technology university structure that variety of field of studies are included from engineering to multimedia covering multiple components of technology education components. Being a reputed technology university Univotecplays a key role according to the international technology university pathway to provide better technology education in Sri Lankan domain.

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