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Resilience in Education: An Example from Primary School in Fiji and Technical Vocational Education and Training

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Abstract In the Pacific, the capacity of curriculum writers for integrating the content of climate change into their curricula and/or taught Resilience [Climate Change Adaptation (CCA) & Disaster Risk Reduction (DRR)] in education is limited. This paper described the findings of a 2018 study on the integration of climate change into primary and secondary schools' curricula and taught resilience in education in TVET. It involves teachers (n=30) from Kadavu and Levuka islands, curriculum writers and editors from the Ministry of Education, GIZ, SPC, and USP – in Fiji. An exploratory design was used to explore the curricula for Fiji and the EU PacTVET project at SPC. Information was collected from workshops and training events, interviews and project documents. Using BEKA (Benchmarking, Evidencing, Knowing, Applying) and the concept of ako (e.g. to study or educate), a model of climate change and resilience in education was designed as part of this research to help Pacific schools with their curricula. These results indicate how behavioural changes may shape Resilience, thus placing them in a better position to achieve the UNFCCC, the SDGs, the Sendai Framework and the Framework for Resilient Development in the Pacific (FRDP) targets and objectives by 2030 and beyond.

Keywords Resilience • Climate Change • Education • Pacific • Sustainability

Introduction

The Pacific is known to be the most at-risk region in the world to be affected by climate change and disasters caused by natural hazards (IPCC, 2014a; b; Nunn, 2013; Nunn et al., 2014; Singh et al., 2001; SPC & GIZ, 2016; United Nation University, 2016; United Nations University, Institute for Environment and Human Security (UNU-EHS), & Universität Bonn, 2013; WHO, 2015). As a result, many climate change programmes are preparing for these inevitable changes (Bell et al., 2011; EU PacTVET Project, 2017; EU PacTVET Project, SPC, & USP, 2016a; b; Luetz & Havea, 2018; Pacific Community et al., 2016; Pacific Community (SPC), 2014; Regmi, 2015; UNESCO, 2006; WHO, 2015; Yamamoto & Esteban, 2017). However, albeit this climate change foray has been a significant lacuna, the fact that it will also raise the level of awareness of the people in the Pacific, to be more self-consciousness, sustainable and resilient in education (McIver et al., 2016; Pacific Community (SPC), 2015; Rochat, 2003; SPREP, 2017; Taylor, McGregor, & Dawson, 2016), plays a critical role in the building of resilient Pacific Islanders by 2030 and beyond.

From what is known in the Pacific, climate change education is already experienced by children and young people in the primary and secondary schools and Technical Vocational Education and Training (TVET) sectors in Fiji, Kiribati, Samoa, Tonga and Vanuatu through integration into the primary school syllabus, secondary school basic science, geography, agricultural science and TVET education (Pacific Community (SPC), 2011). Even other countries have done so, including in Europe (Cefai et al., 2014), Asia (Luetz & Sultana, 2019), and Africa (Boakye, 2015; Chirwa, Naidoo, & Chirwa, 2014; Mokaya et al., 2016). Therefore, this work will generate fresh insight as to why this integration-based course of study is vital for the region.

To begin with, this is in-line with the regional SPC/GIZ programme 'Coping with Climate Change in the Pacific Island Region' (CCCPIR), which aims at integrating climate change into primary and secondary education and TVET through its European Union Pacific Technical Vocational Education and Training in Sustainable Energy and Climate Change Adaptation (EU PacTVET) project (EU PacTVET Project, 2017; EU PacTVET Project et al., 2016a; b; Hemstock S.L. et al., 2018; SPC & GIZ, 2016). As a result, even though this integration of climate change into the Pacific schools' curricula is unquestioning and essential, to play an active role in bolstering the next generation to come, to be more resilient by 2030 and beyond, there is a need to

conceptualise thinking about Resilience (CCA & DRR) as a resolution rather than focussing primarily on how many people will be affected by climate change.

Second, the Framework for Resilient Development in the Pacific (FRDP) 2017-2030 (Pacific Community et al., 2016) goal 1 (e.g. to strengthen integrated adaptation and risk reduction to enhance resilience to climate change and disasters), and goal 2 (e.g. preparedness, response and recovery), both indicate calling to increase awareness or program visibility, and most importantly an option for training and education. All of these are significant in achieving the Pacific plan for a Climate Change Education for Sustainable Development (CCESD), by 2030 and beyond.

Third, the qualifications at levels 1-4 were developed regionally by all 15 P-ACP (Pacific African Caribbean Pacific) countries, which was facilitated by the Fiji Higher Education Commission (FHEC), thus allowing the region to bridge the lower level to the milestones for climate change or Resilience in higher education for the future. More importantly, the EU PacTVET project was given endorsement from 15 P-ACP countries (Cook Islands, Federated States of Micronesia (FSM), Fiji, Kiribati, Nauru, Niue, Palau, Papua New Guinea, Republic of Marshall Islands (RMI), Samoa, Solomon Islands, Timor-Leste, Tonga, Tuvalu and Vanuatu), to proceed with the development of these “regional qualifications” in Resilience, in the sense that it incorporated country priority needs, which were identified through the national needs and gaps analysis.

National stakeholders at the EU PacTVET Inception Meeting were keen to ensure opportunities for learning via formal qualifications available to all people affected by climate change. This call for action is vital not only for the Pacific but other cultures as well, so that the capacity building opportunities should be applicable across the board from grassroots community members, through to technicians and government and private sector managers. In this regard, vocational qualifications have been constructed around a “competency” and “skillset” approach, so that people can pick what competencies they need to “up-skill”, to improve their own capacity – a menu of competencies and skill sets are available within the qualifications. The national stakeholders were also keen to ensure that aspects of “resilience” (not just climate change) were covered in the qualifications developed by the EU PacTVET project.

In Europe, some aspects of resilience and environmental responsibility has already been taught in schools, so it would be easier to integrate the concepts of climate change and disasters caused by natural hazards to the current curriculum (Boniwell, David, & Ayers, 2013; Cefai et al., 2014; Wosnitza et al., 2018). The Australia Pacific Training Coalition (APCT) is also offering the same resilience-based course of study in Fiji, Papua New Guinea, Samoa, Solomon Islands and Vanuatu (APTC, 2018). Fortunately, Vanuatu is the first country in the Pacific to have its cohort graduated with certificates in resilience, which was supported by the EU PacTVET project. More significantly, not until recently, the Pacific TAFE at the University of the South Pacific (USP) has offered Resilience certificate levels 3 & 4 as part of its program to meet the University’s targets and objectives for sustainable education (USP, 2018) by 2030 and beyond. As a result, this study is also consistent with other research needs and programs serving the same mission in the region, to have sustainable education.

So, if this is the case, then this paper used Resilience in education rather than climate change per se for the TVET because it is imperative, popular and disaster-oriented. Adding to this information, its technical application and foundations for the concept of ako¹ (e.g. to educate

¹ In the context of the Pacific, ako means to teach (e.g. educator) or to study (e.g. learner). It is a two-way process of learning founded on reciprocity and student-based approach. The idea is that when educating students in Fiji and the Pacific, the focus is not only academic, but also physically, mentally, and spiritually. So, using this concept of ako as a guide, learners of climate change must be holistically educated. Because climate change and disasters are affecting people lives at different levels of society, therefore ako about climate change should not separate the learners from families, Vanua (land), and religions.

people) about both climate change and hazards would appear to be necessary. The discovery of resilience was in the early 17th century. It was derived from a Latin word *resilire*, which means ‘to rebound or recoil’. Since then, the usage of resilience has emerged and recognised internationally and applied in the following discipline:

- 1) science (e.g. Woods, 2015);
- 2) ecology (e.g. ecological resilience);
- 3) individual (e.g. resilience of individuals);
- 4) community (e.g. community resilience);
- 5) organisation (e.g. organisational resilience);
- 6) economics (e.g. resilience of the economy);
- 7) national level (e.g. national resilience);
- 8) humanitarian (e.g. humanitarian resilience);
- 9) security (e.g. resilience and security);
- 10) vulnerability (e.g. resilience and vulnerability);
- 11) risk (e.g. resilience and risk).

Now, resilience has also been applied to climate change (e.g. climate resilience) as well (Barrow Cadbury Trust, 2012; Flinders University, 2018; Vernon, 2004).

In the Pacific, resilience has now featured at the forefront of climate change leadership and hazards management platform. It features not only in the FRDP for the Pacific but most importantly, it has defined and built its development to fit the concepts of resilient Pacific Islanders, as indicated by the SDGs (UNDP, 2015) and the Sendai Framework (Maini et al., 2017; United Nation Office for Disaster Risk Reduction (UNISDR), 2015). As an integrated Climate Change Adaptation (CCA) and Disaster Risk Management (DRM) framework for sustainable development in education, FRDP defined resilience using the above state of affairs. As a result, it describes “development processes and actions that address the risks and impacts of disasters and climate change while progressing to stronger and resilient communities” (Pacific Community et al., 2016, p. 3).

This definition provided an opportunity to advance the understanding of the capacity building in resilience or sustainable development in education because it is both climate and disaster-oriented – personalising and professionalising the resilience sectors in the Pacific Islands region (Hemstock S.L. et al., 2018). Using this modern definition as a guide, integrating climate change and using resilience in education is to be aligned with government development planned. To achieve this goal, Fiji will be used as a case study for integrating climate change and the EU PacTVET project for resilience in education. This integration of climate change into the school system has been requested by the Government of Fiji via its Ministry of Education to the GIZ office in Suva.

The basis is that since climate change is a cross-sectoral (e.g. crosscut between economic, health, tourism, fishery, energy) area, it is much cheaper and convenient to relate it and fill in gaps in the existing learning system (e.g. integrating it into social science, agriculture and science subjects) rather than having it as a stand-alone subject. Furthermore, by doing it in this way may also help the ministry to forcibly prevent polarising issues from teacher turnover in the sense that it is cheaper to prepare the current teachers and retain their jobs than to train new climate change teachers and issue of resignation and/or relocation. Based on this analysis, using the BEKA (benchmarking, evidencing, knowing, applying) framework as a guide, a model was designed to illustrate how the integration of climate change in education may be implemented for the primary and secondary education sector in Fiji and TVET sector for Resilience education in the region.

Methods

Methodology

This study used a mixed method approach named exploratory design. For the quantitative aspect of the study, obtaining information on CCE and ESD was from teachers' workshops, training and survey (Clark & Ivankova, 2016; Curry & Nunez-Smith, 2015; Havea, Hemstock, & Combes, 2017; Nastasi et al., 2007; Parvaiz, Mufti, & Wahab, 2016). For the qualitative aspect of the study, data were deducted from project documents and in-depth interviews (Brady & O'Regan, 2009; Creswell & Plano Clark, 2011; Curry & Nunez-Smith, 2015; Parvaiz et al., 2016; Tanyanyiwa & Kanyepi, 2015). This method relied heavily on the qualitative aspect of the study (Clark & Ivankova, 2016; Creswell & Plano Clark, 2011; Curry & Nunez-Smith, 2015; Havea et al., 2017; Heyvaert, Hannes, & Onghena, 2017; Nastasi et al., 2007; Parvaiz et al., 2016; Tanyanyiwa & Kanyepi, 2015).

Data Analytical Strategy

Information from the study was analyzed using Benchmarking, Evidencing, Knowing and Applying (BEKA) framework. The benchmark was used to assess the clarity of integrating climate change into primary and secondary education curriculum and resilience in education as a stand-alone certificate level 1-4 in TVET. Evidencing was used to assess the curriculum content and resources to map against the benchmarks. Knowing and applying were then used for deeper mining to have a complete understanding and to corroborate the evidence collected.

To achieve this goal, an exploratory design used desktop research (e.g. printed documents), document analysis, surveying and in-depth interview to provide a more thorough understanding as to how the integration of climate change by the Ministry of Education in Fiji, SPC/GIZ from CCCPIR, EU PacTVET project and FHEC has achieved. Once this information was gathered, the BEKA process was then used to map the relevant data to the framework's content. Information on the integration of climate change was moved iteratively between code and text to derive themes related to how climate change had been integrated into the school's curriculum using benchmarking, evidencing, knowing and applying content as a guide (Hall, 2014).

Limitation of the Paper

Although the paper has reached its aim, there were some unavoidable limitations. First, because there was no funding to support this work within a set time limit, this research was conducted only on a small size of the population who was working for the EU PacTEVT at SPC (Pacific Community). Therefore, to generalise the results for all the Pacific Island Countries (PICs), the study would have benefitted from involving more participants at different levels. Second, because the model developed in this study was based on Fiji and the EU PacTVET project, it may not be applicable beyond Fiji's cultural context. Even so, research designer might adapt the model to address respective issues in other countries.

Third, the data regarding the quantitative aspects of the study are limited. Because of this, the authors also used the data from a research that was conducted in five coastal communities in Tongatapu Island: Kanokupolu, 'Ahau, Tukumonga, Popua and Manuka – to help address this topic. Another important limitation worth mentioning is the issue regarding policy anticipation. Hence, the respective countries should adjust or align their policy recommendations based on what they need. For example, countries that prefer to have Resilience as a major topic of study for schools

may differ from those that prefer integration. As a result, policy development should be implemented accordingly.

Results

Integrating Climate Change Adaptation and Disaster Risk Reduction – A Key for Education for Sustainable Development in Tonga

Intriguingly, a study by Havea et al. (2018) on impacts of climate change on livelihoods, health and well-being in five coastal communities in Tongatapu, Tonga: Kanokupolu, ‘Ahau, Tukutonga, Popua and Manuka – found that of the 460 participants, 97.8% (450) considered integrating climate change adaptation and disaster risk reduction as a key for education for sustainable development in Tonga (Table 1).

Table 1 Do you think it is a good idea that this research may be used as a benchmark to initiate a course curriculum structure on climate change and its impacts for all young people in Tonga and for our future generations to learn?

	Frequency	Percent
No	10	2.2
Yes	450	97.8
Total	460	100

Source Authors

Furthermore, when asked whether this could be one of the solutions on the impacts of climate change on people’s livelihoods, health and well-being in Tonga, one participant responded, “yes” (Table 2), although many other solutions were also recommended in the study.

Table 2 What are the best solutions to tackle the impacts of rising sea levels, extreme rainfalls, flooding, cyclones, droughts, temperature rise and tsunami on livelihoods, health and well-being amongst Tongans aged 15 to 75?

	Frequency	Percent
Climate change course structure curriculum, god scriptures fulfill	1	0.22
Total	460	100

Source Authors

Most importantly, this cosmological framing of integrating climate change into the school’s curriculum in Tonga seems to be relevant for the concept of fulfilling God’s scripture in the Bible, although it needs further research and development in the context of Tonga. This state-of-the-art-idea is pertinent when considering Tongan communities across the Pacific, in which a high percentage are Christians. Their worldviews and cosmologies comprise a rich epistemological framework of human-nature-spiritual relationships that are entwined with evangelical faiths and comprise spirituality-based resilience. This approach is vital in crafting and/or hatching effective and efficient measures for spiritual resilience that would contribute significantly to the building of a resilient Pacific Islanders by 2030 and beyond.

Adding to the above state of affairs, as Tonga was not part of this current study, the fact that the people are also cognizant about educating their children and young people as part of the solution to the problems is significant. By building the capacity of all Pacific Islanders to be more resilient and sustainable in nature is both pertinent for their lives and also allows the message to reach out to the communities at the household levels through their children who learn climate change adaptation at schools and take the message home to their parents for implementation. This is evident in what Fiji's Ministry of Education is doing. As a result, whether climate change is integrated and/or used as a separate subject of learning like Mathematics or English, it puts the Pacific ahead of this adaptation curve.

Integrating Climate Change in Education

There are two models for merging and using climate change in education. The first one is the model for primary and secondary schools in Fiji (Fig. 1).

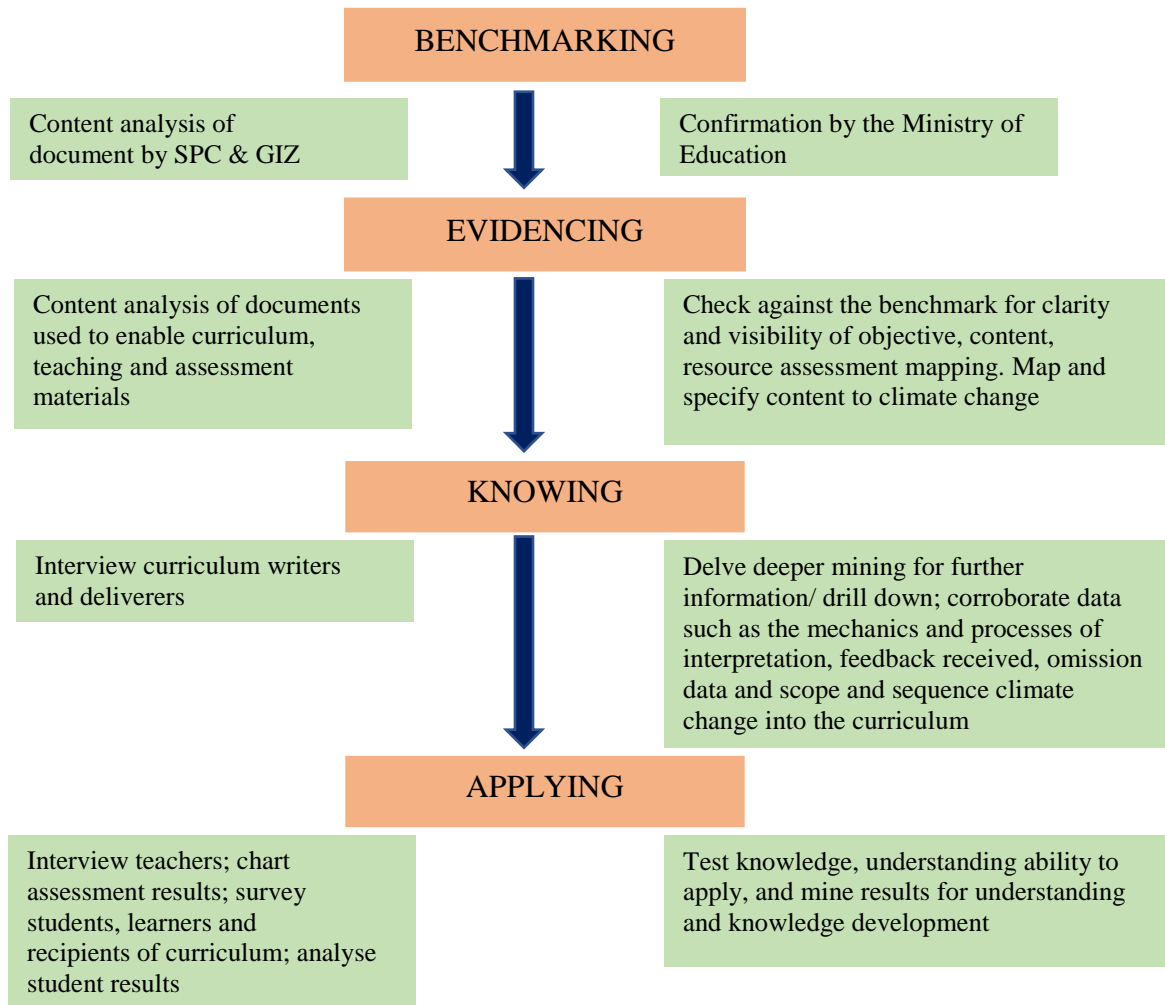


Fig. 1 Integration model for primary and secondary education in Fiji

EU PacTVET Resilience in Education

The second model is for TVET education in the region (Fig. 2).

This model was developed by the EU PacTVET project to deliver resilience qualifications certificate levels 1-4 through eight streams: agriculture, coastal management, energy and infrastructure, fishery, forestry, health, tourism and water resource management (EU PacTVET Project et al., 2016a; b).

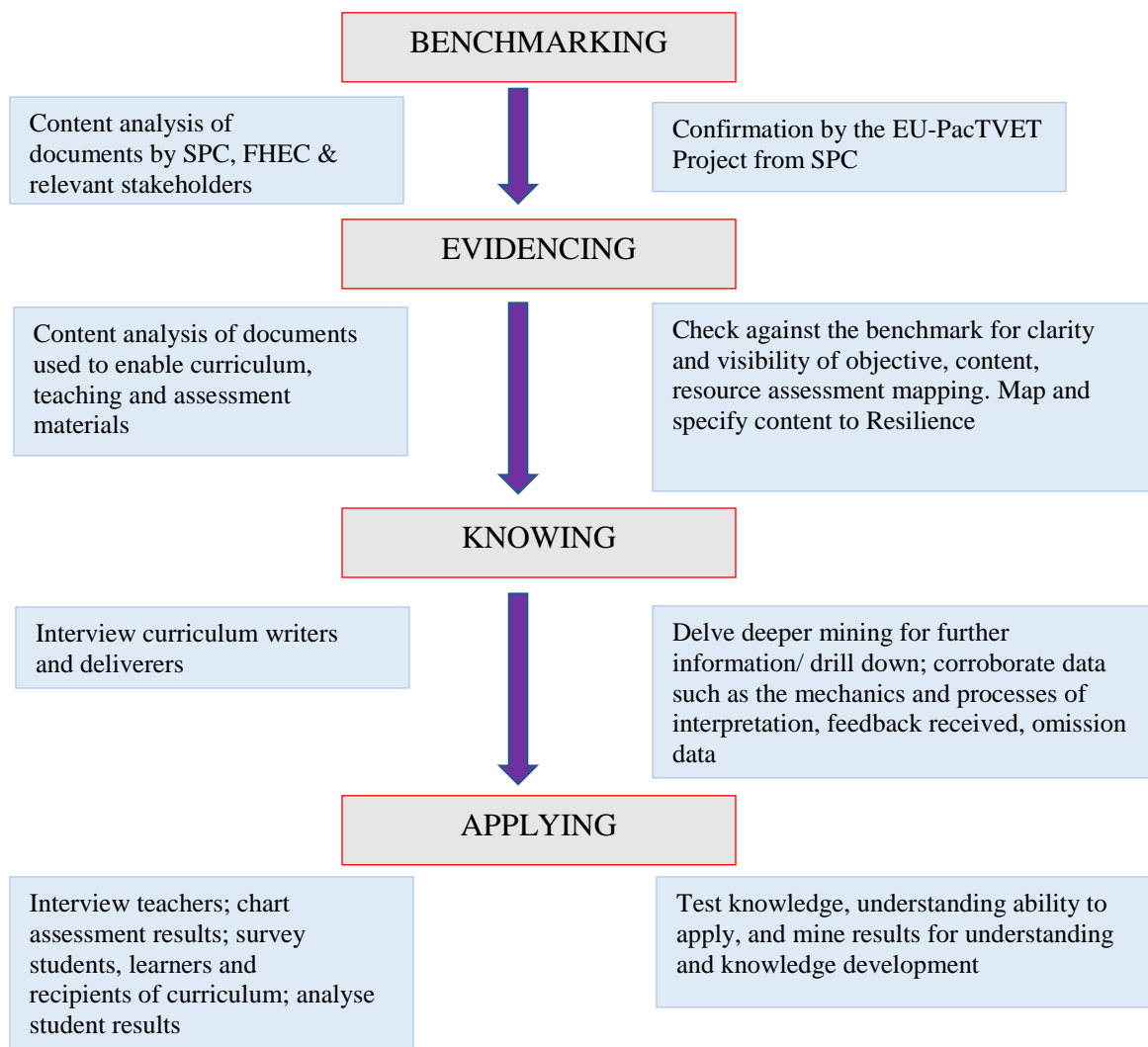


Fig. 2 Model for Resilience in Education for the region for the TVET

Discussion

The BEKA process consists of four components: benchmarking, evidencing, knowing and applying, and it has been used successfully to demonstrate how the integration of climate change into the school curriculum in Fiji and having resilience in education for TVET's would benefit the children and young people of the Pacific both now and in the future.

Integration Climate Change in Education for Primary and Secondary Schools

The integration of climate change and disaster risk management topics into the school curriculum were done by the SPC/GIZ CCCPIR programme to meet Fiji Education for Sustainable Development (ESD) and Climate Change Education (CCE), and most importantly, the objectives of the FRDP framework. Fiji along with Kiribati, Samoa, Tonga, and Vanuatu cast the first countries in the Pacific to pilot this programme of integration targeting schools at the national level. The strategies that were used to integrate climate change into the school curriculum comprised of four major steps:

- Step 1 – Integration of climate change into curricula
- Step 2 – National curriculum consultations
- Step 3 – Development of teaching materials
- Step 4 – Training of teachers.

There were several strategies used to integrate climate change into the school's curricula: curriculum mapping (CAS-TVET), curriculum scoping and sequence, consultations and expert presentations, write-shops, and stock-take or collection of CCA/DRM education awareness materials for Fiji and from the regional climate change websites.

The study found the integration of climate change in education for primary and secondary schools is more appropriate than developing a standing-alone climate change subject for two reasons. First, it is more relevant to what teachers are doing to strengthening the learning outcome of the unit subject by linking climate change to these subjects (e.g. science and social science), so to prevent work overload.

Second, according to the Ministry of Education, integration of climate change is cheaper and by doing so helps the school system to overcome staff turnover (e.g. from teachers' relocation to other schools, teaching other subjects and retirement), now and in the future. More importantly, since the primary and the secondary education in Fiji is now in the second phase such as monitoring and evaluation of their integration programme, it is recommended that other Pacific Islanders who have not yet integrated climate change to their school curriculum can adapt Fiji's climate change education programme and perform a pilot study.

Addressing climate change to the children at a young age is one way of improving the understanding of the Pacific citizenry, the dynamics and processes that would help them build resilient Pacific Islanders now and in the future. As a Tongan concept to value the education of the Tongan children indicated that the "reef of today is an island of tomorrow" may mean to Tonga, but in the context of Fiji and the Pacific, this framework could also apply to ESD and CCE. As a result, not only has the Government of Fiji contributed significantly to its national development and adaptation plan, but it has appreciated all concerned from all parties and relevant stakeholders into account.

Resilience in Education – EU PacTVET Project

The other model to be used by TVET institution in the region is the Resilience in education that was developed by the EU PacTVET project. The EU PacTVET in Sustainable Energy (SE) and Climate Change Adaptation (CCA) project is the third component of a larger programme: Adapting to Climate Change and Sustainable Energy (ACCSE). The European Union funded PacTVET project is a €6.2 million project currently implemented by the Pacific Community (SPC) and the University of the South Pacific (USP) (EU PacTVET Project et al., 2016a; b).

One of the goals of the EU PacTVET project that had been achieved recently is the development of a model of resilience curriculum from certificate levels 1-4 to be used by the participating Pacific African Caribbean Pacific (P-ACP) countries: Fiji, Samoa, Tonga, Vanuatu,

Papua New Guinea (PNG), Solomon Islands, Cook Islands, Kiribati, Tuvalu, Federated States of Micronesia (FSM), Marshall Islands, Niue, Nauru, and Timor Leste. This program of study is an accredited-competency based curriculum that is universal (e.g. open and flexible), which can be delivered and taught at eight streams: agriculture, coastal management, energy and infrastructure, fishery, forestry, health, tourism and water resource management – at any institution as long as they met the expected countries’ national qualification criteria of deliverables.

As this study is the first to undertake a curriculum analysis on climate change, it is expected that this will be a benchmark to the milestone of developing a state-of-the-art system of support to build a world-class and renowned institution for resilience, owned and operated by PICs, as internationally recognised, vibrant, forward-thinking and innovative as USP. As a result, it is significant that the Pacific countries must continue with this sustainable model for capacity development to 2030 and beyond.

Using the Concept of Ako to Understand Resilience in Education

Using the concept of ako (e.g. to learn, study or educate) as a hallmark to understand the learning of climate change and/or resilience in education, students at primary and secondary schools and TVET can be able to learn climate change through a formal learning environment using a mix of students and/or teachers-based pedagogical approach. Because information and technology are very advanced in this era, this paper proposes using VARK (video, aural, reading/writing and kinesthetic) model of learning (Othman & Amiruddin, 2010). In this approach, students are not only prepared academically but also with a placement component whether classroom-based or industrial-based assessment or visitation. All theoretical treatment and practical placement will be climate change and hazards related (e.g. sea level rise, temperature rise).

Policy Implication: Resilience in Education for the Pacific by Integration or Teaching

Based on the results of this study, this paper suggested the governments in the Pacific to use this evidence to propose a policy to their own Ministry of Education depending on their situation. First, is to integrate climate change into their school curricula. Second, is to teach climate change as a compulsory in schools. Nevertheless, other options are that some schools could mix these two methods and employ them concurrently.

This climate change policy is vital especially from a resilience point of view because it is also a part of the National Adaptation Plan for Fiji. At the regional level, this is where the EU-PacTVET came in to support the 14 PICs. The Pacific schools should consider this alternative paradigm as a state-of-the-art ESD for the region.

Conclusions

In conclusion, there are three major lessons learnt from this paper. First, Resilience can be integrated into the current school curriculum using Fiji as a guide. Second, Resilience should be made as a leading course of study for schools and TVET. For primary and secondary education, they will be granted a certificate in resilience. For the TVET, the award is a certificate level 1 to 4. Third, the two models developed under this study should be used as a guide. Because of this, the model was designed to be universal and open, so it should be flexible enough to solve issues of other cultures.

For other cultures, since the model presented in this paper is universal and can go beyond Fiji, as a result, the TVET institutions in respective countries should architect their Resilience

curriculum to their environment and context. For example, since different countries experience issues surrounding climate change differently, it is significant for the education sector (e.g. Curriculum Development Unit) to recognise these and address them accordingly in their schools' program of study.

The reason is that a five-year-old boy who has experienced climate change impacts and adaptation in New York City would differ from the same five-year-old boy whose livelihoods, health and well-being are affected in Suva, Fiji, or Nuku'alofa, Tonga. Therefore, it is imperative for children to be well-versed with what is affecting them (e.g. climate change impacts) and how to overcome adversity (e.g. climate change adaptation) if the plan is to build resilient and sustainable Pacific Islanders by 2030 and beyond.

For the future, further studies on evaluating resilience in education may include but are not limited to:

- 1) longitudinal studies on cost versus benefit;
- 2) cost-benefit analyses;
- 3) studies on the impact of Resilience courses of study on community-based adaptation.

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