

Community and Cultural Competencies contribution in Engineering Education

Sarla Kumari^a; Shafiqur Rahman Tito^b

Auckland University of Technology-Auckland, Waikato Institute of Technology-Hamilton
Corresponding Author Email: Sarla.kumari@wintec.ac.nz

ABSTRACT

CONTEXT

Cultural leadership and community in a Wānanga setting is to re-claim spaces that are guided by indigenous values, principles, and beliefs. Cultural skill is needed in a globalised world where learners from numerous environment and background connect each other. Through the practice of Tikanga Māori, protocols and rituals, such as karakia (prayers), pōwhiri (welcoming ceremony), waiata (songs) link quality with all learners' interfaces incorporating the spiritual, emotional, and intellectual reasons of how and why Māori principles occur (Mead, 2003).

PURPOSE OR GOAL

The correlation between cultural competence and education is reciprocal. Cultural competence will encourage learners to engage with the people from different cultures and backgrounds and community. Main goal for considering cultural competences is to support our learners or ākonga towards industries and real world.

APPROACH OR METHODOLOGY/METHODS

Cultural competence permits engineers to consider obstacles from different perceptions to enhance the problem-solving skills. Diversity is the key to lead innovative and efficient problem-solving, empathy, critical thinking practices. We have analysed the changes by considering changes in teaching practices and implementing more cultural share and community practices into our teaching environment.

ACTUAL OR ANTICIPATED OUTCOMES

These practices incorporating diverse perspectives into the curriculum. Cultural competence is not just important in educational settings but also in various professional fields. As an outcome community involvement and cultural competence played a vital role towards achieving graduate attributes in engineering education.

CONCLUSIONS/RECOMMENDATIONS/SUMMARY

In engineering educational surroundings cultural competence can encourage open discussion and provide resources for educators to develop their cultural competence. This is not about people simply getting along socially; it is about building productive relationships, between tutors and learners and among learners, where everyone is empowered to learn with and from each other.

KEYWORDS

Cultural Competencies, Community and Engineering Education

Introduction

Engineering occupation enhances more consistent in several nations and cultures, the capability to regard, appreciate and work within different cultural backgrounds is important. In engineering education cultural competencies plays an important role to enable all engineers to work effectively in diverse environment. In framework of engineering, cultural competencies allows engineers to work and cooperate with multicultural team. Being an engineer cultural competencies helps us in recognizing and acknowledging cultural differences. In the framework of engineering, cultural competencies imply understanding on how culture stimuli the design, execution, and use of engineering solutions to be successful. Working with multiple culture will give us more clear understanding on cultural competencies (2024, He Pikorua). In our organisation we have Māori learners as well as Pasifika learners. In this paper we have taken some examples based on cultural competencies and community involvement in our teaching and learning spaces towards engineering education. In this research we have described few particular approach as an example to teaching cultural competence from the Māori perspective and that incorporates Māori values, practices and pedagogies.

To achieve a success towards implementing cultural competencies within engineering education, we as a guardian and leaders for our learners must have some in hand expertise towards cultural competencies strategies. In this research we have explained few examples of culturally self-development to be a role model for our learners. Our main goal is to share these strategies worldwide to get more cultural competencies within engineering education. According to He Pikorua New Zealand in New Zealand, we now recognise that consultation with family and cultural community is a crucial component to educational decision making (Bevan-Brown, 2001,2003; Macfarlane, 2005).

Overall, when we talk about the Engineering Education and Cultural Competencies we must start thinking on importance of cultural competencies in engineering education. Our learners are future engineers. There are many useful outcomes we will consider towards the cultural competencies and engineering education.

Moral Factors

Being in engineering education we are collaborating with many multicultural learners and academic staff within the organization. Cultural competencies affect identifying and acknowledging the moral values and standards that differ through cultures. We must direct these variations to respect international moral values within our engineering education environment (Goldfinch et.al, 2010).

Teamwork and Interaction

Teamwork and interaction are very important when we start involving cultural competencies within our engineering education system. Being diverse now a days engineers must work together with collaborators from diverse cultural backgrounds. We get enhancement in communication, trim down any possible disagreements, and create productive work environment.

Internationalisation of Engineering Preparations

Interestingly Engineering education and projects imply inter regional associations and worldwide groups. To lead an improved project outcome cultural competency makes engineers very confident on communication and collaboration with colleagues, consumers, and stakeholders from separate cultural backgrounds.

Gaps in the engineering education and cultural competencies

For the professional development of our learner's cultural competency play a vital role. The lack of engagement, collaboration and teamwork can cause a big gap worldwide between engineers

and the projects. These gaps can affect not only the engineering development but also the development of our future engineers (Goldfinch et.al, 2010).

If there is no cultural competency in engineering education there will be a big barrier and gaps towards the innovations and creations worldwide. Without diverse environment there will be lack of understanding various cultures and their ethics. Our learners being successful engineers will not be able to participate and contribute effectively to global projects and activities. To address these gaps engineering education programmes can decently train learners to be cultural capable. Learners being professionals can contribute towards advanced, comprehensive, and engineering solutions worldwide.

Goal of this research

The main goal of this research is to integrate the cultural competency into the engineering education and curriculum. The main purpose of this research is to create engineers from our learners who will be very good on cultural awareness and will have decent understanding on other cultures. They will be capable to survive in global and diverse environment with their technical proficiency and cultural awareness. We also encourage our learners or ākonga to get involve with industries and real world.

We are working towards “Culturally aware graduates for work ready” by introducing cultural competencies in our engineering education. For achieving these goals, we have tried few approaches within our courses and lessons. The universal approach must be to engineering education to confirm that our graduates are trained to contribute effectively worldwide.

Being tutors we must be a role models for our learners to educate them towards some specific learning. There are few approaches and methodologies we have followed to achieve these goals towards cultural competencies.

Methodologies

We have analysed the changes by introducing the cultural competencies in our engineering education teaching environment. These changes are towards more effective team or group work and learners get more culturally involved. We all being tutors have cultural share in our hui tima (team meeting) regularly. So, what we do every one of us share their backgrounds, culture, and ethics within the team. This practice is so effective to break the silence and the gaps between different culture people. We are working in a diverse teaching environment where people from different places and culture from the world work together to achieve the outcomes (Saldana, D, 2001). Following are the main approaches we have tried to enhance the cultural competencies:

Karakia or a prayer

We are living in a country where we are paying respect to the mainland and people on this land (Māori). Being a part of Auckland University of Technology (AUT) as a research student and Waikato Institute of Technology as an Engineering tutors we have contributed a lot towards cultural competencies. In all our sessions we have introduced a welcoming prayer or karakia and identify and apply key elements from He Whakatupu Kaiako, He Whakatupu Tāngata in our practice as a Kaiako/tutor.

Māori and Pacifica ākonga feel comfortable when they can bring tikanga in classroom. We always lead Karakia or prayer within our sessions to bring my ākonga together and to break cultural barriers. We encourage them for culture share within my sessions. Our academic experience and expertise supported and led to develop our colleagues’ professional practices including cultural practices. We have led workshops, and presentations for cultural responsiveness in progressive years. It is a great experience to lead such type of workshops and share practices within your team and other discipline and across the organisation. We encourage

our ākonga to share their culture during our sessions in way of either saying their own prayer, their own language greeting and shared kai.

We used to announce on our forum regarding upcoming cultural practices. We found this very effective and good participation from ākonga in our engineering sessions. In these programmes we are leading learner- centred learning and group work. It is always good to have a collaboration on Cultural Competencies for with another organisation to ensure we are working towards continued knowledge of Te Reo and tikanga.

During the graduation ceremony every year it was a great experience to join ākonga behind the stage as they shared all feedback towards their learning and interestingly you can see our learners representing their own culture in way of their dressing for the graduation. One example below represents how we encourage our learners/ākonga for their culture share within their sessions.

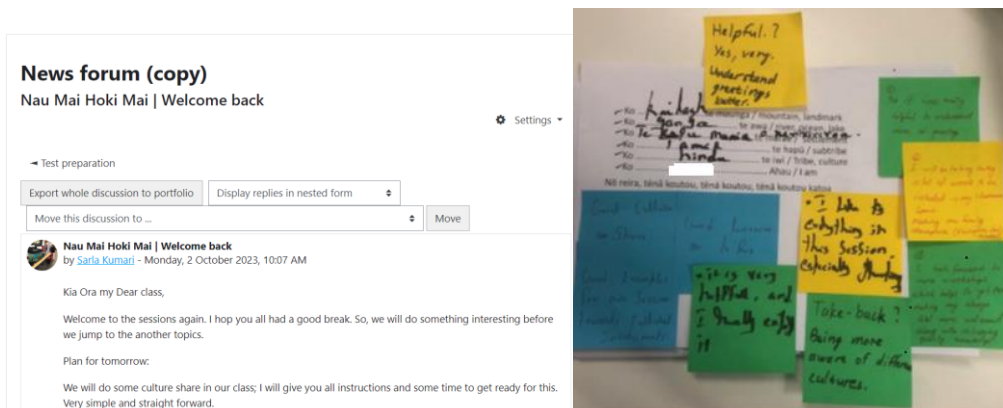


Figure 1: Culture share practices

Reflections and feedback always useful in updating and improving any resources or methods. We received amazing feedback on these practices within our engineering spaces. As a feedback learner say Amazing to do our own Pepeha and prayers in our sessions.

Professional development and cultural competencies-based Workshops and programmes

We have led workshop for our staff/kaimahi towards priority ākonga, whānau, hapū and iwi by demonstrating Te Tiriti principles. We are very much involved in the cultural practices across our organisation and outside the organisation. We have led culturally responsive approaches and focus on Te Reo, Tikanga, Te Tiriti, ako and Ahurea. We also have mentored staff by leading workshops for culturally responsive and competencies and Whakawhangaungatanga approaches as per the cultural competency and capability framework, Whakatupu Kaiako, Whakatupu Tāngata, Te Ngāwhā Whakatupu and the Codes of Practice for International and Domestic ākonga (Wintec |Te Pūkenga, 2023). Based on all the received information, great reflections, and conversations, we implemented, lead, create action plans and share timely in the way of workshops to empower fairness of consequences for all our learners.

Introduction on background with the help of Pepeha (who we are) is the best practice towards cultural competencies. Example given below in the Figure 2.

Pepehā

- Ko ..[Kailash](#) . te maunga / mountain, landmark
- Ko ..[Ganga](#)... te awa / river, ocean, lake
- Ko [Te kopu mania O kirikiriroa](#). te marae / settlement
- Ko ...[Hindi](#)..... te hapū / subtribe
- Ko ..[Hindu](#)..... te iwi / Tribe, culture
- Ko ..[Sarla](#)..... Ahau / I am

Nō reira, tēnā koutou, tēnā koutou, tēnā koutou katoa

Figure 2: Pepeha practice during the workshops (Wintec |Te Pūkenga, 2023)

As a mentor we have completed Tapasā Turu Values Workshop and Toi Mai workshop successfully, so that we can lead confidently our learners towards cultural competencies and diversity. We implement Te Tiriti principles in our engineering education, and it is amazing and very useful in our profession. We have mentored and coached our colleagues and new staff members on action plans from their lesson plans, class observations and support them as much as possible with all cultural competencies' approaches. We have joined some awesome ECR Whaia te Tika workshops on Māori culture and competencies from AUT and we have implanted those learning in our teaching environment to enhance the diversity collaboration in our education sector (Vitto. C , 2008).

Role model ready

Introducing to new strategies and learning it is always beneficial to be a role model for those implementations. In our engineering learning workspaces, we have visualised the various prayers and karakia and even we have these karakia on our walls in staff sitting areas. For moving ahead towards cultural relationships and understanding we make sure that we are ready and well prepared for that at first instance. Opening and closing a meeting with any prayer and karakia makes a huge difference to create a comfortable learning environment and spaces. We as a staff sharing our culture in every hui tima and everyone get a chance to bring their own thoughts and ethics to share with others. This is amazing start towards the cultural competencies. This approach makes us more confident for any group work, projects, and shared sessions. Strategy of knowing each other create more comfortable teaching and learning environment. We as an engineering team (civil, electrical, and mechanical) get very good chance to share our backgrounds and the engineering ideas in way of specific places and culture. From these kinds of meeting and gathering we create great resources of culture share for our learners in engineering education.

There is always a possibility of hesitation and shyness when someone very new to the place and people. Culture share meets are very helpful tools to overcome these barriers. Role model ready is very good strategy to prepare our learners/ākonga for cultural competencies within their learning spaces.

Guest speakers

Guest lectures and workshops driven on cultural competency in engineering is very good collaboration with industry professionals. We have implemented this approach in almost all our engineering sessions. For engineering learners, it is always beneficial to be in contact with the

industries. This approach also helps to break all hesitation and any cultural barriers between learners and industry. Having guest speakers in the sessions helps in improving our learners' knowledge towards the real-world projects and applications. Learners have very good question answer sessions during these speakers' visits. These guest speaker visits always useful in improving learners' capability to step in forward for any kind of challenges and tasks. These sessions can grant learners with realistic consciousness into the challenges and best methods for working in a universal engineering environment.

Conversation with the guest speakers from various industries provide learners a platform to clarify their doubts and concerns towards their engineering profession. This approach is also very helpful in creating learners' interest towards engineering brainstorming and engineering design projects. They will be always curious to join such type of engineering challenges discussed by the industry speakers.

Industry visits and events

In our engineering education we always have possibilities for site visits. We are continuously contributing to our organisation reputation and engineering education nationally through external industry engagement. Leading projects from Industries research project always add on to the cultural relationship in engineering education. Learners get a chance to explore their options for their future scopes and project in real world. We have led many industries projects for our ākonga to build their confidence with industries people and workspace. Being a part of EERU (Engineering Education) we always get up to date strategies happening around towards Engineering Education.

We have very good connections with various industries in Waikato region. We always have possibilities to have projects from industry for our learners and they worked on them in groups (teamwork). We also have invited these industries during our organization next and Engineering Day. Our learners get good chance to talk to the industries and break the barriers during these events. We bring these strategies into my teaching practice to maintain the currency. Getting involved with these industries is a very good example of cultural responsiveness and Whāngatanga.

During their journey of engineering our learners always keen to demonstrate their project ready. Once learners are culturally confident and working in a team, they always come forward to show their ideas and projects in designated events. Many of our learners have participated in open days and they have demonstrated their projects to the upcoming learners for the organisation. So, to get involve in a group project; these practices always overcome the barriers and enhance learners' confidence.

Stakeholder Engagement:

Engagement with stakeholders and other organisations always contribute to achieve cultural competencies in our education system. We are conducting STAR (Secondary Tertiary Resource Alignment) courses and Evolocity programme WECA (Waikato Engineering Careers Association) within organisation. These programmes are good example of Cultural practices and ako teaching and learning practices towards engineering education. We create a great platform towards cultural practices by having Evolocity programmes in our learning spaces. All students from different schools and backgrounds work as a team to achieve their goals. Basically, many schools join together to work on electric bicycles designs and get ready for final competition across Waikato region. We implement these approaches within our sessions for engineering education.

We are also leading some community-based research and projects. It is very interesting to go through the process and learn how we can get involved for some specific research by following their ethics. We have gone through the process for Māori participation, and we have received a good knowledge on Te Ara Tika process. We feel more confident to work with different

community and people by knowing their morals and Tikanga. This Māori ethics framework has four tikanga based principles: whakapapa (purpose), tika (research design), manaakitanga (cultural and social responsibility), and mana (justice and equity). So, we always lead culture share and Te Reo within my sessions time to time by leading Karakia and culture share.

We bring these strategies into our teaching practice to overcome the cultural distances. Organising STAR Courses and Evolocity programmes and demonstrated them for iwi, whānau, hapū, community and professionals' engagement and we are contributing towards whakaumu system. This is how we are utilising our stakeholder engagement knowledge to lead our colleagues to benefit them in achieving good learning environment in engineering education.

Valuable Outcomes

Tōia Mai cultural competency journey influenced and impacted on our educational practices and leadership. As an outcome we have noticed a very good change within our learning spaces and sessions towards teamwork and group projects. We would like to carry on and move forward with positive attitude and taking along all our team and learners along in this journey and make it success.

It was a great experience for us during this year in the way of teaching, learning, cultural responsiveness, cultural share, Te Reo, industrial and stakeholder engagements to enhance engineering education. We worked as a team and shared our expertise and tried new approaches to support engineering education. As a challenge and Innovation (Whakaaro whānui) we have noticed all above discussed approaches towards cultural competences were very helpful in our learning spaces.

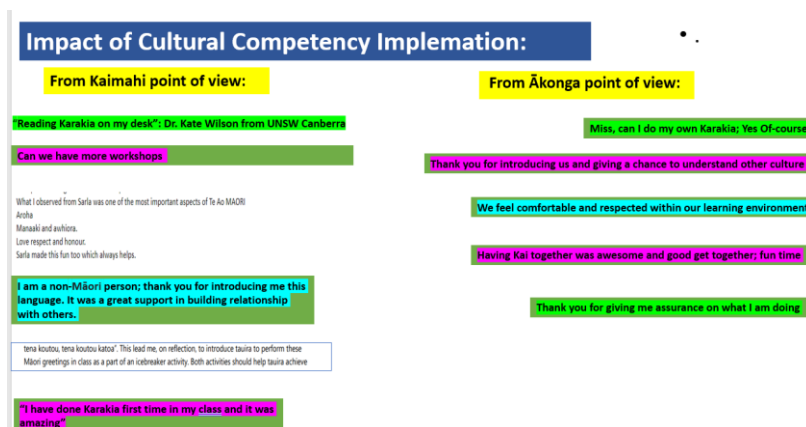


Figure 3: Useful outcomes from cultural and community share

We successfully implemented these methods and created very interesting and engaged teaching environment. Our ākonga enjoyed these strategies and successfully participated in all activities towards cultural share. Our ākonga are our customers and focus (Manaaki Tangata).

Conclusion

As per our experience in engineering education, cultural competencies plays a very key role to bring all our learners, stakeholders and industry people together to achieve goals successfully. Engineering education and our learners must focus on diversity and universal perception to upgrade our diverse collaboration. By growing industry involvements, learner exchange programmes, supporting diverse learning environment and integrating cultural competencies into engineering education curriculum we can enhance the multicultural contributions worldwide. To improve and develop learner's skills these practices will be very helpful in encouraging cultural engineering environment.

References:

- Bevan-Brown, J. (2005). Providing a Culturally Responsive Environment for Gifted Māori Learners. *International Education Journal*, 6(2), 150-155.
- Mead, H. (2003). *Tikanga Māori: Living by Māori values*. Wellington, New Zealand: Huia Publishers.
- Building and Growing Cultural Competence (n.d). He Pikorua – Our Practice Framework. Retrieved on August 16, 2024 from <https://hepikorua.education.govt.nz/how-we-work/building-and-growing-cultural-competence>
- Goldfinch, T. L., Layton, C. A., & McCarthy, T. J. (2010). Encouraging cultural awareness in engineering students.
- February 28, 2023 Wintec |Te Pūkenga launches new cultural capability framework Whakatapu Kaiako, Whakatapu Tāngata.
- Saldana, D (2001). Cultural Competency – A Practical Guide for Mental Health Provider. Hogg Foundation for Mental Health, The University of Texas Austin. Retrieved on August 16, 2024, from https://babeldc.gr/wp-content/uploads/2018/11/Hogg_Foundation_for_MentalHealth.pdf
- Vitto. C (2008). Cross-Cultural "Soft Skills" and the Global Engineer: Corporate Best Practices and Trainer Methodologies. *Online Journal on Engineering Education*, Vol 3, issue 1. Retrieved on August 16, 2024 from <https://digitalcommons.uri.edu/cgi/viewcontent.cgi?article=1008&context=ojgee>.

Acknowledgements

We would like to thank sincerely to my team manager Dr. Trudy Harris for providing us valuable time to complete this research paper this year. We would like to thank our family members as they were very big support during this time.

Copyright statement

Copyright © 2024 Sarla Kumari and Shafiqur Rahman Tito: The authors assign to the Australasian Association for Engineering Education (AAEE) and educational non-profit institutions a non-exclusive licence to use this document for personal use and in courses of instruction provided that the article is used in full and this copyright statement is reproduced. The authors also grant a non-exclusive licence to AAEE to publish this document in full on the World Wide Web (prime sites and mirrors), on Memory Sticks, and in printed form within the AAEE 2024 proceedings. Any other usage is prohibited without the express permission of the Sarla Kumari and Shafiqur Rahman Tito.