

# EXPERIENTIAL STUDENT-CENTRED LEARNING AND TEACHING

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## ABSTRACT

Student-centred learning and teaching (SCLT) is gaining interest internationally in tertiary education institutions. SCLT is an indicator of quality assessment in higher education, and scholars and educators are seeking ways to implement SCLT to boost engagement, participation, agency, and confidence in students. This paper considers some of the practical benefits of SCLT and discusses a unique inter-departmental experiential project, used to augment assessment in an international tertiary campus. Working through stops and starts with conversations and agile pivots presented many perspectives on experiential SCLT approaches. Evidence is mounting that active student learning practices facilitate more meaningful or deeper learning, that is retained longer. The novel contribution of this paper is the experiential link with SCLT paradigms used with diverse, agile student-led teams. With planning and perseverance, exceptional real-life learning can be achieved. Moreover, the underlying capabilities that are developed, support students to be highly employable graduates.

**Keywords:** student-centred learning and teaching, sustainability, experiential learning, agile employability

## INTRODUCTION

The phrase 'Student-centred learning and teaching' (SCLT) is used broadly in educational literature, linked to related topics such as experiential learning, flexible learning, and self-regulated learning (Järvenoja et al., 2015). Frank Herbert Hayward advanced the concept of SCLT more than a century ago (Hayward, 1905) (Brett, 2012); John Dewey (1956) focused on how students learn, informing, and advancing student-centred ideas. Today, SCLT is a point of distinction in tertiary teaching (Klemenčič, 2017), (Zhang & Bayley, 2019). Besides being engaged in learning, students are said to become more confident in non-academic areas; their overall behaviour, attitudes, interests, and self-confidence are elevated (Din & Wheatley, 2007).

Currently, awareness of SCLT is mounting. With accruing evidence, research shows that instructional quality is more likely achievable with SCLT (Hoidn & Klemenčič, 2020), yet SCLT has a wide range of definitions with no consensus. Furthermore, SCLT can vary conceptually between educators (Hodson, 2002). There is a need for comparative research on SCLT and its processes; this is a vulnerability (Klemenčič, 2017). SCLT may be ill-defined, but it becomes meaningful and powerful in context, as it promotes self-efficacy, deep learning strategies, engagement, and agency and at its core, SCLT focuses on student needs, with customised learning pathways (Klemenčič, 2017).

SCLT techniques can supplement or replace lectures with active learning strategies that engage students in discovery (Handelsman et al., 2004). It can be difficult to achieve 'learning outcomes' with SCLT, however, Information Technology (IT) courses are particularly suited to Living Curriculum pedagogy; students learn via collaboration, inquiry, and reflection (Hodson, 2002). This is relevant with ever-changing technologies

and dynamic hybrid learning and teaching contexts (Ganeshan, 2021) and SCLT approaches reinforce active inquiry and problem-solving.

This paper considers SCLT as a basis for an experiential project at Otago Polytechnic Auckland International Campus (OPAIC) in New Zealand using key scholarly SCLT sources chosen by The Global Polytechnic Alliance (GPA) Global Partnerships (2021). The project method aligns with the latest SCLT research, which defines SCLT as an all-encompassing approach comprised of three dimensions (Klemenčič, 2017) (Fink, 2013):

1. SCLT In-class: As a Pedagogic Concept to Foster Individual Learning
2. SCLT Out-of-class: As a Lever Supporting Learning Systems
3. SCLT as an Organisational Mindset: A Cultural Framework for Developing Communities of Learning

The three dimensions were considered in an applied setting to discover the practical benefits of SCLT in a unique inter-departmental experiential project, used to augment assessment at OPAIC. Working through stops and starts while utilising agile pivots, presented various perspectives on experiential SCLT approaches, discussed in the next section. Then, various diverse views were reflected upon within the planned learning and teaching framework. The paper outlines the first two SCLT dimensions as platforms for the third dimension, with the intention of inculcating SCLT as an organisational mindset. The conclusion encapsulates the learning and capabilities fostered as a result of the experiential SCLT project, producing more proficient and employable graduates, which aligns with the vision of OPAIC.

Evidence is mounting that active learning practices facilitate more meaningful or deeper learning, that is retained longer (Chawla & Cherrington, 2020). The novel contribution of this paper is the experiential link with SCLT paradigms that were used with diverse, agile student-led teams. Evidence revealed, that with planning and perseverance, outstanding real-life learning can be achieved using SCLT in-class alongside SCLT out-of-class; a shift to SCLT Communities of Learning requires a long-term vision, that can support students becoming highly employable graduates.

## **METHODOLOGY**

As part of a Master of Professional Practice, a number of OPAIC Campus Sustainability Initiatives (CSI), were evaluated for efficacy via stakeholder feedback. This reflective paper resulted from the initiation of Student Sustainability Projects (SSP), which are interdepartmental research and assessment-linked projects. Many of the feedback comments and reflections are from the students of a Bachelor of Information Technology class and Masters of Applied Management students. Further observations and reflection are given by the lecturers of the papers for context and perspective. The SSP model agile technology, applied management processes and tools and industry project management techniques. Both comparative and quantitative metrics were measured regarding participation (number and type) and outputs achieved (number and type); stakeholder feedback was also garnered and evaluated. Ethics approval was granted (application AIC85).

From stakeholder feedback, SCLT was organically and continually improved using agile and Plan-Do-Check-Act (PDCA) processes (Sangpikul, 2017); eventually a novel student-led SCLT in-class facilitation pilot was trialled and a SCLT facilitation pilot was launched where senior students and alumni students 'guest lectured' to grow an SCLT culture on campus.

Key results and reflections from this SSP are summarised in this paper; fundamental reflective perspectives are provided from applied management and information technology (IT) students as participants SCLT and from the both lecturers working interdepartmentally.

## EUREKA! AN EXPERIENTIAL SCLT PROJECT

The last term of 2020 at OPAIC would encapsulate a Strategic Objectives for Sustainable Practice (SOSP) learning and teaching pilot. OPAIC had a mandate to embed sustainability in all learning and teaching 'in all that we do' (Matthews, 2014). This is interpreted in various ways throughout the campus (Mann 2011), and the SOSP aim:

- To develop sustainable practitioners.
- To model evidence-based sustainable practice in our operations.
- To encourage communities and businesses to embed sustainable practice.
- To ensure our actions benefit our communities.

OPAIC was two years into an experiential teaching resurgence and hotspots of collaborative learning and teaching initiatives were incubating (Cherrington et al, 2021c). Over a coffee conversation, the Information Technology (IT) 'Studio Applications' lecturer stated that Master of Applied Management (Masters) IT students in the 'Managing Change and Adversity' course were looking for applied sustainability projects. A means of combining the projects with diverse teams was found and three campus sustainability applications (Apps) were devised:

- App 1: Application to showcase Student Portfolios on Sustainability (SPS)
- App 2: Web App to record/monitor OPAIC Sustainability Initiatives Operations/ Facilities (SIOF).
- App 3: Web application to Promote Sustainable Practices (PSP) at OPAIC

The courses from the IT and Masters were reviewed to ensure outcomes and capabilities would be appropriately assessed. Although the third dimension of SCLT as an organisational mindset was an implied outcome, the immediate aim was to support the development of sustainable practitioners who would use App 1, model evidence-based sustainable practice in OPAIC operations with App 2 and encourage communities and businesses to embed sustainable practice. Sustainability stories would be uploaded onto the OPAIC website using App 3. It was an ambitious plan, however, OPAIC is a dynamic, international campus, skilled at delivering agile, continual improvement.

The IT and Masters' course assessments were delivered with experiential SCLT in-class and SCLT out-of-class activities. Time was allocated to enable IT and Masters' students to meet in-class to progress the App projects; they were encouraged to have out-of-class meetings as well (often occurring as working lunches). SCLT elements were almost immediately apparent, and lecturers awaited signs or opportunities to expand the SCLT approach outside of the pilot project and into the rest of OPAIC. The Masters students approached the project with 'nervous excitement' and the IT students began devising prototypes:

### App 1: Web application for Student Portfolios on Sustainability (SPS)

In this project, four students enrolled in the Bachelor of Information Technology (BIT) successfully developed and deployed a Web Application (App) complete with a (NoSQL) database (MongoDB) using a hybrid software development methodology (see Appendix, Figure 1). Once refined, App 1 could build OPAIC Student Portfolios on Sustainability, from the many papers, projects, and sustainability initiatives they were involved in.

### App 2: Web application to record/monitor Sustainability Initiatives at OPAIC Operations and Facilities (SIOF).

In this project, three BIT students successfully developed and deployed a Web App to track and display the usage of consumables like power and water at OPAIC. The App produced a sample graph that could be modified for any number of sustainability operations initiatives (see Appendix, Figure 2). With refinement,

the OPAIC Operations and Facilities team could track and display the usage of other consumables such as paper.

This IT student team, like the App 1, also used a NoSQL database (MongoDB). They used Systematic Customer Resolution Unravelling Meetings with weekly sprints and Monday.com for project management. This group had the support of an adjunct team member who had several years of prior industry experience assisting them, including acting as their Agile SCRUM master.

### **App 3: Web application to Promote Sustainable Practices (PSP) at AIC.**

Sustainability is embedded in all that we do at OPAIC, so communications are imperative. Students framed some details of this project using visualisations (see Appendix, Figures 3 and 4). A key feature of the Web App was to promote user sustainability stories, especially across campus, and to detail and evidence Student Portfolios on Sustainability. It would also repository for project work focused on Sustainability Initiatives at OPAIC in Operations and Facilities department.

#### **Role of the Masters of Applied Management Students:**

Level 9 students studying the 'Managing Change and Adversity' course would act as Product Owners in the Agile Scrum, researching necessary information regarding sustainability App requirements. IT students rotated roles as Scrum Master within their Scrum Team; their IT facilitator acted as an Agile Mentor to progress learning.

The project would model real work-based learning where IT professionals are meant to work alongside departmental managers to support outcomes. Management case studies abound, detailing and decrying failed IT projects. Repeatedly, management fails to articulate the requirements of technologies, expecting IT expertise to advise and inform organisations despite the insufficient context, and project managers' perceived control over projects can influence how they assess IT projects (Taherdoost & Keshavarzsaleh, 2015).

IT and management should cohabit and collaborate (Cherrington et al, 2020). Today's workplace is highly interactive and technology-enhanced; individually oriented perspectives and static learning are outmoded (Järvenoja et al., 2015). At OPAIC, the teaching departments are segregated; despite open plan learning and teaching spaces, collaborations are limited. A conversational environment needed to be developed (Zaffron & Logan, 2011).

The Studio Apps project used experiential SCLT as a future-forward vehicle to transform outcomes for students and lecturers while embedding sustainability and creating pathways towards employability after graduation.

### **DIVERSE AND EVOLVING PERSPECTIVES**

The three IT teams understood that they would be concentrating on the technical part of the App projects; they developed the App which would present the data. The Masters' students would meet regularly with their assigned teams, complete research, and supply necessary information on how and what to display.

For the first few weeks, the focus was on researching different tools for App development, while counterparts in the Masters studied the sustainability initiatives to supply relevant data (Zhukov & Cherrington, 2020). Within a few weeks, prototypes were developed as envisioned and presented to the Masters students.

However, soon after the IT students met with management students and there was almost a revolution with the IT students, saying repeatedly that the Masters students, and even their lecturer, "knew nothing" and did not want to have anything to do with these projects. Some Masters students 'walked out' on the

presentation on business intelligence, data mining, and data visualisation partway, not realising how relevant the topics were to change management (Cherrington et al, 2021c; 2021d); they surely did not appear to 'manage adversity'!

After several meetings and further discussions, the IT students realised that real-world clients are not coders who understand coding or Apps, but people whose knowledge, expertise and skills are in other areas; they knew lots of things that the IT students knew nothing about. The resulting complex conversations were priceless, building confidence that would support student workplace transitions (Shukla & Ganeshan, 2011).

The Masters students did not understand the technical aspects of the Apps. This was not due to a lack of explanation, but simply because IT was not a field in which these students had experience. Worse, the Masters students did not find technology or sustainability initiatives relevant to 'managing change and adversity. The global Covid-19 pandemic had already upturned lives; adversity was a daily reality for OPAIC international students. Back in class, theories of change and their suitability in various contexts grounded the agile experiential projects; Masters students focused on the assessment rubric only.

The IT student teams kept moving forward; they took the opportunity to learn about working within a simulated work environment. The 'people problems' were labelled 'not everyone has a similar educational background or is in the same field of study', so they utilised their interpretations. They realised they had to pivot their approach when communicating with non-IT people (or clients). The IT students had to find a way to explain in a mutually understood language what the Apps were doing. The Masters students just wanted good grades, stating that it was 'safer to create an assessment report', that the projects were not related to their learning and that sustainability was a subject they would study next year.

It was a good learning experience that would not otherwise have been available to us in a learning environment. Students are usually surrounded by peers studying the same courses for the same qualification. A positive result was that the Masters students did give us feedback on the User Interface (UI) and what would look and feel better. This in turn helped the IT students make adjustments to the Apps making them more user-friendly. This feedback was seen as an example of highly valuable, real-world feedback and their opinion was provided from a set of fresh eyes that had a different perspective than the IT students, which is highly valuable in ensuring the "customers" requirements are met.

The feedback was vocal and informative. At times, SCLT can be confronting, and experiential learning can seem unstructured or 'aimless' (Cherrington, 2020). IT students were already very familiar with this style of learning, Masters students were not. They are not agile. The speed at which the IT students progressed and overcame barriers was fast and furious. Masters students went into verbose report mode; they complained to their Head of the Department. SCLT needs a more robust framework so that students do not feel vulnerable (Pace & Cherrington, 2020).

More robust SCLT frameworks are noted in SCLT literature, with the central theme 'learner-centred teaching in a non-learner-centred world', coined from participants' experiential recollections (Oyelana et al., p. 118, 2018). When challenging the status quo, some students and lecturers revert to safer norms and retreat to known paradigms (Lubicz-Nawrocka, 2017).

## **DIFFERENT AND DEVELOPING RESULTS**

### **App 1. Student Portfolios on Sustainability**

This IT students had moderate success in terms of App development progress. They felt that they gained valuable experience in team management, modelling client-based scenarios using project management methodologies. They practiced self-learning while discovering new frameworks and applied technologies.

## **App 2. Web application to record/monitor Sustainability Initiatives at OPAIC Operations and Facilities (SIOF).**

- This IT student team had the best App outcome. Some of the feedback from the IT students is provided below.
- This study block was such an exciting experience! We worked in a team to build a web application prototype to measure and monitor sustainability in OPAIC.
- In a group project, the first thing that you must learn is how to work together as a group; this can vary, depending on who your teammates are.
- This project was new territory for me. The projects and subjects I had before were all based on individual work, so adjusting myself and finding my place within the team was very interesting.
- We had not worked with such diverse team members before; in the beginning, we were learning each other's personalities and skills, as well as self-studying to apply new knowledge to the project.

## **App 3. Web application to Promote Sustainable Practices (PSP) at AIC.**

This IT student team struggled throughout the project in the 'resistant' manner of the Masters students. Yet the concluding slide of the students' final presentation revealed that they had 'picked up' important experience while maintaining a positive atmosphere to work with business students, team management, etc.

## **EXPERIENTIAL SCLT AND AGILE PROBLEM SOLVING**

SCLT needs planning by staff (Cherrington et al, 2021b). A collaborative effort with stakeholders is paramount to the successful implementation of learner-centred teaching in practice settings (Oyelana et al., p. 118. 2018).

Mid-project, a lot of confusion lifted for the IT students. Management students remained disengaged, but they continued to meet and give feedback on the UI to the IT students, who got on with the job; the UI had a better look and feel from a user perspective. This in turn helped the IT students make iterative adjustments; the App became more user-friendly. A 'set of fresh eyes' with a different perspective was valuable for the IT students.

As the project was coming to a close, these interactions became routine. The IT students took the project further, developing the prototype and improving it using the Management students' user stories and feedback. By the end of the project, a complete App 2 prototype had been developed which displayed all the information needed by the users. Unfortunately, the Masters students were not able to obtain the data for the electricity and water usage; IT students sourced sample data to evidence the project's performance. Overall, the App developers found it a valuable learning experience, not usually available during term assessment.

IT student teams felt that overall, the eight-week project had been challenging, yet fun. They got to experience what working in the real world would be like and how working with clients to gain an understanding of what they wanted from their Web-App and how to adapt the design. This comment bodes well, given that one aim of experiential SCLT at OPAIC was that students are more 'work-ready' and employable upon graduation.

The IT students felt that the eight-week experience was 'new' by simulating real-life scenarios by working in a team. Although some IT students were at first doubtful of their abilities and how they could contribute to the project team, as the weeks went by, they offered input into everything. They were confident in what they knew and helped the team reach the end goal of completing the project. The most difficult part was working in a group and finding ways to collaborate, wondering whether everyone in the group would be appreciative of the work and effort that was made out-of-class. Some IT students had no prior experience

in databases and had not yet done the Web 2 courses in the BIT. But this was all the more reason to work in varied teams with various levels of expertise to gain diverse perspectives and understanding (Cherrington et al, 2020b).

The requirement to work in groups and teams is common in the New Zealand tertiary curriculum. This mimics the workplace. Understanding the ebbs and flows of individual input toward team objectives is a performance conundrum that causes tension in many organisations in light of sustainable HR (Radvila & Šilingienė, 2020).

A side note that all the Masters students were all female. Was this part of their risk aversion (Cherrington et al, 2021)? Did pandemic uncertainties focus students on grades versus learning? One exercise in the Managing Change and Adversity course focused on the gender pay gap, with an on screen graphic presented as students arrived in class; 'where does that happen?' queried one of the students. 'Everywhere'... as it was a global, by nation, graph (Economic inequality by gender, 2021). We then discussed risk versus reward and the time value of money. In the end, these Masters' students chose to work more on standard assessment strategies than the experiential SCLT opportunity that supported their learning. Perhaps agile methods have many applications, beyond IT.

The third dimension of SCLT is powerful; decisive and diverse thinking is a vital capability (Thorneycroft, 2020), especially as the world becomes more volatile, uncertain, complex, and ambiguous () (Bennis & Nanus, 1985).

Another IT student reflected that all in all, this block helped with interpersonal skills, time management skills, and how to work in a team. Also, learning how NoSQL database (MongoDB) works in the IT industry nowadays gave an in-depth knowledge about express.js. Credit was given to the IT team for imparting several new learnings and for their continual motivation. It was said by the IT team, that without teamwork the project would not have been completed.

Yet another response was about being 'concerned about having valuable contributions in the team'. As the weeks progressed, these reservations relaxed. By researching and sharing findings, the IT students found 'there is a solution for most problems, it just needs to be found'. A few IT students were not keen to learn Studio 3, thinking it would be a repetition of what had been done in another course. Their fears were unfounded. It was a great learning experience in general with new skills learned in NoSQL database MongoDB, express.js, and node.js that they will be able to use in the future.

## **CONCLUSION AND FUTURE WORK**

It is fair to say that experiential student-centred learning and teaching requires energy, planning, and trust, to achieve outcomes with true learning that is framed within curriculum contexts. At times, harsh lessons and realities were revealed; this is best done in a classroom environment where students feel safe, while challenged.

This experiential SCLT project was both 'scary and exciting'. The opportunity to further enhance experiential learning and bring about more inter-departmental collaboration between lecturers was irresistible and students worked at all levels and capabilities within the curriculum. Added to this was the excitement that OPAIC promoted sustainable practices; all three of the projects were linked to the OPAIC Strategic Objectives for Sustainable Practice – skills highly sought after in industry.

For most IT students this was the first time they had worked on team projects, and this caused anxiety and confusion. For Masters students, agile techniques were not in their experiential repertoire and designing prototypes was not part of their post-graduate curriculum. However, they were well versed in writing researched reports.

Luckily, all lecturers involved had decades of experience in academia. Knowing that employment opportunities for international students in a pandemic are limited, lecturers worked together, knowing they were on the right track. There are many challenges in learning and teaching; especially for international students with multiple diversities (Ganeshan, 2010). Perseverance was needed to overcome obstacles. The feedback indicates that this sort of collaboration, based on experiential SCLT, benefits students beyond mere learning outcomes and rubric requirements.

In summary, this was a novel experience for both students and lecturers. Collaboration with people from different sectors, fields, and backgrounds is what working in industry is about. Students also realised the value of research to frame problems, understand user issues and improve user experience in many sectors. Cohesive project development with IT and future management professionals were part of the beneficial experience.

SCLT is an evolving field and can be challenging. For students who created the three Apps, delivered and project managed using agile methods, the learning will not be forgotten.

It is challenging to work inter-departmentally, with defined outcomes and scheduling realities, but the 'real-world' capabilities that were developed are invaluable and students connected the classroom learning with other opportunities, that could lead to project work, internships, or job offers. Finding opportunities to run another such experiential SCLT interdepartmental initiative are currently being explored.

It is interesting to note that Harvard Business Publishing Education presents a useful framework for meaningful course design for the best possible learning experiences for students, on-campus and/or online (Austin, 2021). It would be interesting to use this framework in the next iteration of interdepartmental experiential SCLT online and/or on-campus. The framework suggests the most meaningful learning experiences are those in which students:

1. Are actively engaged.
2. Feel responsible for their learning.
3. Have significant control over the experience (The Faculty Lounge, 2020).

Experiential SCLT aligns with this framework, which can use technology to suit asynchronous class structures. In the framework, it is suggested that the lecturers embed four concepts:

1. **Struggle:** Present a challenge for students to grapple with.
2. **Structure:** Encourage students to categorise what they know.
3. **Systemise:** Guide students through connecting structured information.
4. **Synthesise:** Establish consensus and draw conclusions.

With an SCLT framework, it is likely that students will create a narrative and space to discover on their own.

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## REFERENCES

- 01 Austin, R. (2021, July 20). Harvard Business Publishing Education. [https://hbsp.harvard.edu/webinars/designing-better-courses-blending-the-best-of-pre-and-post-pandemic-pedagogy/?cid=email%7Cmarketo%7C2021-08-03-the-faculty-lounge-subject-test%7C1425479%7Cfaculty-lounge-newsletter%7Csl-4-part%7Cvarious%7Caug2021&actID=none&mkt\\_tok=ODU1LUFUWi0yOTQAAAF-qqc57K0OF3SH-s8laQb15ITN7J2c73WtJcUlfZpthuRTMxt9Lpt016GzQmVYvcAy1XZcwO8EWWJ1vGgD](https://hbsp.harvard.edu/webinars/designing-better-courses-blending-the-best-of-pre-and-post-pandemic-pedagogy/?cid=email%7Cmarketo%7C2021-08-03-the-faculty-lounge-subject-test%7C1425479%7Cfaculty-lounge-newsletter%7Csl-4-part%7Cvarious%7Caug2021&actID=none&mkt_tok=ODU1LUFUWi0yOTQAAAF-qqc57K0OF3SH-s8laQb15ITN7J2c73WtJcUlfZpthuRTMxt9Lpt016GzQmVYvcAy1XZcwO8EWWJ1vGgD)
- 02 Bennis, W., & Nanus, B. (1985). *The strategies for taking charge*. Leaders, New York: Harper. Row, 41.
- 03 Brett, P. (2012). Citizenship education in England in the shadow of the Great War. *Citizenship Teaching & Learning*, 8(1), 55-74.
- 04 Chawla, R. and Cherrington, M. (2020). *Move for Movember - Reflections on experiential learning activity for collaborative learning and peer learning*. Scope: Contemporary Research Topics (Learning & Teaching), (9) Cherrington, M. (2020). Waterwise reflections. *Junctures: Journal for Thematic Dialogue*. Scope: (Teaching & Learning), 9, 2020
- 05 Cherrington, M., Airehrour, D., Cameron-Brown, D., Lu, J., Xu, Q. & Stokes, A. (2021). Intrapreneurship in the Time of COVID. In Proceedings Unitec Research Symposium Proceedings publication, Auckland.
- 06 Cherrington, M., Airehrour, D., Lu, J., Xu, Q., Cameron-Brown, D., & Dunn, I. (2020, November). Features of Human-Centred Algorithm Design. In *2020 30th International Telecommunication Networks and Applications Conference (ITNAC)* (pp. 1-6). IEEECherrington, M., Airehrour, D., Lu, J., Xu, Q., Wade, S., & Dunn, I. (2020b, November). Indigenous Big Data Implications in New Zealand. In *2020 30th International Telecommunication Networks and Applications Conference (ITNAC)* (pp. 1-6). IEEE.
- 07 Cherrington M., Airehrour, D., Madanian, S., Lu, J., Xu, Q., & Artiushkina, P. (2021b). Remuneration Review: Risk, Planning, and Modelling beyond the Covid Crisis, In *ISCRAM Asia Pacific 2021 Proceedings-4th International Conference on Information Systems for Crisis Response and Management Asia Pacific*. Wellington.
- 08 Cherrington, M., Dunn, I., Airehrour, A., (in press). (2020c). Cracking the Covid-19 Code: Cutting-edge Collaboration. Scope: Contemporary Research Topics (Health and Wellbeing), 2021.
- 09 Cherrington, M., Lu, J., Xu, Q., Airehrour, D., & Wade, S. (2021). The digital asset management microcosm: a high-dimensional New Zealand view. *International Journal of COMADEM*, 24(2), 21-27.
- 10 Cherrington, M., Lu, J., Xu, Q., Airehrour, D., & Wade, S. (2021). Deep learning for sustainable asset management decision-making. *International Journal of COMADEM*, 24(2), 35-41.
- 11 Dewey, J. (1956). *The Child and The Curriculum and the School and Society*. University Press, Chicago, IL.
- 12 Din, F. S., & Wheatley, F. W. (2007). A Literature Review of the Student-Centered Teaching Approach: National Implications. In *National Forum of Teacher Education Journal* (Vol. 17). Economic inequality by gender. (2021). Our World in Data. <https://ourworldindata.org/economic-inequality-by-gender>
- 13 Fink, L. D. (2013). *Creating significant learning experiences: An integrated approach to designing college courses*. John Wiley & Sons.
- 14 Ganeshan, K. (2010). *Providing an Effective and Efficient Learning Environment: Meeting the Challenges of Multiple Diversities*.
- 15 Ganeshan, K. (2021, July). Successfully Facilitating Learning during Covid-19 Lockdowns. In *EdMedia+ Innovate Learning* (pp. 654-659). Association for the Advancement of Computing in Education (AACE).
- 16 Global Partnerships. (2021). *Global partnerships are a part of via's DNA*. Study at VIA University College | VIA. <https://en.via.dk/global-partnerships>

- 17 Handelsman, J., Ebert-May, D., Beichner R., Bruns, P., Chang, A., DeHaan, R., ... & Wood, W. B. (2004). Scientific teaching.
- 18 Hayward, F.H. 1905. The Educational Ideas of Pestalozzi and Froebel. Ralph, Holland and Co, London.
- 19 Hodson, K. K. (2002). Student-centered teaching: Refiguring the center. (ERIC Document Reproduction Service No. ED465167).
- 20 Hoidn, S., & Klemenčič, M. (Eds.). (2020). *The Routledge International Handbook of Student-Centered Learning and Teaching in Higher Education*. Routledge.
- 21 Järvenoja, H., Järvelä, S., & Malmberg, J. (2015). Understanding regulated learning in situative and contextual frameworks. *Educational Psychologist*, 50(3), 204-219.
- 22 Klemenčič, M. (2017). 'From student engagement to student agency: conceptual considerations of European policies on student-centered learning in higher education', *Higher Education Policy* 30(1), 69-85.
- 23 Lubicz-Nawrocka, T. (2017). Co-creation of the curriculum: Challenging the status quo to embed partnership. *The Journal of Educational Innovation, Partnership and Change*, 3(2), 1-14.
- 24 Mann, S. (2011). *The Green Graduate: Educating Every Student as a Sustainable Practitioner*. New Zealand Council for Educational Research. PO Box 3237, Wellington, New Zealand.
- 25 Matthews, F. (2014). *Graduating a Sustainable Practitioner – From new student to sustainable practitioner-the educators role*. [www.op.ac.nz/assets/Sustainability/7c3795f4e2/Graduating-a-Sustainable-Practitioner-Research-Project-by-Francesca-Matthews-August-2014.pdf](http://www.op.ac.nz/assets/Sustainability/7c3795f4e2/Graduating-a-Sustainable-Practitioner-Research-Project-by-Francesca-Matthews-August-2014.pdf)
- 26 Oyelana, O., Martin, D., Scanlan, J., & Temple., B. (2018). Learner-centred teaching in a non-learner-centred world: An interpretive phenomenological study of the lived experience of clinical nursing faculty. *Nurse education today*, 67, 118-123.
- 27 Pace, B., & Cherrington, M. (2020). ANALYTICS FOR MANAGERS. Scope: Contemporary Research Topics (Learning & Teaching), (9).
- 28 Radvila, G., & Šilingienė., V. (2020). Designing remuneration systems of organizations for sustainable HRM: the core characteristics of an emerging field. *International journal of human resource studies*, 10(2), 252-279.
- 29 Sangpikul, A. (2017). Implementing academic service learning and the PDCA cycle in a marketing course: Contributions to three beneficiaries. *Journal of Hospitality, Leisure, Sport & Tourism Education*, 21, 83-87.
- 30 Shukla, R., & Ganeshan., K. (2011, October). Living Curriculum: Computing Education. In *E-Learn: World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education* (pp. 404-413). Association for the Advancement of Computing in Education (AACE).
- 31 Taherdoost, H., & Keshavarzsaleh., A. (2015). A theoretical review on IT project success/failure factors and evaluating the associated risks. *Mathematical and Computational Methods in Electrical Engineering*.
- 32 The Faculty Lounge. (2020, August 4). Redirecting; <https://academic.hbsp.harvard.edu/thefacultylounge8-4-20>
- 33 Thorneycroft, S. (2020). Maybe it's us: Imagining Organisational Learning Design. In S. Gregory, S. Warburton, & M. Parkes (Eds.), *ASCILITE's First Virtual Conference. Proceedings ASCILITE 2020 in Armidale* (pp. 90-94).
- 34 Zaffron, S., & Logan, D. (2011). The three laws of performance: *Rewriting the future of your organization and your life* (Vol. 170). John Wiley & Sons.
- 35 Zhang, Zuochen., Bayley, Jonathan. G. (2019). Peer Learning for University Students' Learning Enrichment: Perspectives of Undergraduate Students; *Journal of Peer Learning - Volume 12, Issue 0*, pp. 61-74 - published 2019-01-01.
- 36 Zhukov, Y., & Cherrington, M. (2020). Modelling Sustainability for a Green Circular Economy. Scope: Contemporary Research Topics, 9.

## APPENDIX

Figure 1 App 1 - Hybrid Software Development Methodology

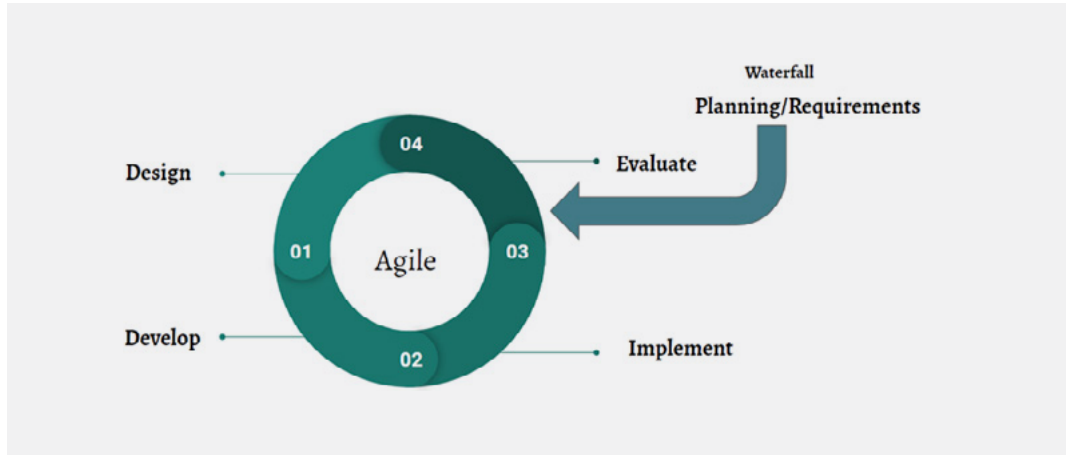


Figure 2 App 2 - Sample Chart Produced by the SIOF Application

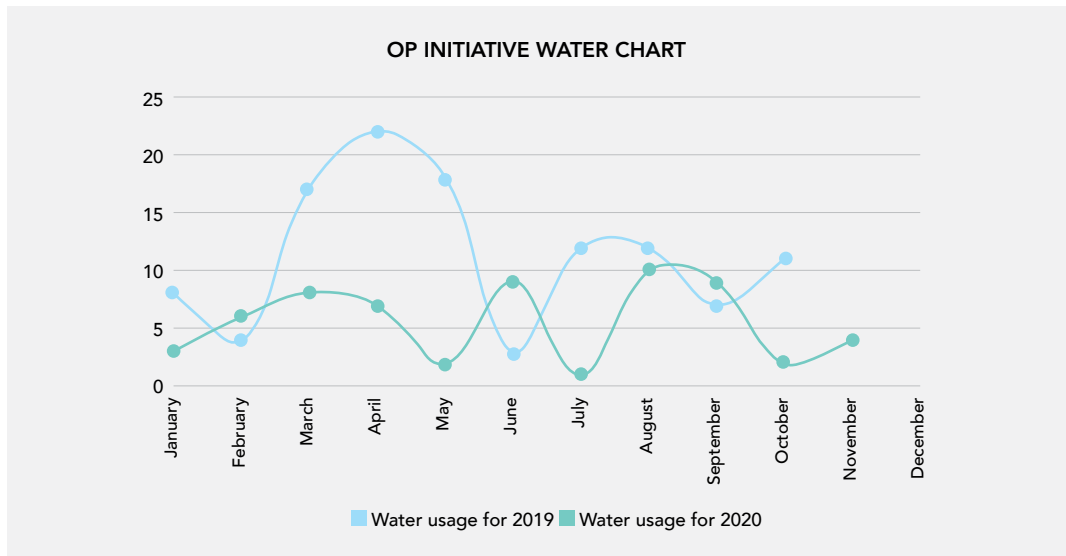


Figure 3 App 3 - Web Application to Promote Sustainable Practices at OPAIC - Overview

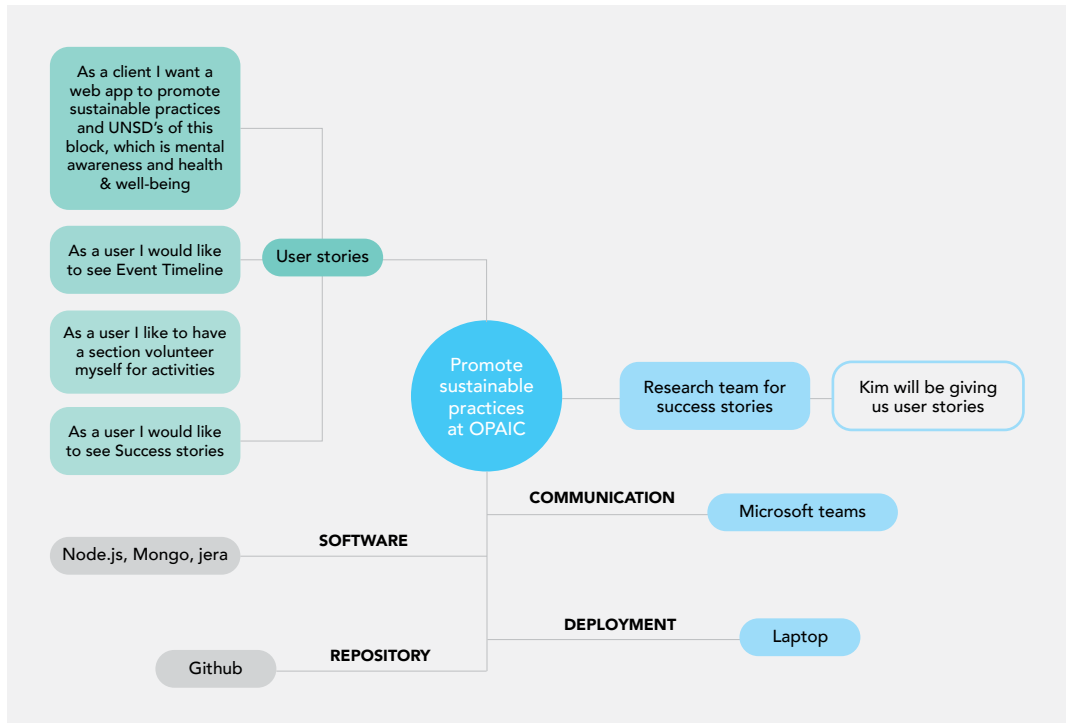


Figure 4 App 3 - Web Application to Promote Sustainable Practices at OPAIC – Project Features

