Reach-Out Project: Bridging Classroom and Society for TVET Sustainable Development

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Abstract

To meet today's intensively competitive and global marketplace challenges, education providers need to produce a dynamic teaching and learning approach that is at par with the global requirements. Reach-Out Project: Bridging Classroom and Society is an initiative that is carried out to develop students who are holistic and balanced, and who are readily marketable once they graduate. This project is an adaptation that emerged from the idea of constructivist, Conceive-Design-Implement-Operate (CDIO) education model and the 21st Century Learning Framework which are aligned with the direction of IR4.0 and Society 5.0 that are closely linked to the Malaysian TVET framework. The Reach-Out Project focuses on teaching and learning in real-world and real-time practice in the real-context of the community. Subsequently, the project engages students to active learning that is aligned with clear learning outcomes, integrated curriculum strategy, integrated learning experience, design-implement experience and skills assessment which are applied through teamwork and collaboration in order to develop in-depth content insights and competencies. Reach-Out Project requires students to be actively involved in the process of teaching and learning – an approach that has moved from the conventional mode of one-way instruction to a more dynamic implementation, whereby students directly interact and collaborate with various people at different levels to find issues and solve them in teams. Consequently, the delivery method has transformed from simulated-problem-based projects in the classroom to a dynamic approach of real-life problem-solving with societal-based projects set in a real-context of community. For sustainable development, this initiative aims to redesign the delivery method to provide a dynamic practice and integrate activities to obtain optimum practice and time for effective TVET practices.

Keywords: dynamic teaching and learning, integrated learning experience, skills assessment.

1.0 Introduction

Reach-Out Project: Bridging Classroom and Society (R'Project) is a transformative delivery method – an initiative that is implemented in the process of teaching and learning (T&L) for the program: Bachelor of Design in Visual Communication and New Media with Honours (BVC) in Politeknik Ibrahim Sultan, Malaysia. The initiative is executed intentionally to gain optimum and effective learning outcomes for achieving the objectives of outcome-based-education (OBE) implementation. According to OBE concept, the education process should be based on the realization of students' specific learning outcomes and creates opportunities that enable and encourage all students to achieve those essential outcomes in the educational system (Wang & Ning, 2018; William G. Spady, 1994). Similarly, students can realize the expected results in the process of learning. In other words, the implementation of the OBE concept can effectively transform the orientation of T&L goals, changing from teacher-centered to student-centered, and the quality control is a continuous improvement process within the practice.

Therefore, the objective of this study is to seek assurance of whether the R'Project, particularly on the aspect of bridging classroom and society could become a model practice for TVET sustainable development for polytechnic Malaysia. The respective students in BVC, who were actively involved in dynamic real-life problem-solving and societal-based projects, at the same time, engaged with several parties or agencies for their work interaction as early as in the beginning of their project were observed and investigated. The study is realized by exposing the BVC students to the real communication, coordination in team and collaboration of work practices during the process of T&L. Stakeholders and the institution's management, on the other hand, were also taken part in the process of T&L, instead of a common practice of T&L that was conducted solely by courses' lecturers. It is after all, a T&L process that has a nice blend between theories, practical and real-work-experiences.

2.0 Background of the initiative

The program, Bachelor of Design In Visual Communication & New Media (BVC) is designed to prepare students to pursue responsibilities in the related fields of visual communication and new media through a blend of coursework, research, entrepreneurship and projects. Interpersonal skills and a strong background are especially gained through the Work-based Learning (WBL) approach. The program's dynamic combination of specialist knowledge and skills prepares graduates for the challenges of creative thinking that are demanded by today's intensively competitive and global marketplace. The course encourages the development of concept, research, experimentation, analysis and critical awareness, which combines creativity and digital

technology knowledge and skills to develop excellent visual communication design and new media projects.

The program design is based on the National Education Philosophy of Malaysia and 10 Surge of Malaysia Education Development Plan 2015 – 2025 (Ministry of Education Malaysia, 2015). In 2015, BVC Program was selected and ordered by the Department of Polytechnic and Community College Education (DPCCE) to implement an integrated approach of the delivery method based on CDIO Education Model (JPPKK, 2018). To initiate the CDIO implementation, a framework of Reach-Out-Project: Bridging Classroom and Society (R'Project) was emerged and carried out.

The implementation chronology is started from September 2015: A pilot test of CDIO implementation – The R'Project was carried out based in Kampung Parit Bugis, Muar, Johor. The project focused on the Rebranding of Kampung Parit Bugis, covering the promotion of the village (Kampung Parit Bugis), the village's services and products packages. The rebranding packages include website, short documentary video, homestay and agriculture activities packages, local food products' packaging design and promotional merchandizes. The next implementation was conducted in September 2016: The R'Project was extended to another community, which was Rebranding of Kampung Belukar Durian in Sedili Kecil, Kota Tinggi, Johor – a recreation park meant for adventure, leisure and edutainment activities and outdoor curriculum lessons. Then follow by The R'Project: The City of Melaka – A heritage-based promotional project to recapture the cultural and heritage highlights in September 2017. The R'Project has started since 2018 till current year is conducted in Johor, of which based on the state's cultural and heritage foci to promote Johor for the perspective of tourism Malaysia.

3.0 Rationale of the initiative

The main issues that triggered to construct this R'Project initiative for the teaching-and-learning (T&L) of BVC program besides the authority order from DPCCE, are: (1) several industry reports indicate that there is a mismatch in academia and industrial needs in terms of developing creative contents (creative developments in the creative industries), problem-solving (critical thinking skills) and soft skills (communication and collaboration skills) in graduates; (2) over testing and heavy workload in students' assignments and assessment; (3) heavy delivery and assessments workload for lecturers and (4) students are difficult to relate or link their studied knowledge to the application of projects or to real-life practices. Aspects of critical thinking is very important and is a part of the 21st century necessary skills needed. 21st Century Learning and Innovation Skills inculcated, are:

a. Heightening students' Collaboration at a different level of stakeholder: authority/agency, management, lecturers, students' peers and community.
b. Engaging students' Critical Thinking in identifying issues, then solving them.
c. Deploying students' Creativity to generate or produce solutions.

d. Developing students' Communication Skills in discussing issues and problems with the stakeholders. English modules are integrated here and it plays an important role in supporting the students' write up, presentation, interaction and pitching requirements.
e. Instilling students' Social Cross-Cultural Skills and Responsibility for taking part in the community's life-changing events/projects.

Saptuti Susiani, Salimi, and Hidayah (2018) also pointed out that critical thinking is defined as the ability to think logically, reflectively, systematically, and productively, applied in judging a situation to make appropriate consideration and decision. It is a process of making reasoned judgments based on the consideration.

Besides the above, the current model of education has moved from STEM to STEAM – a model that emphasizes Science, Technology, Engineering, Arts and Mathematics. Thus, the urge for the BVC team to look for an alternative in delivering method as well as a project framework or a platform that able to allow these 5 elements of STEAM to be practiced has increased. Critical Thinking, Communication, Collaboration, Creativity (4Cs) – A 21st Century Learning and Innovation Skills, which are the key skills needed to pursue further in order to lead to the success of meeting IR4.0, are indeed needed to be considered and put into the plan of finding alternative T&L implementation (Geissbauer, Vedso, & Schrauf, 2016; Halvorsen, 2018) To resolve the aforementioned issues, initiative of R'Project, particularly the redesigning of delivery method to provide a dynamic practice for OBE; integrating activities to obtain optimum practice and time; and collaborating to get link and connection with real content, people and situations are aimed to achieve the objectives. There are (1) to enhance the teaching delivery methods to develop holistic and quality TVET graduates based on the PPPM(PT) 2015 – 2025 to meet the National Education Philosophy; (2) to optimize resources and efficiency in the learning process; (3) to strategize resources for efficient teaching process and (4) to enhance students' capability in thinking intellectually and managing learning activities.

4.0 The theoretical framework

R'Project initiative is an adaptation that emerged from a few educational concepts, model, framework and elements. This includes the adapted idea of Constructivist; Conceive-Design-Implement-Operate (CDIO) Education Model; P21 Century Learning Framework in alignment to the direction of IR4.0; and the Society 5.0 concerns in humanities and societies. This emerged framework is illustrated in Figure 1. The new emerged framework of R'Project requires stakeholders to actively take part in the process of T&L, breaking through the conventional method of one-way teaching approach into communicative, interactive, collaborative and integrative mode of T&L by several parties. This includes students, lecturers, institution's managements, authorities/agencies and communities. Thus, the initiative bridges the classroom activities and society practices within the process of T&L.

Learners are put in the context or search for subject matter in the society, and societal-based-problem scenario. Issues are redefined; awareness,

concerns and insights are gained, and solutions are developed. In short, students reach out to the society in this project. As a result, this allows space for empathy and responsibility to the society (Society 5.0 concerns) – the key playing constituents for the overall problem-based and project-based T&L process. The R'Project Framework starts from adapting CDIO education model. An education that emphasizes the fundamentals, set in the context of Conceiving – Designing – Implementing – Operating (CDIO) systems and products (Vo & Nguyen, 2017). Based also on the constructivist's perspective, fundamental elements are developed at the early stage of learning and are carried out throughout the journey of real-life practice. These fundamentals are implemented alongside the aforementioned CDIO model.

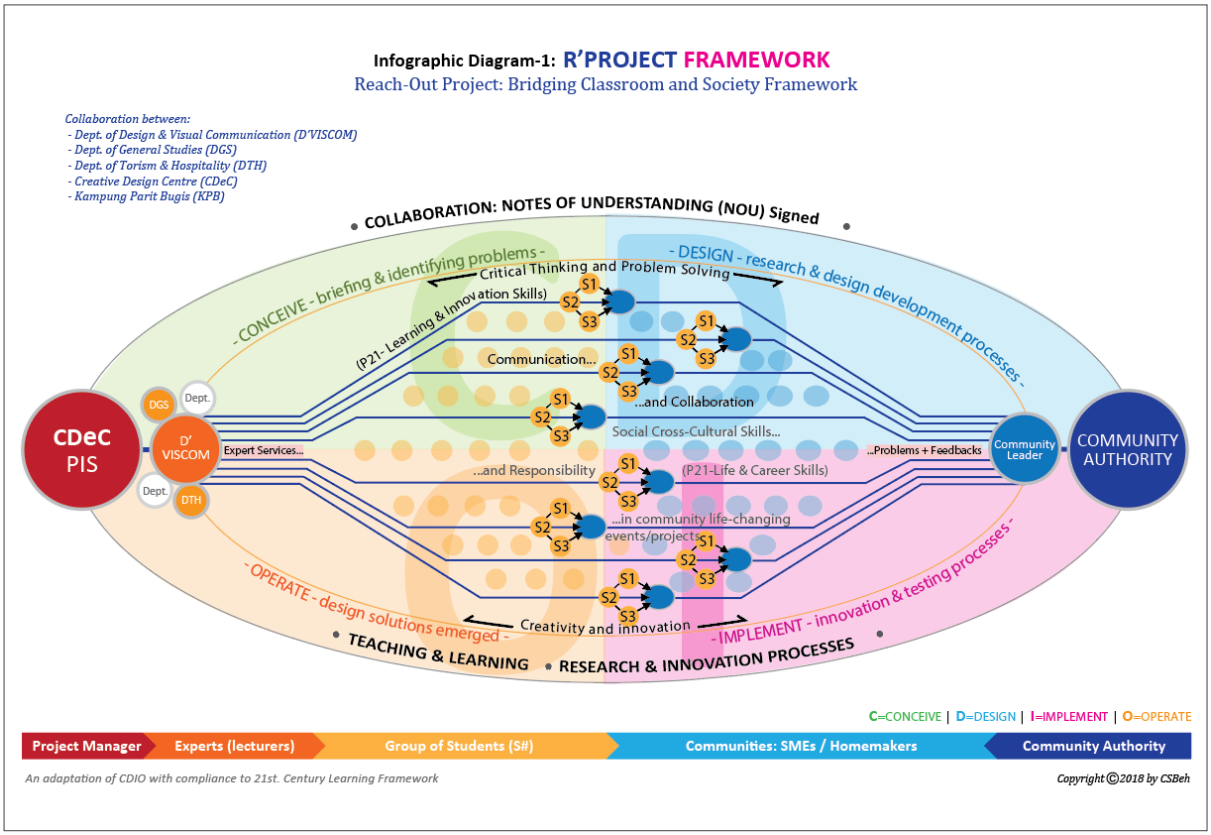

Figure 1: R'Project framework

The implementation of R'Project focuses on T&L in a real-world, real-time practice and also set in a real Context of community with Active Learning and real expected Learning Outcomes (a societal-problems-based project through empathy and experiential learning). Extensive research has clearly documented that active learning strategies are generally more effective than traditional lecturing methods for promoting a wide range of desirable educational outcomes and including increased student learning (Tharayil et al., 2018). Furthermore, Integrated Curriculum and Integrated Learning Experience (between 5 courses); and Design-Implement Experience and Skills Assessment (in Design Project) are applied to gain teamwork, collaboration

and content development insights and competencies. Today's, 21st century skills is one of the most ubiquitous terms in education. Proponents point to a new workforce reality that demands a next generation of college students and workers who are independent thinkers, problem solvers, and decision makers. These skills are also compliant to the 21st Century Learning Framework. The above highlighted terms are all key-words or standards of the CDIO education model.

The Project Brief learning outcomes (LOs) provides the basis and guidance for the framework implementation. Besides that, the collaborative and community-based engagement are employed to meet the P21: 21st Century Learning and Innovation Skills, Life and Career Skills; and the concerns of Society 5.0. Thus, a new framework of Reach-Out Project: Bridging Classroom and Society emerged. The approach of the R'Project, which shows effective learning outcomes, is practical to implement in order to sustain the development in Technical and Vocational Education and Training (TVET) in Malaysia.

5.0 Implementation methodology

CDIO approach is not limited only to the engineering field. Applying CDIO approach in a non-engineering context is particularly effective, especially in product- and design-based program's teaching and learning methodology (Tangkijviwat & Sunthon, 2018). The R'Project implementation methodology begins with several essential plans such as: (1) identify which course content could best be integrated; (2) map the learning outcomes from each course; (2) map the course assessment requirements based on the Assessment Specification Table (AST) in the syllabus; (3) and make a master assessment plan so that to verify the timing needed or practicality of each assessment meet the integrated courses requirements. The courses involved in R'Project include: BVC5143 Visual Research Methodology, BVC5125 Culture, Identity & Communication, BVC5135 Brand Communication & Strategy, BUE3023 English For Design, BUE3053 English For Tourism & Hospitality, and BVC6156 Design Project (Table 1).

Table 1: The courses involved and the mapping of the course learning outcomes (CLO)

Learning Outcome / Courses Involved	CLO1	CLO2	CLO3	CLO4	Program Learning Outcome (PLO)
BVC5143 Visual Research Methodology		Demonstrate a critical understanding of several areas of	Demonstrate the ability to select visual research themes,		PLO 2, 4, 6 & 8

		Visual Culture that enable application of analysis, evaluation and reflection in any graphic design field (P5, A3).	analyze and professional initiative in a range of well-structured, coherent and creative forms (P5, A3).		
BVC5135 Brand Communica-tion & Strategy	Analyze the elements, types, functions, and branding strategies (C4).	Create brand communica-tion and strategies to fit specific situations or problems (C6, P7, A4).	Manage a brand concept and build an appropriate brand communica-tion plan (C6, P5, A5).		PLO 2, 3, 4 & 6
BVC5125 Culture, Identity & Communica-tion		Display the effectiveness of communica-tion design in using the conceptual and theoretical communica-tion tool (P5, A5).	Demonstrate an in-depth understandi ng towards the factors influencing visual elements and examine how aesthetic ideas travel across cultures (P5, A4).	Display the understan ding of the impacts and importanc e of design in society (P5, A5).	PLO 2, 3, 4, 5, 6 & 8
BUE3023 English For Design		Write design briefs pertaining to client needs and expectation (C6, A5).	Explain and justify product designs using presentation skills in a convincing manner (C5, A4).	Listen and respond to comments and feedback by explaining, justifying and persuading the clients	PLO 1 & 3

				effectively (C5, A4).	
BUE3053 English For Tourism & Hospitality	Describe tourism and hospitality products and services using appropriate language in commercial texts such as travelogues, brochures, articles, etc. (C6, A3).				PLO 3 & 9
BVC6156 Design Project	Analyze critically (C4) and verbally express (A3) the trends of technology in relation to the aspects of legal, moral, practical and aesthetic in new media and visual communica -tion internalizin g (A5) relevant elements and principles of design	Create meaningful and purposeful (C6) design projects through series of conceptual development (C6), manipulatio n and integration (P5, P6) of new media techniques, design Principles and practices to attain effective art direction.	Integrate (A4) information from diverse media sources into the design problem-solving within The process of project development .		PLO 1, 2, 3, 4, 5, 6 & 8

	with social values.

5.1 Data collection

R'Project integrates LOs which infuses the CDIO skill sets; Learning and Innovation Skills with Life and Career Skills advocated by Partnership for 21st Century Skills. CDIO skill-sets applied, include: (1) Disciplinary Knowledge and Reasoning; (2) Personal and Professional Skills and Attributes; (3) Interpersonal Skills of Teamwork and Communication; and (4) Conceiving, Designing, Implementing and Operating System in the Enterprise, Societal and Environmental Context.

The data collection and analysis starts from the R'Proect initiative's constructive alignment to the CLOs of the six courses, and it has initiated through the following seven steps:

Table 2: Seven steps to constructively aligned to the expected outcomes

Step 1:	Identify learning gaps within the CLOs
Step 2:	Identify each course intents to find possible integrated partner(s)
Step 3:	Check relevancy of assessment task to nail down courses that can be integrated
Step 4:	Plan the Project collaboratively with Creative Design Centre (CDeC) and the clients' group
Step 5:	Create Project Brief aligned CLOs of the 6 courses to provide Notes of Guidance
Step 6:	Implement the project according to the Project Brief: Research and Case Study to be carried out and extended to a Design Project.
Step 7:	Assess the implementation and outcomes of the project

The above steps help to derive data for the findings of Students Learning Time (SLT) and workloads of each course, which is based on the stated assessment tasks in the Assessment Specification Table (AST) in those respective courses syllabi. Besides, there were records or documentations of lecturers' close consultations, monitoring and observations through out each student's work progress during the R'Project implementation. Students' academic achievements at the end of each semester were collected to be analyzed. Whilst, BVC students at semester 7 and 8 were attached to companies in relation to their field of study, which was based on each student choice of interest during their semester 5 (started from the beginning of the R'Project). The same interest area of study was later continued to be carried out in their semester 6. The attachment program is called work-based-learning (WBL) – a structured-learning program in BVC. Apart from the monitoring lecturer's evaluation on specific knowledge and skills, employers' technical skills evaluation, appraisers and feedbacks on the students' WBL overall performances were collected for the partial marks of WBL, as well as

become the evidence for students' technical and soft skills data for analysis. Data on cost spent in the R'Project was also used as to compare with previously used conventional method which is not an integrated CDIO model.

5.2 Samples

A total of 50 students were involved in the first pilot study of R'Project. The samples students include Stage-1: BVC5 (20 students) and BTH5 (30 students); and at Stage-2: BVC6 (20 students). They were a purposive sample as well as a coincident sample, in that they represent students in 2 different academic backgrounds – one is design-based (BVC) group and the other is tourism and hospitality-based (BTH) group. Students from Bachelor of Science (Hons) Tourism and Hospitality Management (BTH) were initially coincident samples as their English lecturer happened to be the same person for the 2 groups, and of the 2 different English courses, which partial of the CLOs had been identified to be able to complement each other learning outcomes if they were putting in the same context of study. On the other hand, the BVC6 group at Stage-2: was in fact the same sample group of BVC5. It was just BVC5 moving from semester 5 to semester 6 (the next level of study), while the R'Project has continue to the next stage, in completing the measurement of students' progress to end design product out-put.

The R'Project has an impactful real-world practice for true learning. Students samples are exposed to societal issues and to solve society problems, with the intention to provide a balanced socio-economy, or give impact to increase well-being, happiness, etc. – an introductory exposure and experience for students to face the Society 5.0. Students are mentally, physically and affectively rooted in the implementation of R'Project.

It begins with a homestay experience at the identified group of community, gathering comprehensive socio-economic data and information through an in-depth research and case study in real scenario (in groups), and collaboratively engaging with stakeholders. The findings are further studied, identified and defined into issues in teams, then individuals have to propose solutions in the form of Creative Brief (a proposal) and mocks for new products. Next, Testing and gathering feedbacks are done to further improve the design ideas until finally prototypes are developed for evaluation and dissemination. At a later stage, the final designed product(s) or prototype(s) is given to CDeC for further commercialization, who serves as the collaboration coordinator and project management team in this R'Project.

5.3 Data analysis

All data collected were analyzed based on the students' academic and soft skills achievements, which were focused on any significant changes in the 3 main learning properties: Cognitive, Behavioral and Affective. Within this R'Project implementation, the samples (learners) were engaged actively in cognitive, behavioral and affective development and exploration at various stages (Table 3).

Table 3: Integrated learning experiences (cognitive, behavioral and affective)

Project development stages	Integrated learning experiences		
	Cognitive	Behavioral	Affective
Stage-1: **C**	Conceiving and identifying problems: Getting in-touch to the product/services through:		
	Comprehending the Project Brief, and defining clients' problems	Stay in Homestays in the community	Gain experience and feeling
		Explore (to see) the community environment	Gain motivation and inspiration of ideas
		Socialize with the community and get to know their lifestyle	Gain awareness of lifestyles, social economy, as well as responsibility for the society
Stage-2: **D**	Designing process: Research and design development		
	Further defining problems, ideations, and design development	Do a lot of sketches (to trigger ideas)	Propose mood board
		Consultation and feedbacks with lecturers and clients for progress development and checking – UX (User Experience)	Respond to the lecturers' and clients' feedbacks
Stage-3: **I**	Implementing the development: Innovation and testing		
	Identify main design features and strategies	Produce mock design	Gain insights
		Testing the mock and feedbacks – UX	
Stage-4: **O**	Operating: Final design solutions and dissemination		
	Pre-commercial plan	Produce prototype	Establish design solutions
		Exhibit final prototype	

Pitching

6.0 Findings and discussion

Evidence of learners' engagement in R'Project, namely in the aspects of cognitive, behavior and affective properties are as stated in Table 4.

Table 4: Evidence of learners

Cognitive	Behavioral	Affective
Research and Case Study analysis and findings	Research and Case Study data collections	Reflective Journal with Mood Board
Creative Brief	Sketches/Communicative Drawings	Collaborative Review and Reflection Rubric
Design development and Consultation	Industrial appraisers and Feedbacks	

Conventional method does not fully measure student's ability specifically in planning the project developments. Commonly, merely based on the instructions from lecturer, students can only work on the instructions given and provide the results of the assignment and according to their own limited understanding. Projects are developed and produced solely through assumptions of client's needs. Through the implementation of R'Project method, students are now able to provide a clear and well-planned project plan according to the needs and requirements of the clients' socio-economic setting. Academic achievement based on learners' capabilities in R'Project implementation are as described in Table 5.

Table 5: The impacts of R'Project implementation on students

Without R'Project	With R'Project
● Project is conducted only in classroom. ● Students worked in silo without any collaboration with real clients. ● Did not fully measure student's ability specifically in planning the project developments in detail.	● Project is based on the real issues. ● Student had an opportunity to work with real clients and collaborate with the real industries for the whole project. ● Allow students to show their ability especially in project planning and management in detail (based on students' project proposal and planning).

● Students only provide the results of the assignment and work on the instructions given according to their own understanding. ● Students managed to obtain only grades from their assignments.	● Students are able to provide a clear and well-planned project according to the needs and requirements of the clients. ● Students managed to obtain communication skills, teamwork, and collaborative skills; apart from grades (based on students' case study, clients' feedbacks and project development progress and consultations records).

R'Project has motivated learners in various aspects. Among them are their motivation to communicate and increase confidence to meet future tasks. They were also excited and motivated to enter Work-based Learning (WBL) and to link their knowledge with real world practices (video link: https://youtu.be/aur03WyTd44 & https://youtu.be/SLWn5F6bMKk). Employers who have taken our students for WBL claimed that these students have worked well in teams and contributed valuable ideas during projects and discussions. Furthermore, the employers also praised students' communicative skills and their ability to solve problems as well as integrate ideas during design development process. These results were derived from the employers' evaluations and appraisers' forms, which were done in 3 stages monitoring during the duration of WBL.

7.0 Conclusion

R'Project Framework has been extended to the implementation of a few projects collaborated and managed by Creative Design Centre (CDeC). This involved several integrated courses, either in the model of intra-program or inter-program within the Design and Visual Communication Department together with Department of General Studies. A list of projects, participating courses, programs and integrated model are summarized in Table 6. These integrated implementations of the projects show that R'Project initiative is practical, useful and scalable to be applied in any project- and/or problem-based T&L processes. A quick view on this R'Project can be retrieved from: https://youtu.be/laV0lYJ6sWo.

Table 6: Projects carried out using the R'Project framework with several integrated courses

Projects	Semester	Integrated courses	Integrated model
Wetland Rebranding Project	5	Visual Research Methodology Culture, Identity & Communication Brand Communication & Strategy	Intra-Program (BVC)
	3	Communication Illustration Information & Interface Design	
Melaka Heritage Project	5	Visual Research Methodology Culture, Identity & Communication Brand Communication & Strategy English For Design	Intra-Program (BVC)
	3	*Hubungan Etnik* Communication Illustration Information & Interface Design	
Johor Heritage Project	5	Visual Research Methodology Culture, Identity & Communication Brand Communication & Strategy English For Design	Intra-Program (BVC)
	3	Communication Illustration Information & Interface Design	
Industrial Design 4 Project	5	Industrial Design 4 Digital Illustration Advanced 3d Computer Modelling (Catia V5)	Intra-Program (DRI)
Industrial Packaging Design	4	3D Computer Modelling (Solid Work) Packaging Design	Inter-Program (DRI & DRG)

There is also a significant measure in cost, student-learning-time and coursework load can be seen in R'Project implementation, involving 3 main courses; BVC5153 Brand Communication & Strategy; BVC5125 Cultural,

Identity & Communication; and BVC5143 Visual Research Methodology (Figure 2).

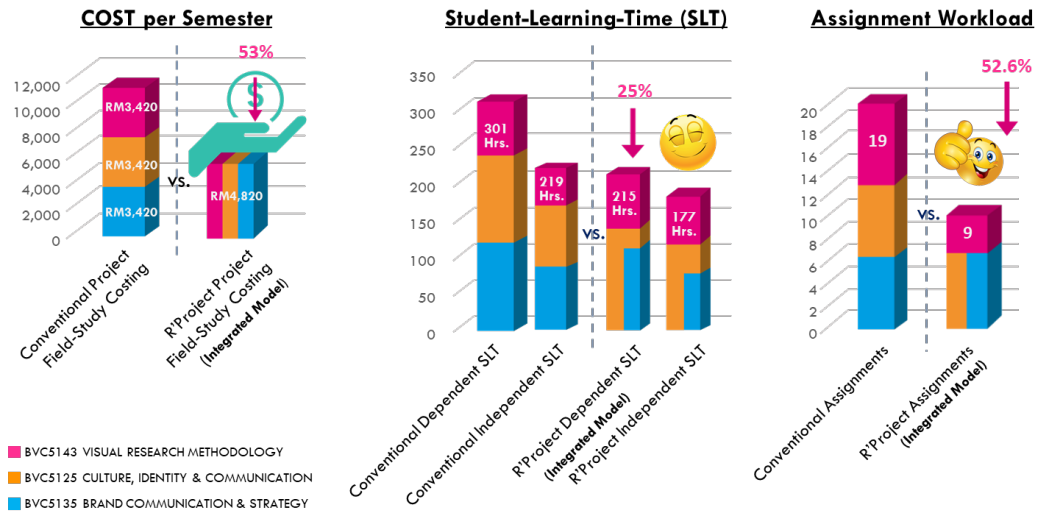

Figure 2: A significant measure in cost, student-learning-time and coursework load

Cost Effective: Each field study will cost about RM3,420.00 and a total of RM13,260.00 is needed to implement it individually. With this R'Project integrated approach the cost is significantly reduced to RM4,820.00, which saved RM8,440.00 (by comparing cost spent during the implementation of R'Project and cost spent in previous years of conventional method).

Student-Learning-Time (SLT): Allocation for dependent learning (DL) time for 3 courses is 301 hours. However, through integration, the time recorded was only 215 hours of DL student learning time. Time needed for BVC5153 was reduced to one fourth of total SLT time. Whereas the SLT for Independent Learning (IL) needed only 177 hours for 3 courses as compared to 219 hours allocation for 3 separate IL. Coursework Load: A very significant quantity of coursework load is reduced from 19 works to only 9 works. Overloaded coursework is known to affect the quality of students' work output. However, with R'Project approach, student workload was substantially reduced to a very significant measure. Hence, students have more time focusing on the substance of the tasks and producing more quality output. Both SLT and AST measurements were derived from the identifying stages as described in Table 2.

This R'Project model might be not as easy as it has been described above and to be implemented without a very good plan with a very committed team members of faculty(ies). It will be a limitation due to its complicated and curriculum alignments, schedules of courses timetables and assessment alignments within courses.

Nevertheless, if this model could be well planned and implemented constructively, it would be a good platform for: (1) knowledge transfer to community; (2) increasing values of innovation, particularly if it was possible

integrated between the design-based and engineering-based students' projects; and (3) building a base for pre-commercialization. Therefore, it is to suggest that R'Project model to be tried out and further studied its implementation strategies, so that it could be better applied and further scalable in TVET system to benefit students, particularly in problem-solving, communication skills, design development in project-based T&L processes.

References

Geissbauer, R., Vedso, J., & Schrauf, S. (2016). *Industry 4.0: building the gigital enterprise*. Retrieved from www.pwc.com/industry40

Halvorsen, A. (2018). *21 st century skills and the " 4Cs " in the english language classroom by Andy Halvorsen*.

JPPKK. (2018). *Pelan Strategik Politeknik dan Kolej Komuniti 2018-2025*. Jabatan Pengajian Politeknik dan Kolej Komuniti.

Ministry of Education Malaysia. (2015). *Executive summary malaysia education blueprint 2015-2025 (Higher Education)*. Ministry of Education Malaysia (Vol. 2025).

Vo, N.V., Nguyen, D.M., N.-H. H. (2017). A case study of cdio implementation in the course of haking exposed at DUY TAN University. In *The 13th International CDIO Conference* (pp. 90–100).

Saptuti Susiani, T., Salimi, M., & Hidayah, R. (2018). Research Based Learning (RBL): How to improve critical thinking skills?.Retrieve from http://doi.org/10.1051/shsconf/20184200042

Tharayil, S., Borrego, M., Prince, M., Nguyen, K. A., Shekhar, P., Finelli, C. J., & Waters, C. (2018). Strategies to mitigate student resistance to active learning. *International Journal of STEM Education*, *5*(1).

Tangkijviwat, U., Sunthorn, W., N. M. (2018). CDIO-Based Curriculum Development for Non-Engineering Programs at Mass Communication Technology Faculty. In *The 14th International CDIO* (pp. 129–138).

Wang, X., & Ning, L. (2018). Research on higher education teaching model based on OBE. *Research (ASSEHR)*, *184*(Icesem), 1060–1063. http://doi.org/10.2991/icesem-18.2018.248

William G. Spady. (1994). *Outcome-based education: critical issues and answers*. *American Association of School Administrators*. Retrieved from http://files.eric.ed.gov/fulltext/ED380910.pdf