A Knowledge-based Service-learning Framework for Large-scale Community Projects in Higher Education

Full paper

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Hanlie Smuts [1][0000-0001-7120-7787], Martina Jordaan [2][0000-0003-0110-6600]

Department of Informatics,
University of Pretoria, Pretoria, South Africa
{hanlie.smuts[1], martina.jordaan[2]}@up.ac.za

Abstract. Service-learning that combines academic study with community service by giving students volunteer projects in community organisations provides a richer, more practical experience for students, while delivering benefits to the community. To achieve faculty, student and community goals, service-learning engagement must be closely aligned with the students' faculty experience and must be built on a sustainable, trusting relationship between the faculty and the community partner. However, current research that focuses on factors that create a supportive environment for service-learning is scarce, and this study aims to contribute a holistic approach for service-learning by considering the role players, their interaction goals and the knowledge conversion processes in service-learning. In this study, we designed a knowledge-based service-learning framework for large-scale community projects in higher education. We applied the framework by mapping it to a service-learning module from a higher education institution (HEI) using the elements of the framework as a guide, as well as proposing a conceptual architecture for the service-based knowledge management system (KMS). By using the knowledge-based service-learning framework and KMS architecture for large-scale community projects in higher education, service-learning designers can ensure that the service-learning solution enables strong support to the community, while students' knowledge and skills are enhanced.

Keywords: Knowledge Management System, Service Learning, Knowledge Exchange.

1. Introduction

Academic service-learning combines academic study with community service by giving students volunteer projects in community organisations, focusing on achieving academic goals for students and fostering meaningful, beneficial outcomes for communities [1, 2]. In addition, service-learning is regarded as a high-impact practice that improves student engagement, pointing to interaction and commitment among the community service-learning parties [3]. Attention to the nature of such a service-learning partnership is indispensable as the intent is for service-learning to ultimately have a positive impact on communities [3, 4].

The aim of service-learning design in the context of large-scale community projects is to explicitly ensure that academic course content and experiential learning create knowledge that students can access and apply in new situations [5]. Researchers established that service-learning and community-based experiences provide a rich context for learning [6, 7] and that prior knowledge is reframed into new understanding through reflection and active experimentation [8, 9]. Therefore, service-learning solutions should enable abilities such as active engagement, problem analysis, action orientation and reflection on the entire service-learning experience [5].

However, scholars have identified several problems with regard to academic service-learning programmes such as the transfer of homogenous, university-based knowledge only, a lack of academic development measurement, a low adoption of deeper learning approaches such as project-based learning activities, and limited research that examines the impact of reflection in service-learning programmes [1, 2, 7, 10]. Current research that focuses on factors that create a supportive environment for service-learning is scarce, and there is a shortage of empirical research in the service-learning field for countries outside the United States of America (USA) [3, 11, 12]. This study aims to contribute a holistic approach for service-learning [11, 13] by asking who the role players are and what interrelationships must be considered for service-learning design. It also aims to investigate the knowledge conversion principles that inform knowledge-based flows in a service-learning module. Therefore, the purpose of this study is to present a knowledge-based service-learning framework and conceptual architecture for large-scale community projects in a higher education institution (HEI). The purpose of such a framework and conceptual architecture is to outline the guiding principles and key structural elements, highlight the role players and interrelationships, and identify knowledge conversion and knowledge-based flows in a service-learning module.

Section 2 of this paper provides the background to the study and presents the role players, engagement goals, knowledge transfer and reflection as part of service-learning. The approach to this study is discussed in Section 3, while Section 4 provides an overview of the knowledge-based service-learning framework. Section 5 maps a community-based academic module to the knowledge-based service-learning framework to establish the proposed framework's suitability for holistic service module design and application. Section 6 discusses the findings and concludes the paper.

2. Background

According to Gelmon, Holland and Spring [4 : i], the definition of service-learning is "an educational methodology that combines community-based experiences with explicit academic learning objectives and deliberate reflection". Service-learning addresses the theory and practical application of teaching and learning through mechanisms such as community and volunteer service projects, work-based learning, field studies and internship programmes [11, 14]. Students who embark on service-learning as part of their academic studies encounter a rich, innovative form of experiential education, while simultaneously gaining academic knowledge and skills [4, 11].

The success of service-learning modules in HEIs depends on multiple factors and interrelationships as these institutions consider module design, implementation and assessment while engaging the community [4, 15]. Some of these factors include the HEI context, the student group involved, the community involved, and the desired learning outcomes [14]. It is also recognised that community engagement is a complex, multi-faceted process that involves relationships in, for and with communities [12, 14].

In the next sections, multiple factors, role players and particular interrelationships in service-learning are considered and an overview is provided of knowledge conversion in service-learning.

2.1 HEI Service-learning Role Players and Interrelationships

According to Bednarz et al. [14], three main parties are implied in service-learning in the community: the community group, the lecturer and the students. These three parties play different roles and arrange the structured interactions of service-learning [3, 15]. The HEI faculty and lecturer define the learning outcomes of the service-learning module, facilitate learning and provide structure and resources, such as a budget for transferring knowledge and skills, in which learning can take place [15]. The student spends time and effort towards service and reflection in order to learn through experience, obtain the required course credit, and achieve a sense of community responsibility [14, 16]. The community partner's role is to provide opportunities, mentorship and resources for students' learning over and above the service they receive from the students and faculty members [14, 17].

In the engagement between the lecturer and the community, some interaction goals include the fulfilment of service requirements and bridging the gap between the HEI and the community. The interrelationship goals between the community and the students point to developing solutions to solve real-word problems and facilitate skills transfer and experiential learning. The interaction goals between the students and the lecturer include bridging the gap between theory and real-world practice, curriculum guidance, evaluation and curriculum credits [14]. The oversight of engagement and exchange is facilitated through a service-learning plan and the realisation of strong relationships between parties [3, 15].

In the context of the different role players in service-learning, their interaction goals and their interrelationships, student learning is more meaningful, productive and enjoyable when the service-learning engagement is closely aligned with the students' faculty experience, and when there is a sustainable, trusting relationship between the lecturer and the community partner [18]. A key factor that reinforces the success of a service-learning initiative is the degree to which the needs and interests of all three role players in a service-learning context are considered and served [1, 18].

In this section, we reflected on the role players and interaction in a service-learning module, highlighting the impact on service-learning design and the interests of the different parties. Hence, the next section presents the considerations related to service-learning and knowledge conversion in the context of service-learning project design in an HEI.

2.2 A Knowledge Based Solution for Service-learning

Service-learning through experience takes many forms in an HEI, with the aim to increase knowledge and provide a service to the wider community [19, 20]. The role of an HEI in this instance includes the development of cross-boundary knowledge and requires new approaches to knowledge generation and transmission as students must be able to apply knowledge in and outside academic structures [8, 21]. Knowledge can be categorised as either being explicit (has been articulated) or implicit (less tangible, deeply embedded knowledge) [22, 23]. Tacit knowledge, as a dimension of implicit knowledge, is personal and context-specific, and therefore hard to communicate and formalise [23-25].

In order to act on information, students should internalise it and achieve this by progressing through knowledge conversion processes namely socialisation, externalisation, combination and internalisation. *Socialisation* ensures that knowledge is acquired, after which *externalisation* enables students to express their tacit knowledge (mental models and know-how) [26, 27]. *Combination* is the process of integrating concepts, while *internalisation* is closely related to learning-by-doing, or experiential learning. This process of knowledge application ensures that knowledge is advanced through practice, guidance, imitation and observation [21, 26]. Reflection offers a means by which the students understand and generalise their experience before, during and after the service-learning module. If considered as part of an HEI service-learning module, reflection supports students to surface tacit knowledge, therefore adding to their work-based learning experience [8, 19]. Consequently, service-learning design should include clearly delineated processes of knowledge conversion, reflection and evaluation [3, 28].

Furthermore, the knowledge management system enabling such a service-learning design, should be based on an architectural framework of knowledge transfer [29]. Knowledge management systems (KMS) are information technology based infrastructure implemented to support and enhance knowledge creation, storage, retrieval, transfer, and application [29-31]. Knowledge *creation* includes activities such as knowledge acquisition and knowledge capturing, while *storage* refers to the effective archiving and codification of knowledge. Knowledge *retrieval and transfer* allow the integration of different representational and communicational media, and *application* denotes the dissemination and utilisation of knowledge [30].

In the next section, we consider the attributes of existing service-learning models and frameworks in order to inform the knowledge-based service-learning framework.

2.3 Existing Service-learning Models and Frameworks

Scholars have identified the need to develop a more systematic approach to understand better, improve and substantiate the theory, practice and value of service-learning [3, 11, 12, 15, 32].

Bennett [3] developed a relationship-based, service-learning framework based on the exchange as a social process of relationship building. This framework considers relationship, objectives, scope, interaction structure, and outcomes, and offers a way for lecturers and their campus-community partners to navigate the service-learning

dialogue and develop meaningful relationships. Kiely [32] conducted a longitudinal research study that led to the development of a theoretical framework for explaining how students experience the process of transformational learning in service-learning. This service-learning model considered five conceptual categories that describe how students experienced transformational service-learning: contextual border crossing, dissonance, personalising, processing and connecting. These five learning processes enable lecturers to understand and foster learning processes that lead to transformative outcomes in service-learning. Konak, Clark and Nasereddin [33] illustrate how the stages of Kolb's experiential learning cycle of doing, feeling, watching and thinking may be applied as a framework to design hands-on activities. Molee et al. [34] evaluated a model of critical reflection for assessing student service-learning. This model comprises a three-step process: describing the service-learning experience, examining this experience in light of specified learning objectives for academic enhancement, personal growth and community engagement, and articulating their learning in their reflections.

Sudtho and Rajaphat [35] utilised a knowledge-based approach to encourage interactions between tacit and explicit knowledge for the creation of new knowledge. However, they focused on final-year students who were enrolled for language education. They implemented the knowledge-based approach in six steps: shared vision, free-writing, editing, sharing, talking to the expert and producing instructional innovation.

In order to establish how the service learning models and frameworks impact the knowledge-based service-learning framework, we mapped the elements of the service learning models and frameworks to the knowledge conversion processes as shown in Table 1.

Table 1. Knowledge conversion processes to service learning model and framework map.

Knowledge conversion process	Service learning model and framework element	References
Socialisation	community engagement, engagement with expert, interaction structure, objectives, relationships, scope, shared vision, watching	[3, 34, 35]
Externalisation	doing, experience description, outcomes, processing, sharing	[32-35]
Combination	connecting, dissonance, learning objective, examination	[32, 35]
Internalisation	contextual border crossing, feeling, personal growth, personalising, reflection	[32-34]

From the existing service-learning models and frameworks discussed in this section, it can be seen that many different variables and approaches are used to guide service-learning design. The approach of this paper is based on the notion of equally benefitting the faculty, students and the community, and ensuring that equal focus is given to the service being provided and the learning that occurs.

Before the knowledge-based service-learning framework for large-scale community projects in an HEI is presented, the research approach is discussed in the next section.

3. Reseach Approach

The objective of this paper was to design a knowledge-based service-learning framework for large-scale community projects in HEIs. The purpose of such a framework is to outline the guiding principles and key structural elements, highlight the role players and interrelationships, identify the knowledge-based flows and provide a conceptual enablement architecture.

In order to achieve this outcome, we followed an educational design research approach that can be defined as "a genre of research in which the iterative development of solutions to practical and complex educational problems also provides the context for empirical investigation, which yields theoretical understanding that can inform the work of others" [36 : 7]. Educational design research is predominantly concerned with developing practical knowledge that aims to improve educational practices [36, 37]. Educational practices are improved through iterative analysis, design, development, and implementation processes that are grounded in collaboration between researchers and practitioners in real-world settings [37]. Educational design research yields theories and practical educational interventions as its outcomes [38] and covers five characteristics [37]: theoretically orientated, interventionist, collaborative, responsively grounded and iterative [36]. Theoretically orientated refers to the application of scientific understanding to frame the research and shape the design of a solution to a real problem. The interventionist nature of educational design research strives to positively affect practice, bringing about transformation through the design and use of solutions to real problems. Educational design research requires collaboration among a range of role players who are connected to the problem being addressed. It also requires responsively grounded points to participant expertise, literature and field testing of the outcomes of educational design research that is structured to discover and explore the complex realities of teaching and learning contexts, and respond accordingly. The insights and interventions of educational design research evolve over time through multiple iterations of investigation, development, testing and refinement, illustrating the iterative nature of the approach [36].

With these characteristics guiding the research, prior literature about service-learning, optimal knowledge conversion and transfer, and education were used as the foundation for a knowledge-based service-learning framework for large-scale community projects in HEIs. The study was conducted at an HEI in South Africa that offers a compulsory undergraduate community-based project module. In order to evaluate the knowledge-based service-learning framework designed for HEIs, the proposed framework was mapped to the large-scale community service module, corroborating the comprehensive nature of this study.

In the next section, the application of the knowledge-based service-learning framework for large-scale community projects in HEIs is discussed in detail.

4. Exploration of Service-learning through Reflection in Education

The purpose of this study is to present a knowledge-based service-learning framework for large-scale community projects in an HEI.

Based on the literature presented in this paper and depicted in Figure 1, three role players are important in service-learning in an HEI: the faculty and the lecturer of the service-learning module, the student, and the campus-community partners. These three partners each have specific roles, as well as specific engagement and interrelationship goals. From a faculty and lecturer perspective, these roles include the definition of the learning outcomes for the service module, the number of credits allocated to the module and the structuring of the service-learning interaction (this may be a lecture, a briefing or a blended learning approach). The student needs to complete the service-learning module as part of their degree and learn new skills and competencies. The community partner provides service opportunities, mentorship and enables active participation with community life. The interaction goals between the lecturer and the student include teaching and learning engagement, curriculum guidance, the assessment of learning outcomes and bridging the gap between the theory and real-world practice. The interaction goals between the lecturer and HEI, and the community partner are built on partner engagement and bridging the gap between the HEI and the community. Through this partnership, service requirements are met and active community participation is achieved. The interaction goals between the community partner and the students focus on the student's actual service delivery, while the community partner and student develop solutions for real-life problems. During this experiential learning process, skills and knowledge are transferred to the student.

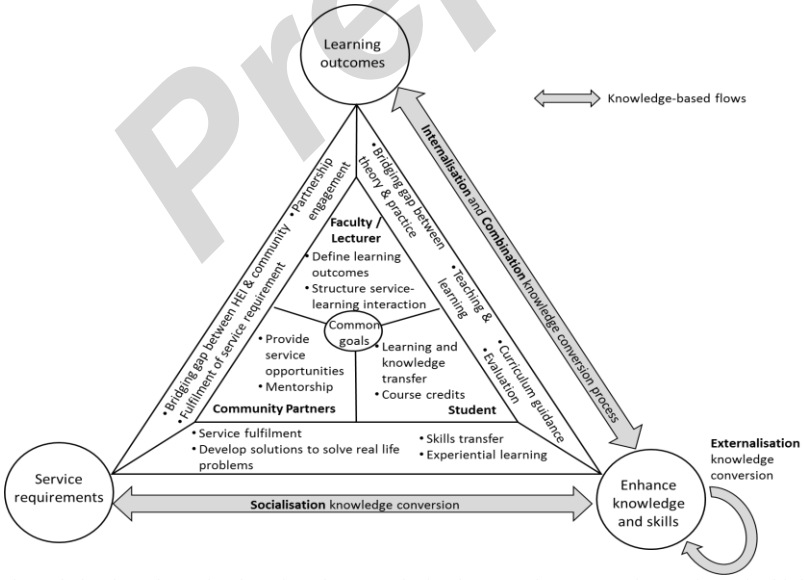

Fig. 1. A knowledge-based service-learning framework for large-scale community projects in higher education, adapted from Bennett [3, 14].

In Fig. 1, the triangle shows the role players, their roles and their engagement goals, each with their own objectives. In order to ensure that students' opportunities for learning and knowledge are enhanced, and personal and social skills are developed, Figure 1 also shows that the knowledge conversion processes can guide the design of particular interventions and thinking about a service-learning module.

Between the lecturer, who is focused on the module's learning outcomes, and the student, the knowledge conversion process of *internalisation* is relevant. The student enters the service-learning module with prior knowledge. The internalisation knowledge conversion process ensures the extraction of knowledge from the service-learning module and enables the subsequent filtering of knowledge, ensuring greater relevance and appropriateness of knowledge to the student. At this stage, the enhanced knowledge is theory-based. With this theory, the student embarks on a service-learning community project, where the theoretical knowledge is converted to capability through the *socialisation* knowledge conversion process. Socialisation is enabled through the experiential nature of the service-learning community project and exposure to a real-world problem setting. Once the student has completed the service-learning community process and ultimately the service-learning module, the *externalisation* knowledge conversion process enables the student to reflect on the learning that took place and *combination* assists the student in creating new explicit knowledge based on the experience.

The inner triangle of Fig. 1 and subsequent description present the role players and interactions, and provide a view of the questions of who the role players are and what interrelationships must be considered for service-learning design. The outer arrows of Fig. 1, the knowledge conversion flows, offer a view of the question of which guiding principles of knowledge conversion inform knowledge-based flows in a service-learning module.

By considering the knowledge conversion processes to service learning model and framework map (Table 1), as well as the knowledge-based service-learning framework (Fig. 1), the final component of the proposed framework includes the enablement conceptual architecture as a KMS facilitates the knowledge-based processes. The proposed knowledge-based service-learning conceptual architecture is shown in Fig. 2.

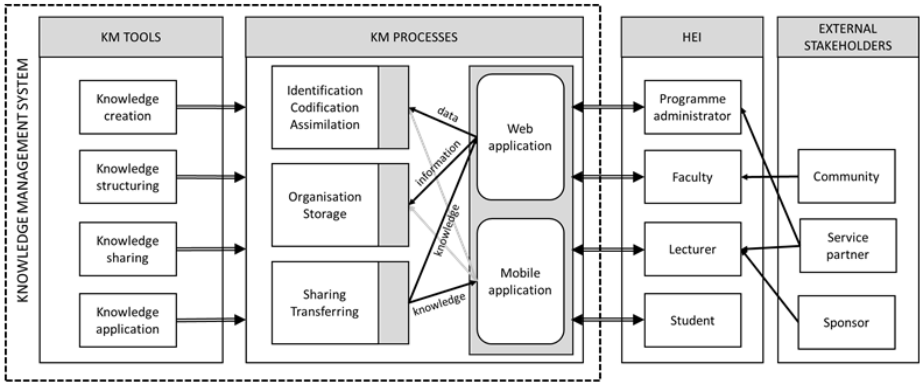

Fig. 2. Proposed knowledge-based service-learning conceptual architecture (adapted from [30]).

The KMS component of the conceptual architecture includes KM tools (technologies) and KM processes as presented in detail in section 2. The KM tools and processes enable the capturing, structuring, organisation, application and sharing of knowledge through a web or mobile user interface. Data, information and knowledge are captured into, and retrieved from, the KMS. In a service learning context, there are 2 role players: the HEI and then external stakeholders. Roles relevant from an HEI perspective are faculty, service module lecturers, students and service learning administrative support staff engaging directly with the KMS in the HEI. External stakeholders, including the service partners, community and sponsors, do not directly engage with the KMS in this instance, but have indirect access through the service learning administrator. This is a requirement as potential service learning projects, service partner details, community requirements, etc. must be captured.

Through an understanding of the role players, the interaction goals among role players and the knowledge conversion processes that are relevant in a service-learning module in an HEI, the knowledge-based service-learning framework for large-scale community projects contributes to a more holistic approach to service-learning. It must be acknowledged that the technologies applied to enable the knowledge-based service-learning conceptual architecture, will be HEI specific as different hardware and software configurations are utilised in each.

In order to learn from practice, as guided by our research approach, we proceeded to map an HEI service-learning module at a HEI in South Africa to the proposed framework. The mapping and implications are discussed in detail in the next section.

5. Knowledge-based Service-learning Framework Mapping

An HEI in South Africa presents a compulsory free-standing undergraduate module, the Community-based Project (JCP) module. The decision to create the independent course was motivated by the need to integrate community service and service-learning projects, including humanitarian engineering projects, in the curriculum of all the undergraduate programmes in the particular Faculty in addition to adhering to the University's strategic social responsiveness goal [39].

The course's primary objectives include a beneficial impact on a relevant section of society by exposing groups of students to real-life challenges. Subsequently, students get the opportunity to become more aware of their social responsibility. Social awareness is created when students apply existing or newly acquired knowledge for the betterment of the community by illustrating their understanding of the social issues that are relevant to the project. Students must learn to work collaboratively in a multidisciplinary and multilingual environment, applying various life skills such as communication, interpersonal, technological and leadership skills. Through their projects, the students must become aware of and cultivate personal, social and cultural values [40].

The project-orientated course must be completed within the allocated 80 notional hours. Students do at least 40 hours of fieldwork, after which they reflect on their experiences through various reflective assignments, including a final presentation, reflective video and report [41]. It is a macro community engagement course due to

the substantial number of enrolled students and projects. Since 2011, more than 1 600 students have registered for the course annually, with an average completion rate of 95% [42]. Generally, the students work in 500 groups each year to help more than 370 different campus-community partners. Typical projects are basic renovation and building projects, teaching Mathematics and Physical Sciences, as well as projects at zoos and animal shelters [6]. Implementing this large number of projects successfully requires a unique teaching and assessment model, sustainable campus-community partnerships, robust logistical and financial processes, effective communication and passionate administrative and academic staff.

In order to evaluate the proposed knowledge-based service-learning framework for large-scale community projects, we considered the individual components of the proposed framework, and the scope and outcome achieved from the class of 2018. Tables 2 and 3 present the mapping. The first column refers to the framework element. The second column contains the JCP module information and implications and our reflection is presented in the third column.

Table 2 presents an overview of the role players and interaction goals in the service-learning module. It provides a view of the question of who the role players are and what interrelationships must be considered for service-learning design. We could identify clear examples from the JCP module that confirm the relationships that are defined in the framework. The engagement among the partners is positive, and an extract from one of the student's reflections indicates that the students experience the community engagement outreach as an exciting learning experience. In terms of the knowledge conversion processes shown in Table 3, internalisation, socialisation and externalisation, we could map each process to the JCP module and identify the knowledge conversion mechanisms the module uses to enhance knowledge and skills. Table 3 offers an example of the question of what knowledge conversion guiding principles inform knowledge-based flows in a service-learning module.

A student reflected on this knowledge conversion process: "*It is really good to experience and take part in community-based projects, as it makes people realise that there are bigger things in this world. People should be optimistic about taking part in community-based projects because even though we might think that there are better things to do with our time, someone else is being advantaged and uplifted. A person should also see the struggle of other people as when they are in the big world one day; they will realise that we all need to look after one another as we all live in this world after all*".

Based on this evaluation of the knowledge-based service-learning framework for large-scale community projects in an HEI, we believe that the framework provides good coverage of considerations for developing a service-learning course. In addition, the observations and reflection columns in Tables 2 and 3 present examples of the application of the proposed knowledge-based service-learning framework that may be referenced for service-learning module design.

Table 2. Service-learning module mapping to the knowledge-based service-learning framework for large-scale community projects in HEIs.

Framework component	Module information for 2018	Observations and reflection
Students	In 2018, students enrolled for the module were mainly second-year students who came from three different schools. Some 979 students came from the School of Engineering (10 different degrees), 299 from the School of Information Technology (nine different degrees) and 288 from the School for the Built Environment (six different degrees), yielding a total of 1 499 students	When the students were briefed, they had to indicate whether they had done community work before. Some 53% indicated that they had participated in community work before; 33% indicated that they had not; and 14% indicated that they were "unsure". Nearly half of the students enrolled in the module had never been involved in a community engagement experience before enrolling in the module.
Faculty or lecturer	The academic staff for the JCP module consists of one lecturer and one administrative support person. The JCP service-learning module is a graduation requirement that bears eight academic credits.	Each student is required to work at least 40 hours with their community partner, and a small budget of R400 is awarded per student. Students are allowed to raise the funds that are required to complete their project. They may choose a project from the projects identified by the JCP office or they may propose their own project within set criteria. The lecturer follows a detailed plan and timeline to ensure that all the students propose a project, execute the project and do a final presentation on the project's outcomes.
Community partners	In 2018, 235 campus-community partners participated in the different service-learning projects. More than 175 campus-community partners are sustainable partners, and some have been working with the module for 14 years.	The campus-community partners provide a wide variety of opportunities, as they oversee museums, children's homes, animal sanctuaries, schools and nursing homes, among other things. Students may not work for a for-profit organisation, earn money during the 40 hours or do elementary repetitive work such as the cleaning of cages.
Lecturer – students	In a contact session, the lecturer briefed all the students regarding the learning outcomes, health and safety, and professional conduct of the service-learning community project.	Students worked on projects in five countries in 2018 and fundamental aspects, including how to identify a project, the steps to complete the project and the assignments that need to be done to complete the module successfully, are covered during the briefing. The lecture includes a security talk by one of the campus security officers.
Lecturer – community partners	Campus-community partners may submit projects to the lecturer even before the students have registered for the module.	The lecturer maintains a close partnership with her campus-community partners and visits them from time to time. Clear feedback is given and information is shared. Campus-community partners are updated on the outcomes of the module via a newsletter, as well as an annual function where campus-community partners are acknowledged for the role they play in the module. An award for the most engaged community partner is presented at the annual award event.
Community partners – students	Campus-community partners may identify possible projects and propose them to the JCP office. They are responsible for monitoring the students' hours and controlling the quality of projects. At the end of the project, the community partner also assesses the students' final projects. The community partner also needs to indicate whether YouTube vido may become "public".	Students stay accountable to the community partner to ensure that they deliver a quality product.

Table 3. Service-learning module mapping to the knowledge-based service-learning framework for large-scale community projects in HEIs.

Framework component	Module information for 2018	Observations and reflection
Internalisation and combination knowledge conversion	Students who completed the module become mentors for new students or project leaders for groups. Alumni remain involved as campus-community partners and mentors. Each group attended a project proposal session where the identified project's execution, logistics and budget are discussed, identified and allocated.	Mentors and project leaders guide and assist the teams. All groups identify a group leader and a financial manager. The lecturer and administrative officer assist with logistical support, among other thing.
Socialisation knowledge conversion	Campus-community partners and alumni mentor the students, monitor their hours, do quality control of the project, assess the students and give feedback on the outcomes to the lecturer.	Within certain criteria, students may choose the community in which they want to work. The students may report any problems to the lecturer and may move to another project if the preferred community cannot accommodate them for all the allocated hours. Students reflect positively on their experience and see it as exposure to real-life situations and their future world of work.
Externalisation knowledge conversion	The six most prominent skills that the 2018 students learnt through the JCP module include group work (84%), project management (67%), communication and interpersonal skills (66%), leadership skills (55%), creative thinking (53%) and financial management skills (53%).	The students reflect on their service-learning via multiple mechanisms. Students complete reflection assignments on the e-learning management system, a final report, presentation and a reflective YouTube video. Celebrating the students' success is important to the JCP module, and an annual celebration and prize-giving function is hosted.

In terms of the last component of the framework, the knowledge-based service-learning conceptual architecture, we have included an example of the architecture at the HEI that enables the JCP programme. This knowledge-based architecture is depicted in Fig. 3.

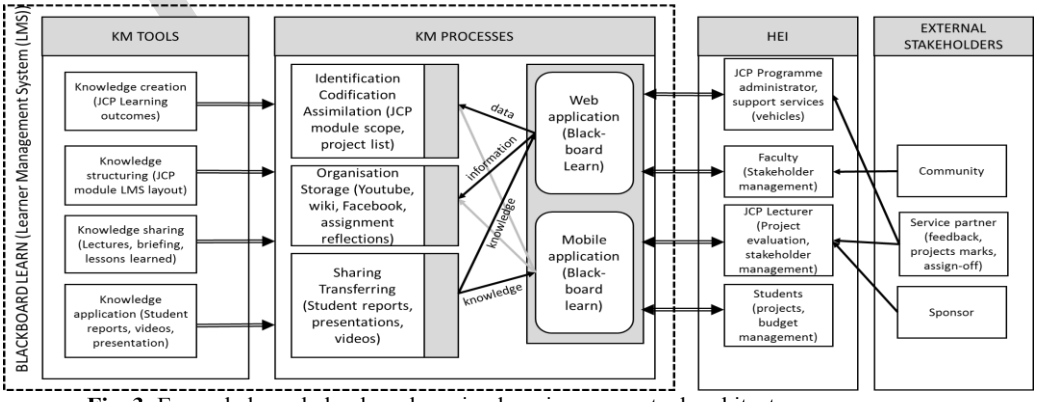

Fig. 3. Example knowledge-based service-learning conceptual architecture.

The knowledge base in this instance contains text documents, video, presentations and reflection reports. It also holds an external stakeholder (service partner) list, details, community requirements and contact people, as well as pertinent information about the potential community project.

By comparing the knowledge-based service-learning framework components (Fig. 1 and 2), and the example architecture (Fig. 3), to the existing service learning models (summarised in Table 1), the contrast between the standard service learning approach and knowledge-based approach are illustrated.

6. Conclusion

Scholars stated that service-learning programmes provide a richer, more practical experience for students and can deliver more benefits to the community by undertaking larger projects that are not limited by the length of a semester. However, such long-term projects with a broader scope present both knowledge conversion and project management challenges. For these service-learning community projects, students must quickly learn enough about the community partner's problem or service requirement to deliver effective solutions and quality products to the campus-community partners. Campus-community partners have long recognised the value of involving students in their service activities, as students can provide additional volunteer help in meeting community needs. Campus-community partners plan and coordinate activities, and direct and mentor student volunteers to complete predetermined tasks towards providing a service to the community. Furthermore, from an HEI point of view, a service-learning module must achieve certain learning outcomes, and classroom knowledge must be turned into practical knowledge, over and above the enhancement of student knowledge and skill.

In this study, we designed a knowledge-based service-learning framework for large-scale community projects in higher education by considering all role players, their interrelationships, the unique composition of service-learning outcomes, as well as a knowledge-based service-learning conceptual architecture. We applied the framework by mapping it to a service-learning module from an HEI using the elements of the framework as a guide. We established that the service-learning module that was mapped conformed well to the components identified in the knowledge-based service-learning framework.

By using the knowledge-based service-learning framework for large-scale community projects in higher education, the faculty, lecturers and instructional designers can warrant that the service-learning design enables strong support to the community, while students' knowledge and skills are enhanced. In this way, they can ensure that the needs and expectations of all parties involved in service-learning are considered through this knowledge based approach.

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