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Developing a Measurement Instrument to Assess Student Learning Outcomes after Service-
Learning Experience

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Author Note

This paper results from the work of a cross-institutional project named “Cross-institutional Capacity Building for Service-Learning in Hong Kong Higher Education Institutions”, aiming at enhancing and supporting the development of service-learning as an effective pedagogical strategy under the collaboration of Lingnan University, The Hong Kong Polytechnic University, Hong Kong Baptist University, and The Education University of Hong Kong, had been launched since 2017, funded by the University Grants Committee (UGC) of the HKSAR government. The authors wish to thank the UGC for funding the project, and the above institutions for their participation in the process of scale development and validation, and we are particularly grateful to Prof. James Yue On KO of The Education University of Hong Kong and Dr. Kam Por KWAN of The Hong Kong Polytechnic University for their advice on statistical analysis.

Abstract

The current paper reports the interim progress of a research study (collaboratively conducted by Lingnan University, The Hong Kong Polytechnic University, Hong Kong Baptist University, and The Education University of Hong Kong) aiming to develop a well-validated measurement instrument to assess student learning outcomes after service-learning experience in higher education settings. This is part of the endeavor of further developing service-learning in Hong Kong, after its adoption by many higher education institutions as a relatively new form of pedagogy during the last decade. The scale development and validation work, with exploratory factor analysis and reliability test, thus far demonstrated that the student learning outcomes after service-learning could be measured and assessed through 56 items, covering 11 domains under four major categories, namely: a) knowledge application; b) personal and professional skills (including relationship and team skills, creative problem solving skills, self-reflection skills, and critical thinking skills), c) civic orientation and engagement (including sense of social responsibility, community commitment and understanding, and caring and respect), and d) self-awareness (including self-efficacy, self-understanding, and commitment to self-improvement).

Keywords: Student learning outcomes, measurement instrument, service-learning.

Overview

Service-learning has been undergoing sophisticated development in higher education, since its very first establishment in the United States in 1960s when Oak Ridge Associated Universities (ORAU) and the Southern Regional Education Board (SREB) developed and popularized service-learning internships (Giles & Eyster, 1994; Ramsay, 2017). Ever since, service-learning has been introduced to higher education institutions of different continents and evolving into new forms with various characteristics to better respond to the ever-changing and specific environment of different societies. Although there has been considerable evolution in terms of practice, service-learning remains a pedagogy, which emphasizes that students learn through doing and participating in service by connecting schools to society. Accordingly, the definition of service-learning, as “a form of experiential education in which students engage in activities that address human and community needs together with structured opportunities for reflection intentionally designed to promote student learning and development” (Jacoby, 1996, p. 5), has not been significantly changed. Besides learning through service, service-learning also emphasizes mutual empowerment through social exchange between the students and the served, in which both sides can learn and grow (Shumer, Stanton, & Giles, 2017), resulting in both academic and non-academic enhancement as expected student learning outcomes. As a pedagogy that is widely agreed as positive for student learning and development, many Hong Kong higher education institutions have also adopted service-learning in their curricula, starting from Lingnan University of Hong Kong, which introduced service-learning in their undergraduate programs in 2004, and then was the first university in Asia to institutionalize service-learning by establishing an Office of Service-Learning in 2006 (Ma & Chan, 2013).

Despite vigorous development of service-learning in the Hong Kong higher education for over a decade, there has not been an effective measurement instrument assessing student learning outcomes after service-learning experience employed by different institutions adopting this pedagogy. On the other hand, many institutions assess their students' service-learning outcomes by using existing measurements which originated from the western cultures, the USA in particular, resulting in various bias due to cultural heterogeneity. This paper, therefore, reports a project aiming to develop a comprehensive and reliable measurement instrument for assessing student learning outcomes after service-learning experience, which is designed to be employed in service-learning programmes in the Hong Kong higher education setting. We begin by reviewing past literature on service-learning and its student learning outcomes, followed by proposing a theoretical model for conceptualizing the student learning outcomes, applicable in the Hong Kong higher education setting. We will then outline how the measurement instrument was developed and validated based on that model, along with plans for a shorter version to be validated in the next step of the research.

Anticipated Benefits of Service-Learning in Terms of Student Learning Outcomes

The student learning outcomes derived from service-learning experience have been studied extensively. An abundant literature is available, and from this several conceptual outcome lists have emerged. For example, Driscoll et al. (1996) proposed that the assessment model of student learning outcomes of service-learning should comprise the following: awareness of community, involvement with community, commitment to service, career choices, self-awareness, personal development, academic achievement, sensitivity to diversity, autonomy/independence, sense of ownership and communication. Eyler et al. (2001) also listed what they

judged to be the consensus view about the domains where service-learning had positive effects on college students, based on past research. These domains comprised: student personal development, such as personal efficacy, personal identity, spiritual growth, and moral development; interpersonal development, such as ability to work with others; leadership and communication skills; reduced stereotypes and prejudice, along with enhancement of cultural understanding; sense of social responsibility and commitment to service; enhanced academic results and knowledge application; cognitive development, problem analysis, and critical thinking skills; and students' career development in the long term.

Based on the past research findings, some researchers have further developed conceptual models for understanding and assessing student learning outcomes in service-learning. Eyler and Giles (1999) stated that service-learning "aims to connect the personal and intellectual, to help students acquire knowledge that is useful in understanding the world, build critical thinking capacities...Service-Learning aims to prepare students who are lifelong learners and participants in the world" (p.14). Although no explicit models were stated, Eyler and Giles in their book listed a set of student learning outcomes encompassing four areas: a) understanding and applying knowledge; b) personal and interpersonal development; c) cognitive development, including critical thinking, engagement curiosity, reflective practice, and perspective transformation; and d) citizenship. More recently, Ash and Clayton (2009) developed a conceptual framework that identified three components of service-learning, namely: a) academic material, b) relevant service and c) critical reflection. From this framework, they derived three main categories of learning goals, comprising: a) academic enhancement, b) personal growth, and c) civic learning, which can be achieved via the participation of students, faculty members and community members. This tripartite model of student learning outcomes chimes with past research evidence, that service-

learning can enhance student learning in terms of knowledge understanding and application, personal and professional skills development, and civic orientation and engagement (e.g. Astin et al., 2000; Celio et al., 2011; Conway et al., 2009; Driscoll et al., 1996; Felten & Clayton, 2011; Prentice, 2007; Richard et al., 2017; Shek & Chan, 2013; Simon & Cleary, 2006; Snell et al., 2015; Warren, 2012; Yorio & Ye, 2012). Other benefits of service-learning include higher self-efficacy, self-awareness and self-confidence (Astin & Sax, 1998; Astin et al., 2000; Keup, 2005), greater multicultural competence (Boyle-Baise, 2002; Einfeld & Collins, 2008), more empathy (Lundy, 2007), better writing skills (Astin et al., 2000), increased passion for lifelong learning (Rama, 1998; Bonnette, 2006), and higher creativity (Shek & Chan, 2013).

Regarding the definition of each component of the above conceptual framework, knowledge understanding and application indicates the extent to which students are able to understand the knowledge learnt at class and apply this to real life situations. Personal and professional skills, by contrast, are defined as the soft skills, as distinct from hard knowledge. Such skills cannot be easily learnt from lectures and books, and include relationship skills, team skills, problem-solving skills, critical-thinking skills, self-reflection skills, and creativity. Lastly, civic orientation and engagement refer to the extent to which a person is inclined to care about the community and engage in the community affairs. This is reflected in understanding of community needs, sense of social responsibility, willingness to contribute, commitment to social action, participation in community service, and caring for others. Table 1 lists the constructs under each component of the conceptual framework.

Table 1

The Conceptual Category and Learning Outcome Domains Based on the Tripartite Conceptual Framework by Ash and Clayton (2009)

Conceptual Category	Knowledge Understanding and Application	Personal and Professional Skills	Civic Orientation and Engagement
Learning Outcome Domains	1. Subject Knowledge	3. Relationship Skills	9. Sense of Social Responsibility
	2. Knowledge Application	4. Team skills	10. Commitment to Social Action and Community Service
		5. Problem-solving Skills	11. Understanding Community Needs and Assets
		6. Critical-thinking Skills	12. Caring for Others
		7. Self-reflection Skills	
		8. Creativity	

Localization of Service-Learning in Hong Kong

In comparison with western countries such as the United States, Hong Kong formally adopted service-learning in higher education relatively late. This was not until Lingnan University introduced service-learning formally as an academic credit-bearing subject in 2006 (Ma & Chan, 2013). Since then, other higher education institutions, including The Hong Kong Polytechnic University, Hong Kong Baptist University, The Education University of Hong Kong, and The University of Hong Kong, have introduced this pedagogy in various forms, adapted to the unique settings of particular institutions. Despite customizations, the goals and curriculum content of service-learning programmes across institutions do not vary very much. All emphasize the importance of providing students with a learning environment that enables and empowers them to learn through doing service. The expected student learning outcomes of service-learning,

therefore, also do not differ greatly. For example, Lingnan University's service-learning model targets student learning outcomes across seven domains: subject-related knowledge, social competence, civic orientation, communication skills, problem-solving skills, research skills, and organizational skills (Ma & Chan, 2013). These domains bear some relationships to the ideal graduate attributes advocated by the university. By comparison, The Hong Kong Polytechnic University identifies a not dissimilar set of four learning outcomes through service-learning: a) knowledge and skill application; b) empathy, civic engagement and responsibility; c) becoming professional and responsible citizens; and d) connecting between the academic content and the need of society (Chan & Ngai, 2014).

Generally speaking, the student learning outcomes expected by the Hong Kong higher education institutions through service-learning are consistent with the aforementioned tripartite conceptual framework: students should be able to enhance their academic knowledge, along with personal development and a higher level of civic orientation. In order to measure student learning outcomes achieved after service-learning, a number of Hong Kong higher education institutions have collaborated to develop a new common outcomes measurement instrument (Chan, 2011; Ma et al., 2016), addressing the learning outcomes by nine domains: a) self-understanding/confidence, b) communication skills, c) problem-solving skills, d) civic engagement, social responsibility and willingness to contribute, e) team skills, f) self-reflection, g) general knowledge application, h) caring for others, and i) intercultural competence.

The nine domains basically correspond to the tripartite conceptual framework by Ash and Clayton (2009). Thus, general knowledge application corresponds to academic enhancement; communication skills, problem-solving skills, team skills, and caring for others correspond to personal growth; and civic engagement, social responsibility and willingness to contribute

correspond to civic learning. There is one additional category, namely self-awareness, which includes self-understanding and confidence, corresponding to prior studies that have shown the enhancement of self-awareness, as well as self-efficacy, self-knowledge, and self-confidence as important outcomes of service-learning (Astin et al, 2000; Conway et. al, 2009; Eyler & Giles, 1999; Simon & Cleary, 2006). Moreover, the category of self-reflection skills is also worth noting as a crucial component of service-learning, through which students are able to challenge their assumptions to result in perspective transformation (Eyler & Giles, 1999; Jacoby, 1996). Reflection also forges deep and internal links between experience, coursework and learners themselves, such that service-learning provides education instead of merely experience (Godfrey et al., 2005). Hatcher et al. (2004) showed that the inclusion of regular and structured reflection was significantly correlated with the quality of service-learning courses. Acquiring self-reflection skills hence is an important learning outcome for students, along with its secondary benefits, such as higher level of self-awareness, self-esteem, and commitment to self-improvement. On the other hand, the domain of intercultural competence can be regarded as optional, given that many service-learning programmes in Hong Kong focus on local community engagement and do not involve substantial intercultural elements.

To conclude, past literature has indicated a variety of benefits to students as learning outcomes in service-learning, which can be accommodated within the conceptual framework of Ash and Clayton (2009). In the process of localization in Hong Kong, on the other hand, service-learning programmes relatively engage the community more at the local rather than international level, and therefore place less emphasis on intercultural elements. Intercultural competence was therefore not included in the model. Instead, the category of self-awareness and the domain of self-reflection skills were added, given that prior studies illustrated that the enhancement of self-

awareness is also an important outcome of service-learning, through self-reflection, which is regarded as an important practice for students in service-learning.

The Proposed Theoretical Model

The literature review therefore led us to adapt a conceptual framework, based on a tripartite student learning outcome structure comprising: a) knowledge application, b) personal growth, and c) civic learning, as developed by Ash and Clayton (2009), with several modifications. First, the category of personal growth was split into two categories. We thereby distinguished between personal and professional skills, which were oriented toward practical applications such as team skills and problem-solving skills, versus self-awareness, which comprised underlying attributes such as commitment to self-improvement, self-esteem and self-understanding. Second, for the sake of parsimony, communication skills were excluded from the model because these can be reflected in other skills, such as relationship skills, team skills, and problem-solving skills. Third, the domain of self-reflection skills was added to the category of personal and professional skills to reflect its importance, as argued above. Fourth, we dropped subject knowledge from the category of knowledge understanding and application, on the grounds that the assessment tasks within the course should suffice for systematically measuring how much students gain in terms of subject knowledge.

This resulted in a proposed four-category conceptual framework with 15 domains to capture student learning outcomes in the measurement instrument. The four categories and the 15 domains comprise: 1) relationship skills, 2) team skills, 3) problem-solving skills, 4) self-reflection skills, 5) critical thinking skills and 6) creativity for the category of personal and professional skills; 7) sense of social responsibility, 8) commitment to social betterment, 9)

understanding community, 10) respecting diversity, and 11) empathy and caring for others, for the category of civic orientation and engagement; 12) self-understanding, 13) commitment to self-improvement, and 14) self-esteem for the category of self-awareness; and 15) knowledge-application for its eponymous category. Table 2 depicts the measurement theoretical model.

Table 2

The Measurement Theoretical Model

Conceptual Category	Knowledge Application	Personal and Professional Skills	Civic Orientation and Engagement	Self-awareness
Learning Outcome Domain	1. Knowledge Application	2. Relationship Skills	8. Sense of Social Responsibility	13. Self-understanding
		3. Team Skills	9. Commitment to Social Betterment	14. Commitment to Self-improvement
		4. Problem-solving Skills	10. Understanding Community	15. Self-esteem
		5. Critical-thinking Skills	11. Respecting Diversity	
		6. Self-reflection Skills	12. Empathy and Caring for Others	
		7. Creativity		

Method

Based on the above conceptualization, 103 items were developed for the measurement instrument. This was done by referring to scales currently adopted by the collaborating institutions in their service-learning programmes (e.g. Ma et al., 2016), and to other scales from past literature (e.g. Rosenberg’s self-esteem scale; Rosenberg, 1965), and by engaging in brainstorming in collaboration with a panel of researchers, comprising faculty members from four institutions adopting service-learning pedagogy, namely Lingnan University, The Hong Kong Polytechnic University, Hong Kong Baptist University, and The Education University of Hong

Kong. The emerging items were further commented on by subject matter experts, consisting of experienced service-learning practitioners from the above institutions. The panel reviewed the comments and finalized the items.

Procedure and Participants

The draft measurement instrument in English was then subjected to a pilot study, which aimed at testing item readability for the target respondents, namely students studying at the higher education institutions. Six pilot sessions were held at the above institutions through face-to-face administration. Each session lasted about one hour with no more than 20 participants and comprised two parts. In the first part (around 40 minutes), the participants were invited to answer the draft measurement instrument and note when they encounter any difficulty in understanding items. In the second part (around 20 minutes), the participants were invited to raise any comments they wanted to share with the administrator, about issues such as the use of words, ambiguity, and uncertainty when answering the measurement instrument. The pilot collected responses from altogether 83 participants, comprising 29 males (34.9%) and 54 females (65.1%), with the mean age of 20.5. Their comments shared in the session and written on the measurement instrument were then analyzed and discussed by the panel, with the result that two items were discarded, and 35 items were revised in wording in order to enhance readability.

With the revised draft measurement, a validation exercise was implemented to test the psychometric properties, such as underlying dimensionality and internal consistency. The measurement instrument was administered in class on a collective basis. Students were informed of the rationale of this validation exercise and were invited to join voluntarily, and those who did not want to participate could choose to leave. The remaining students were then instructed to indicate their consent and answer the revised draft measurement instrument, along with some

demographical information (including gender, age, major of study, prior service-learning experience) under the assurance of data confidentiality. Each respondent was offered a supermarket gift voucher valued at HK\$50 as a token for their participants upon completing the measurement instrument. A total of 400 university full-time students at the four collaborative institutions completed the revised draft measurement instrument via classroom administration, with 397 of them providing demographic data. Among them, 35.0% were male respondents while 65.0% were female respondents, and the mean age was 20.9. They came from various disciplinary backgrounds (Arts: 23.4%; Social Science: 15.6%; Business: 22.4%; Engineering & Science: 27.5%; Nursing: 11.1%). Most respondents had previous service-learning experience (70.5%).

Multiple methods were adopted to explore the dimensionality of the revised draft measurement instrument and their stability. First, owing to the large number of measurement items and their underlying domains, the Minimum Average Partial (MAP) test was employed to provide guidance for determining the number of factors under the four categories. The MAP test, which involves principal components analysis with the examination of a series of matrices of partial correlation, is regarded one of the best methods to obtain optimal solutions to the number of components in factor analysis (O'Connor, 2000). The items within the four categories were inputted into the MAP program developed for SPSS by O'Connor (2000) to obtain the number of optimal factors under each category.

Statistical Analysis

Each category's items were then analyzed by Exploratory Factor Analysis (EFA) in IBM SPSS version 23.0 by the specification of the number of factors to that category obtained in the MAP test. Specifically, Principle Components method with oblimin rotation was employed,

given that correlations were expected among domains of the measurement instrument. Two exclusion criteria were adopted in reducing the number of items in the EFA, with the purpose of simplifying the final factor structure. First, any items with the highest factor loading lower than 0.4 in absolute value were removed, given that “one would want in general a variable to share at least 15% of its variance with the construct (factor) it is going to be used to help name” (Stevens, 2009; p.333). Second, any double-loaded items were removed. After exclusion, the EFA was re-administered. In the event that all items obtained satisfactory absolute values of factor loadings, some would be discarded based on the consideration of semantic proximity and the results of item-total correlation. Owing to the large number of tested domains and items, as well as that the four categories were expected to be theoretically distinctive yet empirically related, four sets of EFA were separately performed for the four categories in exploring underlying dimensionality.

Results

The MAP test results indicated different optimal factor numbers for different categories, specifically one factor for the category of knowledge application, five factors for the category of personal and professional skills, four factors for the category of civic engagement; and three factors for the category of self-awareness. Table 3 below depicts the results of the four category MAP tests.

Table 3

The MAP Test Results for the Four Categories of the Measurement

Category	Optimal Number of Factors
Knowledge Application	1
Personal and Professional Skills	5
Civic Orientation and Engagement	4
Self-awareness	3

The EFAs for determining the factor numbers guided by the above MAP test results for the four categories were then administered by following the afore-mentioned item exclusion and selection

procedures. The analysis results indicated a clear factor structure at the higher order with satisfactory factor loadings. Table 4 to 7 illustrates the resulting measurement instrument by category.

Specifically, the items for the category of knowledge application converged to a single factor with factor loadings between .799 and .881, with variance explained 72.35% ($\alpha = .872$).

Table 4

Results for the Items of the Category of Knowledge Application

No	Item	Absolute Value of Factor Loading	Item-Total Correlation
1	I know how to apply what I learn in class to solve real-life problems.	.881	.771
2	I am able to apply/integrate classroom knowledge to deal with complex issues.	.867	.752
3	I know how to transfer knowledge and skills from one setting to another.	.853	.731
4	I can make connections between theory and practice.	.799	.656

Within the category of personal and professional skills, a four-factor structure emerged in the final result. The four factors are named as: a) creative problem solving, comprising the original items of the domains of problem solving skills and creativity, with factor loadings between .472 and .867 ($\alpha = .919$); b) relationship and team skills, comprising the original items of the domains of relationship skills and team skills, with factor loadings between .470 and .886 ($\alpha = .925$); c) self-reflection skills, with factor loadings between .542 and .838 ($\alpha = .848$); and d) critical thinking skills, with factor loadings between .411 and .732 ($\alpha = .751$). The overall variance explained by the category's items was 67.91% ($\alpha = .961$).

Table 5

Results for the Items of the Category of Personal and Professional Skills

No	Item	Absolute Value of Factor Loading				Item-Total Correlation
		Creative Problem-Solving Skills	Relation ship and Team Skills	Self-reflection Skills	Critical Thinking Skills	
1	I am not afraid of trying new things.	.867				.610
2	I am able to generate original ideas.	.685				.700

3	I am able to solve challenging real-life problems.	.652	.783
4	I feel confident in dealing with a problem.	.635	.747
5	When necessary, I can think of alternatives.	.534	.764
6	I feel confident in identifying the core of a problem.	.518	.771
7	I am able to look at an issue from a fresh perspective.	.511	.720
8	I often modify my strategies to solve a problem when the situation changes.	.472	.744
9	I am good at keeping in touch with people.	.886	.691
10	I am good at building relationships between people.	.730	.691
11	I can build long-term relationships with people.	.716	.711
12	I can easily establish effective relationships with people.	.706	.749
13	I am good at resolving conflicts.	.649	.733
14	I am confident in leading others toward common goals.	.543	.731
15	I participate effectively in group discussions and activities.	.531	.761
16	I have the necessary skills for making groups or organizations function effectively.	.470	.764
17	I will evaluate myself after completing a task.	.838	.678
18	I reflect on myself regularly.	.766	.653
19	I always think how I can improve myself.	.633	.651
20	I consider circumstances when reflecting on how well I have performed.	.542	.710
21	I can analyze an issue comprehensively.	.732	.601
22	I often look at complex issues from different angles.	.654	.655
23	I can understand others' viewpoints when we are making decisions together.	.411	.627

Within the category of civic orientation and engagement, the number of domains was simplified into a three-factor structure. The three factors are named as: a) community commitment and understanding, comprising the original items of the domains of commitment to social betterment and

understanding community, with factor loadings between .608 and .861 and ($\alpha = .919$); b) caring and respect, comprising the original items of the domains of respecting diversity and empathy and caring for others, with factor loadings between .467 and .795 ($\alpha = .907$); and c) sense of social responsibility, with factor loadings between .605 and .789 ($\alpha = .813$). The overall variance explained by the category's items was 67.71% ($\alpha = .946$).

Table 6

Results for the Items of the Category of Civic Orientation and Engagement

No	Item	Absolute Value of Factor Loading			Item-Total Correlation
		Community Commitment and Understanding	Caring and Respect	Sense of Social Responsibility	
1	I always actively discuss possible improvements for our community.	.861			.584
2	I can identify useful resources of a community.	.822			.724
3	I think about how I can serve the community after graduating.	.733			.639
4	I can identify challenges in the community.	.727			.709
5	I can investigate the challenges faced by people in need in a community.	.726			.726
6	I will contribute my abilities to make the community a better place.	.692			.735
7	I can identify issues that are important for a disadvantaged community.	.675			.726
8	I will play my part to reduce social problems.	.608			.719
9	I respect the needs of people from different backgrounds.		.795		.645
10	I appreciate the ideas of people from different backgrounds.		.789		.693
11	I am willing to try to understand people whose background is different from mine.		.751		.736
12	I can respect people whose background is different from mine.		.705		.576
13	I consider others' points of view.		.685		.690
14	I care about others.		.478		.746
15	I observe others' feelings and		.467		.692

	emotions.		
16	I believe that everybody should be encouraged to participate in civic affairs.	.789	.622
17	I believe that taking care of people who are in need is everyone's responsibility.	.750	.681
18	I feel obligated to help those who are less fortunate than me.	.605	.700

Lastly, the items within the category of self-awareness reflected the designated structure with three resultant factors. These are a) self-efficacy, renamed from self-esteem, with relevant items retained, with factor loadings between .736 and .842 ($\alpha = .859$); b) self-understanding, with factor loadings between .527 and .901 ($\alpha = .845$); and c) commitment to self-improvement, with factor loadings between .660 and .941 ($\alpha = .829$). The overall variance explained by the category's items was 72.01% ($\alpha = .922$).

Table 7

Results for the Items of the Category of Self-awareness

No	Item	Absolute Value of Factor Loading			Item-Total Correlation
		Self-efficacy	Self-understanding	Commitment to Self-improvement	
1	I am satisfied with my achievement so far.	.842			.644
2	Most things I do, I do well.	.830			.694
3	I have many good qualities.	.770			.761
4	I am positive about myself.	.736			.721
5	I know my strengths and weaknesses.		.901		.639
6	I have a clear picture of what I am like as a person.		.877		.642
7	I have a clear understanding of my own values and principles.		.631		.743
8	I know what I need in my life.		.527		.700
9	I look out for new skills or knowledge to acquire.			.941	.641
10	I am always motivated to learn.			.762	.667
11	I always keep my knowledge and skills up-to-date.			.660	.736

Discussion

The resultant measurement structure and emerging factors closely matched the expected student learning outcomes derived from the past literature. Within the broader domain of personal and personal skills, the factors comprised creative problem-solving skills, relationship and team skills, reflection skills and critical thinking skills. Within civic orientation and engagement, the factors consisted of caring and respect, community commitment and understanding, and sense of social responsibility. Within self-awareness, the factors were composed of self-efficacy, self-understanding, and commitment to self-improvement.

It was also particularly interesting that within the broader domains of personal and professional skills and civic orientation and engagement, some of the expected domains were found to be combined under a single higher-order domain. This was the case with creative problem-solving skills, relationship and team skills, caring and respect, and community commitment and understanding. The discovery of these higher-order factors implies that some student learning outcomes in service-learning may not be easily differentiated when using a self-reported measurement instrument.

As a result of the validation exercise, the length of the measurement instrument was reduced from 103 to 56 items under 11 domains. The resultant measurement instrument has achieved satisfactory dimensionality and reliability, with clear domain structure that broadly matches the student learning outcomes identified in previous research studies. The next step will be to confirm the EFA results and dimensionality with another sample by means of the Confirmatory Factor Analysis (CFA), before further testing for test-retest reliability and criterion validity. In addition, more item reduction work will be conducted with the aim of further reducing the measurement instrument to three items for each domain.

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