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Role of Reflection in Service Learning-based Engineering Programs: A Cross-cultural Exploratory and Comparative Case Study in India and the USA

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Abstract

Reflection is one of the pedagogical components which differentiates service-learning from community service and makes student learning authentic. Reflections have been studied widely within the U.S.; however, it is relatively new in India and less investigated. This paper is an exploratory case study between three institutions from two countries.

The first program is a design-based engineering program that uses the service-learning pedagogy at a large midwestern university in the U.S.. Students reflect individually on a weekly basis and submit a final reflection at the end of the semester. The second program is part of a technology focused institution in southern India and employs reflection in a similar manner to the first. The third program, also a technology focused institution in southern India, adopted the framework of the first program but as a co-curricular activity.

This study was divided in two phases. In the first phase, reflections were coded from each institution applying Jacoby's framework of General Criteria for Assessing Service-Learning Reflection. The second phase of the study investigated the cross-cultural comparisons and contrasts between the US and India.

The preliminary results showed that students generally reflected at the Surface or Emerging level in their weekly reflections and in Depth in their final reflection. Students occasionally reflected in Depth during the week if they experienced authentic learning and were able to relate with their personal experience. With the increase in international service-learning programs in undergraduate engineering curriculum, the results from this study would help us understand how reflections were perceived, utilized, and assessed across two distinct cultures. The findings presented would help engineering educators understand how to better facilitate service-learning projects that are international and require cross-cultural collaborations.

Keywords: Service-learning, reflection, global

Introduction

Community engagement in engineering education has gained traction and been increasing substantially over the past decades. The interest in community engagement in higher education began to become accepted in the U.S. in the 1990's when the idea of combining action in community and structured learning began to be institutionalized as a pedagogy and as a field [1],[2]. The idea was called service-learning. Bringle and Hatcher [3] defined service learning as "a credit-bearing educational experience in which students participate in an organized service activity that meets identified community needs and reflection on the service activity in such a way as to gain further understanding of the course content, a broader appreciation of the discipline and an enhanced sense of civic responsibility" (p. 222).

Community service and civic engagement has been ingrained in the Indian culture from a very long time. A modern example of such a service program is National Service Scheme. National Service Scheme provides opportunity for students to take part in government led community service activities and programs [4]. There are also other efforts in engaging and service through initiatives such as Unnat Bharat Abhiyan and organizations such as Indo Universal Collaboration for Engineering Education. Community engagement and service-learning, as it is known in the U.S. and internationally today, is still very young and emerging in India.

Reflection is one of the core components of service learning, along with Service, Academic Content, Partnerships and Reciprocity, and Mutual Learning [5], [6], [7]. Eyler [8] explained that "reflection is the hyphen in service-learning". Reflection is an important and critical part of the educational process, which when combined with community engagement, leads to service-learning. Stanton [9] noted that, when reflection on experience is weak, students' "learning" may be "haphazard, accidental, and superficial" (p. 185). Dewey [10], one of the famous proponents of experiential learning, reimagined reflection and defined it as "the active, persistent and careful consideration of any belief or supposed form of knowledge in the light of the grounds that support it and the further conclusions to which it tends" (p. 6). Reflection, especially critical reflection is not automatic for students and research has shown that effective reflection is beneficial for students [11]. Ash & Clayton [12], thoughtfully and purposefully developed a structured guidance to capture a process such as critical reflection, that generates, deepens, and documents learning.

Eyler, Giles, and Schmiede [13] describe the characteristics of a high-quality reflection as continuous, connected, challenging and contextualized. As noted by the National Research Council [14], formative assessment is increasingly recognized as key to effectively designing teaching and learning. Formative assessment can be used to evaluate critical reflection process by mapping to the student learning outcomes. Reflections can be assessed by using the same set of objectives, standards, and tools to generate learning through reflection prompts, to deepen learning through feedback and to document learning through grading and reporting outcomes [12]. This paper is an effort to look at different approaches employed in service-learning programs in the two countries. The aim of this study is to answer one main guiding research question followed by two sub questions –

1. How do students reflect in engineering service-learning programs?
    a. What are the variations between student reflections across three programs in the two countries?
    b. What are the reasons behind said the differences?

In this paper, three programs were considered for the study. The first program, Service-Learning Design Program-A (SLDPA) is a design-based engineering program that uses the service-learning pedagogy at a large midwestern public university in the United States [15]. SLDPA has been well established in this university for over two decades. Students in this program reflect individually on a weekly basis and submit a final reflection at the end of the semester. The second program, Service-Learning Design Process-B (SLDPB) is part of a technology focused

university in southern India. SLDPB was recently established in this university and is going through its first set of cohorts. Students in this program reflect informally during the semester and submit only formal final reflection at the end of the semester. The third program, Service-Learning Design Process-C (SLDPC) is part of a technology focused college in southern India. SLDPC was recently established in this college and is going through its first set of cohorts. Students in this program reflect verbally and informally, in their respective groups during the semester and as an optional session at the close of the semester. The SLDPC is offered as a non-credit course to the students outside of the core curriculum.

Methods

In each program, students were asked to reflect at the end of the semester which is also called as final reflection. We chose the final reflections from Spring 2020 semester to be investigated for this study.

Jacoby's [16] general criteria for assessing service-learning reflection was used as the framework for evaluating student reflections which Jacoby adapted from Bradley [17]. According to Bradley, critical reflection can be characterized into three levels – Surface, Emerging, and Deep [17]. We used the reflection components, described in Table 1, to code the student reflections from the three programs.

Table 1: Jacoby's general criteria for assessing service-learning reflection

Surface	Emerging	Deep
Focus on one aspect of a situation	Provides cogent critique from a single perspective but fails to see the broader system	View situations from several perspectives
Frequently uses personal beliefs as hard evidence	Provides connection to the issue or discipline but are not deep or insightful.	Perceive conflicts and acknowledge the differences
Observations are unidimensional	Observations are more thorough and nuanced	Articulate judgments based on strong evidence and sound reasoning

Jacoby's model had to be modified for this study to address student reflections that lacked even the minimum requirements of being classified as a Surface level [16]. Thus, Table 2 lists the criteria for a reflection to be categorized as Non reflection.

Table 2: Modified Jacoby's general criteria for assessing service-learning reflection

Non reflection	Surface	Emerging	Deep
Does not discuss any specific situation	Focus on one aspect of a situation	Provides cogent critique from a single perspective but fails to see the broader system	View situations from several perspectives
Does not connect to any issue or use personal beliefs	Frequently uses personal beliefs as hard evidence	Provides connection to the issue or discipline but are not deep or insightful.	Perceive conflicts and acknowledge the differences
No observations included	Observations are unidimensional	Observations are more thorough and nuanced	Articulate judgments based on strong evidence and sound reasoning

The end of semester reflections were evaluated from each program and categorized into one of the levels as described by the modified Jacoby's model. To calibrate at the start of the coding, a couple of same sample student reflections were evaluated by two researchers and the results were compared. Following this calibration, the rest of the final reflections were coded by each researcher. In addition to this, each researcher used the coding criteria to select an example quote from the final reflection based on which category they represented on the model. In the end, all the results were compared and shared examples to ensure consistency between coders.

From SLDPA, a total of 65 students were randomly selected as participants for this study. Students maintained all their documentations (including reflections) in a Microsoft OneNote notebook. Students were asked to reflect individually through writing. In addition to the final reflection, students would also reflect individually on a weekly basis, which is also documented in their electronic notebook. Any undergraduate student in this university can enroll in SDLPA. Additionally, for effective reflection, the instructors introduced students to the prompts and guidelines generated by [18].

All the students enrolled in SLDPB (total of 23) were selected as participants for this study. Students were asked to reflect individually through writing and submit their final reflection through e-mail to the course instructor. Any undergraduate engineering student in this university, except first-year, can enroll in SDLPB. In this program, there are no formative assessment components related to reflection. The reflection prompts are generated by the course instructors.

As mentioned earlier, students enrolled in SLDPC reflect verbally and informally in their respective groups after completion of each design phase. In order to collect and document their reflections, a focus group discussion was setup. 6 students (out of 25) chose to participate in the discussion. The discussion was set for 90 minutes and the reflection prompts designed by Ash and Clayton was shared with the participants in advance [18]. The discussion was moderated by two researchers, where each reflection theme was introduced, and participants took part in the discussion in no particular order. The audio from the discussion was recorded and later

transcribed for evaluation. Any undergraduate engineering student in this college can enroll in SLDPC.

Results

In this section, we present the level of student reflection achieved by participants from each program. The results throw light on the importance of formative feedback and faculty development in service-learning.

SLDPA
According to this university, there were 16 weeks in spring 2020 semester and week 10 was scheduled as spring break. The students in the sample were a random mix of all years in their undergraduate studies, different majors, even outside the college of engineering. A key point to note is that due to the global pandemic, the second half of the semester, starting from week 11, was completely online.

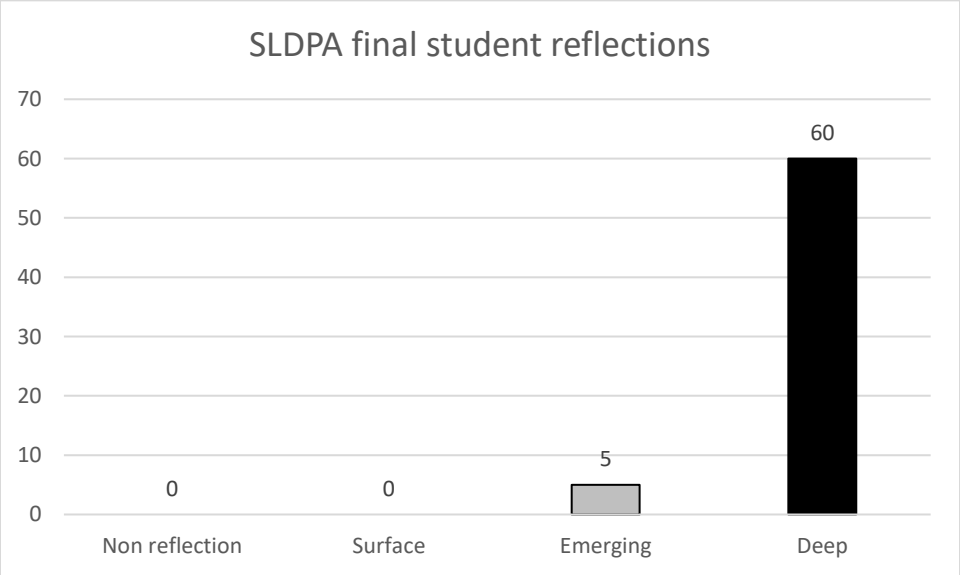

Figure 1. SLDPA final student reflection evaluation based on Modified Jacoby's levels of reflection

As per Figure 1, 60 students (92%) reflected deeply, 5 students (8%) reflected at the emerging level. A key takeaway from Figure 1 is that no student was reflecting at the surface level by the end of the semester.

In this quote is an example of Deep Level reflection. The student is reflecting on the whole semester from multiple perspectives, while also recognizing the conflicts and acknowledging the differences. Thus, this student is critically thinking at the Deep level.

> *…, I have learned the importance of flexibility and keeping an open mind. After school was called off and classes moved online midway through the semester, everything*

changed, and we had to quickly change our entire plan. … Remaining frustrated and stuck on our old plans and ideas of how the semester was supposed to go would only slow our progress, so I realized it was essential to move on and let go of those ideas. … In addition, similarly to the importance of flexibility, I also learned the importance of keeping an open mind. I learned the importance of keeping an open mind through working with a team as well as through the coronavirus pandemic. At the beginning of the semester, our team received several new members from all different majors who had never been on the team before. A lot of our work this semester also involved brainstorming and designing different ideas. Through this work, I learned that it is essential to keep an open mind when working with a team so that you are able to fully appreciate new ideas and consider new ideas rather than immediately ruling them out because of a closed, stubborn mindset. … I realized that the rest of the semester would look very different from what we originally envisioned, but I also realized that was okay and that it was more important to keep an open mind and remain optimistic about the possibilities still remaining. I believe that both being flexible and keeping an open mind are important skills in many different aspects of life as well as in my future career. Often times, I will face unexpected situations, so I believe it is important to know how to quickly react to ensure

In this quote showing an Emerging level, the student critiques their personal and academic growth through thorough and nuanced observations. They also hint on the issue of design and scheduling, but, doesn't dive deep into the cause of why these issues were present in their team. A word in the quote was replaced to maintain anonymity of the program.

As the semester wraps up, I can't help but reflect on the growth I've seen through this course. Not only have I seen a project in an early prototyping stage grow to a point where final testing and manufacturing plans are in place, but I've also seen myself grow as an engineer and a team member. This team has been through ups and downs with redesigns and scheduling, however I have never been a part of a team that has meshed and worked so efficiently together. I am super proud and honored to be a part of such a program. Unfortunately due to scheduling conflicts, I cannot participate in the [SLDPA] course until next spring, however I am already counting down the days until I can rejoin the program. Due to this growth, I can't help but notice the personal development and academic enhancement that I've seen in myself as a result of this group and course.

SLDPB

As mentioned earlier, SLDPB is a relatively new program and it is going through its first set of cohorts. The students from SLDPB are all 2nd year students from different engineering disciplines.

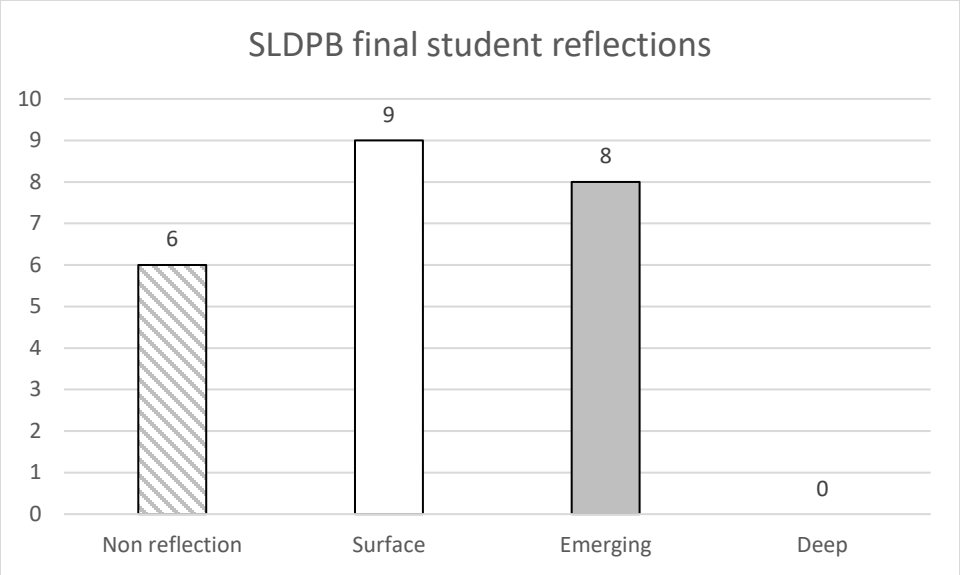

Figure 2. SLDPB final student reflection evaluation based on Jacoby's levels of reflection

A significant aspect to talk about Figure 2 is the Non reflection category which accounts for 6 (26%) student reflections. At the end of the semester, 8 (35%) students were reflecting at the Emerging level and 9 (39%) students in the Surface level.

The following is an example quote of Non-reflection as the student is answering the prompt and not critically thinking about it. In this quote, the student answers to the prompt – what is the importance of communication in community engagement?. The student reflection does not discuss a situation, nor does connect to any issue. There are also no observations captured.

> *Communication is the vital aspect. Communication is basically is the art of conveying meanings from one entity or group to another through the use of mutually understood signs, symbols and semantic rules. Communication is fundamental to existence. So to understand a community it is a process of creating and showing ideas, information, views, facts, feelings etc among the people to reach a common understanding. Communication is the key to the directing function of management.*

In this quote as an example of Surface level reflection, the student focuses on the importance of communication through personal beliefs. The observations are one-dimensional as it is written from only their perspective.

> *Communication can be defined as the giving, receiving, or exchanging of information, opinion, or ideas. Communication is not restricted to any language. It can be expressed in verbal and non verbal manner. With communication with communities enables development and sustainability. Interaction with community helps us to understand the working model of each person in the community. The hierarchy of the community can be learnt. Communication is a influential process, which help us to build the relationship with community. Communication of the right kind matters a lot when communicating with*

a group. Communication needs to be parental and the dynamics change as the way of communication changes. Every community has different sets of communication. It depends on custom, rituals and even superstitions of the community. While communicating with such community a person has to respect the order of the community. Interaction with community needs optimal ignorance is utmost necessary for the distinguish of the useful data and the data that is not required.

In this quote, the student satisfies all the criteria for the Surface level but, goes a little further by providing different scenarios to upkeep effective communication in communities. The student also talks about some of the issues and note multiple observations. This reflect may not have all the elements required for a reflection to be Emerging, however, it has surpassed the Surface level and the thus, is classified as Emerging level.

... A community may not necessarily refer to people living near one another as a team on a province. A community may also be a group of people that are from each other but have the same cause, issue, or interests. Communication can be defined as social interaction through messages, or the transmission of information, ideas, opinions so on from one person or group to another with the use of symbols. We could also say communication is dynamic as it always changes and that it uses behavior languages. It is also essential for the growth of the individuals and the society. It is a process of social interaction conducted in small groups with the application of interpersonal and indigenous media like radio broadcasts, community theatre, audio visual media in groups, drama, face expressions and media where the people in the community could relate. Being accepted by the community takes time. It is just like an ocean which doesn't turn into a reality overnight. You need come up with activities like being with them comfortable in order to break the ice. In cases it may take some time but having a constant friendly attitude towards the community is the key for interacting with them in a better way. And still if the community is hesitant then connecting the leader or respected member of the community and through them to the community that's how things can be tackled to ensure a better communication with the community.

SLDPC

As mentioned earlier, SLDPC is a relatively new program and it is going through its first set of cohorts. The students who participated in the discussion from SLDPC are all sophomores from different engineering disciplines. According to Figure 3, 5 final reflections were classified as Emerging and 1 was classified as Surface level.

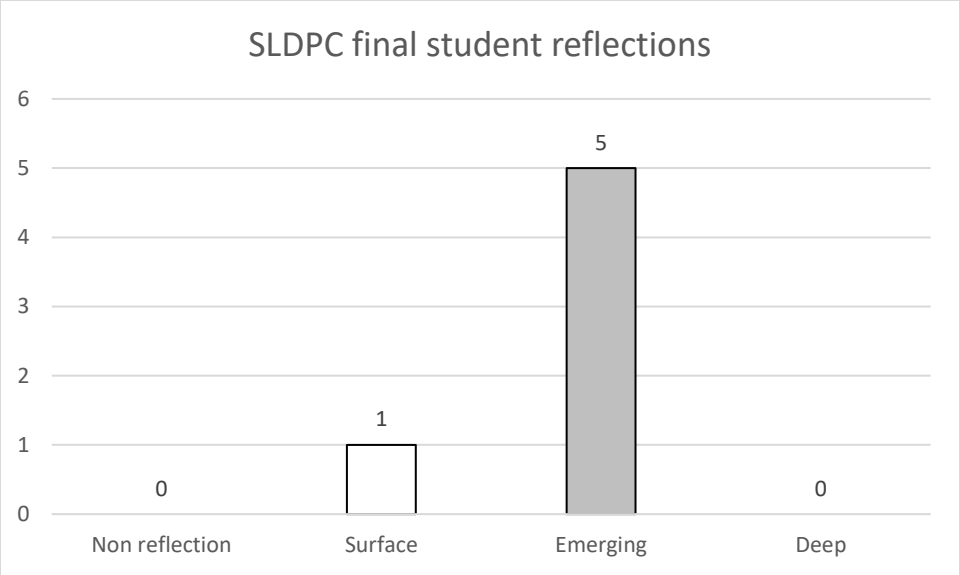

Figure 3. SLDPC final student reflection evaluation based on Jacoby's levels of reflection

The following quote is the transcription of a student reflecting to their experience so far being part of SLDPC. The student provides multiple observations reflecting on the experience gained through community engagement and how satisfied they are with being part of the program. This reflection was categorized as Emerging. A word in the quote was replaced to maintain the anonymity of the program.

> *... About my personal strengths, I came to learn that, if I work on a project, I can make it to benefit the community partner to some extent. It helped me to achieve my goals. I wanted to explore things apart from academics. [SLDPC] was part of the same. ... When we spoke to the community partner, I learnt a lot. When I visited village, the people treated us differently as some officials. Then I came to know my identity as an engineer in the society. What my technical skills would help. If our technical solution is saving two to three hours of their time, I felt it would be a great help for them. We interacted trice with the community partner. We did a prototype. The components and consumables have been arranged by the college. When the team my team members work with the community partner, we had to be in the user's place and see the issue. So, empathy worked for us. ... We can globalize it [project]. According to my team, community partner comes first. Is it good for them. We would make changes as required by the community partner. ... Teachers help us in any part of components and learning. Senior students too helped us. ... It gives happiness when we work for society. .... When we work with actual projects if we choose, wrong motors etc., it will impact large. So, we did decision matrix approach to avoid. In future if I encounter such problems, I will ask why it happened and I will be able to solve further.*

This quote is the transcription of a student reflecting to their experience so far being part of SLDPC. The student observation expressed are on-dimensional and provide personal beliefs as

evidence. This reflection was categorized as Emerging. A word in the quote was replaced to maintain the anonymity of the program.

> *… They [SLDPC] taught Design thinking. I was confused. After I entered the projects, I have understood better. I got a confidence that I can also do projects. I have learnt leadership skill, team management, project analysis. Before that I didn't know the project flow etc. [SLDPC] gave me confidence. Did not know what it was. Seniors told, its projects and interesting. After I joined the centers, learnt not only projects but skills as well. Situation did not challenge. There were no challenges as of now. … I learnt from my community partner, … I thought my solution would help them. We interacted only once so far. We did analysis on what components would be required. I am team leader for my team. I learnt many things as it's my first-time projects with lot of mistakes. …*

The student final reflection distribution in the three programs is very different between the three programs (see Figure 1, Figure 2, and Figure 3). The researchers were not able to draw a conclusion with just the data presented so far. The researchers wanted to look at the programmatic differences – SLDPA is in the United States and the students in this program do a weekly reflection and a final reflection at the end of each semester. They do formal, structured weekly reflections with periodic feedback. This program also provides scaffolding on the reflection mechanisms to the students. SLDPB and SLDPC are in India, are new programs and going through its first set of cohorts. The students in these two programs do a final reflection but in an informal, less structured way with no feedback.

Thus, the researchers wanted to investigate further and look at the weekly reflections of SLDPA. The students considered in Table 3 are from first year and new to SLDPA. Students can take the SLDPA for multiple semesters so examining how they started required sorting through the sample. This selection criteria was not considered for the other two programs as they were new for all the students.

Table 3: SLDPA first year and new students' weekly reflection evaluation based on modified Jacoby's levels of reflection

			Weeks														
Name^	**Year**	**New?**	**1**	**2**	**3**	**4***	**5**	**6**	**7**	**8***	**9**	**11**	**12***	**13**	**14**	**15**	**16**
Hana	**First**	**Yes**	1	1	1	2	1	2	3	3	2	2	2	3	3	3	3
Tye	**First**	**Yes**	2	2	2	2	2	3	3	2	2	3	2	2	2	3	3
Andy	**First**	**Yes**	1	1	2	2	2	2	2	2	3	2	3	2	3	3	2
Sebast	**First**	**Yes**	2	2	2	2	3	2	3	2	2	3	2	3	3	3	3
Pratap	**First**	**Yes**	2	2	2	3	2	2	2	2	2	2	2	3	3	3	3
Vasily	**First**	**Yes**	1	1	1	2	2	1	2	2	2	2	2	1	1	1	2
Giovanni	**First**	**Yes**	1	1	1	2	2	2	2	2	3	3	2	2	2	2	3
Darrin	**First**	**Yes**	2	2	1	2	2	2	2	1	2	3	2	2	2	3	3
Berko	**First**	**Yes**	2	2	2	2	3	2	2	2	3	3	2	3	3	3	3

Bethney	**First**	**Yes**	2	2	2	3	2	3	2	2	3	3	3	3	3	3	3
Maci	**First**	**Yes**	2	2	2	3	2	2	3	3	3	3	3	3	3	3	3
Traci	**First**	**Yes**	1	1	1	2	2	2	3	3	3	2	2	3	3	3	3
Danita	**First**	**Yes**	1	1	1	1	2	2	1	1	2	2	2	2	2	2	2
Cadence	**First**	**Yes**	1	1	2	2	2	2	2	3	3	2	2	2	2	2	3
Mina	**First**	**Yes**	2	2	2	2	1	1	1	2	2	2	2	2	2	2	2

^ A pseudonym name is used for each student.
* denotes the weeks where formal feedback was provided to the students

In Table 3, 0 represents the Non reflection level, 1 represents the Surface level, 2 represents the Emerging level and 3 represents the Deep level as per the modified Jacoby's model. There were no reflections coded as 0 in this sample. It is apparent that the feedback over the semester improves the quality of the reflections and of note are the weeks when formal feedback is given.

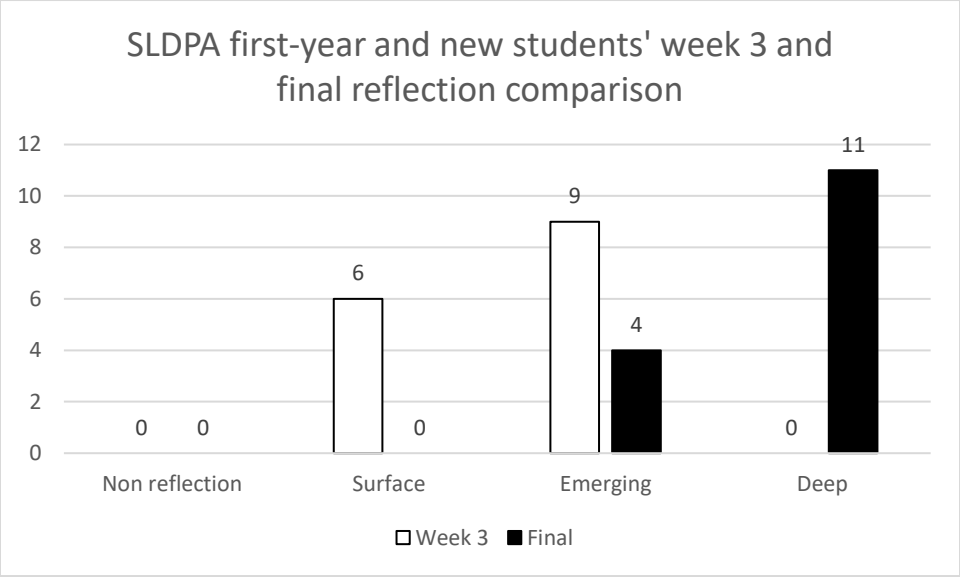

Figure 4. SLDPA first year and new students' week 3 and final reflection comparison

Figure 4 compares the first-year new students' week 3 and final reflection in SLDPA. Figure 4 shows that week 3 student reflection distribution in SLDPA is very similar to the distribution of final reflection from SLDPB and SLDPC. Week 3 was chosen as a variable as the formal periodic feedback started from week 4. Thus, giving the best comparison to SLDPB and SLDPC's final reflection.

It is interesting when the returning students in SLDPA are analyzed. One might think that they picked up where they ended the prior semester, but the data shows a clear progression over the semester. While they do not start as low as the new students, they clearly improve of the semester.

Table 4: SLDPA returning students' weekly reflection evaluation based on modified Jacoby's levels of reflection

			Weeks														
Name^	**Year**	**New?**	**1**	**2**	**3**	**4***	**5**	**6**	**7**	**8***	**9**	**11**	**12***	**13**	**14**	**15**	**16**
Loris	**First**	**No**	1	2	2	2	2	2	2	3	3	2	2	2	2	3	3
Rosaria	**First**	**No**	1	1	2	2	2	2	2	3	2	2	2	3	3	3	3
Cordula	**First**	**No**	1	1	2	2	2	2	1	2	2	2	3	2	2	2	3
Kyson	**First**	**No**	2	2	2	3	2	2	2	3	3	3	2	2	2	3	3
Carver	**First**	**No**	2	2	2	3	3	3	2	2	2	3	3	3	3	3	3
Kaley	**First**	**No**	2	2	2	3	2	3	2	3	3	2	2	3	3	3	3
Prabodh	**First**	**No**	2	2	3	3	2	2	2	3	3	3	3	3	3	3	3
Placida	**First**	**No**	2	2	2	2	3	2	3	3	2	2	3	2	3	3	3
Lacy	**First**	**No**	2	2	2	2	2	2	3	2	3	2	3	3	3	3	3
Royalty	**First**	**No**	2	2	3	3	2	2	3	3	3	3	3	2	3	3	3
Elisabetta	**First**	**No**	2	2	2	3	3	3	3	3	3	2	2	3	3	3	3
Ondina	**First**	**No**	2	2	2	2	3	2	2	3	3	2	2	3	3	3	3
Nives	**First**	**No**	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Carter	**First**	**No**	2	2	2	3	2	3	3	3	3	3	3	3	3	3	3
Linnette	**Second**	**No**	1	2	2	2	2	2	2	2	2	2	2	2	2	2	3
Aylmer	**Second**	**No**	2	2	2	3	2	3	3	3	3	2	2	3	3	3	3
Jillie	**Second**	**No**	2	2	3	3	3	3	3	3	3	2	2	3	3	3	3
Nthanda	**Second**	**No**	2	2	3	2	3	2	2	2	3	3	2	2	3	3	3
Melyssa	**Second**	**No**	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3
Erika	**Second**	**No**	2	2	2	2	3	3	3	3	2	2	3	2	3	3	3
Prunella	**Second**	**No**	2	2	2	2	3	3	2	3	3	3	3	3	3	3	3
Tiger	**Second**	**No**	1	2	1	2	1	1	2	3	2	2	2	3	2	2	3
Rosemarie	**Second**	**No**	1	1	2	2	1	1	2	2	2	2	2	2	2	2	3
Mariangela	**Second**	**No**	3	3	3	3	3	3	3	3	2	3	3	3	3	3	3
Coleen	**Second**	**No**	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3
Maja	**Second**	**No**	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3
Jade	**Second**	**No**	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3
Elouise	**Third**	**No**	1	2	1	2	2	2	3	3	2	2	2	3	2	3	3
Matteo	**Third**	**No**	2	2	3	2	3	3	3	3	2	3	3	3	3	3	3
Rhianna	**Third**	**No**	2	2	2	2	3	2	3	2	3	3	3	3	3	3	3
Muriel	**Third**	**No**	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3
Terentiy	**Third**	**No**	2	2	2	3	2	2	2	2	2	2	2	2	2	2	3
Sheard	**Third**	**No**	2	2	2	2	2	2	2	3	3	3	2	3	3	3	3
Quirino	**Third**	**No**	2	2	2	3	3	2	2	2	3	3	3	3	3	3	3
Krysten	**Third**	**No**	2	2	2	2	3	3	2	3	3	2	3	3	3	3	3
Darleen	**Third**	**No**	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3

Sharyn	**Third**	**No**	2	2	3	3	3	3	2	3	3	3	3	3	3	3	3	3
Braylen	**Third**	**No**	1	2	2	2	3	2	2	3	3	2	2	3	2	2	2	
Elvin	**Third**	**No**	3	2	2	3	3	2	3	3	2	3	3	3	3	3	3	
Charlotte	**Third**	**No**	2	2	3	3	3	3	3	3	2	3	2	2	3	3	3	
Elly	**Fourth**	**No**	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
Lim	**Fourth**	**No**	2	2	2	2	2	2	2	2	3	2	2	3	3	3	3	
Karthik	**Fourth**	**No**	2	3	2	3	2	3	2	2	2	3	2	2	2	3	3	
Chasity	**Fourth**	**No**	2	2	2	2	3	3	3	3	2	3	3	3	3	3	3	
Abidemi	**Fourth**	**No**	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	
Thandeka	**Fourth**	**No**	2	2	2	2	3	2	2	2	3	3	2	2	2	2	3	
Amaranta	**Fourth**	**No**	2	2	2	2	3	2	2	3	2	2	2	2	2	2	3	
Margherita	**Fourth**	**No**	2	2	2	2	3	2	2	3	2	2	2	2	3	3	3	
Valter	**Fourth**	**No**	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
Avis	**Fourth**	**No**	2	2	3	2	3	3	3	3	3	2	2	2	3	3	3	

^ A pseudonym name is used for each student.
* denotes the weeks where formal feedback was provided to the students

Just as in Table 3, in Table 4, 0 represents the Non reflection level, 1 represents the Surface level, 2 represents the Emerging level and 3 represents the Deep level as per the modified Jacoby's model.

Discussion

The intent of the paper was to look at programmatic differences across countries but what emerged from the data was a compelling evidence that formative feedback and regular instruction make a student to reflect at a deeper level. The differences between the program structure seems to be more significant than the cultural differences. The structured support and improvement in SLDPA is consistent with the findings of Eyler, Giles and Schmiede, which listed the characteristics of a high-quality reflection as being continuous, connected, challenging and contextualized [13].

SLDPA
As mentioned earlier, SLDPA documents reflections on a weekly basis, in addition to the final reflection. There were three rounds of formal feedback (on weeks 4, 8, 12) provided to the students before the end of semester evaluations. The end of semester evaluations took place in week 16. Majority of the students (92%) were able to reflect deeply in their final reflection and one of the main reasons is due to the 3 rounds of formal feedback provided to students over the course of the semester before the final reflection. Students are given enough time to absorb the feedback and implement it in their reflection (practice). Another supportive reason is that the students are introduced to the prompts and guidelines as listed by Ash and Clayton [18].

There are two evidences that support that the formative assessment and guided prompts are the reasons for students to reflect deeply. This first evidence is provided in Table 3 and Table 4. Table 3 clearly shows the progression of levels of reflection of first-year new students in SLDPA and Table 4 of returning students. The number of students reflecting deep, starts to increase in week 4, when they were provided with the crucial feedback on their reflections so far. The second evidence in support is better explained using Figure 4. Week 3 was chosen to be represented as this was the week before which any kind of formative assessment was performed with the students of SLDPA and first year new students were chosen to have a strong comparison with the other two programs. So, if SLDPA did not have formative assessment (like the other two programs), week 3 reflection would have been the final reflection. The week 3 distribution in Figure 4 looks very similar to Figure 2 and Figure 3, where students are mostly at the Surface level and Emerging levels.

Another key point to discuss with SLDPA is Table 4. Table 4 comprises of the students who are returning to the program. With careful observation, it can be noted that most students do not reflect deeply till week 4. There could be multiple reasons to this. One reason is that returning students need to be reminded to reflect deeply. Or, the students might not have had meaningful experiences in the initial weeks to reflect deeply. Despite any reason, Table 4 shows the progression of reflection through the weeks. It is also evident from Table 4 that feedback is critical each semester, irrespective of the student's experience in the program. In all, as far as SLDPA goes, we can confidently say that practicing reflection repeatedly with consistent periodic feedback improves reflection.

SLDPB

This was the first case where a quarter of the student responses were not able to be classified as a reflection. There could be many reasons to this. When introducing this program in the paper, we mentioned that the prompts for reflection are generated by the course instructors who may or may not have the necessary training to work with reflection mechanisms. Another reason could be that the students are new to this program and service-learning pedagogy in general. Maybe due to the structure of the program and the students not being able to receive feedback before the final reflection, the students might not know how to reflect is as they had never practiced it before.

SLDPC

Even though with a small sample size, SLDPC showed us the important role guiding prompts play in students' level of reflection. Before the discussion, the guidelines from Ash and Clayton were shared with the students, so that they had enough time to prepare [18]. As the reflection was through discussion, the moderators were able to probe deeper using the prompts and thus, most students were able to reflect at the Emerging level. There are indications that the students were experienced with reflecting in an informal verbal group setting that may have made it comfortable for students in the discussion to reflect. A key point to note here is that there were no artifacts to show the students progression in reflection or the informal verbal reflection which

the students practiced. If the discussions were to happen again with the same sample of students, we may see some students reflecting deeply.

As SLDPB and SLDPC are both in India, it also gets complicated by the fact that the Indian education system has not much experience in reflection and the students need structured guidance. Based on the findings so far, the service-learning pedagogical structure employed in the programs play a huge role in the way students reflect. The key cross-cultural difference was the rote, reproductive and surface approaches to learning in India as explained by Ninnes, Aitchison and Kalos [19]. Another evidence to this cross-cultural difference is the "textbook culture" in Indian education system, where the learnings is teacher-textbook centric [20]. A typical Indian student is good at answering a question. This loops back to the generation of prompts and its importance in Indian service-learning programs.

The National Education Policy [21] is targeting to eliminate this cultural difference by implementing an "organic continuum" that not only focuses on the need to improve cognitive abilities, but also, encourages to reconstruct and redesign the Indian education system to promote critical thinking ability. This policy has designed specific program outcomes that focus on discovery, preparation, abstract thinking, and multidisciplinary thinking at all levels of Indian education system. The National Education Policy [22] adds to this by encouraging curriculum content development which focuses on critical thinking. Thus, leading to more importance and prominence given to service-learning and community engagement activities.

Conclusion

This exploratory and comparative case study reported on analyzed and coded weekly reflections of three programs from two countries to understand how students reflect in each of the programs. Based on the analysis, findings show clear benefits from regular formative assessments with the students and also, introducing them to the guiding prompts that encourage students to dive deeper in their reflection. Although there were cross-cultural components involved in the findings of this study, they did not play a significant role in the way students reflect. The key differentiating factor is the structural difference between the way service-learning pedagogy is employed in these programs. This research is important because there is a shift towards international service learning where projects or programs run the risk of going very wrong if we are not mindful of the assumptions about their history, culture, community and expertise [7].

Service-learning is young and emerging in India. The best way to be prepared for this wave is to organize and conduct multiple trainings for faculty in the field of service-learning pedagogy and its structure. We must train the faculty on the reflection mechanism (the 4 C's as listed by Eyler, Giles and Schmiede [13]) and its components. So that, they can then identify the gaps in student reflection and guide the student to dive deeper in their reflection. Another suggestion is to encourage more international collaborations. Indo Universal Collaboration for Engineering Education is one such effort in this journey towards international service-learning.

There were limitations in this study such as the sample size in the case of SLDPC. In terms of future research, further studies on impact of gender, student's undergraduate discipline can be investigated to find if any of these factors interact with each other. Another limitation was the maturity of the programs. SLDPA was a well established program with over two decades of experience in service-learning pedagogy, whereas, SLDPB and SLDPC are new and young programs.

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