RESEARCH ARTICLE

Proposed Framework for Analysis of Reflective Journal Writing of Dental School Students Participating in a Service-learning Program

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ABSTRACT

A student's personal and professional growth is a hallmark to proper dental education, and service-learning provides one avenue to help enable these skills and competencies. A common tool to help gauge this progression is by using reflective journal writing. This manuscript suggests that a more in-depth method of evaluating journals, such as by using Bloom's Taxonomy, may help to recognize higher levels of cognition achieved by the students during their service-learning experiences. Selected student reflective-journal quotes from an ongoing service-learning program at the University of Pittsburgh School of Dental Medicine, during the school year 2013- 2014, are used to illustrate the identification of cognition levels as described by Bloom. In return, identifying these levels may help to demonstrate the dynamic learning process presented by the implementation of particular service-learning programs. As encapsulated in their journals, many students are not only able to apply lower-level cognition skills, such as "comprehension," but are also able to generate higher-order skills, such as demonstrating the ability to "analyze" and "synthesize" their thoughts. This manuscript is a call for a more detailed exploration of the manner in which reflective-journals may be used and interpreted.

Keywords: Cognition, Dental school education, Educational methodology, Professional socialization, Self-assessment.

INTRODUCTION

Historically, medical and dental education has emphasized the development of interpersonal skills and virtues. The

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Hippocratic tradition that has its roots in Greek civilization continues to guide the moral actions and character formation of physicians. This tradition represents Aristotelian philosophy, where there is a desired goal to develop virtues of character. These virtues include fidelity, benevolence, intellectual honesty, compassion, effacement, courage, and truthfulness.[1] Similarly, Gies expressed that dental education should provide a "sound academic education that involves a thorough grounding in fundamentals: intellectual, moral, and spiritual discipline." He further wrote, "the perspective of cultural study guards the mind and the spirit against the relative narrowing influences of a professional education and yet adjusts them to its exactions."[2]

Currently, health professional schools present a variety of educational models and tools to cultivate health professionals who are caring, socially responsible and capable of behaving as patient advocates in all practice environments.[3] Service-learning models are frequently used to attain these goals and are believed to help enable (a) personal and interpersonal development, (b) understanding and applying knowledge, (c) engagement, curiosity and reflective practice, (d) critical thinking, (e) perspective transformation, and (f) citizenship."[4] These programs aim to help students develop the "interactions required to tackle the complex health problems that are influenced by many factors - social, behavioral, environmental, and cultural, as well as biologic causes."[5] Although reflective journal writings are frequently used to evaluate the effectiveness of the service-learning process, outcomes remain difficult to demonstrate and quantify owing to the qualitative nature of the data. In this paper, we propose a novel approach to interpret service-learning findings from student reflective journals meaningfully. We intend to suggest a new perspective in the analysis of reflective writing that may ultimately reflect on the success and value of various service-learning programs.

Journal writing is an instructional strategy to encourage students to reflect on their experience. It is also an important data source for assessing the student's level of engagement and understanding of what it means to be a socially responsive healthcare professional (Center for Community Service Learn-

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ing, the University of Texas at Arlington, 2014, www.uta.edu/ccsl). Student journal analysis typically dichotomizes students as either in "authentic engagement" or "strategic compliance." Authentic engagement is associated with the service having clear meaning and value, whereas strategic compliance represents an experience where personal outcome, such as receiving a grade, is substituted for the true value of the task. The problem with the current dichotomy is that some strategically compliant students may demonstrate a moderate level of engagement (knowledge-and comprehension-based) (Schlechty Center, 2014, www.schlechtycenter.org), thus, be at a higher cognitive level than other purely strategically compliant students. Other students may demonstrate deeper levels of analysis and critical synthesis, yet may not have absolute engagement. Deeper levels of reflection are also more difficult to define and demonstrate.[6] Since current journal analysis relies upon keywords and phrases that reflect the basic knowledge (lower cognitive levels) obtained by students, this analysis falls short in uncovering the broad range of cognitive levels. It is therefore not surprising that the evidence to support service-learning interventions remains inconclusive. A detailed rubric for journal analysis may help uncover these cognitive levels, and thus offer greater power to discern the effectiveness of service-learning programs, where the effectiveness of a program is judged by the cognitive levels demonstrated by its students. Bloom's taxonomy is a tool that provides a well-documented hierarchy of cognition levels to help organize and interpret successful gains in student cognition.[7] This paper proposes that replacing the current rubric with Bloom's Taxonomy may enable an improved system for journal analysis.

MATERIALS AND METHODS

This study is IRB exempt (# PRO14060630). All of the service-learning activities and resulting documents are from the ongoing Student Community Outreach Program and Education (SCOPE). Established in 2001 at the University of Pittsburgh's School of Dental Medicine, this program was developed to help enable both personal and professional development of our students.[8,9] All students from the class of 2016 (n = 80) participated in SCOPE (50 hours of community service), beginning the first day of their professional education (Fall 2013) and ending near the end of their second-year (spring 2014). This part of the program prepares students for providing supervised dental services in community health center settings during the third and fourth year of their dental school. Interested readers are referred to Razdan et al. for further details on the second part of the SCOPE

program.[10] At least thirty of the required hours take place in non-dental environments, and at least one student activity needs to be direct experiences with children with special needs, the elderly or direct patient or family care. After completion, all students were required to write a 3 to 5 page reflective journal, given minimal instruction on writing technique and content. Although a variety of journal quotes then were available, the intention is not to quantify any results. The selected quotes solely demonstrate various levels of cognition achieved by individual students, as recognized using Bloom's taxonomy levels. The excerpts presented are confidential and permission obtained from the student-authors.

Bloom's Taxonomy

Bloom's taxonomy is a stepwise progression in a student's cognitive development, in which each of the six identified levels generally relies upon development of the proceeding level. According to this system, there are six levels of cognition:[11]

- *Knowledge:* Rote memorization, recognition, or recall of facts
- *Comprehension:* Understanding what the facts mean
- *Application:* Correct use of the facts, rules, or ideas
- *Analysis:* Breaking down information into component parts
- *Synthesis:* A combination of facts, ideas, or information to make a new whole
- *Evaluation:* Judging or forming an opinion about the information or situation

Based upon the original and updated versions of Bloom's taxonomy[7,11] a brief outline of the critical attributes and identifying actions associated with each level is presented in Table 1.

RESULTS

Excerpts from four student journals to illustrate cognition skills using Bloom descriptors are presented in Table 2. One selection exhibits only lower cognitive learning skills (student #1), while others display a range of achieved cognitive levels. Student #5 displays high cognitive skills that appear to be previously developed, as the writing moves quickly towards exhibiting evaluation skills, especially in the form of evaluating the effects that service learning will have on other students and in forming judgments. In these examples, the writings appear to follow the progression of taxonomy levels linearly as suggested by Bloom; these levels that are placed alongside the approximate area of the corresponding journal excerpts with arrow-indicators at cognition level changes.

Table 1: Summary of Bloom's taxonomy levels, attributes, and actions

Taxonomy level	Attributes	Key actions
Knowledge	Recalling facts, terms, basic concepts and answers	List; name; label; define
Comprehension	Demonstrating an understanding of facts and ideas	State; organize; compare and contrast; rephrase; summarize
Application	Solving problems by applying acquired knowledge; use of facts	Apply, construct; develop; model
Analysis	Making inferences and finding evidence to support generalizations; identifying motives or causes	Relate (make relationships); infer; distinguish
Synthesis	Compiling information in a new pattern or proposing alternate solutions	Create; formulate; imagine; modify; suppose; theorize
Evaluation	Making judgments about information and presenting/defending opinions	Value; judge; support; explain; appraise

Table 2: Student journal evaluation using Bloom's taxonomy cognition levels

Journal #	Activity	Cognition level	Key phrases
1	A, B	Knowledge comprehension ➡	These SCOPE projects have given me the opportunities to grow in communication and empathic skills, and hopefully, these skills will help in my transition to the clinics to better serve my patients.
2	C, D	Knowledge comprehension ➡	This program allowed me the opportunity to expand the skills needed to be able to connect people in general… This will be helpful with seeing new patients and trying to start a trusting relationship with them during an appointment. ... ... Until I completed these requirements, I did not realize the disparity in the health care fields and the sheer number of people who do not receive adequate oral health care.
		Application ➡	This insight into the community in and around Pittsburgh is probably very similar across the nation and shows that as a dentist I can make a difference in my community....
		Analysis/ synthesis ➡	And one of the most important things I can do as a member in the community provides a positive role model in the community for the young people; to show them that hard work and perseverance will pay off. Shaping young minds to be respectful, hard-working, and honorable adults ensure a brighter future for not only them but for those people who they will have an influence on….
		Evaluation ➡	Being a professional, whether it is a doctor, lawyer, dentist, etc., means more than just focusing on your field; it means you have a responsibility to create a better community in which you live, practice, and serve.
3	E	Knowledge comprehension ➡	The first event that I volunteered for was Special Olympics Bowling. Going into it that day, I remember being very apprehensive and unsure of myself. I was nervous that I would not know how to act around children with disabilities and I was scared that I would do something wrong. By the end of the day, however, I fell in love with the event and all of the people involved. The joy I got from helping the participants was unlike anything I had ever experienced. Every smile I was able to bring to the faces of the children was repaid ten-fold in the satisfaction I received. It was eye opening and awe-inspiring to witness the determination, kindness, talent, and intelligence of the participants….
		Application analysis ➡	I realized that despite the disabilities they might have, they were still people with hopes, fears, and dreams-just like myself and just like everyone else. And more importantly, their hopes, fears, and dreams were no less important than anyone else's. It was quite a fantastic thing for me to recognize this fully. I walked away that day feeling like I got so much more in return than I could have ever given… The more time I spent at the events, the more I grew to appreciate that the people there are so much more than their disabilities.
		Synthesis ➡ Evaluation ➡	Although it's difficult to admit, before these events, it was easy for me to define people that are different from me by what makes them different, whether good or bad. Meeting so many incredible people at these events helped to realize no one can or should be defined by one thing. Just as I would not like to be determined by any single aspect of myself, the rest of the world is no different. This realization applies to more than those with special needs—regardless of age, race, gender, religion, ethnicity, culture, background, or sexual orientation; everyone deserves to be treated equally. Every patient deserves to be treated with kindness and compassion, and it is so important not to judge someone based on his or her appearance or abilities alone. My experience with the Special Olympics events will forever change my outlook not only on special needs patients but also all other patients with different backgrounds from my own. Because of my time spent at the Special Olympics, I have grown into a more accepting, less judgmental individual, and I am forever grateful for it. The fulfillment I got out of these experiences has sparked an interest into me to work with patients with special needs in the future, something I had never even considered before.

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Journal #	Activity	Cognition Level	Key phrases
4	F	Knowledge comprehension ➡️ Application ➡️	I had never thought about the idea that there is a community among those with IDD and their families, but these relationships continued to strike me throughout the day... When I tried to imagine myself to be a parent or family member of those with IDD or even an individual with an IDD, I realized the importance of this connection and tremendous blessing and resource to have a network of those experiencing the same difficulties and joys throughout life….
		Analysis/ synthesis ➡️	By putting myself in the place of the people experiencing things so different than the challenges and joys that I experience gave me a much greater understanding and empathic attitude. I was thankful to be a part of the day and excited to celebrate with my athlete and all of those involved, but continue to be impacted through the exercise of putting myself in the proverbial "shoes" of others.
		Evaluation	In my time since starting dental school, I realized how much my attitude toward those with IDD was condescending and ignorant. My experience working and talking to those with disabilities and their families have taught me a lot about the hurtfulness of that attitude of ignorance. Also, I have seen first- hand how those with IDD do not allow their handicaps to define them or prevent them from living their lives with vigor and joy.
		Evaluation	Having been fortunate enough to be brought up by selfless parents, the idea of giving back to the community is not a foreign one to me. In all honesty, SCOPE has not done much for my personal growth because I've always been open to helping out in the community. Also, even before dental school, I've always planned to do free dental work for those in need. I also believe that helping out in the community doesn't have to be planned out, such as putting aside a weekend here and there, but just being helpful to others wherever you are on a daily basis…. For those who are lacking in communication skills, SCOPE has done wonders for them. By forcing students to communicate with others in different settings, I've seen the transformations that have taken place. For myself, SCOPE was an excellent way for me to keep my communication skills sharp because I have been too accustomed to speaking with those in the health sciences… Also, just communicating among ourselves during these events, we have become better at becoming team players and team leaders…. SCOPE provides us with the opportunity to see how much of an impact we can make not only as people in general but also as practitioners. Whether or not we choose to make an effort in the future to carry on what we have learned is up to us. I can only hope that SCOPE will provide the same realization for my peers.

A = Food bank
B = Free medical/dental screenings
C = Boy's and girl's Club
D = Sharing and caring (providing meals for the elderly)
E = Special olympics (bowling, basketball, bocce ball)
F = Children's Institute of Pittsburgh (aiding intellectually disabled)
G = Ronald McDonald house

DISCUSSION

The purpose of this paper was to demonstrate how Bloom's taxonomy may be applied in the analysis of student journal writing as part of the dental school curriculum. The taxonomy gives a broad and in-depth view of student development of characteristics, which is necessary for a student's personal and professional growth. Interestingly, there appears to be a natural progression towards increasing cognition levels as the journals unfold. This may be explained when one considers the inherent relationship between language organization and cognition skills.[12]

Two situations may affect service-learning outcomes and journal interpretations. First, student anticipation of the methods used for journal evaluations (such as their understanding that certain keywords and phrases are evaluated), and their perceptions regarding faculty expectations resulting from the service-learning program, may interfere with the validity of their statements. Second, achieving higher cognition levels may be dependent upon engagement in specific activities.

In the first case, the ability to distinguish the validity of statements may be challenging; however, the ability to express elements of synthesis and evaluation may in naturally indicate student attainment of advanced cognition, whereas the parroting of phrases that underscore knowledge gained and "comprehension" may be merely an academic exercise. This distinction may therefore not be an insurmountable task, but requires much further study. Regardless, even if the cognitive outcomes may be exaggerated, this type of "non-differential bias," where the students' reflections represent a socially acceptable

response (that the student benefited cognitively from the program) does not affect the comparative effectiveness of two service-learning programs as the bias would even out between different programs.

In the second case, future studies may reveal a connection between distinct service experiences/characteristics and their potential for enabling attainment of higher cognition levels. As in many fields, acquisition of knowledge is far different than understanding principles–the trick is to transcend mere application levels. Educators need to approach reflective journal writings with a bit more scrutiny regarding student engagement, motivations, and ultimate learning experiences.

CONCLUSION

By closer examination of the reflective journals using evaluation tools such as Bloom's taxonomy, a clearer picture of student development and engagement may be attained. This type of analysis helps to establish a complete picture of a student's cognitive development in the context of cultural competency, and therefore to monitor the effectiveness of a service-learning program. Future direction would include creating a rubric to explore the validity and reliability of applying Bloom's taxonomy to journal analysis.

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