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Keywords
Case-based learning, Formative assessment, Student feedback, Student centered learning

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Abstract

Application Quests are case-based learning activities that emphasize issues in professional practice and are given as part of the classroom learning process. This qualitative investigation examined students' views regarding the perceived impacts that Application Quests had on their learning. A phenomenological analysis of written assignments from 44 undergraduate students revealed six prevalent themes. The Application Quests were described as being unlike previous experiences, difficult and time consuming, and an emotive process. They were further identified as helpful for learning and integrating course material, improving learning across courses, and increasing readiness for professional practice. These themes are discussed in relation to Astin's input-environment-outcome model of student development during college and potential improvements to future Application Quests.

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Introduction

Application Quests are student-learning activities that are grounded in the pedagogies of case-based and inquiry-based learning. Students are given professional cases that are built on the content, skills, and activities that have thus far been addressed in the course. To solve these cases, however, students must apply their learning to problems that are somewhat different than those previously discussed during coursework. Application Quests provide formative and summative measures of students' developing expertise and abilities to a) apply the course content to professional cases, b) extend their knowledge and skills to new applications, and c) learn and adapt from the feedback of others.

Application Quests were developed by the first author in 2007 and have since been used in undergraduate and graduate courses. The purpose of this investigation is to examine students' views of Application Quests, including procedural aspects and impact(s) on learning within the course and development as professionals. Following a detailed description of Application Quests and their pedagogical bases, a qualitative analysis of written essays and course evaluations from 44 students in an undergraduate course on child speech disorders are presented.

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Application Quests Features

Procedurally, Application Quests have each begun with the instructor handing out or posting a document with detailed descriptions of a professional case, the problems to be solved, instructions for the students about addressing the problems and formatting their response, and a grading rubric. The appendix presents part of one such Application Quest document from an undergraduate course on the assessment and intervention of children with speech sound disorders, specifically part of the professional case and the description of the problems to be solved. After receiving this document, the students are given one week to complete what is called the "first full version" of their response. The first full version is a complete response to the challenge, not a draft. The students are instructed that this version should be what they would turn in if they only had one week to complete the assignment. The first full version is used for review purposes and is not graded. On its due date, the students bring in written copies of their first full version that do not contain any identifying information. These papers are randomly distributed amongst the class for peer review. The students receive their peer reviews at the end of the session and reviews from the instructor a day or two later. The final version is due one week after the peer review.

Professional application. Application Quests have been developed individually, within and between courses, to target specific knowledge and skills. Despite these differences, there are at least five primary features that they all share (see Table 1).

Table 1. Five primary features of Application Quests and their pedagogic bases.

Primary features of Application Quests	Pedagogic Bases
Professional application: The tasks are based on challenges that one would expect a professional in the field of study, or a related field, to face.	Case-based learning
Complex problem solving: The tasks are problems that require careful examination of the issues involved, complex decision-making, and evidence-based support for decisions and results.	Inquiry-based learning, Critical thinking, Reflective practice
Active transfer of knowledge and skills: The tasks are based on prior work in the course, but also extend beyond what was directly covered in class.	Deep learning
Multiple sources of feedback. The students receive feedback from the instructor and each other without negative consequences.	Formative assessment
Revisions without negative consequences: The students are allowed to make revisions without negative consequences.	Formative assessment

The first feature is that they are based on professional application. In other words, the challenges mimic those that might be faced by a professional in the field of study or a related field. These professional challenges are a form of case-based learning, an active learning approach that requires students to gather information about a case, analyze the information, and make value-laden decisions (e.g. Carder, Willingham & Bibb, 2001; Georgiou, Zahn, & Meira, 2008; Lyons, 2008). As Savery (2006) wrote,

> A well-constructed case will help learners to understand the important elements of the problem/situation so that they are better prepared for similar situations in the future. Case studies can help learners develop critical thinking skills in assessing the information provided and in identifying logic flaws or false assumptions. Working through the case study will help learners build discipline/context-specific vocabulary/terminology, and an understanding of the relationships between elements presented in the case study… Cases may be used to assess student learning after instruction, or as a practice exercise to prepare learners for a more authentic application of the skills and knowledge gained by working on the case (p. 15).

The professional case presented in the appendix is in the form of a speech assessment that was conducted on a 4-year-old child. Along with this information, the students received a copy of a four-page, single-spaced report from the speech-language pathologist who conducted the case. The case was based on an actual client, with adjustments made to prompt the challenges of the Application Quest and assure the client's confidentiality. This particular Application Quest directed the students to determine why the clinician made these assessment choices and to identify additional items to include in the assessment. These issues reflected some of the challenges that clinicians across health care disciplines face when planning a client/patient assessment.

Complex problem solving. A second feature of Application Quests is that successful completion requires complex problem solving. These are assignments that can be correctly solved in more than one way and whose answers can neither be easily deduced nor found in a book. In the appendix example, the students had to use their knowledge and skills from the course to deduce the speech-language pathologist's intentions behind the clinical choices and make justifiable decisions themselves. Complex problem solving activities like these are at the center of inquiry forms of learning, including case-based learning (e.g., Bass, Contant, & Carin, 2011). As a result, students must apply cognitive and metacognitive skills that are associated with critical thinking (e.g., Kuhn & Dean, 2004) and reflective practice (e.g., Schön, 1983; 1990), including identifying multiple options, critically comparing and contrasting each possibility, and justifying the selected choices.

Active transfer of knowledge and skills. The third feature of Application Quests refers to taking the information acquired in a course and applying it to a new situation. It is a feature of "deep learning" because it requires students to extend ideas to new and varied contexts (e.g., Marton & Säljö, 1976; Rhem, 1995). The transfer that is required on most Application Quests is similar to what Perkins and Salomon (1994) described as near transfer (see also Perkins' 2008 description of "performative knowledge"). Near transfer refers to applying knowledge and skills to a closely related context. In the case of the exemplar Application Quest in the appendix, the students had spent earlier class sessions developing diagnostic plans for different clinical cases and tasks. This Application Quest required them to work in the opposite direction, to take a completed diagnostic and deduce the clinician's intentions.

Multiple sources of feedback. The fourth and fifth primary features of Application Quests are based on formative assessment in which students' current knowledge and skills are examined primarily as data for the instructor and student to improve current learning (e.g., Angelo & Cross, 1993; Black & Wiliam, 1998; Sadler, 1989). This contrasts with summative assessments, whose measurements are done at the end of learning experiences and focus on final outcomes. Although feedback may be included in both types of assessments, its role

varies. In summative assessments, feedback is used to identify the differences between the students' responses and the instructor's standard. Formative assessments build upon this by then using this information to alter or close the gap (Nicol & Macfarlane-Dick, 2006; Ramaprasad, 1983; Sadler, 1989).

By both reviewing another student's response and receiving comments of their own, students completing an Application Quest receive multiple forms of input. As a reviewer, the students are required to complete a worksheet that contains the following questions.

1. How did this author address/complete the assignment differently than you?
2. What are things that you learned from reading this paper? What was done really well?
3. What parts of this paper did you have difficulty understanding?
4. How do you foresee changing your own paper based on reading this author's paper?
5. What are three things that this author should not change?
6. What three things that the author should consider revising?

It is important to note that the questions emphasize a) comparisons between the reviewer's own response and the one that they are commenting on and b) lessons that the reviewer learned from doing the review. They do not directly ask for comments regarding the accuracy of the author's response. By doing so, the reviewers need to critically analyze their peers' response and compare it to their own. The instructor also provides feedback on the students' first full versions. The methods of the instructor's feedback have varied from individual comments to summary comments for the entire class. Thus, students completing an Application Quest receive information and feedback from three different sources: themselves as reviewers of someone else's work, the peer review that they receive of their own work, and the instructor's review.

Revisions without negative consequences. Because the challenges presented within Application Quests can be solved in multiple ways, students are given freedom to develop their responses as they see fit (within the requirements of the assignment). This freedom allows students to develop and explore their own problem solving methods. The fifth primary feature of Application Quests facilitates this by allowing students to make revisions based on the feedback that they receive, without any negative consequences (such as points taken off). Revisions come from the peer and instructor reviews described above as well as reflective self-evaluations from the individual students. As stated earlier, no score or letter grade is assigned to students' first full versions of an Application Quest (penalties are only imposed if the first full version is incomplete or late). In addition, the nature of the feedback that the students receive, especially from the instructor, focuses more on leading them in the intended direction than giving specific answers. As a result, the students continue using their critical thinking skills as they revise their response.

Taken together, these five primary features of Application Quests and their pedagogic bases fit within the paradigm of learner-centered teaching (e.g., Weimer, 2002). Each of the courses in which Application Quests have been used has emphasized learning through student discovery within in-class activities and discussions. These activities were similar to the challenges of the Application Quests. In the course that included the case described in the appendix, for example, the students and the instructor participated in classroom sessions that included viewing a video of a child with a speech sound disorder, working as a large group to determine diagnostic questions, and meeting in small groups to develop an

evaluation plan based on those questions. As such, the students had prior experience with creating assessment plans; experiences that they could build upon to complete this Application Quest.

As most faculty members know, even the best-designed learning activities can fall short of their intentions. This may be especially true for newly developed tasks. The purpose of this study was to investigate student's reactions to Application Quests, via the following research questions:

1. Did students view Application Quests as having a positive impact on their learning? If so, what connections did they make between their experiences with Application Quests and a) their learning within the class and b) their development as future professionals? If not, how did they view Application Quests in relation to their learning?

2. What aspects of Application Quests influenced their views on its educational impact? In other words, what did they find particularly helpful and/or problematic about Application Quests?

Method

The method of investigation was that of phenomenological research, specifically psychological phenomenology (e.g., Creswell, 1998). This form of qualitative research examines the experiences of multiple people in regards to a particular event or phenomenon (Creswell, 2011; Miles & Huberman, 1994; Moustakas, 1994). In this investigation, two sources of written data from 44 students in an undergraduate course on child speech disorders were analyzed. The first data source was a reflective essay from the final assignment in the class. The second was an end-of-the-semester written narrative review of the course. In general, the procedures of phenomenology involve identifying the phenomenon and individuals who have experienced it, collecting data from the individuals about their experience, identifying individual idea statements and grouping them into codes and themes, and reflecting on the meanings of the experience. The Human Subjects Review Board at Bowling Green State University approved the methodology of this study on April 14, 2012 and the data were analyzed shortly thereafter.

Participants

The participants were 44 students who were enrolled in a 300-level undergraduate course titled Phonological Assessment and Intervention. The course included three Application Quests during the semester. The students were all majoring in communication sciences and disorders. The class included 7 sophomores, 26 juniors, 8 seniors, and 3 post-baccalaureate students. All of the students were female. No further demographic information about the participants were collected.

Data Collection

The first source of written data was a personal reflection within the course's final assignment. The reflections were assigned to be two to three pages long (double-spaced) and contained the following instructions:

> Go back in your mind to that first day of class. Remember how we talked about the hero's journey; from a life not satisfied, to training and experiencing obstacles, and ultimately transcendence to victory. Think about how you felt then about actually working with a phonological client. Next, recall the first time you read the course syllabus and its promise of challenge. Finally, go back and review your Phonology and You paper. Remind yourself of who you were at the time. Spend time and consideration doing all of these things before you begin writing this reflection.
> Although you are not yet ready for clinical work, you should be able to see that you are now a different person from who you were in January. Your final assignment is to write a two-page reflection on how you have changed. What have you learned about phonological assessment and intervention that will make you a better clinician? What have you learned about yourself? What aspects of this class shaped these changes the most? How has this experience shaped you towards becoming the excellent professional that you will one day be?

The students submitted their responses to this reflection electronically. In order to insure the students' confidentiality, all of the reflections were placed into a single document and all identifying information (such as names and identification numbers) was removed. This de-identified document was used for all subsequent analysis.

The second data source was from the departmentally required course evaluations. The instructions guided the students to provide positive and negative feedback about the course content, instruction, examinations, assignments, and books/materials. The students completed this evaluation during the last week of the class without the course instructor present. Their written statements ranged from one to four sentences long. No personal information was included on these worksheets, ensuring confidentiality when the instructor received them after the course was completed and the grades had been submitted. Neither the course evaluations nor the personal reflections directly solicited feedback on the Application Quests.

Analysis

The data analysis followed procedures for psychological phenomenology as outlined by Creswell (1998, 2011). It began with the authors identifying their own thoughts, experiences, and biases on the subject of classroom learning and assessment activities and Application Quests. The purpose of this was for each member of the research team to identify and limit the potential effects of their own bias on the analysis and interpretation (i.e., bracketing). The first author was the developer of Application Quests and principal investigator of the study. At the time of data collection, he had taught at the university level for 10 years. He created Application Quests with the intention of improving students' critical thinking skills and increasing their exposure to professional thinking and problem solving. The second and third authors were doctoral students in Higher Education Administration. These authors had no direct experiences with Application Quests prior to their work on this study, although they had experienced aspects of its pedagogic bases in their earlier coursework.

In the second step of the analysis, the written responses were prepared for review. The handwritten course evaluations were typed into a single document. Because neither the reflective paper nor course evaluation included items specific to Application Quests, written statements about other aspects of the course were removed from both documents. This was

done independently by each of the authors, who then met to compare their results. An Application Quest specific version of each data source was developed by group consensus and then combined into one file. This final document was 11,478 words long, with 10,088 words from the reflective papers and 1,390 from the course evaluations.

The final step of the analysis focused on the development of codes and themes from the data. Each member of the research team, working separately, divided the students' responses into individual idea statements, and placed each idea in its own spreadsheet cell (i.e. horizontalization of the data). Every idea was then considered for the potential code it represented and copied into another spreadsheet, organized by theme. Thus, the themes were derived from the data themselves and not any previously articulated decisions. Once completed, each member of the research team shared their codes, themes, and idea statements with the other members. A dialogue process was then used to reach consensus on the final set of themes.

As with other forms of research, phenomenological investigations are concerned with the credibility and transferability of the findings. Of particular concern are the potential negative influences of bias from the examiners and the degree to which the information presented represents the actual experiences of the participants (Creswell, 2011; Maxwell, 2005; Miles & Huberman, 1994). Credibility and transferability were established in a number of ways, including the above outlined procedures of bracketing, horizontalization, and triangulation during the code/theme development. In addition, having the participants write their own descriptions minimized potential interferences between their thoughts and reflections and the data analyzed. The students were given one week to complete the reflective papers and as much time as they needed to write their course evaluations.

Results

The research team identified approximately 200 individual idea statements about Application Quests within the participants' self-reflections and course evaluations. These statements were sorted into codes and then organized into six themes. The themes, along with sample statements from the participants, are presented in Table 2 and described below. The number of idea statements that occurred within each theme was as follows; unlike previous learning experiences = 44, difficult and time consuming = 50, an emotive process = 37, learning course content = 22, improving learning across courses = 19, readiness for professional practice = 26. Six idea statements did not fit in with any of the themes; each expressing support for working with a partner or meeting with the instructor.

Table 2. The six themes identified from the participants' self-reflections and course evaluations.

Theme	Sample Statement
The Application Quests were unlike previous learning experiences.	By having Quests instead of exams, this made me remember the information better. For an exam I know I study mostly to get a good grade on the exam not to retain all the information. Whereas for the Quests we applied what we knew, this made me learn the information and remember it through the whole class.
The process of completing Application Quests was difficult and time consuming.	As tedious and long as the Quests were…, I have to admit that there were times that I was having fun doing the assignments given, even at midnight when I had been working on a Quest for a good six hours.
Completing Application Quests was an emotive process.	The Quests have really tested me, there were times that I was stuck or just wanted to quit. I really had to dig deep and look inside myself to work through these struggles and this is where I learned these lessons.
The Application Quests were helpful for learning and integrating course content.	I learned that knowing a fact is completely different than being able to apply a concept. I might be able to transcribe the girl from the video's speech perfectly every single time, but if I do not know what to do with the results, then that step is useless.
The Application Quests provided lessons for improving learning across courses.	I have always been a procrastinator because I know I can get it done and still do well on the assignment. Working on theses Quests and actually having to apply what I've learned is a different challenge in me and it taught me to not procrastinate.
The Application Quests increased readiness for professional practice.	Being a clinician in the future will be much tougher than completing a Quest. However, having completed the Quest I have now gained the abilities to be creative to keep my client motivated and flexible to make therapy effective.

Theme 1: The Application Quests were unlike previous classroom experiences

The students reported a number of ways that the Application Quests were different from the assignments and assessments of their previous coursework. A number of students wrote about how memorization was a very important method of learning in other classes, but not efficacious for these experiences. The following quotes, from two separate students, reflect this idea:

> I had been used to sitting down with materials set out in front of me, rereading, rewriting, and rehearsing notes and terms until I was sure I was prepared for an exam. This habit was definitely not something I could apply to a Quest.

> The assignments that we had were not only lengthy, but were different than any class work I have had in the past. It was no longer a matter of reading a book, memorizing material, and being able to spit it right out a few times a semester when the test date rolled around.

Many of the comments that reflected on differences between Application Quests and activities from other classes also included statements about benefits of the Application Quests. One student, for example, identified working with the material in a practical way:

> The Communication Disorder classes that I have taken before involved mostly lecturing, memorizing disorders and how they should be treated, and while there were "labs" and "case studies", there were not that many opportunities to really practice what we have learned in class, especially not in an all encompassing way like the Summative Quest is doing.

Other students commented on how the Application Quests helped their mental organization and retention of the information. This was demonstrated by the first quote in Table 2 as well as the following, "It wasn't going to be a class I simply attended and took notes, but rather a class I had to actively think and participate every day in order to build upon the material and form the maps in my brain."

Some of the students, however, did not report positive differences between the Application Quests and activities from other classes. These students stated that they felt underprepared for the casework aspects of the Application Quests. As one student wrote:

> I did not like the Quests. At this level, where we just learned the info, the Quests were above our capabilities. I believe exams would have helped us actually understood the information first, then maybe in another course where we are more comfortable we could do Quests.

Theme 2: The process of completing Application Quests was difficult and time consuming

Students shared comments about the process of completing Application Quests. These comments were predominantly of two major sub-themes: requiring more clearly outlined instructions and needing more time to complete each Quest. Statements reflecting the need for clearer instructions included, "I feel that sometimes on the Quests I found the instructions confusing" and "all Quests had parts where they were worded confusingly and the entire class struggled with ever fully understanding. Also, there seemed to be a lot of contradictions in the wording of the instructions."

The students also mentioned the need for more time to complete the activities. Some of the students were concerned with the lack of overall time given to complete an Application Quest. They reported working for many hours (one student stating over 12 hours) and expressed a desire for more time on the final Application Quest. Other students did not appreciate the day of the week that the Quests were assigned, and then due. One student stated, "Getting them on Wednesday is a challenge because by the time we can start the Quest it is the weekend and we can't ask questions until Monday."

Theme 3: Completing Application Quests was an emotive process

Student challenges and frustrations were exhibited through language describing difficulties they experienced with the structure and implementation of the Application Quests, as well as gains or growth they observed from the process. These data emphasized references to how "difficult," "challenging," "complicated," and "stressful" these assignments were to complete. One student demonstrated these emotions by writing, "These Quests have been some of the most complicated and stressful assignments I have been given this year." This challenge made numerous students "nervous," "overwhelmed," and fearful about their ability to complete the tasks well: "I eventually worked through my fear and roadblocks. To work through these I once again had to be flexible and creative." These feelings were exhibited with initial language of frustration or anxiety when receiving Application Quests

and throughout the process of completing them. One student articulated this frustration by stating, "hands down, these Quests are the most difficult assignments I have ever had to do."

While expressing overall stress and frustration, some students also recognized the benefits of this type of assignment: "Even though the Quests were stressful, I feel like I learned a lot from doing them. I really like how it put us in the shoes of a speech-language pathologist." When discussing application of material students had mixed responses regarding their ability to apply content: "Even though the Quests were difficult, they really made me think and helped me to understand all of the different material." Students listing challenges also referenced growth in personal aspects, skills, knowledge, and/or greater understanding of the role of a clinician:

> The Quests are what really shaped my changes, mostly because this was a new way of learning I had never experienced before. I believe that writing these Quests have been the biggest struggle so far in my college career. It's a new way of showing what I've learned and what I'm capable of doing. It made me more confident in my abilities, made me think, helped me to understand the material.

Theme 4: The Application Quests were helpful for learning and integrating course content

The students made a number of statements about how the Application Quests had helped them to learn new information about child phonology and the discipline of communication sciences and disorders. These comments included statements about specific content and the application of this content to clinical cases. Improvements with content acquisition were reported in applying phonological theory, discriminating phonetic and phonemic errors, transcribing speech samples, conducting speech assessments, understanding different therapy approaches, and creating treatment plans. Improvements in these areas were recorded in both knowledge and skills. As one student wrote:

> They [the Quests] required me to think critically about the patient and their speech. I had to take several factors into account such as the child's age and what type of errors they were making. At the beginning of the year I would have been entirely lost in this assignment. And although even now it seems like I am sometimes lost, I have been given the tools to work through it.

As the above quote suggests, the students' comments reflected deep learning through the recognition of improvements in their abilities to use the content in working with clinical cases. One student, for example, described initially thinking of some particular course content as, "just busywork until I had to use that very same chart just weeks later … for the second Quest. Using what we have been taught in a clinical manner has helped me retain the material." The students also identified improvements in their abilities to "write a good paper as a clinician," "study and apply it [content] beyond taking a test," "read and comprehend information," and "trust what I've learned and take my best educated guess to apply that knowledge." These improvements did not always come easily, as shown by one student who stated, "The projects [i.e., Quests] were sometimes hard to apply to the material presented in class."

Theme 5: The Application Quests provided lessons for improving learning across courses
In addition to comments about learning material for the class they were taking, the students also reported that the Application Quests helped them improve learning skills that could be applied to other courses. Some students wrote about how the Application Quests improved their critical thinking skills, "The Quests took me from being a student that just memorized the information given to me, into a student that critically took what I learned and use it in a clinical setting." Others discussed learning about persistence, procrastination (e.g., the fifth quote in Table 2) and patience:

> In terms of patience, I learned that in order for a clinician to be effective with his/her clients, they need to realize that it takes time and effort to work with a client and accept that progress might not happen for a while. The Quests were a great example of putting this idea into practice.

A final learning lesson that was identified was self-reliance:

> During the first Quest we had to work by ourselves. This made us think for ourselves and apply what we learned without asking someone else for help. I think this was a motivator for me, I now know that I do not need to rely on someone to help me get through an obstacle.

Theme 6: The Application Quests increased readiness for professional practice The students reported multiple ways in which they viewed the Application Quests as being applicable to their future success as clinicians. By having to "piece together so many things that I've learned in other classes", one student identified how she had, "learned the basic idea of what to do with a client from the time they come in for their first evaluation to the day we discharge them." Another student wrote about how the Application Quests helped her with problems that do not have a single correct solution; "This helped shape me in the fact that there aren't going to be cut and dry answers when working in a real clinic with real clients." The students also demonstrated increased confidence in their future as clinicians. As one student stated, "I may not be ready for clinical work, but I am much more confident in myself than I was at the beginning of the semester." Many of the students, like the one above, recognized that even though the Application Quests had made them more confident and passionate about becoming clinicians, they were not yet fully ready for clinical practice. The following quote from another student perhaps best sums up the students' sentiments about the effects of the Application Quests on their future practice:

> Gaining knowledge and having successful outcomes on my Quests and assignments has given me much more confidence as a future clinician. Originally I hated the Quests. They always seemed to throw me through some type of loop. I now understand that they are just building blocks. Being a clinician in the future will be much tougher than completing a Quest. However, having completed the Quest I have now gained the abilities to be creative to keep my client motivated and flexible to make therapy effective.

Discussion

Research in the scholarship of teaching and learning has challenged faculty to develop student-learning activities that extend beyond the acquisition and recitation of lower-order knowledge and information. Application Quests are one such activity, presenting students with case-based problems that reflect professional practice. Written responses from 44 students who had completed an undergraduate course that included three separate Application Quests were analyzed to examine the impacts of these assignments on their learning. A phenomenological analysis of these data revealed 6 themes (see Table 2). The following discussion addresses how the Application Quests influenced the students' learning and the implications that the students' comments may have for developing future Application Quests.

Influences on Student Learning

A number of theories and models have been proposed to describe the impacts of college on student development. Astin (1965, 1970) proposed that students' college experiences should be examined as the interaction among three separate components: student inputs, the college environment, and student outputs. Student inputs describe the personal histories with which students enter college. These include their prior knowledge, skills, experiences, and world-views. The college environment consists of the administrative, educational, and physical aspects of schools that influence students. Astin suggested that student inputs have direct impacts on their outputs as well as mediated impacts via the college environment. This model not only endures in the current literature (Pascarella & Terenzini, 2005), but also provides a lens for interpreting the themes identified here.

The first three themes described the Application Quests as different than previous experiences, difficult and time consuming, and an emotive process. Together, these themes reflect interactions between the students' inputs and the college experience of the Application Quests. The primary student inputs expressed related to the participants' previous, lecture-based courses and the learning methods they found to be successful in those environments (e.g., reading, memorizing, and restating information). As some of the participants described, these methods were not helpful for successful completion of the Application Quests. Instead, the skills of critical thinking, persistence, precise writing, patience, and self-confidence were listed as helpful. This disconnect between previously-used methods and the ones necessary for the Application Quests may have caused the students to be unsure of how to solve the challenges and resulted in a) confusion over what to do, b) the desire for more time to complete the activity, and c) feelings of challenge, frustration, and stress.

The final three themes demonstrated ways that the Application Quests influenced the students' output thoughts and skills. As a result of these experiences, students reported that they were better able to see how the content information addressed in the courses related to professional practice. They also described how they planned to apply the skills that had helped them with the Application Quests to other courses. Professional benefits that were expressed included having a better understanding of clinical practice and increasing their confidence as future clinicians. Many of the students reported that these changes were the result of more than just learning new

information and professional skills. They emphasized that overcoming their initial confusion and anxiety with the Application Quests had aided them with complex understanding and skill development.

A comparison between the themes identified here and the common features of Application Quests suggests that the students understood the intentions of this particular college experience although they did not necessarily enjoy the difficulty. For example, the themes of a) helpful for learning and integrating course content and b) improving learning across courses appear to be similar to the feature of active transfer of knowledge and skills. Likewise, the themes of c) increasing readiness for professional practice and d) difficulty--fit with the features of professional application and complex problem solving, respectively. While these connections were not observed among any of the themes and the features of multiple sources of feedback and multiple opportunities for learning, there were some individual comments made regarding feedback and working in pairs (both positive and negative for the former and positive for the latter).

Implications for Future Application Quests

The nature of Application Quests suggests that they can be used across multiple disciplines, although they may be particularly suited to professional training programs and disciplines that emphasize theoretical constructs prior to issues of professional practice (Schön, 1983). One can imagine, for example, Application Quests that address elementary school scenarios for students in education, industrial applications for chemistry students, and commissioned composition activities for music students. The results of this phenomenological analysis revealed multiple factors that the students identified as impediments to their learning. A consideration of these hindrances may provide implications for the development of future Application Quests. The implications presented here are considered to be preliminary and should be applied cautiously because the present investigation included a homogenous group of students within a single experience and did not directly assess issues of cause and effects (as is the nature of qualitative research).

Based on the novelty expressed in the first theme, it seems that clear and frequent explanations of the Application Quests would be helpful. The course in which the participants in this study were enrolled included descriptions of the Application Quests on the syllabus, during the first session of the class, and before each Application Quest. While the six themes suggest that the messages given about the learning goals were successful, more may need to be done about the process of completing Application Quests. For example, drawing multiple, direct connections between the problem solving processes used during classroom activities with those needed for the Application Quests may prove helpful for future student learning. Likewise, the students' concerns regarding the timing of Application Quests could be relieved by including them in the decision making processes of when the Application Quests are handed out and when they are due.

The themes expressed in this study suggest that positive changes should be made to Application Quests' instructions. The instructions need to be clearer so that the students know what to do and can begin the problem-solving process. The inquiry-based nature of the clinical cases and complex problems that are presented, however, may not allow for the level of direct, step-by-step instructional support that

some students desire. This is especially true for challenges in which there is not one right answer. In addition, the differences in skills needed for traditional exams and the Application Quests described earlier may further complicate the instructions. One possible solution is to first give the instructions of the Application Quest without the case data, similar to the information in the appendix. Then, after the students have had time to process the overall challenge, the specific case information would be circulated. An instructor also may choose to include an intervening step requiring the students to write an adequate plan for addressing the issues before they receive the data.

Conclusion

The students in this study expressed aspects of their lived experiences within an active-learning course that included three Application Quests. They reported multiple ways in which they found the Application Quests to be difficult and caused them to apply learning strategies that were different from those used in their previous courses. For some students, these difficulties were more than they expected in a mid-level professional undergraduate class. For others, the challenges were occasions to rise above initial doubts and learn more about themselves as students and future professionals. These students appear to have reached the emotion of "urgent optimism" that McGonigal (2011) described among video game players as "the moment of hope just before our success is real, when we feel inspired to try our hardest and do our best" (p. 69). Although Application Quests are not appropriate for all students in all courses, the results of this investigation demonstrate that these students perceived Application Quests as having positive impacts on their learning and professional development.

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Appendix

Excerpt of case information and the problems posed from an Application Quest.

At the end of this document are selections from a diagnostic report of a 4-year, 8-month old boy named Andy. Some of the sections of the report are complete, others are vague, and others are missing. Use this report to complete the following primary tasks.

1. Deduce the motivations behind the sections that are available. (2 – 3 pages)

The report currently lists the results of the following actions: questionnaire / parent interview, standardized testing, speech-motor screening, and hearing screening. The report includes the information learned from each action, but does not report why each action was

taken. In class, we discussed that the actions that you take in an assessment should be motivated by your diagnostic questions. For this task, you need to deduce the questions that Dr. Bear (the clinician) asked when he was designing the assessment. Do this by creating 4 questions that you think Dr. Bear had in mind for each task. Develop two questions from general information that you would want to know about Andy and two that are related to information that you learned about Andy in previous sections of the report. Then, write one to two paragraphs, per set of questions, about why you think Dr. Bear was asking those questions. In other words, what motivated him to pick those diagnostic questions and not others.

2. Improve on the task selection. (3 pages)

The "speech" section includes lots of detailed information about the results of Andy's standardized speech test. There is almost no information, however, about the standardized test that was selected. Assist Dr. Bear by identifying the type of standardized test that you would use and discuss why it would be the best to evaluate Andy. Further specify your optimal test by identifying three features that you would like to have in the standardized test that you choose. Use your book, notes, and lessons from classroom activities to pick features that differentiate/distinguish one test from another. Do not list things that are common to all tests. You might, for example, be tempted to identify the feature of having 4-year-olds within the test's normal range. This is an important feature in selecting a test for Andy, but it's not one that differentiates between tests because they all should do this. Instead, consider features that would need to be part of a test that you would use specifically with Andy. You do not need to name or know of a test with these particular features. The critical piece here is identifying 3 features that will help you know more about Andy's speech skills. Be sure to justify why you picked each of these features by commenting on how they relate to questions and information that was previously reported.

3. Extend the report to include two more actions. (2 pages)

Dr. Bear has included a number of important actions in his report. There are a few others, however, that would help him to answer more questions and learn more about Andy's speech. Pick two new actions that you think would really help. Like the first task, list 4 questions (2 general and 2 specifically related to information in the report) that would motivate each action and then state why those are important questions to be answered. Finally, predict how you think Andy would do on these actions. Base your predications directly from the information that is currently in the report.