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Reflective Practice in an Experiential Learning Program: An Exploratory Content Analysis of Reflective Writing in Experiential Learning Portfolios

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Abstract

A foundational principle of experiential learning is to reflectively process the information learned from an experience. The purpose of this paper is to explore how Science With Practice, an undergraduate experiential learning program, used Do, Reflect, Apply to facilitate reflective practice in portfolios. DRA is an adaptation of the 4-H EL Model and is used in SWP to guide reflection. Conducting an inductive qualitative content analysis resulted in identifying four themes in SWP students' reflective writing: Analysis and Assessment, Awareness, Transformation, and Transfer of Learning. The themes were then deductively aligned with the DRA model. When talking about what they did, students in SWP analyzed and assessed their experiences by analyzing their learning and assessing challenges and successes. Students demonstrated awareness while reflecting about the impacts of mentorship and community, by offering advice and recommendations, and through demonstrating growth in affective and metacognitive awareness. In further reflection, SWP students identified ways they were transformed by sharing how they changed during the experience. Finally, students applied their learning by transferring their experience from previous contexts to SWP, from SWP to other situations, and considered future applications. The findings from this study suggest that DRA structured reflection provides a foundation for learners to move beyond explaining what they did and engage in deeper reflective processing. In practice, we recommend using DRA prompts to scaffold student reflective processing and facilitate deeper reflective thinking when introducing students to reflective practice in experiential learning.

Introduction

Experiential Learning Theory (ELT) is a constructivist learning theory that underlines the importance of learning through actively participating in real-world contexts (Zijdemans-Boudreau et al., 2013). According to ELT, the learner must intentionally engage in their learning environment for experiences to be educational (Dewey, 1938). ELT informs the philosophical foundation and pedagogical practices of agricultural education (Baker et al., 2012; Knobloch, 2003; Roberts, 2003). The Holistic Model of Experiential Learning in Agricultural Education and preceding models (i.e., Roberts, 2006; Roberts et al., 2010) exemplify the role of ELT in agricultural education (Coleman et al., 2024).

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Kolb (2015) conceptualized Experiential Learning (EL) as a process, which he described in four cyclical modes: concrete experience, reflective observation, abstract conceptualization, and active experimentation. Kolb's EL Cycle is used to guide teaching and learning in educational experiences (e.g., Baker et al., 2012; Baker & Robinson, 2019; Lamm et al., 2011; Shoulders & Myers, 2013). Learners become actively engaged in the learning process during reflective observation.

In Kolb's (2015) EL Cycle, reflective observation represents how learners process new information. In reflective observation, learners process their learning by thoughtfully considering their experiences and engaging in discourse. This requires intentionally reviewing learning and considering the impacts and implications of the learning experience. Retallick (2010) described this process of active engagement as *minds-on* learning.

The process of reflecting on experiences within the context of ELT was not thoroughly described by Kolb but has been explored by subsequent scholars (e.g., Boud et al., 1985; Boud & Walker, 1998; Mezirow, 1990; Moon, 1999; Schön, 1983). Engaging in reflective activities to improve professional practice is described as *reflective practice* (Jasper, 2003; Schön, 1983; York-Barr et al., 2006). Reflective practice is a prerequisite skill for lifelong learning and transformation (American Association of Colleges & Universities, 2009; Mezirow, 1997; Zull, 2011). A developmental perspective of reflective practice suggests reflective thinking is a skill taught through guidance, practice, and feedback (Kember et al., 2000; King & Kitchener, 1994; Moon, 1999).

Taking a developmental approach to reflective practice requires instructors to consider ways to support learner acquisition of reflective thinking skills (Boud et al., 1985; Moon, 2004). This includes providing organization and structure to reflection activities. Additionally, learners may benefit from the scaffolding of reflective activities to promote their progress along the reflective thinking continuum from surface-level to deeper reflection (Moon, 1999, 2004).

The EL models employed in agricultural education provide frameworks for supporting learning through meaningful educational experiences. However, agricultural education has not widely adopted models to support the development of reflective thinking. As a skill requiring intentional guidance, frameworks are necessary to support reflection as a pedagogical practice (Grossman, 2009). There is a need in agricultural education to focus on supporting learners in effective processing of EL opportunities (Arnold et al., 2006; Shoulders & Myers, 2013).

Science With Practice (SWP), an undergraduate EL program at Iowa State University recognized the need to provide instruction to support student development of reflective thinking skills. SWP uses Do, Reflect, Apply (DRA), a refined version of the 4-H EL Model (Diem, 2001) as a guide for reflective practice. This use of DRA as a reflection model was adopted to support students' development of reflective thinking skills by helping them move beyond descriptive, surface-level reflection. SWP uses the DRA model to provide structure for reflective writing; students were asked to begin journal responses by explaining what they *did*, then *reflect* more deeply on specific aspects of their experience, and finally to consider how they could *apply* what they learned to new situations. Further, the SWP instructor provides prompts to support students' reflective thinking.

Purpose

The purpose of this exploratory, qualitative research study was to gain a deeper understanding of reflective practice in an EL program. We asked the question, "How does using the DRA model for reflection influence students' reflective practice?" SWP, a college-wide EL program, provided the context for this exploration. Through conducting a qualitative content analysis on student portfolios, we determined themes in students' reflective writing and aligned these themes to the DRA model. By aligning the themes with the

DRA model, we sought to identify patterns and gain insight into students' reflective practice. The intended outcome of this study is to inform EL practices and contribute to dialogue on reflective learning in experiential education.

Literature Review

To explore the literature on this topic, we briefly highlight ELT and reflection in EL within the discipline of agricultural education. Next, we describe SWP as an exemplary EL program and discuss the role of reflection in SWP. We begin with the foundational principles of ELT and follow up with an overview of the impact and role of EL and reflection in agricultural education. Finally, we introduce SWP and detail the role of reflective practice in this EL program. To highlight ELT, we begin with an overview of David Kolb's (2015) EL Cycle.

In 1984, Kolb published the EL Cycle, which became a popular design for EL programs (Kolb, 2015). Kolb's EL Cycle depicts phases where the learner transitions through four modes of learning: concrete experience (CE), reflective observation (RO), abstract conceptualization (AC), and active experimentation (AE). Kolb's EL Cycle presents learner development through experiences as a dynamic, dialectic process.

Kolb's EL Cycle is central to the 4-H EL Model (Diem, 2001) and the Holistic Model of EL (Coleman et al., 2024). The 4-H EL Model is an adaptation of Kolb's EL Cycle, which describes the process of teaching and learning from experiences in three phases: do, reflect, and apply. The Holistic Model of EL is an adaptation of Kolb's EL Cycle and legacy agricultural education EL models (i.e., Roberts, 2006), which considers the application of ELT in the context of School-Based Agricultural Education (SBAE). These models all describe the process of teaching and learning from educational experiences.

Experiential Learning in Agricultural Education

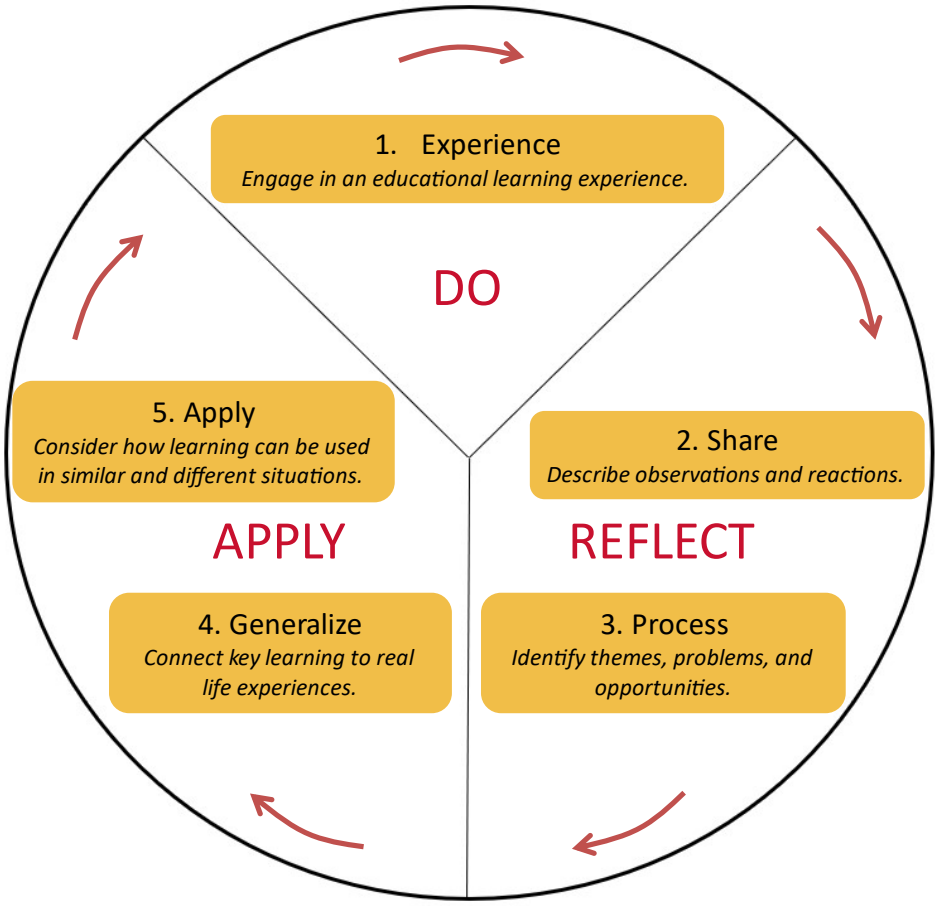
There is a robust literature base exploring EL in agricultural education (Coleman et al., 2024). Agricultural education scholars argue EL principles are (a) foundational to the discipline (Knobloch, 2003; Roberts, 2003); (b) congruent to active/ minds-on and authentic learning methods (Knobloch, 2003; Retallick, 2010); and (c) in alignment with Kolb's EL theory (Baker et al., 2012).

One example of an EL model in agricultural education is the 4-H EL Model which was designed for informal youth experiential programming (Figure 1). 4-H, a youth development program supported by the Cooperative Extension System, adopted the EL process as a strategy for implementing their "learning by doing" slogan (Diem, 2001). In adapting Kolb's EL Cycle to youth development, 4-H proposes five processes: experience, share, process, generalize, and apply, which are further simplified into three phases: do, reflect, and apply.

In the first phase of the 4-H EL Model, *do*, "youth engage in a hands-on educational learning experience" (Iowa State University Extension and Outreach, 2019, part 1). The *do* phase comprises the first process: *experience*, which refers to a planned educational activity (Diem, 2001; Iowa State University Extension and Outreach, 2019). *Reflect* is the second phase and consists of *sharing* and *processing*. Sharing takes the form of describing results, reactions, and observations. The goal of *processing* is to relate the experience to learning objectives. When processing the information, youth are asked to analyze their experience by identifying themes, problems, and opportunities. In the final phase, *apply*, youth are asked to *generalize* and *apply* their learning by connecting it to real-life examples and consider how they can use what they learned in different situations.

Figure 1

The 4-H Experiential Learning Model



Adapted from Iowa State University Extension and Outreach (2019) 4-H Experiential Learning Model.

Reflection in Experiential Learning

The stages of reflection in EL have been studied by scholars and presented as independent theories (e.g., Atkins & Murphy, 1993; Boud et al., 1985; Boyd & Fales, 1983; Steinaker & Bell, 1979). Moon (1999) synthesized these theorists' models and summarizes them in nine stages: (a) experience; (b) need to resolve; (c) clarification of the issue; (d) reviewing and recollecting; (e) reviewing the emotional state; (f) processing and knowledge of ideas; (g) resolution; (h) transformation; and (i) possible action. These stages of reflection provide a sequential description of the reflective process.

Research on reflection in EL is studied beyond the stages of reflection. Additional aspects of reflection literature focus on topics related to reflective purpose, content, and quality. Specific examples include reflecting for transformation (Mezirow, 1990), critical reflection (Brookfield, 1995), reflecting to learn (Boud et al., 1985; Moon, 2004), reflecting to improve teaching (York-Barr et al., 2006) and reflecting to improve professional practice (Moon, 1999, 2006; Schön, 1983). Several scholars make an argument for assessing reflective quality in terms of reflective depth (Grossman, 2009; Hatton & Smith, 1995; Luttenberg & Bergen, 2008; Moon, 2004, 2007).

Determining the quality of reflective writing is one approach to assessing reflective development. Reflective quality may be considered in terms of reflective levels (e.g., Boud et al., 1985; Kember, 1999; Kember et al., 2000) or depth (e.g., Grossman, 2009; Moon, 2007). These assessments measure reflective thinking according to the individuals' capacity to demonstrate rich insights and complex thinking. For example, Grossman's (2009) levels of reflection are: content-based reflection, metacognitive reflection, self-authorship reflection, and transformative or intensive reflection. It is necessary to provide students with scaffolded support structures for facilitating reflection to develop reflective thinking skills and achieve higher quality reflection (Grossman, 2009; Moon, 2004).

Reflection is an essential part of the EL process. Literature supports providing learners with structures to support the development of reflective thinking skills when conducting EL programming. Learners demonstrate reflective development through producing deeper, higher quality reflective writing when engaging in reflective practice. SWP instructors at Iowa State University developed the program with an appreciation of EL principles and they recognized a need to foster reflective development and intentionally integrated reflective practice.

Reflection in Science With Practice

SWP provides a platform for EL at Iowa State University for students in the College of Agriculture and Life Sciences (Retallick & Steiner, 2009). The Department of Agricultural Education and Studies offers this 3-credit hour undergraduate course, which guides students through an academic project. Students receive academic credit for coursework and earn a wage for weekly work hours. Student learning outcomes for SWP include fostering lifelong learning skills such as the development of reflective thinking.

In the early years of SWP, instructors recognized a need to guide students' reflective development. Students who enrolled in the course were primarily from natural and life science backgrounds and were accustomed to providing descriptive laboratory reports. When asked to engage in reflective activities, it was difficult for them to progress from descriptive to deeper reflective thinking. In response to this need, the program began to consider ways to encourage students to produce higher quality reflective writing.

SWP turned to using Do, Reflect, Apply (DRA) from the 4-H EL Model as a strategy for introducing reflection to students. This method employs questions to guide learners to think about what they *did*, transition to *reflecting* more deeply on their thoughts and feelings, then consider how they might *apply* their learning. Using DRA reflection prompts, SWP supports reflective practice in a semester-long experience.

In summary, ELT offers foundations for learning in real-world settings and features reflection as a key component of learning from experiences. The 4-H EL Model, which is used to guide experiential programming, exemplifies the influence of ELT on agricultural education as a discipline. However, little work has been done to elaborate on practices for supporting learners through the reflection stage of learning. SWP, an EL program for undergraduate students, uses DRA from the 4-H EL Model as a framework for supporting reflective practice. This study explores how DRA guided reflection impacts reflective practice.

Methods

We conducted an exploratory qualitative study using content analysis methods to address our research question, "How does using the DRA model for reflection influence students' reflective practice?" Qualitative research is useful in educational research as a tool for determining the quality of activities (Ary et al., 2018), which aligns with our goal to explore students' reflective writing in SWP. Content analysis methods are suitable for analyzing qualitative data by identifying patterns or themes from a variety of sources (Elo et al., 2014). Addressing trustworthiness is a primary concern of qualitative research and is

established through credibility, confirmability, dependability, and transferability (Stahl & Kind, 2020). We address the trustworthiness of this study throughout the methods.

Data Sampling

The primary data for this study were obtained from SWP coursework. In SWP, students create a comprehensive portfolio for the course, which consists of a learning agreement, project description and abstract, bi-weekly journal entries, a poster review, an exploration of a professional organization, a resumé entry, a final report, and a thank you note. Student reflective writing was extracted from these portfolios as the primary data source for this project. Reflective writing was selected from courses taught from Fall 2005 to Fall 2019. These academic terms provided the greatest opportunity for consistent data collection as the global COVID-19 pandemic disrupted the program in Spring 2020. During the academic terms under examination, SWP was hosted in the Department of Agricultural Education and Studies at Iowa State University. Dr. Michael Retallick was the instructor for this 16-week, 3-credit hour course. While SWP is available for students of any classification in the College of Agriculture and Life Sciences, most students who enroll in the course are juniors or seniors.

Data Collection Methods

The primary data for this study were originally collected for coursework and not intended for research. Using data not intended for research adds to study credibility and strengthens the trustworthiness of findings (Stahl & Kind, 2020). Several additional data sources were identified to support this study's credibility such as programmatic records and course documents. Further, the primary instructor of record for the course was included as a researcher on this project. We obtained permission to conduct this research from the Institutional Review Board (IRB) and a university representative for the Family and Educational Rights and Privacy Act (FERPA) approved our procedures.

Instrumentation

The investigator is the instrument used for collecting and analyzing data in qualitative research (Ary et al., 2018). Flexibility is a benefit of using the human as the instrument as the nuance of a phenomenon may be sufficiently examined for socially contextual meaning (Ary et al., 2018). Researcher positionality influences findings as their background informs their work. For this reason, we have included positionality statements.

Author Positionality

As first author and a graduate student in the Department of Agricultural Education and Studies at Iowa State University, I have worked with the SWP program for several academic semesters. My experiences as a former SBAE teacher inform this research. My educational philosophy most closely aligns with a constructivist approach to education, which implies that learning is a process where learners make sense of their experiences and build knowledge through active processing (i.e., reflection). As a first-generation college student, I believe reflection has played an important role in my own development personally and professionally.

The second author is a full professor who has developed and taught in formal and nonformal settings using ELT. He has studied and published research in EL and elements of thinking like critical thinking. He firmly believes reflective practice is not innate and can be developed through scaffolded instructional support and practice.

Data Collection Procedure

The study procedures are detailed to establish the dependability of this work. In this study, 516 hard-copy portfolios were available for examination. The data were de-identified, portfolios were assigned random identification, and students were assigned pseudonyms to keep their identities anonymous. Five

sample portfolios were reviewed for initial familiarization with the portfolio content. Next, a random sample of 30 portfolios were selected from the larger collection using a digital randomizer tool. Randomization of sampling from a larger sample enhances study credibility (Ary et al., 2018). While 30 portfolios were selected, we reached saturation after analyzing 12 portfolios.

Data Analysis

Using content analysis methods, we examined artifacts from the SWP program. We sought to describe the content of students' reflective writing and then align those findings to the DRA model. First, inductive content analysis techniques were used to describe the content of written reflections. Then, we deductively aligned the reflective content themes to the DRA model. Together, these allowed us to gain a deeper understanding of reflective practice in SWP.

The first phase of the research process involved conducting an inductive content analysis to determine reflective themes. The data were reduced and reconstructed to interpret the phenomena being observed. Qualitative research allows document review (i.e., content analysis) as a data collection technique (Ary et al., 2018; Merriam, 1998). As the data were analyzed by the researcher, they were coded and categorized before themes were interpreted. In basic qualitative research, the researcher interprets themes in the data, informed by their own discipline (Ary et al., 2018). In this study, themes were derived from coding the data to assign meaning to the text. After gaining familiarity with the data, the portfolios were reviewed and coded in *Taguette* software using methods for inductive, thematic data analysis. We used an iterative, open coding process which involved creating and collapsing codes as portfolios were systematically analyzed.

The first cycle of coding generated 15 codes and was considered complete when the portfolios were analyzed using the established codes with no additions or alterations to the codebook. In the second coding cycle, we collapsed the 15 initial codes into eight categories: learning in SWP, challenges and successes, mentorship and community, advice and recommendations, affective awareness, metacognitive awareness, transfer of learning, and transformation. In the third cycle of coding the eight categories were organized into four themes: Analysis and Assessment, Awareness, Transformation, and Transfer of Learning.

The second phase of this research was to deductively align the reflective content themes with the DRA model. First, the reflective prompts used to guide student reflections were aligned with the DRA model. Then, we determined how the reflective content mapped onto these prompts. We determined which portion of the reflections were written in response to the DRA prompts. Finally, we determined how these connected with the data associated with each theme. The findings will be reported using reflective content themes in the order of their alignment with the DRA model (i.e., Do: theme 1; Reflect: theme 2 and theme 3; and Apply: theme 4).

To ensure rigor in our analysis, we maintained an audit trail throughout the study. This included documentation of data reduction, coding decisions, analytic memos, and reflective journaling. All coding processes and emerging themes were recorded in *Taguette* and Microsoft Excel. The audit trail was reviewed in-depth by an external auditor who examined the documentation of the research process for confirmability, dependability, and credibility.

Confirmability was maintained by engaging the course founder and instructor in the research process. Using historical documents confirms objectivity of findings and supports confirmability (Stahl & Kind, 2020). Historical documents such as research articles, programmatic reports, course documents, and personal accounts in addition to SWP portfolios ensured credible representation of the data.

Overall, the quality of this study may be assessed in terms of credibility, confirmability, dependability, and transferability as indicators of rigorous qualitative research. In our methods, we have detailed efforts to establish credibility, confirmability, and dependability. Through providing a *thick description* of findings, we strengthen this study's transferability.

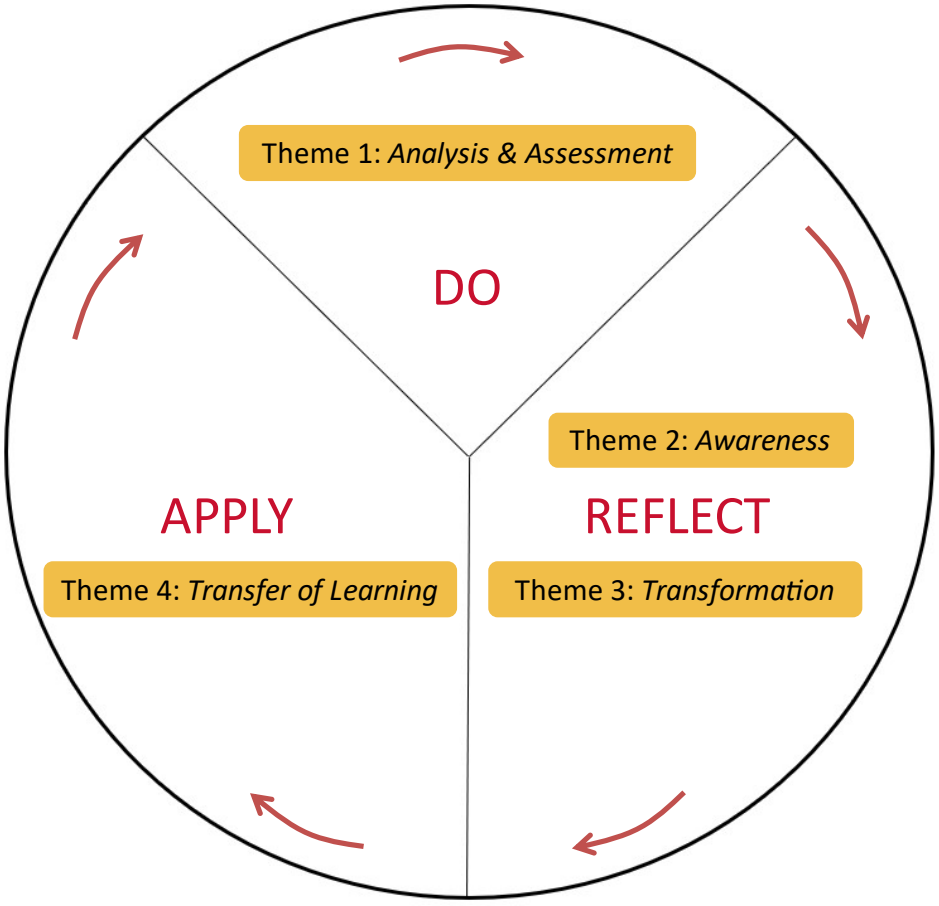
Findings

A qualitative content analysis was conducted on SWP portfolios to answer the research question, "How does the DRA model for reflection influence students' reflective practice?" Four themes were generated through inductive analysis: Analysis and Assessment, Awareness, Transfer of Learning, and Transformation. This analysis revealed insights into the content of reflective writing in SWP portfolios.

To align reflective content to the DRA model, we conducted a deductive qualitative analysis by aligning the four content themes to the DRA prompts (Figure 2). We found *Do* prompts generated analysis and assessment reflection, *reflect* prompts generated awareness and transformation reflections, and *apply* prompts yielded reflections related to Transfer of Learning. The findings are reported by content themes as aligned to the DRA model and include literature to support these findings in addition to supporting quotes from the students' reflective writing.

Figure 2

SWP Reflection Content Themes Aligned to the DRA Model



Note. This figure shows the four SWP reflection content themes aligned to the DRA model.

Do: Analysis and Assessment (Theme 1)

When reflecting on what they did, students often began with descriptive reflections. Through prompting, students were able to move into deeper reflection by analyzing and assessing their experiences. Analysis was defined as students' ability to differentiate, organize, attribute, and distinguish components or parts of their experience. Assessment was defined as students' ability to make judgements or evaluations of their experience. The analysis and assessment theme was informed by Blooms' Revised Taxonomy for higher order thinking skills (Anderson et al., 2001). In these reflections, students focused on analyzing and assessing their learning in SWP, their projects, or the program.

First, students analyzed their learning by reflecting on their development of content knowledge and skills. They reflected on the knowledge they did not have before the experience relating to disciplinary topics and the research process. Students also assessed their development of technical skills required in their laboratories and facilities, as well as professional skills such as collaboration, communication, and management. Matthew's reflection exemplifies this when he wrote:

> *The three most important things that I will take away from this experience are the lab experiences that I now have. I will also take away the fish knowledge that I now have. Lastly, I will take away the time management skills that I have gained*. (Final Report, SWP Portfolio 05)

Second, students analyzed challenges and successes with their projects. They reflected on the problems or challenges they were facing throughout their experiences with the research process, with interpersonal relations, and with professionalism. Matthew explained a situation where his experience helped him manage responsibilities when we wrote, "*The biggest challenge was the full schedule of classes and sometimes I felt like I was working a full-time job like I did this summer so I had to successfully balance my time*" (Final Report, SWP Portfolio 05). Ashley reflected on the challenge of learning new things by expressing, "*In the end, the struggles I really only endured was completing the tasks due to them being so out of my realm in the beginning, but this was all a part of the learning curve*" (Final Report, SWP Portfolio 04).

Students also reflected on their success with their project and program. They assessed their research progress as well as their progress in achieving their desired project and learning outcomes. Emily provided an example of reflecting on her success with her project, as well as her progress towards accomplishing personal goals in this journal entry:

> *In the past two weeks, my project has made a lot of progress. I met with my mentor to get on the same page about what he is expecting for my bird project and have been working on that on my own… Through this project, I was able accomplished my goals by learning the importance of early detection of an infection, how to paddle test and sample a cow, and how to identify the micro-organism*. (Journal Reflection, SWP Portfolio 06)

In addition to an assessment of themselves and their projects, SWP student's reflections provided evidence of programmatic critiques. This included an assessment of SWP as a program and course. Ashley provided this assessment:

> *Science with Practice is a unique program that Iowa State University has the opportunity to offer. In this class, students get hands-on work experience in many different areas ranging from research to communications. Besides the hands-on approach, we as students, also have a classroom portion in the program to develop our professional skills*. (Foundation Letter, SWP Portfolio 04)

Responding to the *do* reflection prompts helped students reflect deeper than describing what they did, it allowed them to analyze what they learned. It also allowed them to assess the challenges and successes they faced in their projects. Finally, students judged their own progress and their experience in the program.

Reflect: Awareness (Theme 2)

Beyond analysis and assessment of their experiences, SWP reflections provided evidence of increasing awareness. Reflections related to deeper awareness were found in the *reflect* portions of the portfolio journals. Awareness is broadly defined as students' ability to demonstrate a deeper perception or knowledge of themselves, their learning, or their experience. Increasing awareness of oneself and situation through reflection shows up in literature as an important part of affective reflection (Boud et al., 1985), transformative reflection (Mezirow, 1991), and metacognitive reflection (Grossman, 2009). The construct of awareness is also related to the metacognitive knowledge dimension of learning (Anderson et al., 2001). Students demonstrated deeper awareness in four areas: mentorship and community, advice and recommendations, affective awareness, and metacognitive awareness.

SWP students reflected on the value of learning from mentors and colleagues. Emily discussed the value of the mentor-mentee relationship in her final report when she wrote:

> *A few highlights of doing this project after learning how to do the sampling was probably getting to work under such an intelligent and fun mentor. I got to know him better and vice versa. [My mentor] is a good connection to have and he has taught me a lot about dairy. I also enjoyed working alongside [my mentor] when we were identifying the growths on the plates. I learned a lot from him that I will use in my future career… I also developed a relationship with my mentor and learned more about communication and listening skills when I had my meetings with him.* (Final Report, SWP Portfolio 06)

In the final report, students recommended SWP to others and provided advice for future participants. Many recommendations included advice about gaining professional skills. Ashley provided advice related to the meaning of hard work, mentorship, and the importance of work ethic. In her final report, she said:

> *Don't assume that just because you sit at a desk all day and spend a lot of time on the computer means that this project isn't difficult. It will challenge you and make you work hard in ways that will make you mentally exhausted instead of physical exhaustion like other projects… Also, I would recommend building a great relationship with [your mentor] … Gaining a relationship with [them] is something that can be carried on past graduation and being a student at Iowa State University… One last thing, you get out of it, what you put into it, so challenge yourself in your writing and try to do more than what is expected.* (Final Report, SWP Portfolio 04)

In their journals, students demonstrated an awareness of their emotions through affective reflections. These reflections centered around how their experience in SWP made them feel. The most common feelings communicated were those of excitement or frustration related to their project progress. Ashley identified how her emotions changed throughout the experience and related feelings of excitement, trepidation, and accomplishment. In a journal entry she wrote:

> *This is exciting to me because it allows me to express my full creativity all while learning something new to add to my skill sets… The change in emotion towards my writing and my projects because of accomplishing that news release was my biggest highlight of the whole semester in this project… Looking back through my journals, you can see the amount of improvement I had in just emotion*

> *towards my tasks… Being able to sense that frustration in my journals, moving to the happiness and proudness I had felt after completing the tasks is portrayed through my journals, and that to me means there was a lot of progress, and I had been successful.* (Journal Reflection, SWP Portfolio 04)

DRA prompts facilitated insight into the reflection process and resulted in metacognitive reflections. In metacognitive reflection, students reflected on their own learning. Chris credited achieving their goals to the reflection process. They were able to see the benefits of reflection and transfer those benefits outside of SWP. In the final report, Chris wrote:

> *One of the main things I have learned from this experience overall is to write goals and actually work towards them. Doing regular reflections is also very important in this process to see what you have accomplished and what should happen next. All areas of my life can benefit from this experience.* (Final Report, SWP Portfolio 03)

Emily provided another example of reflecting on her learning. She wrote about how revisiting her journals helped her realize the importance of the reflection process and her reflective development. Emily found the reflection process a beneficial way to document her progress and help her recognize the benefits of the experience. She specified this in her final report when writing:

> *In reviewing my journals, I do believe I have made progress. It is easy to tell as the semester went on, I was learning more and more along with getting better at recording and reflecting thoughts. I will use the assignments I completed through Science with Practice in my future because I learned a lot about setting and accomplishing goals. I got to see firsthand how rewarding that has been.* (Final Report, SWP Portfolio 06)

Emily was not the only student who found value in revisiting her journals. Some students surprised themselves with their progress. Amanda read her journals and was delighted with her growth. In a journal entry she shared:

> *Reflecting back to the initial weeks of this project, I am astonished at how much I have done and have been able to understand to this point. I felt very overwhelmed in the beginning and now my Mentor will be having me teach a freshman! Through reviewing my journals, I have definitely seen growth and change in my abilities.* (Journal Reflection, SWP Portfolio 12)

As a theme, awareness points to the insight students gained into themselves and the learning experience. Students gained *awareness* when they were asked to *reflect* more deeply on their experiences. They pondered the importance of working with mentors and in a community, reflected on how to improve their experiences, wrote about their emotions, and contemplated how the process of reflection contributed to their development.

Reflect: Transformation (Theme 3)

Transformation involves changing one's perceptions, attitudes, beliefs, or ideas and is evidenced by action (Mezirow, 1991). SWP reflections provided a glimpse into student transformation throughout the course. As a theme, transformation represents how students changed in their perceptions, attitudes, behaviors, and interests because of their experiences in SWP. Students reflected on transformational aspects of their learning when asked to *reflect* in the DRA process.

Students' perceptions changed because of their experience. Some students became more open-minded about engaging in novel experiences. Chris provides an example of this when they shared, "*This is*

a good reminder to be open minded about situations and it might lead to more opportunities" (Journal Reflection, SWP Portfolio 03). In Ashley's situation, the experience challenged her assumptions and led her to change her attitude about her work in SWP. In her final report, she wrote:

> *When I had started, I had the assumption that because my project wasn't directly working with research or animals, that it was inferior to the others in my class. After putting in the work over the semester and seeing the struggles alongside the progress I had made, changed my mind completely. It might not have been hard because I sit in an office all day, but the content of what I did was hard to me, and a different kind of hard than the other projects.* (Final Report, SWP Portfolio 04)

One of the most common changes was students' attitudes about graduate school. Jess found this to be true for them and commented, "*This semester was my first experience working in this type of laboratory setting and I discovered that I like research and would possibly be interested in pursuing graduate school*" (Final Report, SWP Portfolio 02). Another notable change was in career goals. For example, Sarah shared her career ambition. In a journal reflection she wrote, "*This experience has made me realize that my career goal is to research plant growth and soil nutrients. I have gained more knowledge than I ever expected, and this knowledge will stay with me throughout my career and life*" (Journal Reflection, SWP Portfolio 08).

Some students talked about how they changed their behaviors. In Michael's example, his work ethic developed throughout the project. In his letter to the foundation, Michael shares:

> *Since beginning work on the manual, I have grown in motivation, diligence, and precision as a worker I also managed to somehow underestimate the enjoyment I would get from explaining myself and these animals to future readers through my computer.* (Foundation Letter, SWP Portfolio 01)

Another example of behavior change was exemplified by taking new action steps. Sam discovered new interests, which directly led to signing up for related internships and coursework. He described how his perceptions about the swine industry were changed:

> *I would say that overall things were a success. I have been able to accomplish my goals and I know that I have grown in this experience. It has even sparked an interest for me in the swine industry. I have even been thinking about looking into an internship position that [my mentor] sent me from the National Pork Board. I am also currently enrolled in [a] spring semester Swine Science course.* (Final Report, SWP Portfolio 10)

Nicholas found new career options available to him through SWP. He directly connected the skills he gained from the experience to future jobs. He wrote about new opportunities in his journal:

> *The past week I have been considering a lot my natural skills and those that I have developed in preparation for next semester and the job I will acquire for then. This program has helped me really consider my options and what available careers there are for me to earn experience for my future after my four years of college.* (Journal Reflection, SWP Portfolio 11)

Amanda reflected extensively on changes she identified in herself, including feeling more comfortable in the professional work environment, increased confidence, greater persistence, and improved problem-solving skills. In a journal entry she detailed her transformation when writing:

> *This [experience] has also forced me to be more flexible, which is a very important characteristic to have when I am a doctor… In reviewing my journals, I have definitely seen growth and change in my abilities. At the beginning I felt very unsure of what was going on in the lab and sometimes I felt very overwhelmed. However, now I am able to walk into the lab, take care of the list before me, and I feel very confident in my abilities to take care of everything… I also feel very confident in the concepts behind my research. In the beginning I was very lost… I grew a lot in my ability to problem solve…* (Journal Reflection, SWP Portfolio 12)

Jacob saw himself growing in several ways. He listed the skills he developed including work ethic, communication, engagement, and the ability to complete tasks. He also connected this to gaining motivation. In his final report he summarized this by writing:

> *That brings in the largest skill that I gained over the course of this whole year, to wholly devote yourself to your work, to ask questions, become involved, and having the motivation to accomplish each task to the best of your abilities.* (Final Report, SWP Portfolio 09)

SWP students demonstrated transformational learning as they developed skills, increased responsibility and independence, identified their interests, adjusted plans for future educational pursuits or careers, and changed their dispositions and perceptions. Students considered how they changed in the *reflect* portion of their DRA journals.

Apply: Transfer of Learning (Theme 4)

Transfer of Learning refers to the students' ability to reflect on how they could apply their learning in a new context or situation (National Research Council, 2000). There were three ways students demonstrated Transfer of Learning in their reflections. First, students reflected on transferring their learning from past experiences. Secondly, they reflected on ways to immediately apply their learning in new contexts. Finally, students reflected on ways to transfer their learning to future experiences. Students wrote about how they could transfer their learning when asked to *apply* in the DRA process.

Students made connections between past learning that provided them with relevant content knowledge. In this way, they demonstrated an ability to transfer their learning from past experiences to SWP. It also helped them find real-world connections to their academic coursework. Ashley identified opportunities to apply existing professional skills in creativity when she wrote, "*I thought I would be really good at bulletin boards because I have a great sense of creativity*" (Journal Reflection, SWP Portfolio 04). Emily focused on the relevance of prior coursework and lab skills in a journal entry:

> *I realized why taking microbiology class and lab is important because I used a lot of my knowledge from that class… I used a lot of what I learned in micro lab to identify and understand the micro-organisms on the plates.* (Journal Reflection, SWP Portfolio 06)

Reflections that demonstrated current applications for transfer of learning in SWP were often related to how their experience in SWP could benefit them in current coursework or help them achieve personal goals. This was the case for Joshua who said, "*It's connecting with my environmental class which I didn't really think that I would be interested in*" (Journal Reflection, SWP Portfolio 07). Students found their experiences in SWP currently relevant to their professional development in applying for jobs and in developing communication skills such as public speaking. Nicholas shared these benefits:

> *The experience within Science with Practice and the research position have already helped me tremendously within my professional life aside from the skills I have developed. I am currently applying for other jobs for next semester, and the experience I already have as a first-year student*

> *have [sic] created good impressions for potential employers. Overall, the experience I have gained is much appreciated and makes me grateful for attending a university and department where I have these opportunities available to me.* (Journal Reflection, SWP Portfolio 11)

In addition to past and current transfer of learning, students considered how they could apply their experience in the future. Students identified immediate opportunities such as applying their experience to upcoming coursework or work experiences in the next semester. They also thought about distant future opportunities to apply their learning, such as in future professional roles. Amanda mentioned both near and far opportunities for future applications:

> *I have learned a lot through reading and listening to experts and I am excited to continue to learn about branding and hope to use these skills in the direct and far future, specifically while continuing to work for [this company] and during my agency internship this summer.* (Journal Reflection, SWP Portfolio 12)

SWP students not only focused on future career applications, but also on professional engagement more broadly. They eagerly explored opportunities to get involved with professional organizations. Nicholas wrote about how he might use his experiences in to get engaged:

> *For me as a student, there are volunteer options, internships, as well as employment opportunities that are all available to me. Why this organization would be so beneficial to me would the variety of farming available in contrast to western style farming promoted at Iowa State University. Sustainability is a major component of my major that I need to stay in sync with. The availability of it for summer internship is also an alluring point that makes me seriously consider joining the organization.* (Professional Organizations, SWP Portfolio 11)

In addition to coursework, careers, and professional applications of learning, students also reflected on the skills they were gaining in conducting research and working on projects. Not only did they gain real-world skills and find success in conducting and disseminating research, but they made direct connections to how this would benefit them in the future. Jacob reflected on how his experiences could help him achieve his future goals in research:

> *In addition to the main project, I have also done a couple days work on finding research project thesis and published papers relevant to the research we are conducting. It was a useful skill for my future research and class work.* (Journal Reflection, SWP Portfolio 09)

Transfer of Learning was part of SWP reflection in the form of past, current, and future applications. Some students reflected on specific opportunities for transfer, where others identified general scenarios for transferring learning either to or from SWP. These reflections were produced when students responded to *apply* prompts from the DRA model.

A content analysis of reflective writing in SWP provided evidence of learners Analyzing and Assessing their own learning experiences, deepening their awareness through reflection, changing their perceptions through transformation, and Transferring their Learning experiences to new situations. Deductively aligning these themes to the DRA model allowed us to determine which prompts were generating certain reflective content.

Discussion, Recommendations, and Conclusions

Roberts (2018) called for "longer term, rigorous, and mixed methods studies" (p. 5) with a "focus on issues of diversity and inclusion" (p. 5) in future EL research. Implementing mixed methods to observe long-term growth of reflective development could add new insights for reflective practice. Considering participant background experiences would allow for greater consideration on issues related to diversity and inclusion in the development of reflective practice and impacts of experiential education. While this study was limited in these aspects, recommendations from are related to both practical application of these findings in teaching and learning and future opportunities for continued study of reflective practice in EL.

The purpose of this study was to gain a deeper understanding of reflective practice in EL. The EL program exemplified for this study was SWP, which provides students with a structure for their reflective writing. This structure is based on the 4-H EL Model: Do, Reflect, and Apply (Diem, 2001). A thematic analysis of SWP portfolios produced four themes. Students were able to (a) Assess and Analyze their experience when they wrote about what they did, (b) build awareness through deeper reflection, (c) reflect on their transformation, and (d) apply or Transfer their Learning to new situations.

By using DRA to structure reflection, students moved beyond descriptive reflection, or reporting, and contemplated their experiences more deeply. The first way students demonstrated deeper reflection was by Analyzing and Assessing their learning. In Bloom's Revised Taxonomy for teaching and learning, remembering and understanding are the basis for a learning experience while analysis and evaluation are demonstrations of higher order thinking skills (Anderson et al., 2001). The DRA reflection model and reflective prompts facilitated student achievement of these more complex thinking skills.

The next theme, awareness, was evident as students responded to *reflect* prompts. Deeping awareness demonstrates growing reflective development (Grossman, 2009; Hatton & Smith 1995; Kember et al., 2000; Moon, 2006). Students shared awareness of the impact their mentors and community had on their success in the program. Further, they provided advice and recommendations for future students which showed awareness of their experience and how it could benefit others. Students became aware of how they felt about their experiences by identifying their emotions through affective reflection. Further, student reflection supported the development of metacognitive awareness as the learners became consciously aware of themselves and their own development in the learning process.

Cultivating awareness through reflection is the first step towards achieving transformational learning (Grossman, 2009; Mezirow, 1981). Transformation in SWP student reflective writing involved changed perceptions, attitudes, beliefs, and behaviors. Reflect prompts from the DRA model encouraged students to consider how their experiences impacted them. They decided academic interests and determined if graduate school was an option for them. They considered their career paths and asked if they wanted to continue doing similar work in the future. Some students changed their attitudes and behaviors by learning the value of dedication, consistency, hard work, and decision making.

DRA as a model for reflection allows students to consider how they might *apply* their learning, which provided evidence of transfer of Learning. In ELT, transfer of learning occurs when learners apply their experiences to other experiences in new contexts and settings (Dewey, 1938; Kolb, 2015; Zull, 2002). In students' reflective journals, transfer of learning was evident in three ways: past, current, and future transfer as students applied prior knowledge to current learning, applied their knowledge from different contexts to their current situation, and considered how their experience might impact their future goals.

When implementing DRA as a reflection model, we recommend providing prompts to guide reflection. When probing into what students did, consider asking them to describe their experience, list their

tasks, and recall details. Taking *do* a step further involves asking students to provide an account of their interactions with others and promoting socio-emotional awareness. When describing interactions with others, students were encouraged to also consider interpersonal dynamics, which deepens reflection.

In the *reflection* phase, SWP asks learners to share and process their experiences by identifying themes, problems, and opportunities. SWP also asks them to elaborate on their thoughts and to consider their questions and concerns. Here, students were prompted to recognize their progress and compare their experiences to their expectations. *Reflect* prompts should focus on self-knowledge and introspection such as personal feelings and reactions to the experience. Reflection exercises should guide students to consider first how they feel, second what they are thinking, and third how their thoughts and feelings are related (Boud et al., 1985; Grossman, 2009). Using this method, students may develop greater awareness of themselves and how their experiences impact them.

Prompts for *apply* involve asking the student to determine how they will use their learning in the future and describing how their goals will be impacted. By generalizing their experiences, learners can connect them to the real-world and consider how they will use their learning in similar or different situations. One way this is achieved is by asking students what they will take away from the experience, or what advice they would give to others in similar situations.

We recommend asking learners to be specific when considering how they will apply their learning. Ask learners to consider past experiences, think about where they can currently apply their learning in new ways, and ponder future applications. SWP asked students how their future could be specifically changed or benefited and encouraged students to provide specific examples. Further prompts could include questions about how students have changed, the ways they are different, or strategies for doing something different.

We recommend continuing research on reflective practice to support EL. Future research could involve interviews with participants and include background information. This would offer important insight into supporting the development of reflective thinking skills for all learners. Conducting a longitudinal study on the development of reflective thinking skills would support the credibility of work in this area. Finally, future research should consider mixed methods approaches to studying the development of reflective thinking skills through reflective practice.

Using DRA to introduce reflective practice provides a model for generating deeper reflective thinking for students who are new to reflection. This is transferable to various contexts where students are asked to reflect on their experiences. SWP found that simply asking students to reflect was not enough to produce quality reflection. The DRA reflection model offers a first step to generating deeper, higher quality reflection and the development of reflective thinking skills.

This study offers DRA as a reflection model for facilitating reflective practice through intentional prompting, especially for students who are new to reflection. This work supports reflective practice as a crucial component for achieving complex learning outcomes through EL. The findings from this study suggest that the DRA structured reflection provides a foundation for learners to move beyond explaining what they did and engage in deeper reflective processing and helps to establish reflective habits of the mind. Findings further suggest the DRA reflection model supports the development of deeper reflection and transfer of learning as lifelong learning skills. Further, this study exemplifies the DRA model as a tool for building awareness to promote transformative learning in EL. In practice, we recommend using DRA prompts to scaffold student reflective processing and facilitate deeper reflective thinking when introducing students to reflective practice.

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