

MEASURING LEARNING IN THE AFFECTIVE DOMAIN USING REFLECTIVE WRITING ABOUT A VIRTUAL INTERNATIONAL AGRICULTURE EXPERIENCE

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Abstract

Agricultural educators are familiar with the three domains of learning: 1) cognitive, 2) affective, and 3) psychomotor. When teaching agricultural content, the instructional and assessment strategies are typically focused on the cognitive domain of learning because of the difficulty in measuring gains in the affective domain. The purpose of this study was to measure affective learning after viewing an asynchronously delivered simulation, reflecting (metacognition), and writing about the experience. Research in agricultural education is devoid of writing as an assessment tool to measure learning in the affective domain. Content analysis of 83 reflective writing samples was used to analyze affective learning at the levels of receiving, responding, valuing, organization, and characterization. It was evident in the reflective writing that all students participated at the receiving and responding levels. It is much more difficult to assess students at the higher levels of the affective domain (valuing, organizing, and characterizing). From the analysis of reflective writing, the researchers recognized and determined that some students expressed affective learning at higher levels of the affective taxonomy and increased their level of reflective writing in the process.

Introduction

Piaget noted, “at no level, at no state, even in the adult, can we find a behavior or a state which is purely cognitive without affect nor a purely affective state without a cognitive element involved” (as cited in Clark & Fiske, 1982, p. 130). McKeachie (1976) emphasized the need to understand humans holistically; cognition and affect should not be separated. Agricultural educators are familiar with the three domains of learning: 1) cognitive (Bloom & Krathwohl, 1956), 2) affective (Krathwohl, Bloom, & Masia, 1964), and 3) psychomotor (Harrow, 1972). When teaching agricultural content, the instructional and assessment strategies are typically focused on the cognitive domain of learning because of the difficulty in measuring gains in the affective domain (Leng, 2002). A few studies have examined the relationship between instruction and student performance in the cognitive domain

(Cano, 1990; Cano & Newcomb, 1990). However, in today’s atmosphere of large classrooms and multiple choice exams, it can be difficult to assess learning in the affective domain.

As agricultural educators, we understand the value of writing. We often assign writing as part of our assessment in courses and we teach courses in technical and journalistic writing. Day, Raven, and Newman (1998) measured changes in student attitudes in technical writing in an agri-communications course. Other studies have measured writing competencies of graduate students (Murphy, Lindner, & Kelsey, 2002; Lindner, Murphy, & Wingenbach, 2002). No studies were found in agricultural education that specifically examined using writing to assess affective changes in undergraduate students.

Huba and Freed (2000) determined that short writing assignments serve as an appropriate assessment tool to measure changes in attitude. Writing supports

learning through the whole-brain processing of doing, depicting, and symbolizing (Emig, 1988). When a learner reflects upon their thoughts and emotions as a result of an instructional sequence, then the nature of the learning process helps the learner to construct meaning from information and experiences. In order to fully understand this study, it is important to review the taxonomy of the affective domain, as well as the use of reflective writing as an assessment tool.

Theoretical Framework

When we think about beliefs and attitudes, we are on a less trodden path called the affective domain of learning. Researchers studying human behavior recognize the need to consider both cognitive and affective dimensions of learning, and their interrelationships (McKeachie, 1976; McLeod, 1991; Vygotsky, 1962). Perhaps the first step on this path is to operationally define these terms. "Affect" is often described with words such as feelings, emotions, motivations, attitudes, and beliefs. Studies have noted relationships exist between moods and information storage and retrieval (Bower, 1981). There is evidence that affect can directly influence cognition. Several studies describe relationships between a student's mood and learning, as well as relationships between moods and information storage and retrieval (Bastick, 1982; Bower; Bower & Cohen, 1982; Kuiken, 1991; Morris, 1989).

Attitude can be defined as "a mental or neural state of readiness, organized through experience, exerting a directive or dynamic influence upon the individual's response to all objects and situations with which it is related" (Allport, 1935, p. 810). Attitude theory contends that the expression of attitude is a social phenomenon and fits within the social constructivist paradigm of learning (McLeod, 1991).

Beliefs can be defined as "judgments of the credibility of conceptualization" (McLeod, 1991, p. 7). Values on the other hand are representations of either positive or negative notions (McLeod, 1991; Rokeach, 1986). Motivation can denote both external

and internal states that drive us in a particular direction (McLeod, 1991). Within attribution (motivational) theory, Dweck (1989) proposes a framework made up of beliefs and values. This framework consists of students' beliefs about the nature of competence and the level of their own competence, variables that influence outcomes, and their ability to achieve those outcomes. Therefore, students' beliefs about their competence and ability will impact their learning, emphasizing the relationship between affect and cognition.

The Taxonomy of the Affective Domain was first developed by Krathwohl et al., 1964. This original taxonomy contains five levels, from lowest to highest: 1) *receiving* when the learner is aware and attending the instructional event; 2) *responding* when the learner reacts to the instructional event or content; 3) *valuing* when the learner demonstrates a voluntary commitment to the instructional event or content; 4) *organization* when the learner demonstrates internalization of a value system; and 5) *characterization* when the learner consistently acts within the value system. This taxonomy was applied to the students' reflective writing to assess the level of changes in affective learning.

Topics presented within an affective framework become very real and relevant in students' lives (Rompelman, 2002). Reflection-in-action is a form of metacognition in which the student questions both the unexpected event and the knowledge-in-action that brought on the unexpected event. Surprises cause us to reflect on the cause of that surprise (Bruning, Schraw, & Ronning, 1999).

Reflection encourages students to integrate theory with practice. Boud and Walker (1985) define reflection as "those intellectual and affective activities in which individuals engage to explore their experiences in order to lead to new understandings and appreciations" (p. 19). Reflection may include the sharing of feelings, observations, ideas, and reactions regarding a learning activity. While reflection can take many forms, reflective writing is often used to get students to delve into subject matter at a deeper level.

Hatton and Smith (1995) identified four types of reflective writing done by students. The first is descriptive writing (not reflective) where the student simply describes the events. Students may begin their reflective writing in this manner to set the stage for further discussion. Unfortunately, some students never get beyond this stage (Hatton & Smith). The next type, descriptive reflection, uses the student's personal judgment in descriptive reflection of an event. A student might cite personal reasons for choosing a particular theory or position at this level. In dialogic reflection, students engage in conversation with themselves where they explore possible reasons for the event. The most in-depth level is critical reflection. At this level, the student provides reasons for the event in the broader social, political, or historical contexts. Writing is a fundamental part of the reflection process (Walkington, Christensen, & Kock, 2001).

Several studies have determined that writing could be used to assess students' level of reflection (Kember, 1999; Litke, 2002; Wong, Kember, Chung, & Yan, 1995). For example, Litke found that students in a service-learning experience indicated through written reflection that they experienced changes that fall into the affective domain. Participants in their study felt a greater sense of belonging to their group and the community as a result of their activity, as well as a commitment to active citizenship. Would reflection and writing about a virtual international agricultural experience provide evidence of an affective change?

Purpose

The purpose of this study was to measure student affective learning after viewing an asynchronously delivered simulation, reflecting (metacognition), and writing about the experience. Descriptive reflection was the type of writing used to assess learning in this study (Hatton & Smith, 1995). The five major categories of the affective domain were used as the constructs for documenting the level of affective learning (Krathwohl et al., 1964).

Methods

Study Context

The context of this study was an undergraduate overview course taught over a 15-week semester in the Department of Agricultural Leadership, Education and Communications at Texas A&M University. As a part of a unit on international agricultural development during the fourth week of classes, students were asked to view a simulation called, *Five Minutes in a Developing Country*. The simulation was developed by international workers with Food for the Hungry International (FHI, 2005). In the simulation, students assumed the role of a banana farmer in Peru with a family of four. The activity involved a decision-making tree where at every turn there were different outcomes. At each stage of the simulation, students made a decision between two alternatives with the goal of improving the lives of the farmer's family. Students were asked to complete the simulation several times, changing their responses each time to achieve different outcomes. Upon completion of the simulation, learners were asked to voluntarily write a one-page descriptive reflection paper to describe their reaction to this experience. Each paper was coded by a number (N = 83) as it was reviewed to ensure confidentiality and will appear in the narrative as a part of the audit trail to authenticate original data sources. This study was approved by the Institutional Review Board.

Research Approach and Analysis

This study used content analysis within the qualitative research paradigm. Content analysis can be both a quantitative and qualitative research technique. The difference is dependent upon the procedures of analysis rather than the character of the data available (Selltiz, Jahoda, Deutsch, & Cook, 1959). "Content analysis is a technique that enables researchers to study human behavior in an indirect way, through an analysis of their communications" (Fraenkel & Wallen, 1999, p. 405). According to Borg and Gall (1989) content analysis usually aims to achieve one of the following kinds of objectives: 1) produce

descriptive information; 2) cross-validate research findings; and 3) test hypotheses. For this study the researchers did all three. First the researchers sought to test the working hypothesis that students were gaining an appreciation and change in attitude as a result of participating in the virtual simulation. Second, descriptive examples of affective domain constructs within the writing samples were identified and coded. Finally, findings were cross-validated using independent corroborative techniques.

Miles and Huberman (1994) suggest three approaches for qualitative data analysis: interpretative, social anthropological, and collaborative social research. This research employed a social anthropological approach (Berg, 2001). Two of the researchers were course instructors and spent considerable time in the “community” (prolonged engagement over a 3 month period). Both these researchers participated directly with the study population, which provided perspective on the materials collected during the research and a special understanding of the participants and how these individuals interpret their social world (Berg). Content analysis allows the researcher(s) to examine written documents unobtrusively in order to provide “a passport to listening to the words of the text, and understanding better the perspective(s) of the producer of these words” (Berg, p. 242).

Strauss (1987) suggests that researchers use sociological constructs based upon a combination of the researcher’s scholarly knowledge and knowledge of the field under investigation. For this study, the *Taxonomy of the Affective Domain* was used as the sociological construct and coding scheme to reach beyond local meanings to broader social scientific ones (Berg, 2001). The unit of analysis was words, phrases, sentences, and paragraphs within the descriptive reflection writing samples. Abrahamson (1983) suggests that researchers begin by immersing themselves in the documents in order to identify the themes (inductive) and use some categorical scheme or theoretical/social construct for assessment (deductive).

Content analysis is a “qualitative data reduction and sense-making effort that takes

a volume of qualitative material and attempts to identify core consistencies and meanings” (Patton, 2002, p. 453). Content analysis requires deciphering skills and pattern recognition to ensure that variations can be “rigidly and consistently applied so that other researchers or readers, looking at the same messages, would obtain the same or comparable results” (Berg, 2001, p. 241). For this study the research team incorporated independent corroborative techniques (like inter-rater reliability) and detailed excerpts from relevant statements to document interpretations.

This study used an open coding technique (Strauss, 1987). This process involves carefully reading the document to determine the concepts and categories. The constant comparative method allows the researcher to integrate data (descriptive reflection papers) and theory (affective taxonomy) using joint coding and analysis (Lincoln & Guba, 1985). Each reflective paper was read by two independent reviewers and action verbs from the affective domain were highlighted and categorized by levels. Sentences and phrases were included to provide clarity and context for interpretation. A peer debriefing with an independent reader was conducted to check the initial domain levels. Every assertion made in the analysis was documented with no fewer than three examples.

In the *Handbook of Qualitative Research*, Hodder (1994) suggests that documents, such as reflective papers, require more contextualized interpretation. “Somehow it is assumed that words get us closer to minds. But...meaning does not reside in a text but in the writing and reading of it” (p. 394). He speaks toward a theory of material culture and the need to use theoretical or social criteria for analysis.

The material culture may not be able directly to ‘speak back,’ but if appropriate procedures are followed there is room for the data and for different levels of theory to confront interpretations. The interpreter learns from the experience of material remains—the data and the interpreter bring each other into existence in dialectical fashion. The interpretations

can be confirmed or made more or less plausible than others using a fairly standard range of internal and external (social criteria). (p. 401)

Therefore, this study cannot be separated from its context and the descriptive examples in the findings allow the reader to draw their own inferences of transferability.

Results

Receiving is the first level in the affective domain. Some verbs that describe this level include ask, choose, or view. The next level, *responding*, assumes active participation, attendance or reaction to the content. Action verbs such as answer, write, discuss, or perform reflect the *responding* level. As an example, one student responded:

This activity was also interesting because when you made one small decision it would change this family's whole life for the next few years just on that one decision you made. Before I sent them to the city, they were doing OK on their banana farm, but afterwards, they were struggling in the city considering sending their children to beg instead of staying home to study. Another example is the man makes a simple decision to send his daughter to work and make more money for the family, which will help the family. This leads to less frequent visits from her, and the family ends up resenting him for sending her away. (9)

Another student reacts to the decisions (s)he has to make in the scenario with this statement, "It is hard making these decisions because one mistake and you lose someone in your family." (S)he concludes with, "I have decided I never want to be in this position" (46). Student reflections at these two levels were written at the descriptive reflection level (Hatton & Smith, 1995). Simply by choosing to complete this voluntary assignment, all students were at the *receiving* and *responding* levels of the affective domain. In any classroom setting, one should expect most students to

participate at these lower levels. It is much more difficult to assess students at the higher levels of the affective domain (valuing, organizing, and characterizing).

Valuing is the worth that the learner gives to the content. Action verbs describing this level include differentiate, propose, appreciation for, and concern for. One respondent expressed:

For most of us, the toughest decisions of a day are what to wear, where to eat, or how much to study for a test; decisions for the people like in this activity involve whether or not to send their children out to beg, whether or not to steal to provide money and a living, or whether or not to have more children so that they can help on the farm. (10)

Another student realized that, "I was able to go back and do this over and try a different route to see if there was some way to beat the scenario, but they are not able to go back" (25). Yet another student asserted,

These people are definitely facing a harsh reality of life and would welcome any of the luxuries we take for granted. Many of us have grown so comfortable in our daily lives that even realizing these situations are out there is hard for us. I am definitely guilty of thinking that surely they could do better for themselves, they just don't do it. (6)

Learners at the *organizing* level go beyond valuing by demonstrating consistency and priority of their values. Compare, generalize, modify, relate, and synthesize are action verbs that describe this level. This student was able to put himself into the character's situation, "But if you allow your self to be in the banana farmer's shoes for a few minutes, forgetting that you're sitting in a heated house on a computer, you can really see the reality of the situation" (20). Another compared their own life to that of the Peruvian farmer:

While growing up as a child, there was very few of us that would go to bed hungry. Your parents would clothe, bathe, feed and give you shelter. In most

families, children won't start working until the age of sixteen or later. Even later in life, your parents are still there for you and would do anything for you. In these third world countries, you start working from the moment that you can walk. It's not that your parents are being cruel, but because they had to do it to survive. (13)

Other students noted that "...other people around the world are struggling just to have enough to eat, while we throw away millions of pounds of food everyday" (29), and

Everyday is a struggle for them to live and everyday is a struggle for us to get up. We complain if we have to work a ten hour day and it's a short day if they work a ten hour day. (25)

Characterizing is the highest level of the affective domain. Questioning, demonstrating empathy, solving, and modifying behavior are actions that describe this level. The simulation caused some respondents to question their own lives. One student wrote, "Why am I able to go home and have food in my kitchen that I just do not feel like eating and have the ability and the means to go to the store to get something else?" (17). Another student questioned, "What would we do if we were in poverty like so many others, and not have the things that we take for granted?" (42). Other students developed empathy for the characters in the simulation. One student stated,

This exercise made me more perceptive and empathetic for those less fortunate. I've always been disturbed and disappointed by beggars, especially children. I have never actually considered the fact that they may have no choice. This hurts my heart to think how quick and harsh I was to judge others. (36)

Another student realized:

Until I did this exercise, I don't think that I realized the total severity of it

(world hunger). I now see how important it would be to have a job in international agricultural development to help people around the world that work so hard just to get by. (14)

Some students were moved to action by the activity, "This really encouraged me to get involved in any way I can even while still in school to try and alleviate this problem in our world" (5). As the students reached this affective level, their reflective writing gained more depth. These students used dialogic reflection (Hatton & Smith, 1995).

Conclusions

The affective domain consists of levels that address a learner's interests, attitudes, values, and appreciation of a given topic or content area. Undergraduate courses that include agricultural content invariably contain both cognitive and affective dimensions. The interrelationships between cognition and affect cause a learner to further internalize the information and promote a change in attitude, belief, and values that would instill a desire to improve the condition of international agriculture and other relevant agricultural education content areas.

Students' descriptive and dialogic reflections provided evidence that learning occurred at all levels of the affective domain, but of particular interest, at the higher levels where changes make a greater impact on the student. Changes at the upper three levels of the affective domain might impact students' career choices, level of community involvement, empathy toward others, or willingness to work or travel abroad. After viewing the simulation, students expressed feeling grateful to live in the U.S. and appreciative of the privileges and prosperity that they enjoy. Students were motivated to want to help those in developing nations. Students realized that people in developing nations are living their entire lives barely able to afford to eat with no hope of any improvement any time in their lives. Their reflections expressed an awareness of developing countries and the kinds of decisions people must make and

discernment of whether others share their level of awareness.

This research demonstrated that descriptive reflection was an appropriate assessment tool for affective learning. In addition, it was noted that as students increased their level of the affective domain, they also reflected at a deeper level. Some students' writings at the characterization level moved from descriptive to dialogic reflection, and perhaps a bit to critical reflection. While not a specific purpose of this study, the findings imply that a relationship may exist between student's level of reflective writing and the higher levels of the affective domain. At the higher levels of affect, some students' reflections were more conversations with themselves (dialogic) while others were moved to question why society is not doing more to improve the condition of those in need (critical reflection). Further study is needed to examine the relationship between levels of reflection and affect.

Instructional implications may exist for prompting higher levels of reflective writing in agricultural education courses. Instructors should consider the use of reflective writing, both as an instructional tool to improve learners' cognitive models, as well as an assessment tool to measure changes in attitudes, beliefs, values, and motivations.

Affective learning and assessment is an under represented area of research in agricultural education. There is a need for additional research examining the relationship between all three domains of learning: cognition, affect, and psychomotor. Implications for our profession exist in terms of instructional strategies and content delivery. Retention and transfer of agricultural content could be enhanced with the inclusion of affective and psychomotor dimensions. Furthermore, Krathwohl et al., (1964) admitted difficulty in placing learning into specific levels within the affective domain. As a result, other theorists have proposed the need for a new taxonomy (McLeod, 1991; Bohlin, 1998). Further research is needed in these areas and agricultural educators are

positioned for inclusion to join in this line of inquiry.

References

- Abrahamson, M. (1983). *Social research methods*. Englewood Cliffs, NJ: Prentice Hall.
- Allport, G. W. (1935). Attitudes. In C. Murchison (Ed.), *Handbook of social psychology*, (pp. 798-844). Worcester, MA: Clark University Press.
- Bastick, T. (1982). *Intuition: How we think and act*. New York: John Wiley and Sons.
- Berg, B. L. (2001). *Qualitative research methods for the social sciences*. Needham Heights, MA: Allyn & Bacon.
- Bloom, B., & Krathwohl, D. (1956). *Taxonomy of educational objectives: The classification of educational goals, by a committee of college and university examiners. Handbook I: Cognitive Domain*. New York: Longman, Green.
- Bohlin, R. M. (1998). The affective domain: A model of learner-instruction interaction. *Proceedings of Selected Research and Development Presentations*. The National Convention of the Association for Educational Communications and Technology (AECT).
- Borg, W. R., & Gall, M. D. (1989). *Educational research: An introduction* (5th Ed.). White Plains, NY: Longman.
- Boud, D., & Walker, D. (1985). Barriers to reflection on experience. In D. Boud, R. Keough, and D. Walker (Eds.), *Reflection: Turning experience into learning* (pp. 18-40). London: Kogan Page.
- Bower, G. (1981). Mood and memory. *American Psychologist*, 36, 129-148.
- Bower, G., & Cohen, P. R. (1982). Emotional influences in memory and thinking: Data and theory. In M. S. Clark &

S. T. Fiske (Eds.), *Affect and Cognition* (pp. 291-331). Hillsdale N.J.: Erlbaum.

Bruning, R. H., Schraw, G. J., & Ronning, R. R. (1999). *Cognitive psychology and instruction*. Upper Saddle River, NJ: Merrill Publishing.

Cano, J. (1990). The relationship between instruction and student performance at the various levels of cognition among selected Ohio production agriculture programs. *Journal of Agricultural Education*, 31(2), 74-80.

Cano, J., & Newcomb, L. H. (1990). Cognitive level of instruction and student performance among selected Ohio production agriculture programs. *Journal of Agricultural Education*, 31(1), 46-51.

Clark, M. S., & Fiske, S. T. (1982). *Affect and cognition*. Hillsdale, NJ: Erlbaum.

Day, T. M., Raven, M. R., & Newman, M. E. (1998). The effects of world wide web instruction and traditional instruction and learning styles on achievement and changes in student attitudes in a technical writing in an agricommunications course. *Journal of Agricultural Education*, 39(4), 65-75.

Dweck, C. S. (1989). Motivation, In A. Lesgold & R. Glaser, (Eds.) *Foundations for a psychology of education*, (pp. 87-136). Hillsdale, NJ: Erlbaum.

Emig, J. (1988). *Writing as a mode of learning*. New York: Oxford Press.

Fraenkel, J. R., & Wallen, N. E. (1999). *How to design and evaluate research in education*. New York, NY: McGraw-Hill.

Food for the Hungry International. (2005). *Five minutes in a developing country*. Retrieved July 29, 2005 from <http://www.fhi.net/fhiperu/FHISite/interacti veintro.htm>

Harrow, A. (1972). *A taxonomy of the psychomotor domain. A guide for*

developing behavioral objectives. New York: McKay.

Hatton, N., & Smith, D. (1995). *Reflection in teacher education: Towards definition and implementation*. The University of Sydney: School of Teaching and Curriculum Studies. Retrieved January 23, 2005 from <http://alex.edfac.usyd.edu.au/LocalResource/study1/hattonart.html>

Hodder, I. (1994). The interpretation of documents and material culture (pp. 393-402). In N. K. Denzin, & Y. S. Lincoln, (Eds.) *Handbook of qualitative research*. Thousand Oaks, CA: Sage.

Huba, M. E., & Freed, J. E. (2000). *Learner-centered assessment on college campuses: Shifting the focus from teaching to learning*. Boston: Allyn and Bacon.

Kember, D. (1999). Determining the level of reflective thinking from students' written journals using a coding scheme based on the work of Mezirow. *International Journal of Lifelong Education*, 18(1), 18-30.

Krathwohl, D., Bloom, B., & Masia, B. (1964). *Taxonomy of educational objectives: The classification of educational goals. Handbook II: Affective domain*. New York: David McKay Co.

Kuiken, D. Ed. (1991). *Mood and memory: Theory, research, and application*. Newbury Park, CA: Sage.

Leng, Y. L. (2002). Learner analysis in instructional design: The affective domain. *CDTLink*, 6(3). Retrieved July 20, 2005 from <http://www.cdtl.nus.edu.sg/link/nov2002/tech2.htm>

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Newbury Park, CA: Sage.

Lindner, J. R., Murphy, T. H., & Wingenbach, G. J. (2002). Written communication competencies: Strengths and weaknesses of agricultural education graduate students. *Proceedings of the*

National Agricultural Education Research Conference, Las Vegas, NV.

Litke, R. A. (2002). Do all students “get it?” Comparing students’ reflections to course performance. *Michigan Journal of Community Service Learning*, 8(2), 27-34.

McKeachie, W. (1976). Psychology in America’s bicentennial year. *American Psychologist*, 31, 819-833.

McLeod, S. H. (1991). The affective domain and the writing process: Working definitions. *JAC*, 11(1). Retrieved November 11, 2004, from <http://jac.gsu.edu/jac/11.1/Articles/6.htm>

Miles, M. B., & Huberman, M. A. (1994). *Qualitative analysis: An expanded sourcebook* (2nd ed.). Thousand Oaks, CA: Sage.

Morris, W. N. (1989). *Mood: The frame of mind*. New York: Springer.

Murphy, T. H, Lindner, J. R., & Kelsey, K. D. (2002). Authenticated writing competencies of agricultural education graduate students: A comparison of distance and on-campus students. *Proceedings of the National Agricultural Education Research Conference*, Las Vegas, NV.

Patton, M. Q. (2002). *Qualitative research and evaluation methods* (3rd Ed.). Thousand Oaks, CA: Sage.

Rokeach, M. (1986). *Beliefs, attitudes, and values: A theory of organization and change*. San Francisco: Jossey-Bass.

Rompelman, L. (2002). *Affective teaching*. New York: University Press of America.

Selltiz, B., Jahoda, M., Deutsch, M., & Cook, S. W. (1959). *Research methods in social relations*. New York: Holt, Rinehart & Winston.

Strauss, A. L. (1987). *Qualitative analysis for social scientists*. New York: Cambridge University Press.

Vygotsky, L. (1962). *Thought and language*. Cambridge, MA: MIT Press.

Walkington, J., Christensen, H. P., & Kock, H. (2001). Developing critical reflection as a part of teaching training and teaching practice. *European Journal of Engineering Education*, 26(4), 343-350.

Wong, F. K. Y., Kember, D., Chung, L. Y. F., & Yan, L. (1995). Assessing the level of reflection from reflective journals. *Journal of Advanced Nursing*, 22(1), 48-57.

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