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Student Teaching Changed Me: A Look at Kolb's Learning Style Inventory Scores Before and After the Student Teaching Experience

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Abstract

Student teaching as the culminating experience of a teacher preparation program has been shown to be of great importance in the preparation of pre-service agricultural educators (Harlin, Roberts, Mowen, Edgar, & Briers, 2007; Roberts, Mowen, Edgar, Harlin, & Briers, 2007; Kitchel & Torres, 2006, 2007; Myers & Dyer, 2004). Kolb's Learning Style Inventory (KLSI) is an instrument designed to examine individual preference for learning in four learning modes: active experimentation (AE), reflective observation (RO), concrete experience (CE), and abstract conceptualization (AC). In addition, the KLSI examines learning preferences in the dimensions of grasping and transforming experience. This descriptive study examined the KLSI scores for two semesters of student teachers (N = 37) from Texas A&M University at both the beginning and end of their student teaching experience. Student teachers were observed as falling into all nine learning styles as indicated by Kolb and Kolb (2013) at both the beginning and end of the student teaching experience. Results indicated that there was wide range of changes in individual student teachers. Active experimentation was the learning mode showing the greatest amount of change among the population, and changes in the group were more apparent in the dimension of transforming experience than in grasping experience.

Keywords: experiential learning, student teaching, learning styles, high-impact experience (HIE), KLSI

Introduction

Student teaching as a capstone experience is the most intensive preparation which prospective teachers can receive (Darling-Hammond & Bransford, 2007). This professional internship meets the requirements of a high-impact experience (HIE) as set forth by Kuh (2008). According to Kuh (2008), high-impact experiences are purposefully designed components within an education program that promote active learning in contextual settings. HIEs have been shown to influence the way individuals take in and process new information (McKim, Latham, Treptow, & Rayfield, 2013). Understanding the changes that occur during a HIE can provide insight into the quality of the preparation participants received in order to fully embrace the experience (Kuh, 2008). Because of the nature of student teaching as a HIE, it is important to look at the ways in which the student teacher is affected by the experience.

Examinations of the importance of the student teaching semester have shown that, for many student teachers, changes occur in thoughts regarding pedagogical delivery, content knowledge, and teaching intent during this experience (Harlin, Roberts, Briers, Mowen, & Edgar, 2007; Myers & Dyer, 2004; Stripling, Ricketts, Roberts, & Harlin, 2008). Understanding change during student teaching, and which groups are most influenced by the experience may be an important factor in

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teacher educators decisions with placement decisions and preparing pre-service teachers for the experience (Darling-Hammond & Bransford, 2007).

Kolb's Learning Style Inventory (KLSI) has been found to be an accurate measure of an individual's preference for grasping and transforming information during learning (Kolb & Kolb, 2013). Researchers have found that using the *KLSI* as an indicator of the learning preferences for a particular group can help explain their preferred learning method (Kolb & Kolb, 2005a), which can help guide decisions regarding curriculum development and delivery. The *KLSI* instrument has been noted as a relatively stable measure of learning style preference (Kolb & Kolb, 2005a). Alice Kolb (2005a) stated, "experiential learning theory hypothesizes that learning style is situational, varying in response to environmental demands" (p. 15).

One method for examining change during the student teaching experience would be to explore the change in *KLSI* score for student teachers from the beginning of their student teaching experience to the end. This study examined changes in student teachers *KLSI* scores from the beginning to the end of a 12 week student teaching experience. To determine what changes occurred in student teacher learning style over the course of a student teaching semester, we administered the *KLSI version 3.2* to two consecutive semesters of agricultural education student teachers at both the beginning and the end of their student teaching experience.

Theoretical Framework

We developed this study to examine student teacher change through the frame of experiential learning theory (Kolb, 1984). To accomplish the purposes of this study, we explored changes in student teachers based on the theoretical underpinnings of Bandura's (1986) social cognitive theory, and the nature of the personal determinants through experiential learning theory (Kolb, 1984).

Social cognitive theory (Bandura, 1986) was used as the basis for examining changes in student teachers. The changes occurring within student teachers during their preservice teaching experience can be explained as the dynamic interaction between their personal, behavioral, and environmental determinants. Personal determinants, like student teacher background, beliefs, and personal learning preferences are influenced by both environmental and behavioral determinants. Student teachers are in completely new environments once they enter their experience, and are required to behaviorally shift into the role as a full time teacher (Darling-Hammond & Bransford, 2007). When one of the components of social cognitive theory is changed, Bandura (1986) posits the other determinants will adjust in response, resulting in change for an individual.

In this study, we examined change in learning preference, which served as a personal determinant within the scope of social cognitive theory. Individual learning preference was determined using an instrument based on Kolb's (1984) experiential learning theory (ELT). Kolb proposed that learning is a cyclical process, which may be entered at any point, and posited that individuals differ in the ways they prefer to grasp and transform new information (Kolb, 1984, 2015; Kolb & Kolb, 2009). This model is based on the premise that learning is an interaction between the learner, the methods through which information is gathered, and the methods by which information is processed in the mind (Kolb, 1984, 2015).

Kolb (1984) defines four learning modes through the experiential learning cycle: active experimentation (AE), reflective observation (RO), concrete experience (CE), and abstract conceptualization (AC). The continuums are shown between preferences for AE or RO in relation

to the dimension for grasping experience, and as a continuum between CE and AC in relation to transforming information, as shown in Figure 1.

. Kolb (1984) described each of the anchor points on the continuums as the extent to which individuals had preferences for each of the characteristics, saying that learning is the "generalized differences in learning orientation based on the degree to which people emphasize the four modes of the learning process" (p. 26). As the *KLSI* instrument was developed to align with this Kolb's (1984) model, our study operated based on and within the parameters of the theory.

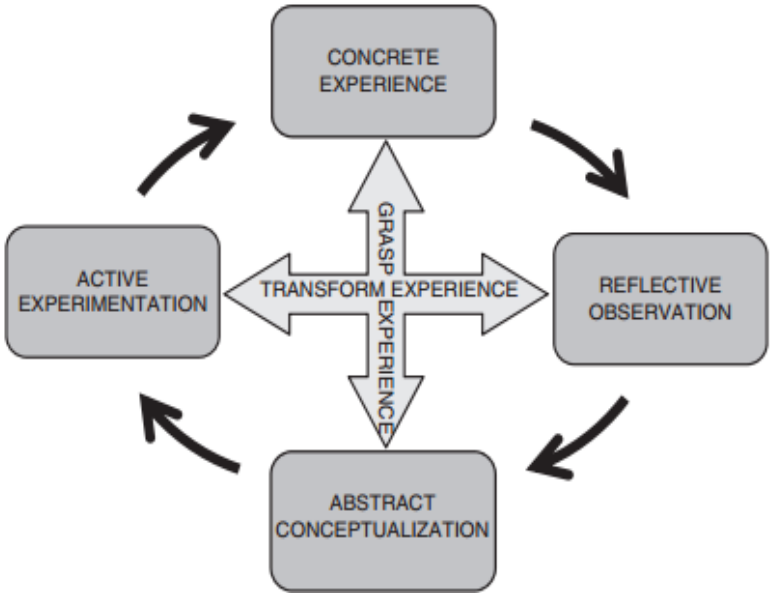

Figure 1. Kolb & Kolb's (2009) Experiential Learning Cycle. Reprinted with permission.

Review of Literature

To accurately examine the change in student teacher learning preferences during the student teaching experience, we determined that an examination of the relevant literature related to student teaching experiences in agricultural education, influence of learning styles, and high impact experiences was crucial to understanding the objectives of this study.

Student teaching in agricultural education has been studied from numerous perspectives. The experience has been approached by researchers to gather information about the student view of the experience (Fritz & Miller, 2003; Harlin, Edwards, & Briers, 2002; Knobloch, 2006; Roberts, et. al., 2007; Whittington, McConnell, & Knobloch, 2006), cooperating teacher expectations and perceptions (Deeds, Flowers & Arrington, 1991; Thobega & Miller, 2007; Young & Edwards, 2005), the importance of the relationship between student teacher and cooperating teacher (Edwards & Briers, 2001; Kitchel, 2006; Kitchel & Torres, 2006, 2007) and the broader impact of student teaching experiences in agricultural education (Stripling, et. al., 2008).

Overall, researchers have concluded that the outlook of student teachers on their experience has been positive. The findings of Harlin, et. al. (2007) and Whittington, et. al. (2006) echo the earlier conclusions of McGhee and Cheek (1990) who noted that agricultural education graduates believed their formal preparation for teaching to be above average. With regard to cooperating teachers, Myers and Dyer (2004) cited a need for research related to cooperating teacher

requirements and expectations. Since that time, this topic has been examined in order to develop a list of appropriate factors that would lead to better equipped cooperating teachers (Roberts, 2006).

Relationships between cooperating teachers and student teachers have been found to be important to the overall success of the student teaching experience. Kitchel and Torres (2006, 2007) noted that the cooperating teacher is the most important factor contributing to a favorable student teaching experience. In addition, they examined the importance of personality as a factor in student teacher relationships, finding it to be a crucial factor driving the success of a student teacher placement (Kitchel, 2006). A qualitative examination of student teacher/cooperating teacher perspectives revealed that both groups felt the relationship between a student teacher and their cooperating teacher was the factor most likely to influence change, positive or negative, in a student teacher during their experience (Smith, McKibben, & Rayfield, 2015).

In addition to gathering perceptions of the student teaching experience and relationships between student teachers and cooperating teachers, the impacts of student teaching experiences have also been examined. Stripling et. al. (2008) compared the efficacy scores of student teachers before and after the student teaching experience, and noted increases in efficacy for student engagement, instructional strategies, and classroom management. Although the importance of student teaching has been cited, not all evidence suggests that it is paramount to novice teacher success. In an examination of factors important to novice teacher efficacy, Knobloch and Whittington (2002) found that student teaching experience was not the factor contributing the most to increased efficacy.

Research into experiential learning in agricultural education has often related to the work of theorists like Dewey (1910), Joplin (1981), and Kolb (1984). Kolb's (1984) experiential learning model was tied to his belief that people have predisposed preferences for how they grasp new information and how they process that information into acquired knowledge. To further examine the topic, Kolb developed the Learning Style Inventory (*KLSI*) as an assessment of individual preferences.

Some researchers have concluded that learning style cannot be conclusively used as an assessment of overall learning capabilities of an individual (Pashler, McDaniel, Rohrer, & Bjork, 2008). However, Kolb & Kolb (2005b, 2009) posit that learning style is an important indicator of preference for learning, and subsequent engagement in the learning process. Many learning style assessments are currently used, including the *Gregorc* (1979) *Learning Style Delineator*, *VARK Assessment* (Fleming, 2001), *Dunn & Dunn* (1989) *Learning Styles Inventory*, and the *KLSI* (Kolb, 2013). Of the learning style inventories that exist, only the *KLSI* has capacity for measuring both the grasping and transforming dimensions of learning preference as aligned with Kolb's (1984) Experiential Learning Theory (Kolb & Kolb, 2013). Sousa (2011) discussed the varying acceptance of learning styles within academia and said that despite the argument on how to use learning styles "there is little argument that people have various internal and external preferences when they are learning" (p. 59).

Examining personal student teacher characteristics as a factor in the student teaching experiences is not a new concept. Kitchel and Torres (2006, 2007) examined the pairing of student teacher and cooperating teachers based on the Myers-Briggs Type Indicator (MBTI). Learning styles for pre-service teachers as a factor in determining critical thinking abilities has also been examined (Myers & Dyer, 2004; Rudd, Baker, & Hoover, 2000). Whittington and Raven (1995) considered the importance of learning and teaching style in a study of pre-service teachers in the Northwest, concluding "there is a need for teacher educators to explore the different types of

students and to discover the learning styles and thus teaching styles associated with those students" (p. 16).

The nature of student teaching as a high-impact experience can help in the understanding of changes that may occur for student teachers. Kuh outlined high-impact experiences (HIE) as a form of experiential learning designed to "challenge student to develop new ways of thinking about and responding immediately to novel circumstances as they work side by side with peers on intellectual and practical tasks, inside and outside the classroom, on and off campus" (p.15). In his description of the importance of HIEs, Kuh (2008) outlines that HIEs can alter the way in which student interact with each other, the content, and can impact the way they gather and process information. This finding highlights the importance of examining potential change in students as a result of high-impact experiences.

To summarize the relevant literature, student teaching is an important event in the development of a pre-service agricultural educator, understanding the importance of learning style could be helpful in examining factors related to student teaching, and the nature of student teaching leads us to believe that there is the potential for student teaching, as a high-impact experience, to be a factor in potential change in *KLSI* score among student teachers.

Purpose and Objectives

The intent of this study was to describe changes in the *KLSI* score for student teachers from the beginning to the end of their student teaching experience. To meet this purpose, the study was guided by the following objectives;

1. Identify *KLSI* scores and learning styles for agricultural education student teachers at the beginning of their student teaching experience
2. Identify *KLSI* scores and learning styles for agricultural education student teachers at the end of their student teaching experience
3. Describe changes in *KLSI* scores for agricultural education student teachers from the beginning to the end of their student teaching experience

Methods

This study employed the use of descriptive survey methods. According to Fraenkel, Wallen, and Hyun (2012), the purpose of a descriptive study is to "describe a given state of affairs as fully and carefully as possible" (p. 15). To fulfill the purpose and meet the objectives of this study, we carefully outlined the procedures for data collection and analysis.

The population of this study were the Texas A&M University agricultural education student teachers for both the fall 2014 and spring 2015 semesters (N = 37). In their respective semesters, participants completed the *KLSI* on the final day of pre-student teaching instruction, three days before their student teaching experience began, and again at the end of semester conference, three days after the end of their student teaching experience. At the end of data collection, n = 3 of the instruments were completed incorrectly, and both pre and post student teaching scores for those participants were excluded from the analysis, yielding a 91.9% useable response rate. The complete pre and post assessments from the remaining participants (n = 34) were included in the analysis.

The instrument we used for this study was the paper version of *Kolb's Learning Style Inventory, version 3.2* (Kolb & Kolb, 2013), which is commercially available from Haygroup. The

format of *KLSI v. 3.2* is a forced-choice response to 12 instrument items. Each item contains a sentence prompt and asks respondents to rank their preferences for four answer choices, corresponding to the four learning modes of Kolb's (1984) Experiential Learning Theory (ELT). Respondent rankings are ordinal from 4 "most like me" to 1 "least like me" (Kolb & Kolb, 2013).

The descriptions for each of the modes of learning are outlined in the *KLSI version 3.2 workbook* (Kolb & Kolb, 2013), as shown in Table 1.

Table 1

KSLI v. 3.2 description of modes of learning (Kolb & Kolb, 2013)

Learning Mode	Description	Characterized by
Active Experimentation	Learning by doing	Ability to get things done, take risks, and influence people and events through action
Concrete Experience	Learning by experiencing	Learning from specific experiences, relating to people, being sensitive to feelings and people
Reflective Observation	Learning by reflecting	Observing carefully before making judgments, viewing issues from other perspectives, looking for the meaning of things
Abstract Conceptualization	Learning by thinking	Analyzing ideas logically, planning systematically, acting on an intellectual understanding of a situation

Validity of the *KLSI v. 3.2* has been widely established for use in the field of education (Kolb & Kolb, 2005a). Validity was determined to be acceptable for the purposes of this study. Previous measures of internal reliability for the four learning modes included in the *KLSI* range from $\alpha = 0.77$ to $\alpha = 0.84$ (Kolb & Kolb, 2005a). As such, we determined the internal reliability to be suitable for use in this study. Of specific interest to this study, which employed the use of the *KLSI* as a pre and post measure, was the test-retest reliability of the instrument.

Test-retest reliability for the instrument was calculated using Cohen's kappa coefficient, and is reported in instrument documentation to be above $\kappa = 0.90$ for multiple research studies (Kolb & Kolb, 2005a). Although test-retest reliability is sufficient for the purposes of this study, several studies reported lower test-retest reliability estimates (Kolb & Kolb, 2005a). In these cases, Kolb states "learning style is situational, varying in response to environmental demands; changes in style may be the result of discontinuous intervening experiences between test and retest" (Kolb & Kolb, 2005a, p. 16). As the purpose of this study was to determine if changes occur in *KLSI* score with the intervening variable of a student teaching experience, the test-retest reliability was deemed to lend to the strength of analysis.

Upon the completion of the *KLSI*, respondents yield calculated scores highlighting their preference for each of the four learning modes (AE, RO, AC, CE), along with a score for preferences in grasping (AC - CE) and transforming (AE - RO) experience. In addition to the raw scores of the *KLSI*, Kolb and Kolb (2013) identify nine categorized learning styles which are based

on an individual's scores for grasping and transforming experience. The nine learning styles of *KLSI v. 3.2* replace the four learning styles of the *KLSI v. 3.1* (Kolb, 2015), and are based on preferences on both the grasping and transforming continuums. Scores for learning style are scaled to reflect normative groups, with a score of +7 as an equal preference between the dimensions for grasping experiences (AC-CE) or transforming experiences (AE-RO). The nine learning styles in relation to *KLSI* scores are shown in Figure 2.

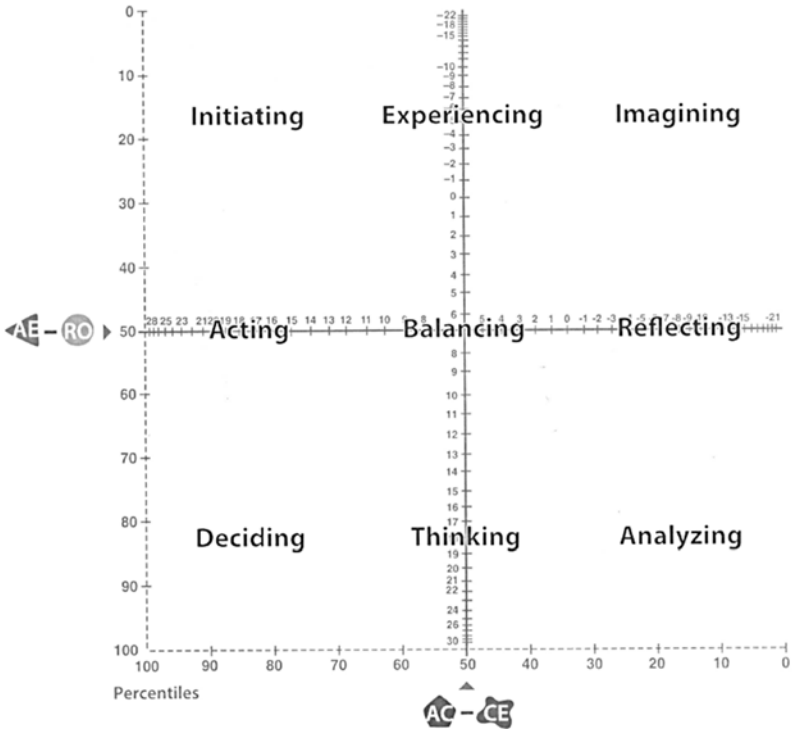

Figure 2. Kolb's nine learning styles as related to *KLSI* scores on grasping and transforming dimensions. Copyright Haygroup, 2013. Reprinted with permission.

Scoring the *KLSI* was completed by hand, with the assistance of an Excel spreadsheet, using the guidelines set by Kolb and Kolb (2013). Scores were calculated for each of the four learning modes. Potential scores for each of the learning modes range from 12 (lowest rank given on all instrument items) to 48 (highest rank given on all instrument items). In addition, scores for grasping knowledge (AC-CE) and transforming knowledge (AE-RO) were calculated per the guidelines of Kolb and Kolb (2005a). Scores for grasping and transforming data range from -36 to +36. To determine change, the difference between data points were calculated, and the absolute value of the changes were used in analysis. Resulting data were analyzed using IBM ® SPSS version 22.

Findings

On the *KLSI* assessment taken prior to student teaching, we found that more student teachers were most commonly classified in the initiating (n = 8) and analyzing (n = 6) learning

styles, with acting and balancing (*n = 5*) closely following in number of students. It is worth noting that all nine of Kolb and Kolb's (2013) learning styles were represented in the population. Frequencies and percentages of student teacher learning styles before the student teaching experience are shown in Table 2.

Table 2.

Learning Styles of Pre-service Agricultural Educators Before Student Teaching (N = 34)

Learning Style	*f*	%
Initiating	8	23.5
Thinking	6	17.6
Acting	5	14.7
Balancing	5	14.7
Analyzing	3	8.8
Reflecting	3	8.8
Experiencing	2	5.9
Deciding	1	2.9
Imagining	1	2.9

Note. Learning styles were calculated using the guidelines of Kolb and Kolb (2013)

The highest mean by learning mode was active experimentation (M = 39.26, SD = 5.41) while the lowest mean for the pre-student teaching instrument was in concrete experience (M = 24.06, SD = 5.24). The overall mean for the preferences for grasping information was M = 4.44 (SD = 10.79) on a scale from -36 to 36. Kolb and Kolb (2013) set the balance point for equal preferences between ends of the dimensions for grasping and transforming experiences at +7. Although answers varied greatly among individual participants, as a group there was a slight preference for grasping experience through concrete experience over abstract conceptualization. The mean of the scale for transforming information was M = 11.15 (SD = 9.88), indicating a slight preference in the group for transforming information through active experimentation rather than reflective observation. Scores for each learning mode along with scores on the grasping and transforming continuums are shown in Table 3.

Table 3

KLSI Scores for Pre-service Agricultural Educators Before Student Teaching (N = 34)

Construct	*Min*	*Max*	*M*	*SD*
Abstract Conceptualization	16	47	28.53	6.74
Concrete Experience	18	36	24.06	5.24
Active Experimentation	25	47	39.26	5.41
Reflective Observation	17	42	28.47	6.06
Grasping Experience (AC-CE)	-20	29	4.44	10.79
Transforming Experience (AE-RO)	-11	26	11.15	9.89

Note. Calculated scores can range from 12 – 48 on learning modes and -36 to +36 on experience dimensions. Equal balance between ends of the continuums for transforming and grasping experience dimensions is set at +7 (Kolb & Kolb, 2013).

At the end of the student teaching experience, there were proportionately more student teachers whose *KLSI* learning style was categorized as initiating (n = 12) than the other eight learning styles, although all nine learning styles were again represented in the population. The breakdown of learning styles for student teachers at the end of the student teaching experience is shown in Table 4.

Table 4.

Learning Styles of Pre-service Agricultural Educators After Student Teaching (N = 34)

Learning Style	f	%
Initiating	12	35.3
Deciding	6	14.7
Imagining	4	11.8
Experiencing	4	11.8
Acting	3	8.8
Analyzing	2	5.9
Reflecting	2	5.9
Thinking	1	2.9
Balancing	1	2.9

Note. Learning styles were calculated using the guidelines of Kolb and Kolb (2013)

Analysis of *KLSI* scores for learning modes and the dimensions of grasping and transforming experiences revealed high means for both active experimentation (M = 32.38, SD = 10.24) and abstract conceptualization (M = 32.29, SD = 10.42). With regard to the dimensions of grasping and transforming experiences, there was a slight preference toward abstract conceptualization in the grasping domain (M = 0.24, SD = 13.03) and a continuing slight preference toward active experimentation (M = 9.15, SD = 12.60) in the dimension related to transforming experiences. It is important to note the relatively high standard deviations for the observed *KLSI* scores after student teaching. The *KLSI* scores for all constructs is shown in Table 5.

Table 5.

KLSI Scores for Pre-service Agricultural Educators After Student Teaching (N = 34)

Construct	*Min*	*Max*	*M*	*SD*
Abstract Conceptualization	13	47	32.29	10.42
Concrete Experience	16	41	26.79	6.53
Active Experimentation	14	47	32.38	10.24
Reflective Observation	17	47	28.53	7.57
Grasping Experience (AC-CE)	-21	26	0.24	13.03
Transforming Experience (AE-RO)	-20	27	9.15	12.60

Note. Calculated scores can range from 12 – 48 on learning modes and -36 to +36 on experience dimensions. Equal balance between ends of the continuums for the transforming and grasping experience dimensions are set at +7 (Kolb & Kolb, 2013).

Analyzing the absolute value of the change in *KLSI* scores for each of the learning modes revealed the average change in score from the pre student teaching assessment to the post student teaching assessment. The learning mode showing the greatest overall mean change was active experimentation (M = 10.29, SD = 8.47). The learning mode showing the smallest overall mean change was concrete experimentation (M = 6.03, SD = 5.31). Complete change in *KLSI* scores are shown in Table 6.

Table 6.

Change in KLSI Scores from Beginning to End of Student Teaching Experience (N =34)

Construct	Min	Max	M	SD
Change in Abstract Conceptualization	0	25	8.24	7.25
Change in Concrete Experience	0	20	6.03	5.31
Change in Active Experimentation	0	26	10.29	8.47
Change in Reflective Observation	0	25	7.24	5.84
Change in Grasping Experience (AC-CE)	0	28	6.68	5.72
Change in Transforming Experience (AE-RO)	0	32	8.00	7.15

Note. Change was calculated as the absolute difference between scores from pretest to posttest. Equal balance between constructs on dimensions is set at +7 (Kolb & Kolb, 2013).

A broad range of changes was experienced among individual respondents. For every learning mode, there was at least one student teacher who had no change in score from pre student teaching to post student teaching assessment. A careful analysis of the entire data set revealed that there were no student teachers who had identical scores in all dimensions from their pre student teaching assessment to their end of student teaching assessment. The graphic learning styles from beginning of student teaching to end of student teaching is shown in Figure 3.

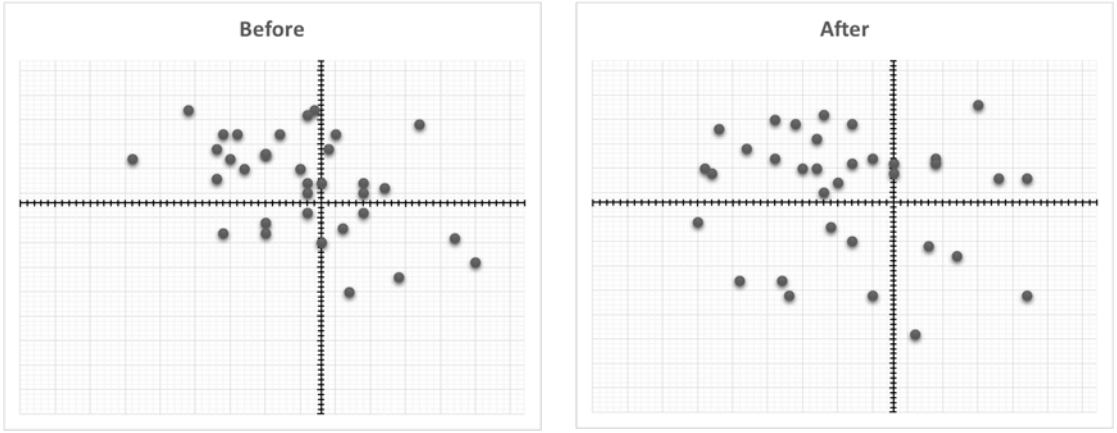

Figure 3. Complete *KLSI* learning style scores before (left) and after (right) student teaching.

Data points in this figure are not scaled to the normative scale of *KLSI* style grid

Conclusions/Implications

The findings of this study lead to the conclusion that, at least for some student teachers in this group, *KLSI* learning style, preferences for learning mode, and preferences for grasping and transforming experiences changed from the beginning to the end of the student teaching experience. Kolb and Kolb (2005a) stated the importance of examining intervening variables when changes in *KLSI* scores were observed with repeated tests, stating that these experiences could be factors

contributing to the change. For many of the student teachers in this population, change was evident. Although in many cases change occurred, it is important to note that examining the nature of change, or if change in learning style is beneficial or desirable, was not the intent of this study. There is no evidence linking change in *KLSI* score to growth as an individual. Our intent was simply to determine if the intervening activity of student teaching led to change in these cohorts of student teachers.

The wide range of change scores leads us to conclude that the amount of change occurring for individual student teachers varies. Bandura (1986) outlined the potential for changes in personal, behavioral, or environmental determinants to impact the other determinants. The student teaching experience forces a change in determinants, and it is therefore not surprising to find change in this group. Kuh (2008) suggested that high-impact experiences are most effective and lead to the most change in students when they are prepared for the potential impacts of those experiences. This finding leads us to wonder what the factors are that drive change in student teachers during the course of the student teaching experience, and if in fact change in a specific direction indicates growth or regression. This concept has potential implications for both pre-service teachers and teacher educators. Student teachers may be able to gain more from their student teaching experience if they are prepared for the potential impacts of the experience on their learning preferences. In addition, teacher educators may be able to better capitalize on the strengths of student teaching as a HIE, providing a framework for developing student teaching assignments and reflection activities geared toward development in Kolb's (2013) learning modes.

Another potential explanation for the broad range of change scores from beginning to end of the student teaching experience in this population could be the overall quality of the student teaching experience. We suggest using the change in *KLSI* to further examine the factors of a student teaching experience which contribute to change in *KLSI* score. In addition, these results could lend to the need for placing student teachers in cooperating centers that are designed to stretch their thinking and insight change in their learning style.

There is no "ideal" learning style related to automatic success in education, or any particular occupation (Kolb & Kolb, 2013), but understanding which learning modes are most important to foster in pre-service teachers could be a starting point for making placement and assignment decisions during student teaching that could stimulate change in those areas as part of a larger conversation about learning styles related to effective teaching. We suggest continued examination of the impacts of *KLSI* score as a factor contributing to teaching preferences, and the employment of the recently released *Educator Role Profile (ERP)* which is geared toward an examination of educator preferences within ELT.

As a collective group, the student teachers in this population showed the most change in the active experimentation learning mode. This leads to the question: is there something about the student teaching experience that would translate to a change in preference for transforming information through active experimentation? It is important to note that while this area indicated the highest amount of change, we did not examine directional changes in learning modes, only that change occurred. The overall mean for active experimentation did experience a decrease from the pre student teaching assessment to the post student teaching assessment, indicating that there may be something in the student teaching process that could lead to decreases in active experimentation and a shift toward reflective observation. This finding warrants additional examination.

Concrete experience was not only the learning mode exhibiting the smallest amount of change (M = 6.03), but also had the smallest standard deviation (SD = 5.31). This finding leads us to suggest that for this population, preference for concrete experience was more stable than the

other three learning modes. Further research should be conducted to explore this learning mode and the likelihood of flexibility in this area.

The greatest range related to change in *KLSI* scores was observed in the dimension of transforming experiences, with students exhibiting up to a 32 point shift in learning preference between active experimentation and reflective observation. Less overall change and smaller range of change was found on the grasping experience dimension than the transforming experience dimension. This could be indicative of something during the student teaching experience which facilitates a need for student teachers to adapt the way in which they transform experiences.

Based on the findings of this study, we suggest that the *KLSI* continue to be used as an indicator of student teaching learning preferences, and that more data related to the changes in *KLSI* score during the student teaching experience be examined. Using the *KLSI* as a tool for preparing student teachers could allow teacher educators to better evaluate the changes occurring during the experience. As student teachers become aware of their own learning preferences, they could increase their awareness of the personal changes which occur during their student teaching experience. In addition, understanding the changes occurring in student teaching could prove useful in examining programmatic effectiveness in areas which allow student teachers to develop in the four learning modes of the *KLSI*.

Recommendations

We realize that we have placed much of the credit for this study on the shoulders of the *KLSI*. We also realize that this a limitation to the study which can serve as a call for future research. We recommend further research be conducted using other learning style assessments during the student teaching experience to broaden the literature base in this area. Further, we recommend this study be replicated in different settings. Perhaps there are differences in student teaching experiences based on length of time, time of year (spring or fall), or structure of the student teaching experience (on-campus student teaching block or beginning the semester in the field) that may not be accounted for by using the *KLSI*.

We recommend testing the *KLSI* as a means to more effectively place student teachers with cooperating teachers during the student teaching experience. Further research should focus on using this tool to improve the student teaching experience for student teachers as well as cooperating teachers. This may include further quantitative analyses, longitudinal studies, or even a mixed methods approach to capture qualitative data.

Student teaching has been the capstone experience for teacher education programs since their inception. Documenting high-impact experiences can be difficult. We recommend further study and linkage to HIE practices in higher education to better capture the "high impact" nature of the student teaching experience. This has the potential to strengthen our relationships with stakeholders in agricultural education and generate additional funding for innovative programs that could incentivize student teaching and transform our current student teaching model for future generations.

In practice, this study allows for a glimpse into the multi-faceted changes that may be occurring in preservice agricultural educators. Teacher educators should be mindful of these changes and how change in individual student teachers can be capitalized on for growth in the program and individual student mentorship. Understanding that change for each student teacher may vary lends to the importance of providing an individualized approach to supervising student teachers. By assessing student teachers at the beginning of the semester, university supervisors

could become more aware of the starting point for learning preferences in those they are supervising, praise areas of strength, and monitor areas of weakness. Helping student teachers develop requires an acknowledgement of change during the student teaching semester. The direction, desirability, and factors involved in that change remain unknown. However, understanding that change does occur for many student teachers is a step toward providing guided support to help each student become the best teacher they can be.

References

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice- Hall, Inc.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY: Freeman.

Darling-Hammond, L., & Bransford, J. (Eds.) (2007). *Preparing teachers for a changing world: What teachers should learn and be able to do*. San Francisco, CA: Jossey-Bass.

Deeds, J. P., Flowers, J., & Arrington, L. R. (1991). Cooperating teacher attitudes and opinions regarding agricultural education student teaching expectations and policies. *Journal of Agricultural Education, 32*(2), 2-9. doi: 10.5032/jae.1991.02002

Dewey, J. (1910). *How we think.* Mineola, New York: Dover Publications.

Dunn, R., & Dunn, K. (1989). *Learning style inventory.* Lawrence, KS: Price Systems.

Edwards, M. C., & Briers, G. E. (2001). Cooperating teachers' perceptions of important elements of the student teaching experience: A focus group approach with quantitative follow-up. *Journal of Agricultural Education, 42*(3), 31-42. doi: 10.5032/jae.2001.03031

Fleming, N. D. (2001). *Teaching and learning styles: VARK strategies*. Christchurch, New Zealand: N.D. Fleming.

Fraenkel, J. R., Wallen, N. E., & Hyun, H. (2012). *How to design and evaluate research in education*. New York, NY: McGraw-Hill.

Fritz, C. A., & Miller, G. S. (2003). Concerns expressed by student teachers in agriculture. *Journal of Agricultural Education, 44*(3), 47-53. doi: 10.5032/jae.2003.03047

Gregorc, A. F. (1979). *Learning/teaching styles: Their nature and effects*. NASSP Monograph, (October/November), 19–26.

Harlin, J. F., Edwards, M. C., & Briers, G. E. (2002). A comparison of student teachers' perceptions of important elements of the student teaching experience before and after an 11 week field experience. *Journal of Agricultural Education, 4*3(3), 72-83. doi: 10.5032/jae.2002.03072

Harlin, J. F., Roberts, T. G., Briers, G. E., Mowen, D. L., & Edgar, D. W. (2007). A longitudinal examination of teaching efficacy of agricultural science student teachers at four different institutions. *Journal of Agricultural Education, 48*(3), 78-90. doi: 10.5032/jae.2007.03078

Joplin, L. (1981). On defining experiential education. *Journal of Experiential Education, 4*(1), 17-20.

Kitchel, T. (2006). Perceived differences, by gender, in student teacher-cooperating teacher interactions. *Journal of Southern Agricultural Education Research, 56*(1), 62-75.

Kitchel, T., & Torres, R. M. (2006). The influence of personality type on the extent cooperating teachers provide psychosocial influence to student teachers. *Journal of Agricultural Education, 47*(4), 134-144. doi: 10.5032/jae.2006.04134

Kitchel, T., & Torres, R. M. (2007). Possible Factors in Matching Student Teachers with Cooperating Teachers. *Journal of Agricultural Education, 48*(3), 13-24. doi: 10.5032/jae.2007.03013

Knobloch, N. A. (2006). Exploring relationships of teacher's sense of efficacy in two student teaching programs. *Journal of Agricultural Education, 47*(2), 36-47. doi: 10.5032/jae.2006.02036

Knobloch, N. A., & Whittington, M. S. (2002). Novice teachers' perceptions of support, teacher preparation quality, and student teaching experience related to teacher efficacy. *Journal of Vocational Education Research, 27*(3), 331-341.

Kolb D. (1984). *Experiential learning as the science of learning and development.* Englewood Cliffs, NJ; Prentice Hall.

Kolb, D. A. (2015). *Experiential learning: Experience as the source of learning and development* (2nd Ed.). Upper Saddle River, NJ: Pearson Education, Inc.

Kolb, A. Y., & Kolb, D. A. (2005a). *The Kolb Learning Style Inventory version 3.1 2005 technical specifications.* Philadelphia, PA: HayGroup. Retrieved from http://learningfromexperience.com/media/2010/08/tech_spec_lsi.pdf

Kolb, A. Y., & Kolb, D. A. (2005b). Learning styles and learning spaces: Enhancing experiential learning in higher education. *Academy of Management Learning & Education, 4*(2), 193-212.

Kolb, A. Y., & Kolb, D. A. (2009). The learning way meta-cognitive aspects of experiential learning. *Simulation & Gaming, 40*(3), 297-327. doi: 10.1177/1046878108325713

Kolb, A. Y., & Kolb, D. A. (2013). *Kolb Learning Style Inventory workbook version 3.2.* Philadelphia, PA: HayGroup.

Kuh, G.D. 2008. *High impact educational practices: What they are, who has access to them and why they matter.* Washington, DC: Association of American Colleges and Universities

McGhee, M. B., & Cheek, J. G. (1990). Assessment of the preparation and career patterns of agricultural education graduates, 1975-1985. *Journal of Agricultural Education, 31*(2), 17-22. doi: 10.5032/jae.1990.02017

McKim, B. R., Latham, L., Treptow, E., & Rayfield, J. (2013). A repeated measures study of the short-term influences of high-impact practices on college students' learning styles. *NACTA Journal, 57*(3a), 122. doi: 1445180908

Myers, B. E., & Dyer, J. E. (2004). Agriculture teacher education programs: A synthesis of the literature. *Journal of Agricultural Education, 45*(3), 44-52. doi: 10.5032/jae.2004.03044

Pashler, H., McDaniel, M., Rohrer, D., & Bjork, R. (2008). Learning styles concepts and evidence. *Psychological Science in the Public Interest, 9*(3), 105-119.

Roberts, T. G. (2006). Developing a model of cooperating teacher effectiveness. *Journal of Agricultural Education, 47*(3), 1-22. doi: 10.5032/jae.2006.03001

Roberts, T. G., Mowen, D. L., Edgar, D. W., Harlin, J. F., & Briers, G. E. (2007). Relationships between personality type and teaching efficacy of student teachers. *Journal of Agricultural Education, 48*(2), 92-102. doi: 10.5032/jae.2007.02092

Rudd, R., Baker, M., & Hoover, T. (2000). Undergraduate agriculture student learning styles and critical thinking abilities: Is there a relationship?. *Journal of Agricultural Education, 41*(3), 2-12. doi: 10.5032/jae.2000.03002

Smith, K. L., McKibben, J. D., & Rayfield, J. (2015, September). *The relationship status is complicated: A qualitative examination of thoughts on the student teacher/cooperating teacher relationship from both perspectives*. Paper presented at the Western Region meeting of the American Association for Agricultural Education, Corvalis, Oregon.

Sousa, D. A. (2011). *How the brain learns.* Thousand Oaks, CA: Corwin Press.

Stripling, C., Ricketts, J. C., Roberts, T. G., & Harlin, J. F. (2008). Pre-service Agricultural Education Teachers' Sense of Teaching Self-Efficacy. *Journal of Agricultural Education, 49*(4), 120-135. doi: 10.5032/jae.2008.04120

Thobega, M., & Miller, G. (2007). Supervisory Behaviors of Cooperating Agricultural Education Teachers. *Journal of Agricultural Education, 48*(1), 64-74. doi: 10.5032/jae.2007.01064

Whittington, M. S., McConnell, E., & Knobloch, N. A. (2006). Teacher efficacy of novice teachers in agricultural education in Ohio at the end of the school year. *Journal of Agricultural Education, 47*(4), 26-39. doi: 10.5032/jae.2006.04026

Whittington, M. S., & Raven, M. F. (1995). Learning and teaching styles of student teachers in the northwest. *Journal of Agricultural Education, 36*(2), 10-17. doi: 10.5032/jae.1995.02010

Young, R. B., & Edwards, M. C. (2005). A profile of cooperating teachers and centers in Oklahoma: Implications for the student teaching experience in agricultural education. *Journal of Southern Agricultural Education Research, 55*(1), 60-73.