Learning Style, Preparation Techniques, and Success of Secondary Students Participating in a Nursery/Landscape Career Development Event

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ABSTRACT

The purpose of this study was to determine if a relationship existed between self-perceived learning styles of selected students and preparation techniques and success in Career Development Events (CDE). A tutorial website was developed to assist secondary Agricultural Science teachers and their students in preparing for the 2002 Texas Nursery/Landscape Career Development Event. Data were gathered using the Ways of Knowing Learning Style Inventory. Participants were self-selected for the survey based on their participation in a Nursery/Landscape CDE and their use of the CDE website tutorial. Most participants in the Nursery/Landscape CDE were white females aged 16-18. Regardless of gender, the most widely used training method for the CDE was videos/slides, followed closely by greenhouse/garden centers. Most had not used the CDE website tutorial. Frequencies indicated that males utilized the website tutorial to a greater extent than females, and yielded higher individual scores in the CDE than females. Most participants who used the website tutorial accessed the site from a school computer. The majority of participants were Concrete Active learners; however, participants who abstractly perceived learning performed better overall in the Nursery/ Landscape CDE.

KEYWORDS: Agricultural Education, Learning Styles

INTRODUCTION

Educators believe that studying the manner in which individuals learn is at the heart of educational enhancement. Learning style is thought to shape student educational performance (Kolb 1976, Dorsey and Pierson 1984, Cano et al. 1992a, Cano et al. 1992b, Torres and Cano 1994, Cano and Garton 1994, Whittington and Raven 1995, and Garton et al. 1997). Whittington and Raven described learning style as "the predominant and preferred manner in which individuals take in, retain, process, and recall information" (1995, p. 10). Since learning styles impact how effectively individuals learn in certain circumstances, educators should be responsive to cognitive technique variations (Shih and Gamon 2001). Agricultural education researchers (Cano et al. 1992a, Cano et al. 1992b, Cano and Garton 1994, Whittington and Raven 1995) determined the diversity of learning styles for Agriculture Science Teachers as well as preservice Agriculture Science Teachers. It stands to reason that secondary agriculture students are equally

unique individuals with diverse learning styles. To that end, research suggested that learning styles might be an influential component in achieving success at the secondary level as both students and agricultural teachers embrace new technology.

Marrison and Frick (1993) affirmed the dramatic increased use of microcomputers in secondary schools across the nation. They recommended "….computer modules should be used by agricultural education teachers to supplement or replace a portion of traditional classroom instruction" (p. 37). Meeting the needs and goals of these students in the 21st century was an essential commitment of the Agriculture Science Teacher. Web-enhanced instruction was a viable means of promoting active learning. Such innovative approaches allowed the opportunity to individualize instruction to accommodate differences in educational goals, abilities, and learning styles. Another appeal of web-enhanced instruction was the convenience of accessing information at any time and from any place.

The model for Agricultural Science stressed the importance of classroom and laboratory instruction along with application through Supervised Agricultural Experience (SAE), incentives and FFA. These students were expected to participate in Career Development Events (CDE) to enhance learning. The importance of competition for students as a learning tool and the impact competition had on student self-esteem was generally held.

In 2002, Texas had 1460 Agriculture Science Teachers with over 100,000 students and 56,000 FFA members (Texas FFA background and info. n.d.). Traditionally, secondary agriculture students competing in the Nursery/Landscape CDE had prepared using live greenhouse plants, reference texts, and previous contest materials. While use of the Internet in Agriculture instruction at the secondary level had rapidly increased, it was still a relatively new practice. Research indicated students were more successful in classes if teachers used a variety of methods to address the different learning styles of students. However little research was found relating the impact of students' learning styles and students' preferred preparation techniques for Career Development Events. Therefore, a need existed to determine if learning styles and preparation techniques influenced success in a Career Development Event.

The purpose of this study was to determine if a relationship existed between self-perceived learning styles of selected students and preparation techniques and success in Career Development Events.

MATERIALS AND METHODS

Website tutorial. A tutorial website was developed to assist secondary Agricultural Science teachers and their students in preparing for the Nursery/Landscape CDE. The website tutorial included photographs of the 100 plants in the identification portion of the CDE, categorized by common and scientific name. Additionally, the website included the 200 questions from which the State CDE exam was taken; the answer key; a class of four landscape designs with accompanying site analysis, family profile, placing and justification. A link to the website was posted on the SWT Agriculture Department website: www.swt.edu/agriculture. Information regarding the website was made available to Texas Agricultural Science teachers via a postcard mailing and electronic mail. Additionally, information about and access to the site was available via links from the Texas FFA website as well as the unified CDE registration website for the state. The use of the materials as primary or supplemental study aids was left to the discretion of each participating Agriculture Science teacher or student.

Instrument. The Ways of Knowing Learning Style Inventory (Pierson and Frost, 1992) was used for the study. The inventory is a self-description survey, on which respondents rank four words in nine different items, based on their perceptions of the primary way they learn. Figure 1 provides an overview of the learning style categories. A section was added to the instrument to elicit responses from respondents regarding selected demographic information and use of the website as a study aid. The developers of The Ways of Knowing instrument report a reliability of 0.90 (Dorsey and Pierson 1984, Pierson and Frost 1992).

Concrete Active (CA) • Left brain preference and emphasizes concreteness and activeness • Likes to do things and will take risks. • Works well with people • Becomes aware through the senses and is extroverted • Generally employed in business-related occupations	**Abstract Reflective (AR)** • Right brain preference and emphasizes abstractness and reflectiveness • Likes to create theoretical models • Uses inductive reasoning to solve problems • Theory-oriented • Becomes aware through intuition and is introverted • Generally employed in science-related occupations
Concrete Reflective (CR) • Right brain preference and emphasizes concreteness and reflectiveness • Likes to create and has great imaginative ability • People-oriented and emotional • Becomes aware through the senses and is introverted • Generally employed in service-related occupations	**Abstract Active (AA)** • Left brain preference and emphasizes abstractness and activeness • Likes to make practical applications • Uses deductive reasoning to solve problems • Thing-oriented and not emotional • Becomes aware through intuition and is extroverted • Generally employed in technical-related occupations

Figure 1. Characteristics of learning style types as defined in the Ways of Knowing Learning Style Inventory (Pierson and Frost 1992).

Population. The target population was all students in Texas training for the 2002 Nursery/Landscape CDE. A sample representing the population was chosen from the students attending the SWT Invitational CDE in March 2002. The SWT Invitational CDE has historically drawn participants from across the state of Texas who were preparing for the Texas Nursery/Landscape CDE.

Method. The researchers provided the survey instrument to respondents during a rotational down period of the CDE. At the time voluntary completion of the instrument

was requested, instructions were given and confidentiality was assured. Students who had not used the website were assigned to the control group, while students who had used the website, regardless of frequency, were assigned to the treatment group. The data were analyzed using the Statistical Package for the Social Sciences (SPSS) for Windows Release 10.0 (SPSS 1999). Statistical procedures included descriptive statistics, frequencies and analysis of variance.

RESULTS

Sixty responses were gathered of which 45 were female and 15 were male (Table 1). Demographic information indicated that the CDE participants included approximately equal numbers of fifteen through eighteen year olds. The overwhelming majority of respondents were Caucasian, although Native American, African American, and Hispanic responses were also reported (1, 1, and 10, respectively). This level of response was adequate for supplying ideas for the given population, but was not intended for generalizations to other populations.

When asked about training methods, regardless of gender, the most widely used training method for the SWT Nursery/Landscape CDE was videos/slides, followed closely by greenhouse/garden centers (Table 1). Most had not used the SWT CDE website tutorial. Videos and slides were used by 55 (92%) of the contestants, while 50 (83%) indicated training at a greenhouse or garden center. Contestants also reported using textbooks (52%) and living laboratories (10%). However, only eighteen (30%) reported using the SWT CDE website.

Table 1. Number of male and female survey participants indicating various training methods used to prepare for the Southwest Texas State University Career Development Event.

Characteristic	Female	Male	Total
Training Methods			
Greenhouse/Garden Center	36	14	50 [a]
Videos/Slides	41	14	55 [a]
Textbooks	24	7	31 [a]
Living Laboratory	2	4	6 [a]
SWT CDE Website	12	6	18 [a]

[a] More than one training method was reported

The majority of both female (73.3%) and male (60.0%) respondents indicated they had not used the SWT website in preparation for the CDE (Table 2). However, 18 of the 60 contestants reported they had used the website, with none reporting having visited the site more than 10 times. Although a larger percentage of males (40%) than females (27%) reported using the website, the difference was not statistically significant ($p = 0.905$). Respondents were asked to note the access location and frequency of use of the Southwest Texas State University CDE website (Table 3). A greater percentage of both females and males (15.6% and 20.0%, respectively) reported accessing the website from school.

Table 2. Frequency and percentages of reported website use of male and female survey participants at the Southwest Texas State University Career Development Event.

	Female		Male		Total	
No. of Uses	Freq.	%	Freq.	%	Freq.	%
0	33	73.3	9	60.0	42	70.0
1-5	10	22.3	6	40.0	16	26.6
6-10	2	4.4	0	0.0	2	3.4

Table 3. Frequency and percentages of reported website access locations of male and female survey participants at the Southwest Texas State University Career Development Event.

	Female		Male		Total	
Location	Freq.	%	Freq.	%	Freq.	%
Home	1	2.2	2	13.3	3	5.0
School	7	15.6	3	20.0	10	16.7
Both Home and School	4	8.9	1	6.7	5	8.3
No Access	33	73.3	9	60.0	42	70.0

A majority of both female (55.6%) and male (53.3%) respondents were discovered to be Concrete-Active learners based on the way they completed the Ways of Knowing instrument (Table 4). A vast majority of the respondents preferred to actively process information, while only 20 percent indicated they were more reflective in their processing style. More female respondents perceived information concretely than abstractly. Male respondents were fairly evenly split regarding the way they perceived information for learning.

Table 4. Frequency and percentages of learning style types of male and female survey participants at the Southwest Texas State University Career Development Event.

	Female		Male		Total	
Learning Style	Freq.	%	Freq.	%	Freq.	%
Concrete Active (CA)	25	55.6	7	46.7	32	53.3
Concrete Reflective (CR)	6	13.3	0	0.0	6	10.0
Abstract Reflective (AR)	3	6.7	3	20.0	6	10.0
Abstract Active (AA)	11	24.4	5	33.3	16	26.7

When comparisons were made between the CDE scores of males and females, a statistically significant difference was found (Table 5). The maximum possible individual score for the Nursery/Landscape CDE was 900. The mean score for the male participants was almost 100 points higher than the mean score for the female respondents (514 and 418, respectively).

Table 5. Results of an analysis of variance comparing male and female survey respondents to Southwest Texas State University Career Development scores.

Gender	N	Mean Score	SD	df	F	p
Female	45	418.04[a]	122.735	1	5.409	0.006**
Male	15	514.07[a]	159.102			

[a] Scores range from 0 to 900 with higher numbers indicating more positive scores.
**$p<0.01$

When looking at the frequencies of participants' use of the website, broken out by learning style, the Concrete Active and the Abstract Active learners, the most common styles in this study, appeared to have used the website most (Table 6). However, an analysis of variance revealed no statistically significant difference ($p = 0.27$) between the four learning styles and use of the website. Interestingly, the Abstract Active learners were the most evenly split group between website use and website non-use.

Table 6. Frequency and percentages of learning style types of survey participants and the use of the Southwest Texas State University Career Development Event training website.

	Website Use		No Website Use	
Learning Style	Frequency	Percentage	Frequency	Percentage
Concrete Active (CA)	8	25.0	24	75.0
Concrete Reflective (CR)	1	16.7	5	83.3
Abstract Reflective (AR)	2	33.3	4	66.7
Abstract Active (AA)	7	43.8	9	56.2

A multivariate analysis of variance revealed statistically significant differences in comparisons of respondents' different learning styles and the individual CDE scores (Table 7). Individuals who reported AR and AA, indicating an abstract learning style, scored on average over 100 points higher at the contest, compared to CR or CA, indicating concrete learning styles. The group of students with abstract reflective learning styles had the highest individual mean scores, while the group of students with concrete reflective learning styles had the lowest individual mean scores.

Table 7. Results of an analysis of variance comparing different learning styles of respondents to Southwest Texas State University Career Development scores.

Self-Perceived Learning Style	N	Mean Score	SD	df	F	p
Concrete Active (CA)	32	397.75	101.906	3	2.961	.040*
Concrete Reflective (CR)	6	389.67	137.609			
Abstract Reflective (AR)	6	535.67	168.985			
Abstract Active (AA)	16	515.19	151.461			

Note. Scores range from 0 to 900 with higher numbers indicating more positive scores.
*$p<0.05$

CONCLUSIONS

Past research indicated agriculture students were more likely to be Concrete Active learners. This held true for the participants in this study. Agricultural education researchers have stressed the importance of addressing the way agriculture students perceive information, however it may be just as important to address the way agricultural students process information. Since the overwhelming majority of FFA members participating in the study were Active in the way they process information, teachers and coaches should let students try out new ideas as active participants in the learning process.

Using computers with Internet capability, participants were able to access the SWT CDE website tutorial from home as well as school. Availability of such resources should provide additional impetus for secondary Agricultural Science Teachers to incorporate technology in their teaching. Students will be more likely to use such learning aids at home if they were introduced to them in a school setting. Furthermore it allows the Agriculture Science Teacher to, in effect, go home with each student for the purpose of extending and reinforcing learning and preparing for Career Development Events.

Although this study pointed to a group of participants with a certain learning style as having more success in a Career Development Event, the researchers stress it was not their intent to indicate Agricultural Science Teachers should select teams based on

learning styles in order to win contests. On the contrary, it is the contention of these researchers that all students can be successful in Career Development Events. Teachers can better prepare their students by addressing the preferred learning style and providing learning opportunities to complement a student's preferred style.

In the SWT Nursery/Landscape CDE, the Abstract Reflective learners scored highest. The nature of the CDE requires analysis and judgments with limited artistic expression. It would be interesting to replicate the study with participants in a Floriculture CDE where the artistic expression is a larger component of the scoring. Additional research is also necessary to investigate relationships of team members with different learning styles. The researchers plan a follow-up study with a larger population to assess the impact of learning style on the use of the CDE website tutorial as a training aid.

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