

## **A Brief Research Report: Thinking Styles of Online Distance Education Students**

**Aaron S. Richmond**  
*Metropolitan State College of Denver*

**H. Mark Krank**  
*University of Montana - Western*

**Rhoda Cummings**  
*University of Nevada - Reno*

This study evaluates the distribution of thinking styles in online distance education courses. One hundred and sixty undergraduate students from three universities enrolled in online distance education courses were administered the Sternberg-Wagner Thinking Styles Inventory (Sternberg, 1997). Results indicated a disproportionate number of Legislative and Hierarchic thinkers in online distance education courses. Based on these findings, suggestions for online course development and design are discussed.

Keywords: Distance Education, Thinking Styles, Online Education

Due to an acute concern regarding the use of distance education modalities, Maddux, Ewing-Taylor, and Johnson (2002) discussed the importance of “student adaptation to distance education and the impact on instructional design, instructional methods, and student learning styles in internet-based community college courses” (p. 1). Thiele (2003) carried this concern one-step further by suggesting that since there appears to be an ever-increasing number of courses being offered in a purely online setting, the need to assess the quality and effectiveness of online learning and learner outcomes is imperative. Considering these two statements of concern, the purpose of this study was to investigate how students thinking styles are distributed among online distance education courses.

Simpson and Du (2004) investigated the effect of learning styles and online courses. They found that learning style significantly affects students’ perceptions of class enjoyment. However,

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*Aaron S. Richmond is an Assistant Professor of Educational Psychology at Metropolitan State College of Denver, H. Mark Krank is a Full Professor of Psychology and Education at the University of Montana – Western, Rhoda Cummings is a Full Professor of Educational Psychology at the University of Nevada – Reno. Please send all correspondence to Dr. Richmond at the Metropolitan State College of Denver, Department of Psychology, Campus Box 54, P.O. Box 173362, Denver, CO 80217-3362, e-mail arichmo3@mscd.edu.*

Simpson and Du did not investigate whether there were higher frequencies of a given learning style enrolled in their courses. Richmond and Liu (2005) studied the distribution of Kolb's (1984) learning styles of pre-service education majors in both traditional and online courses. Richmond and Liu did not find a disproportionate distribution of learning styles type in either traditional or online class format. However, these results were based on the small sample size and thus suspect. Additionally, questions regarding the validity of learning styles as a predictor of behavior within an academic context cast doubt on research relying on that model (Sternberg & Grigorenko, 2001).

### THINKING STYLES

Sternberg (1997) has proposed a theory of thinking styles intended to help illuminate the differences in the way people think. Given the failure of various learning styles theories to predict performance within an academic setting, the robustness of Sternberg's theory could prove to be a boon for educators. Specifically, Sternberg's theory has the potential to help educators understand those factors beyond abilities that impact student success within a variety of instructional environments.

Sternberg has described 13 separate characteristics and five categories that comprise his theory of thinking styles. *Functions* are the three basic types of thinking styles. *Legislative* people are very independent and decide how to do things on their own. They can be creative and self-supporting. Sternberg (1997) suggests that individuals who exhibit the legislative style tend to prefer writing about short stories while in school or prefer to give orders while on the job. *Executive* individuals like to follow the rules and go along with pre-established systems. *Judicial* people test whether pre-established rules and systems are necessary or valid. They are often critical and question everything. They tend to prefer correcting other people's work or analyzing the plot or themes of a story while in the school setting and while at work they prefer tasks such as interviewing job candidates and evaluating a business plan (Sternberg, 1997).

*Forms*. Forms are the general way in which we approach our environment and the problems that the environment presents and come in four different modes (e.g., monarchic, hierarchic, oligarchic, and anarchic). The *Monarchic* "is someone who is single-minded and driven" (Sternberg, 1997, p. 22). These individuals are focused on solving problems. *Hierarchic* individuals set priorities and understand that not all goals can be fulfilled. *Oligarchic* people can multitask but struggle with how to organize their priorities. *Anarchic* individuals are motivated by their specific needs and construct their own systems rather than follow established systems (Sternberg, 1997).

*Levels*. According to Sternberg (1997) levels refer to the medium or amount of engagement individuals prefer in a given activity. For example, people who exhibit the *Global* level, are prone to tackle ill-defined and abstract problems. They are thought to be the dreamers or those who are on "Cloud Nine" (p. 24). *Local* individuals prefer to work on well-defined problems and lose sight of the bigger picture.

*Scope*. Scope is a stylistic variable which divides the individual into two basic personalities; those who prefer to work alone (internal) and those who prefer to work collaboratively (external). *Internal* individuals are introspective and less aware of the outside world. They prefer to work alone on projects rather than in groups and may become anxious when working with many people. *External* people are the opposite, they are "extroverted, outgoing, and people oriented" (p. 25). Thus, they work well in groups and if given the choice will invariably choose to work with others.

*Leanings.* A leaning is another stylistic variable that attempts to determine not their political agenda but to understand personality traits that explain the methods and rules by which people solve problems. Leaning come in two forms (liberal or conservative). *Liberal* people are similar to the Anarchists and Judicial because they question procedures and rules by going beyond them to solve problems. They are willing “to go beyond existing rules and procedures, to maximize change, and to seek situations that are somewhat ambiguous.” (Sternberg, 1997, p. 26). *Conservative* individuals like to follow the rules, “minimize change, [and] avoid ambiguous situations where possible” (p. 26). More often than not, individuals with this leaning prefer a highly structured and predictable environment in which to solve problems. If this environment does not work, Conservative learners will typically either seek out this structured and predictable environment or create it themselves.

### THINKING STYLE RESEARCH

Sternberg and his colleagues have conducted numerous research projects investigating not only the reliability and validity of the Sternberg-Wagner Thinking Styles Inventory, but also its application. He has investigated the thinking styles of teachers and found that thinking styles were related to specific teaching characteristics. (Zhang & Sternberg, 2002). In addition, Sternberg and Zhang (2001) conducted nine separate studies on secondary students in both the US and China and found a relationship between student thinking styles and student learning. Specifically they found relationships among student thinking styles and self-esteem, learning approaches, and self-concept. Moreover, Sternberg (1995) over the course of three studies investigated thinking styles of both teachers and students. In these studies, Sternberg found that teachers’ thinking styles were consistent with the global style of their school; however students did not match the global style of the school. In addition, this research paper reported that the students thinking styles tended to coincide with the students’ thinking styles.

In numerous other articles (see Sternberg, 1994a, 1994b; Sternberg & Grigorenko; 1993; 1995) thinking styles have been used and applied to various educational settings. However, none of these articles seek to investigate the distribution of thinking styles in online distance education, nor do any of these articles use the population of online education for any reason at all. Thus, as can be inferred, there is a lack of research addressing thinking styles in online distance education.

### PURPOSE

Within the context of the Maddux, et al. (2002), Thiele (2003), and Richmond and Liu (2005) studies, the following research question was proposed: What is the distribution of Sternberg and Wagner’s thinking styles in students who attend online distance education courses? Clearly, the implications of that distribution for online course design and instruction were of critical concern and the result of this research may alleviate some of the disparity in thinking styles research in online educational setting.

## METHODS

### PARTICIPANTS

To assess Thinking Styles in online distance education, 160 students from two small liberal arts universities and one state university participated in this study. There were 110 women (68.75%) and 50 men (31.25%). Participants were recruited from five separate distance education

classes ranging from freshman level psychology courses to senior level psychology courses. Seven and six-tenths percent of the sample was recruited from general psychology, 20.7% of the sample was recruited from a developmental psychology course, 13% were recruited from an educational psychology course, 25% were recruited from a psychology of learning and memory course, and 33.7% were recruited from a social psychology course. The sample consisted of a wide variety of different majors. Twenty-six percent were social science majors, 18.5% were engineering majors, 16.3% were nursing majors, 9.8% were information technology majors, 9.8% were elementary education majors, 5.4% were secondary education majors, 3.3% were science majors, 2.2% were undecided, and 8.7% reported other. Participants reported they had completed anywhere from 1 to 15 online distanced education courses with an average of 2.1 courses. Participants ranged from freshmen to graduate students with an average of 15.2 years of education (junior college level).

*MEASURES*

There were two measures used in the present study. The first measure was a survey that assessed participant’s demographic information. This measure assessed standard demographic information to accurately describe the participants. The second measure was the Sternberg-Wagner Thinking Styles Inventory (SWTSI) (Sternberg, 1997). For each characteristic (e.g., function: *Legislative*) there were eight questions on a 1-7 point Likert scale with 1 = *Not at All Well* and 7 = *Extremely Well* (see Table 1 for an example question for each characteristic). Thus, for 13 learning style characteristics, there are 104 questions. Scores are then averaged over each characteristic.

*Table 1. Representative Questions for Thinking Styles in the SWTSI*

Thinking Style	Representative Question
<u>Functions</u>	
<i>Legislative</i>	I like to play with my ideas and see how far they go.
<i>Executive</i>	I am careful to use the proper method to solve any problem.
<i>Judicial</i>	I enjoy work that involves analyzing, grading, or comparing things.
<u>Forms</u>	
<i>Monarchic</i>	I use any means to reach my goal.
<i>Hierarchical</i>	I like to set priorities for the things I need to do before I start doing them.
<i>Oligarchic</i>	Usually I do several things at once.
<i>Anarchic</i>	When I have many things to do, I do whatever occurs to me first.
<u>Scope</u>	
<i>Internal</i>	When discussing or writing down ideas, I only like to use my own ideas.
<i>External</i>	I like projects in which I can work together with others.
<u>Levels</u>	
<i>Global</i>	In doing a task, I like to see how what I do fits into the general picture.
<i>Local</i>	I prefer to deal with specific problems rather than with general questions.
<u>Leanings</u>	
<i>Liberal</i>	I like situations where I can try new ways of doing things.
<i>Conservative</i>	I stick to standard rules or ways of doing things.

*Note.* The source of this information is from Sternberg (1997).

## PROCEDURES

All measures were delivered via the internet. Participants completed the questionnaires online and then sent their results to the instructor electronically. The order of measures was counterbalanced as well as the order of the questions in the SWSTI.

## DATA ANALYSIS AND RESULTS

To analyze the research question, a Chi-Square for Goodness of Fit was conducted. For the purposes of classifying participants into style categories, participant's highest score for a given category was chosen to represent that category. For example if someone's scores were Judicial = 4.5, Legislative = 6.2 and Executive = 3.1, they would be categorized as a *Legislative* thinker. This process was performed on all five Thinking Style categories.

*Main analysis.* Results from the Chi-Square analysis are summarized in Table 2. As Table 2 indicates, there is a significant difference in distribution of the Functions and Forms thinking styles but there is no difference in distribution among the Scope, Levels, and Leanings styles.

Table 2. Chi-Square Analysis Summary

Styles	Observed $X^2$	$df$	critical two-tailed $X^2$	$alpha$	Effect Size
Functions	49.85*	2	5.99	.05	.62
Forms	110.70*	3	7.82	.05	.23
Scope	1.225	1	3.84	.05	.008
Levels	3.60	1	3.84	.05	.02
Leanings	0.625	1	3.84	.05	.004

Note. (\*) denotes significant difference in distribution.

Relying on Green et al. (2000), the effect size was calculated using the following equation:  $X^2/(N)(k - 1)$ . For this equation,  $X^2$  is the observed chi-square statistic,  $N$  is the total sample size, and  $k$  is number of categories. Refer to Table 3 for a contingency table of all thinking styles.

Table 3. Contingency Table of Thinking Styles

Categories	Characteristics			
<i>Functions</i>	Legislative	Executive	Judicial	
	86/53.3	60/53.3	14/53.3	
<i>Forms</i>	Monarchic	Hierarchic	Oligarchic	Anarchic
	17/40	97/40	17/40	29/40
<i>Scope</i>	Internal	External		
	73/80	87/80		
<i>Levels</i>	Global	Local		
	68/80	92/80		
<i>Leanings</i>	Liberal	Conservative		
	85/80	75/80		

Note. For each characteristic, there is an observed value and expected values delineated by the slash mark (/). Values to the left are observed and values to the right are expected. Total  $N = 160$  participants.

*Post hoc analysis.* To evaluate the differences between the thinking styles on the functions and forms categories, Haberman (1984) suggested calculating standardized residuals. This statistic allows the researcher to determine which of the categories are major contributors to the overall analysis. Thus, standardized residuals were calculated (see Table 4). The results indicated there were more *Legislative* thinkers than would be expected and fewer *Judicial* thinkers than would be expected in online distance education courses. In the forms category, Table 4 illustrates there were more *Hierarchic* thinkers than would be expected and fewer *Monarchic* and *Oligarchic* thinkers than would be expected in online distance education courses.

*Table 4. Standardized Residuals of Functions & Forms*

Categories	Characteristics			
<i>Functions</i>	Legislative 4.48*	Executive 0.92	Judicial -5.38*	
<i>Forms</i>	Monarchic -3.63*	Hierarchic 9.02*	Oligarchic -3.63*	Anarchic -1.74

*Note.* (\*) denotes standardized residuals are greater than 2.

## DISCUSSION

Based on the results of this study, implications for online instruction and design are both complex and problematic. The results indicated that there is a disproportionate number of both *Hierarchic* and *Legislative* thinkers than would be expected in online distance education courses. While the legislative style tends towards divergent thinking, the hierarchical style tends towards convergent thinking (Sternberg, 1997). While the attributes of the hierarchical style are necessary to succeed in online distance education, the legislative style would potentially put students at-risk within some online formats. For example, many times online classes are self-paced and thus require highly independent self-regulating students. According to Sternberg (1997), the hierarchical thinker would excel in such an environment and the legislative thinker would struggle. The legislative student might be highly independent, but at the same time divergent thinking has the potential for generating considerable off-task behavior absent significant course structure and frequent, corrective feedback.

Though it is impossible to completely overcome online obstacles for the legislative thinker, it is possible to mitigate them. For example, a synchronous format would better support the needs of the legislative thinker than an asynchronous format due to the additional structure of specific time requirements. Additionally, low-tech interventions would include regular telephone conversations between the legislative thinker and the instructor to ensure multi-modal interpersonal interactions. Finally, the structure of the course should include a variety of succinct learning episodes rather than broad, open-ended learning units.

## LIMITATIONS AND FUTURE RESEARCH

Because our goal was to evaluate the distribution of Sternberg’s thinking styles to determine possible instructional designs for online education, we are at the beginning of achieving such a goal. Additional variables of interest include persistence rates and the quality of completed academic outcomes. We wish to collect more data to have a plausible understanding of online students, and then we would like to make more detailed recommendations on how to design classes that enable such students to succeed.

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