# The use of experiential learning styles to predict attrition from a limited-residency information systems graduate program

**Steven R. Terrell,** Nova Southeastern University, terrell@nova.edu

## Abstract

*Due to the expected growth of over 15% in the information systems industry between 2012 and 2022, many individuals desiring to work in academia, or as computer or information research scientists, are returning to graduate school to pursue a doctoral degree in information systems. Because of the need to balance their professional and academic lives, many returning students are electing to attend online or limited-residency programs. While traditional on-campus doctoral programs experience an attrition rate of approximately 50%, the drop-out rate from non-traditional programs may reach as high as 70%. It is higher education's responsibility to ensure that students are offered the best opportunity for success in their educational endeavors by creating learning environments that support the needs of all students. To inform that effort, this study investigated the relationship between doctoral students' experiential learning styles and success in a limited-residency information systems program. The results call for a more thorough investigation of this construct, and others, across disciplines and at different levels of education.*

**Keywords:** Management information systems, experiential learning, graduate education, attrition

## Introduction

A major tenet of digital citizenship is the education of workers to design, develop and use technology quickly and in new manners. As evidence of this, a recent survey by the Bureau of Labor Statistics (2014) reported a median salary of slightly over $100,000 annually for terminally-degreed persons working in the information technology research field. In order to advance their careers, many professionals desiring to earn a Ph.D. elect to attend online or limited-residency programs. Unfortunately, the convenience of programs of this type brings with it a higher attrition rate than that from campus-based universities.

Throughout the years, factors contributing to attrition from graduate school include, among others, a lack of financial support, academic failure and a broad range of reasons including illness, a lack of motivation and family pressures (Bowen & Rudenstein, 1992; Tinto, 1993; Lovitts, 2001; Parker, 2003; Smallwood, 2004; Terrell, 2002, 2005, 2007, Terrell et al., 2012). These issues, combined with a lack of integration into the academic culture and feelings of isolation, lead to attrition rates of up to 70% in programs that are not campus-based. In particular, when discussing attrition from online or limited residency programs, there is little consideration given to personality type, learning style and other constructs which have been shown to contribute to attrition in a traditional environment. The objective of this study was to examine problems with attrition through the lens of Kolb's (1984) work on experiential learning and the management process.

# Experiential Learning

As surprising as it seems, the ability of a student or worker to learn is given limited specific attention in organizations, either corporate or educational. Per Kolb, a perceived fatalism exists in these organizations; a student or employee either learns or does not. Control or motivation to learn is usually limited to encouragement of a student or employee to "do their best". Kolb's experiential learning theory is based on understanding how adults learn, and then designing an educational experience to meet student needs. In doing this, Kolb theorizes four learning strategies:

- Concrete Experience – a preference for learning through personal experience and feelings. This allows for adaptation to open-mindedness and willingness to change in problem solving.
- Abstract Conceptualization – this strategy calls for a learner's reliance on analysis of, and a systematic approach to, the problem at hand. This linear approach often leads to learners refraining from decision-making until they have arrived at a firm intellectual understanding of a given problem.
- Reflective Observation – a reliance on personal feelings and thoughts with emphasis on patience, judgment and an understanding of a problem from divergent viewpoints.
- Active Experimentation – an emphasis on active, "hands on" learning with a focus on different approaches to changing or influencing a learning situation.

Using a specifically designed learning style inventory (Kolb, 1999) learners' preferences for each of the strategies is determined and then paired into two discrete, bipolar scales indicating a learner's preference for Active Experimentation versus Reflective Observation (i.e., the AERO scale) and Abstract Conceptualization versus Concrete Experience (i.e., the ACCE scale). The combination of the scores from the two scales identifies a learner's preferred style – Diverging, Converging, Assimilating or Accommodating (Figure 1).

Figure 1
*Kolb's Learning Styles*

Concrete Experience

| | **Accommodator** | **Diverger** | |
|---|---|---|---|
| Active Experimentation | Leading | Imaginative | Reflective Observation |
| | Risk Taking | Personable | |
| | Adaptable | Problem Identification | |
| | Practical | Innovator | |
| | **Converger** | **Assimilator** | |
| | Problem Solver | Planner | |
| | Decision Maker | Theory Development | |
| | Logical | Patient | |
| | Reasonable | Model maker | |

Abstract Conceptualization

Persons identified as Convergers and Assimilators share a preference for high levels of abstract conceptualization. Convergers also demonstrate a need for active experimentation and prefer to

learn via problem solving, deductive decision-making and the direct application of ideas and theories. Convergers have been described as somewhat unemotional with a preference for working alone. Assimilators, using reflective observation skills, excel in careful planning and problem definition with a preference for theoretical modeling and deductive reasoning. Similar to the Convergers, Assimilators have a preference for working alone with an understanding of abstract concepts.

Persons labeled as Accommodators combine a preference for concrete experience with active experimentation. They are described as having the ability to develop and implement plans via a hands-on approach. Divergers prefer the combination of reflective observation with concrete experience and are considered open-minded with the ability to analyze a problem from divergent viewpoints. Because of this they are often criticized for their inability to identify and react to a learning situation and are labeled as observers rather than participants.

Kolb labeled persons with a preference for accommodating and convergence as demonstrating an Active Experimentation learning style; a combination of accommodation and divergence is indicative of a preference for Concrete Experience. Persons identified as learning best by Reflective Observation prefer assimilation and divergence, with an Abstract Conceptualization learning style combining the preferences of convergers and assimilators. Kolb hypothesized that, due to their learning preferences, persons in the information systems field would generally be labeled as preferring Active Experimentation.

## Background and Problem Statement

As noted earlier, the attrition rate for online and limited residency doctoral programs is significantly higher than similar campus-based programs. Given the financial and temporal problems this represents, an investigation of ways by which attrition can be lessened was called for. Because each of the learning styles identified by Kolb may lead to success or failure in a specific learning environment (Terrell, 2005), the decision was made to investigate the relationship between attrition and each of the four styles in a limited-residency information systems doctoral program. Students in the program represent a broad array of management information systems professionals from the public and private sectors, younger employees desiring to move to a higher echelon in the information systems field, and educators from information systems academic programs.

The students at the university chosen for this study typically complete four semesters of coursework by combining online classes with two three-day meetings on campus during each term. Following completion of the coursework, they are then given up to five years to complete their dissertation. Given the program and format, in alignment with Kolb's theory, it was felt that students favoring an Active Experimentation learning style would complete the program at rates significantly higher than students with other learning preferences.

## Research Questions

This study is driven by four research questions:

1. Do doctoral students in a limited residency information systems doctoral program fall into the predicted Accommodator and Converger learning styles categories?
2. Do doctoral students in a limited residency information systems doctoral program fall into the hypothesized Active Experimentation (i.e., a combination of Accommodator and Converger learning styles) category?
3. Is learning style a predictor of attrition from a limited-residency information systems doctoral program?
4. Are demographic characteristics (e.g., gender and minority status) predictors of attrition from a limited-residency information systems doctoral program?

## Methodology

The university where the study was conducted is interested in developing online learning environments that best support the needs of students, with an ultimate goal of increasing both achievement and the overall graduation rate. In order to better understand personality, learning and social constructs that may affect success in such an environment, 56 students in one faculty member's classes completed a battery of assessments:

- The *Kolb Learning Style Inventory* (Kolb, 1999).
- The *Myers-Briggs Type Indicator* (Myers & Myers, 1995).
- The *State-Trait Anxiety Inventory* (Spielberger, 2012).
- The *Nowicki-Strickland Locus of Control Scale* (Nowicki & Duke, 1974).

Due to its' direct measure of the construct being investigated, the *Kolb Learning Style Inventory* was chosen to investigate the relationship between learning style and attrition.

## Data Analysis and Interpretation

In order to answer the research questions, descriptive statistics were computed and chi-square analyses interpreted to determine if significant differences existed between the groups.

### Research Questions One, Two and Three

As seen in Table 1, the majority of students in the information systems program were labeled as Accommodators or Convergers ($n = 33$; 59.0%); there is no significant difference in attrition between learning styles ($x^2(3, N = 56) = 1.756, p = .625$). Thirty-three (58.9%) of the students demonstrated an Active Experimentation preference (Table 2). There was no significant difference in attrition between learning preferences ($x^2(1, N = 56) = .394, p = .530$)

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Table 1
*Graduation Status by Learning Style*

| | | | Graduate | | Total |
|---|---|---|---|---|---|
| | | | No | Yes | |
| | Diverger | Count | 2 | 4 | 6 |
| | | % within Learning Style | 33.3% | 66.7% | 100.0% |
| | | % within Graduate | 6.3% | 16.7% | 10.7% |
| | | % of Total | 3.6% | 7.1% | 10.7% |
| | Accomodator | Count | 6 | 3 | 9 |
| | | % within Learning Style | 66.7% | 33.3% | 100.0% |
| | | % within Graduate | 18.8% | 12.5% | 16.0% |
| | | % of Total | 10.7% | 5.4% | 16.1% |
| | Converger | Count | 14 | 10 | 24 |
| | | % within Learning Style | 58.3% | 41.7% | 100.0% |
| | | % within Graduate | 43.8% | 41.7% | 42.9% |
| | | % of Total | 25.0% | 17.9% | 42.9% |
| | Assimilator | Count | 10 | 7 | 17 |
| | | % within Learning Style | 58.8% | 41.2% | 100.0% |
| | | % within Graduate | 31.3% | 29.2% | 30.4% |
| | | % of Total | 17.9% | 12.5% | 30.4% |
| Total | | Count | 32 | 24 | 56 |
| | | % within Learning Style | 57.1% | 42.9% | 100.0% |
| | | % within Graduate | 100.0% | 100.0% | 100.0% |
| | | % of Total | 57.1% | 42.9% | 100.0% |

Table 2
*Preference for Active Experimentation*

| | | | Graduate | | Total |
|---|---|---|---|---|---|
| | | | No | Yes | |
| | Active Experimentation | Count | 20 | 13 | 33 |
| | | % within Preference | 60.6% | 39.4% | 100.0% |
| | | % within Graduate | 62.5% | 54.2% | 58.9% |
| | | % of Total | 35.7% | 23.2% | 58.9% |
| | Other | Count | 12 | 11 | 23 |
| | | % within Preference | 52.2% | 47.8% | 100.0% |
| | | % within Graduate | 37.5% | 45.8% | 41.1% |
| | | % of Total | 21.4% | 19.6% | 41.1% |
| Total | | Count | 32 | 24 | 56 |
| | | % within Preference | 57.1% | 42.9% | 100.0% |
| | | % within Graduate | 100.0% | 100.0% | 100.0% |
| | | % of Total | 57.1% | 42.9% | 100.0% |

## Research Question Four

The vast majority of students in the study were male ($n$=46, 82.1%) (Table 3). While a larger percentage of females graduated, (i.e., 60%) than males (i.e. 39.1%), these differences were not significant ($x^2(1, N = 56) = 1.461, p = .227$). Thirty-five students (62.5%) self-identified as being non-Hispanic white; of these 15 (42.9%) graduated from the program (Table 4). Students describing themselves as belonging to a minority group ($n$=21, 37.5%) maintained an identical graduation rate indicating no significant difference in attrition rates ($x^2(1, N = 56) = .000, p = 1.000$)

Table 3
*Graduation Rate by Gender*

|  |  |  | Graduate | | |
|---|---|---|---|---|---|
|  |  |  | No | Yes | Total |
| Gender | Female | Count | 4 | 6 | 10 |
|  |  | % within Gender | 40.0% | 60.0% | 100.0% |
|  |  | % within Graduate | 12.5% | 25.0% | 17.9% |
|  |  | % of Total | 7.1% | 10.7% | 17.9% |
|  | Male | Count | 28 | 18 | 46 |
|  |  | % within Gender | 60.9% | 39.1% | 100.0% |
|  |  | % within Graduate | 87.5% | 75.0% | 82.1% |
|  |  | % of Total | 50.0% | 32.1% | 82.1% |
| Total |  | Count | 32 | 24 | 56 |
|  |  | % within Gender | 57.1% | 42.9% | 100.0% |
|  |  | % within Graduate | 100.0% | 100.0% | 100.0% |
|  |  | % of Total | 57.1% | 42.9% | 100.0% |

Table 4

*Graduation Rate by Ethnicity*

| | | | Graduate | | |
| --- | --- | --- | --- | --- | --- |
| | | | No | Yes | Total |
| Minority Status | Minority | Count | 12 | 9 | 21 |
| | | % within Minority Status | 57.1% | 42.9% | 100.0% |
| | | % within Graduate | 37.5% | 37.5% | 37.5% |
| | | % of Total | 21.4% | 16.1% | 37.5% |
| | Non-Hispanic White | Count | 20 | 15 | 35 |
| | | % within Minority Status | 57.1% | 42.9% | 100.0% |
| | | % within Graduate | 62.5% | 62.5% | 62.5% |
| | | % of Total | 35.7% | 26.8% | 62.5% |
| Total | | Count | 32 | 24 | 56 |
| | | % within Minority Status | 57.1% | 42.9% | 100.0% |
| | | % within Graduate | 100.0% | 100.0% | 100.0% |
| | | % of Total | 57.1% | 42.9% | 100.0% |

# Results and Discussion

As expected, students in the doctoral information systems program preferred an Accommodator or Converger learning style; these combined to indicate a preference for Active Experimentation. Despite that, no significant differences in attrition were seen between learning style, learning preference, gender and ethnicity in the program. Because of that, care should be taken when attempting to generalize the results of this study to other institutions of higher learning, course delivery methods, academic majors or students with different demographic characteristics.

Other factors should be considered when interpreting these results.  First, as noted by the author (2005), in an investigation of students from other doctoral programs within the same institution, the demographic characteristics of these students should be taken into consideration.   The average age of the students in this study was 42, and most were married professionals with full-time jobs; each of these factors has been shown to affect achievement in graduate school.

Second, a key indicator of success towards any educational or professional goal is a person's level of intrinsic motivation.  As noted, students in the students also completed the *Nowicki-Strickland Locus of Control* survey (Nowicki & Duke, 1974).  Scores on this instrument, which range from zero to 40, are highly correlated to levels of intrinsic motivation. Lower scores on the survey indicate high levels of intrinsic motivation; higher scores indicate a preference for extrinsic motivation.  Scores for the participants in this study averaged 8.9 indicating a relatively high degree of intrinsic motivation; this may have allowed them to overcome any negative issues

caused by incongruence between their preferred learning style and the limited-residence environment.

Finally, a small number of representative cases in the Diverger and Accommodator categories may have led to spurious results. A non-parametric reexamination of the data, however, did support the initial findings. Similar results with students in another limited-residency doctoral program within the school support this conclusion.

## Suggestions for Future Research

As noted, the growth of online and limited residency university programs is tremendous and it is in the best interests of both the institutions and students to investigate ways that high levels of attrition can be addressed.

First, in this case, a limited-residency doctoral program was the focus of this study; consideration should be given to similar studies at undergraduate, masters, and other adult education institutions. It is possible that the results of this study could be compared, across institutions, to determine if there are common issues that might be addressed with the development of specific tools and practices to support different learning styles.

As noted by the author in a prior study (2007), consideration must be given to the possibility of a change in preferred learning style over time. Students in this study completed the learning style inventory at the beginning their doctoral coursework; no consideration was given to the possibility that a given student's learning preferences might change in order to compensate and adapt to the limited-residency format.

Finally, it was suggested in prior studies by the author that *post-hoc* data collection and analysis be conducted. Since that point, research has been conducted wherein students who had left the program were interviewed with the results presented in a grounded theory (Terrell et al, 2012). These results indicated that a lack of connectivity with the university and faculty is a key indicator of success or failure. It is therefore imperative that institutions ensure that policies and procedures are in place, and enforced, that support interaction between students and faculty.

## Conclusion

The need for professionals with doctoral degrees in information systems is tremendous and expected to grow by over 15% between 2012 and 2022. It is expected that the high demand, and perceived short supply, of these professionals is expected to lead to mid-career salaries of over $100,000 annually. Colleges and universities are called upon to develop new and different approaches to instruction. While this research has indicated that learning style may not be a consideration in doctoral level limited-residency programs, it opens the doors for similar research at other levels, as well as the investigation of other constructs that may affect the learning process. Understanding what can best support the needs of our faculty and students is imperative in order to meet the needs of industry and our economy.

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## Biography

**Dr. Steve Terrell** is a Professor in the Graduate School of Computer and Information Sciences at Nova Southeastern University where he teaches quantitative and qualitative research methods. His Ph.D. is in Higher Education with Masters in Counseling and Business.  He is the author of *Statistics Translated: A Step By Step Guide to Analyzing and Interpreting Data*, as well as over 100 journal articles and presentations focusing primarily on student motivation and attrition.  Dr. Terrell is active in the American Psychological Association, the American Counseling Association and recently finished serving as the President of the American Educational Research Association's Online Teaching and Learning Special Interest Group.