

Theories of Student Success:  
Evaluating the Effectiveness of an Intervention Strategy

Kenneth D. Royal, Ph.D.  
*University of Kentucky*

Alison J. Tabor, Ph.D.  
*Georgetown College*

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Many first and second year college students experience disappointing academic performance, frequently putting them at risk of academic probation. The institution in which this study was implemented places a student on academic probation when the grade point average (GPA) drops below a 2.0 or the student experiences two consecutive academic semesters with GPAs below 2.0, regardless of the overall GPA. Since these circumstances negatively influence student persistence, institutions have commonly developed various interventions to address student attrition. In this case, students placed on probation are contacted by the University and offered the opportunity to enroll in a three-credit hour course, *Theories of Student Success* (TSS). This study evaluates the effectiveness of the TSS intervention strategy.

Existing literature pertaining to interventions addressing student attrition and retention in higher education is quite extensive. Some of the more common interventions include: peer mentoring (Terrion and Leonard, 2007), curriculum development (Taylor, 2005; Sauer and O'Donnell, 2006), one-on-one counseling with student development advisors and/or faculty (Kadar, 2001; McArthur, 2005; Bishop, 2006), seminars for first year students (Raymondo, 2003), and a variety of programs intended to integrate students academically and socially within the contexts of the institution; most of which are commonly based on Tinto's model of academic and social integration (Tinto, 1975; 1982; 1993). However, the body of literature pertaining to these interventions focuses primarily on the need and rationale for such practices much more than the evaluation of them.

There is a growing call to incorporate institutional research (IR) as a means of accountability of and support for retention and academic success (St. John, 2006; Hossler, Kuh, and Olsen, 2001). Hossler, Kuh, and Olsen (2001) utilized institutional research to supplement literature guided efforts in developing strategies to better prepare first year students for academic success at Indiana University Bloomington. St. John (2006) argues that institutional research can provide much needed accountability, strengthening educational policies and programs.

Therefore, while this paper adds to existing empirical research pertaining to retention and success of first year students, it also uses IR to assess the effectiveness of a program implemented as an intervention strategy addressing student attrition. Additionally, the project makes a methodological contribution with the use of the Rasch measurement model for analysis, as this model provides more reliable analysis than traditional analytical models (Bradley and Sampson, 2005; Royal, 2008).

### *Intervention Strategy and Purpose*

*Theories of Student Success* (TSS), a 3 credit-hour graded course designed for undergraduate students interested in increasing their knowledge of academic life and improving their ability to achieve academic success is offered to first year students on academic probation. The objective of the course is to introduce and/or strengthen the understanding of higher education to students who are on academic probation. Several essential elements of academia are emphasized, including theories of student development, the sociology and history of higher education, and the organizational structure of post-secondary institutions. Particularly, the course attempts to answer such questions as: What is my learning style and how should I adjust to accommodate college work? What does it take to be successful in college? What are some of the

issues facing college students on today's campuses? What do professors expect and how do successful students meet those expectations?

The purpose of this study was to evaluate the effectiveness of *Theories of Student Success* as an intervention strategy designed for students on academic probation. A quasi-experimental design was generated to identify probationary students' sentiments about:

- their first-year experience;
- attitudes and perceptions about faculty, advisors and the institution;
- knowledge of institutional services afforded to them;
- sense of self (including personal growth and academic/social priorities); and,
- various personal and professional support mechanisms.

Treatment and control group samples were compared to determine how students in the treatment group fared in comparison to the control group with regard to specific items within the aforementioned constructs.

## Methods

### *Population and Sampling*

A list of email addresses for freshmen on academic probation as of the Fall 2006 semester was provided by the University's Office of Assessment. Upon receipt of the data the primary investigator cleaned the dataset and separated students according to two criteria: those on academic probation who were currently enrolled in regular courses, and those who were taking regular courses but also enrolled in TSS. These two groups served as a control group and a treatment group for this study.

Because a comprehensive list of students was available a census sample was employed. All students enrolled in the three sections of TSS were given a paper-pencil questionnaire at the end of class and asked to voluntarily complete it. A total of 76 questionnaires were administered and 69 students completed the survey, thus resulting in a 91% response rate. A census sample

was also employed for the general probation group. A web-based survey was utilized because the researchers believed most college students regularly access their email accounts. In total, 581 students were sent an email (with two reminders) asking for their participation in the study. Of those 581 students, 198 returned completed questionnaires. This resulted in a 34% response rate, which is substantially higher than the typical 15-20% response rate of undergraduate students at this institution.

### *Instrumentation*

The questionnaire was adopted from a 1998 study by Fernandez, Whitlock, Martin and VanEarden which evaluated students' first year experience. The original questionnaire was modified to fit the needs of this study, which included several additional items and demographic questions.

The instrument used for the control group consisted of 27 primary items, 18 demographic and four open-response items. The instrument given to the treatment group consisted of 32 primary items, 19 demographic and five additional open-response items. Students were asked to provide their level of agreement with these 28 or 30 items utilizing a four point Likert-type scale as follows: Strongly Agree = 4, Agree = 3, Disagree = 2 and Strongly Disagree = 1. Additional demographic questions were asked to gain a better understanding of the composition of the students in both groups. Open-ended response items were included, allowing students to expand on previous answers and to offer information that was otherwise unsolicited.

Because of the comparative nature of this evaluation study, some questions were carefully worded differently on the two questionnaires to distinguish the TSS class experience and its instructors from other University class experiences and instructors. An example would include: "Generally speaking, I believe University faculty are supportive of me" and "I believe

my TSS instructor is supportive of me”. Although it is true the same construct is not being measured in comparative questions like these, these items do allow for direct comparisons between the two constructs. Overall, 26 items were produced that could be compared to the other group. An additional 6 items pertained to specific items relating to one particular group.

### *Data Analysis*

Data were collected using Zoomerang survey software. Descriptive statistics were generated using Minitab. Rasch measurement, a form of item response theory, was utilized as the primary method of data analysis because the technique provides a number of advantages over traditional statistical approaches. For example, Bradley and Sampson (2005) state:

Whereas the classical model [traditional statistics] produces a descriptive summary based on statistical analysis, it is limited, if not absent, in the measurement capacity. In contrast, Rasch measurement tackles many of the deficiencies of the classical test model in that it has the capacity to incorporate missing data, produces validity and reliability measures for person measures and item calibrations, measures persons and items on the same metric, and is not dependent on the particulars of the sample. Applications of the Rasch model allow the researcher to identify where possible misinterpretation occurs and which items do not appear to measure the construct of interest, while producing information about the structure of the rating scale and the degree to which each item contributes to the construct. Thus, it provides a mathematically sound alternative to traditional approaches to survey data analysis (p. 13).

Winsteps measurement software was used to carry out the Rasch analysis.

### *Survey Validation*

Often referred to as “validating a survey”, Rasch measurement determines the fit of the data to the Rasch model, as well as determines how well the rating scale is functioning. Survey validation asks, “How well are the items measuring what they are intending to measure?”, “Are all respondents interpreting the questions similarly?”, and “Are the response options sufficient?”, meaning should response options be collapsed and limited to fewer response categories, or should respondents be given additional categories to more accurately capture their sentiments?

Having strong theoretical underpinnings and carefully avoiding methodological assumptions is essential for quality research; therefore, this study ensures many of the methodological assumptions of traditional survey research (i.e., treating ordinal scales as interval, treating raw scores as measures, applying linear statistics to nonlinear data, etc.) were overcome via the use of the one-parameter Rasch measurement model.

## Results and Discussion

### *Demographic Information for Respondents*

The sample for this study consisted of 198 General Probation students and 69 TSS Probation students. Demographic information is presented below for both the General Probation group (see Table 1) and the TSS group (see Table 2).

With regard to the collective sample, both groups contain 80% White students, a statistic that is reflective of the University's campus. There is some variation amongst the sex variable, as the general probation sample is nearly even and the TSS sample is approximately two-thirds male.

Table 1  
*Demographic Characteristics of General Probation Group (n = 198)*

Characteristic	n	%
Sex		
Male	103	52
Female	95	48
Race		
White	159	80
Black	21	11
Hispanic	5	3
Asian or Pacific Islander	4	2
Other	9	5

Table 2  
*Demographic Characteristics of TSS Probation Group (n = 69)*

Characteristic	n	%
<b>Sex</b>		
Male	44	64
Female	25	36
<b>Race</b>		
White	54	80
Black	11	16
Hispanic	1	1
Asian or Pacific Islander	1	1
Other	2	2

*Reliability, Model Fit and Rating Scale Functioning*

Winsteps measurement software reports reliability estimates for both persons and items. For the General Probation group, person reliability was .97 and item reliability was .91. For the TSS group, person reliability was .89 and item reliability was .85. Both samples indicate moderate-high reliability measures for both persons and items. Tests for data-model fit confirmed data fit the Rasch model, thus confirming Rasch measurement an appropriate technique for data analysis. Tests for rating scale functioning verifying appropriate response options were provided by way of probability curve analysis and rating scale diagnostics.

*Summary of Rating Scale Diagnostics*

Responses to survey items correspond to the aforementioned four-point Likert-type rating scale, where: Strongly Agree = 4, Agree = 3, Disagree = 2 and Strongly Disagree = 1. Advancing average measures and step calibrations ensure the rating scale measures are stable and accurate. The tables below indicate respondents are utilizing the full range of the scale; however, the

majority of responses are Agree/Strongly Agree statements. This indicates most survey items were likely to be endorsed or agreed upon by the average respondent.

Table 3  
*Summary of Rating Scale Diagnostics for General Probation Sample*

Category	Observed Count (%)	INFIT Mean Sq.	OUTFIT Mean Sq.
Strong Disagree	190 (4%)	1.11	1.16
Disagree	1244 (23%)	1.00	1.06
Agree	2963 (55%)	.92	.91
Strongly Agree	949 (18%)	.98	.98

*Note:* Category, observed count, and percentage indicate the numbers of respondents who chose a particular response category, summed for each category across all items.

Table 4  
*Summary of Rating Scale Diagnostics for TSS Sample*

Category	Observed Count (%)	INFIT Mean Sq.	OUTFIT Mean Sq.
Strong Disagree	44 (2%)	1.01	1.06
Disagree	312 (14%)	1.05	1.07
Agree	1297 (60%)	.95	.90
Strongly Agree	518 (24%)	.98	.97

*Note:* Category, observed count, and percentage indicate the numbers of respondents who chose a particular response category, summed for each category across all items.

### *Empirical Characteristics of Responses*

The control and treatment group responses were compared via an item map (see Figure 1) to detect meaningful differences between the two groups. Results indicated students in TSS reported higher ratings on the vast majority of primary items. Specific to treatment versus control group comparisons, results revealed TSS students indicated the course helped...

- develop a commitment to personal achievement
- cultivate a sense of responsibility for their own behavior
- develop the capacity to make wise decisions

- improve their self-esteem/self-confidence
- instill a sense of discipline within them
- motivate them for academic success
- provide insights about college they probably would not receive elsewhere
- play a significant role in helping them discover their personal strengths and weaknesses
- play a significant role in helping them overcome their academic difficulty

...more so than students from other courses without a treatment.

Figure 1  
Response Map Comparison.

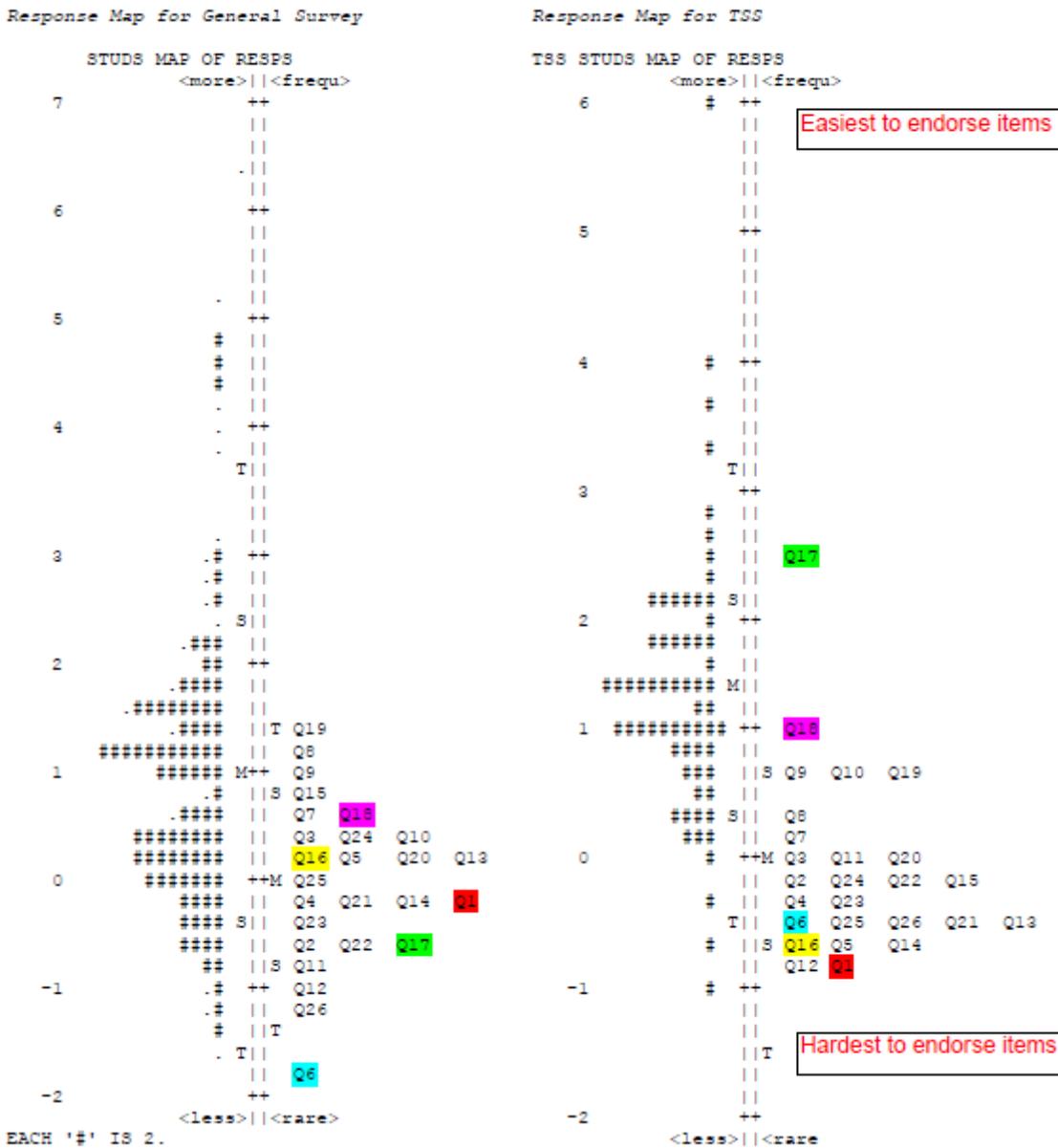


Table 5 displays a list of corresponding survey items to the abbreviations in the table.

Table 5  
*Survey Items*

Item ID	Item
1	Overall, my first-year experience at [this university] was positive
2	My courses at [this university] [TSS] helped me develop a commitment to personal achievement*
3	My courses at [this university] [TSS] helped cultivate a sense of responsibility for my own behavior*
4	My courses at [this university] [TSS] helped me develop the capacity to make wise decisions*
5	My courses at [this university] [TSS] helped me to mature as an individual*
6	My courses at [this university] [TSS] helped improve my self-esteem/self-confidence*
7	I became friends with other students in my classes
8	I became friends with students who were not in my classes
9	I enjoyed the social aspects of my first year
10	I know where to find support on campus for academic problems
11	I know where to find support on campus for personal problems
12	I am confident about my abilities to manage my time
13	There is a sense of community here at [this university]
14	I feel part of a community here at [this university]
15	Prior to entering [this university], I felt this was the right school for me
16	Having spent a previous semester (or more) here, I believe [this university] is the right school for me
17	Generally speaking, I believe [this university's] faculty [TSS] are supportive of me*
18	I believe my advisor is supportive of me
19	My academic life is a high priority
20	My social life is a high priority
21	My courses [TSS] have helped instill a sense of discipline within me*
22	My courses [TSS] have helped motivate me for academic success*
23	My courses [TSS] have taught me insights about college I probably would not have learned elsewhere*
24	My courses [TSS] have played a significant role in helping me discover my academic strengths and weaknesses*
25	My courses [TSS] have played a significant role in helping me discover my personal strengths and weaknesses*
26	My courses [TSS] have played a significant role in helping me overcome my academic difficulty*

\*Items denoted with an (\*) indicate items that differed per survey (General v. TSS)

The most noticeable difference between the two item maps pertains to item Q17. The item reads “Generally speaking, I believe [the university’s] faculty [TSS instructor] are supportive of me”. The map of General Probation student lists this item nearly one standard deviation below the mean. The TSS map lists the item about 1.5 standard deviations above the mean. It is clear that students enrolled in TSS recognized the supportive efforts of those enrolled in the course. Research suggests students who view faculty more favorably are more likely to persist in courses and perceive the institution as more welcoming and caring (Miller, 2007).

Item Q18 is also highly endorsed amongst students enrolled in TSS and moderately endorsed in the General Probation group. This item reads “I believe my adviser is supportive of me”. It is theorized the reason this item is so highly endorsed by the TSS sample is because the respective academic advisors referred the students to the TSS class and closely monitored their progress. The additional conversations and planning sessions with advisors likely gave these students the impression their advisors were more supportive. One might speculate additional meetings with advisors would increase this rating for the General Probation sample as well.

The item with the lowest mark for the General Probation group was item Q6, “My courses at [this university] helped improve my self-esteem/self-confidence”. This item fell over two standard deviations below the mean on this map. The converse, “My TSS course helped improve my self-esteem/self-confidence”, was notably higher on the TSS map as it was within one standard below the mean. These differences suggest TSS students experienced increased confidence in their academic abilities.

There are two items in particular that score higher on the General Probation student map than the TSS map. They are items Q16 and Q1. Item Q16 reads “Having spent a previous semester (or more) here, I believe [this university] is the right school for me”. On the General Probation map, this item falls within one standard deviation above the mean. On the TSS map, this item falls a full standard deviation below the mean. The authors speculate this difference is due to TSS students informed awareness of university life and expectations. This heightened understanding of the university atmosphere and culture likely forces students to evaluate their role within the institution. Having given it more thought than their General Probation group counterparts, TSS are more likely to identify their “fit” both with and within the university.

The other previously mentioned item, Q1, reads “Overall, my first-year experience at [this university] was positive.” General Probation students perceived this item near the mean, well within one standard deviation of the mean. TSS students rated this item a tie for the lowest overall item with a score that fell over one standard deviation below the mean. Similar to Q16, the authors theorize an informed perspective of university life and expectations helped TSS students realize the true measuring stick for a positive first-year. The informed understanding of what constitutes a positive first year made TSS students more critical of themselves, thus leading to a lower score for this item.

Interestingly, one item that fell below one standard deviation on both maps was item Q12 which read “I am confident about my abilities to manage my time”. Although significant time was devoted to this issue in the TSS class, it appears instructional attempts were insufficient. There were no survey items designed to identify how students’ time is used, or how students define effective time management. Therefore, the items employed in this survey do not provide sufficient data to challenge or confirm responses for Q12.

For items appearing exactly the same on both surveys, TSS students reported significantly higher scores with regard to knowing where to find support on campus for both personal (Q11) and academic (Q10) problems. This, too, is affirming because identification of campus resources and their uses was a notion emphasized in the TSS course.

One additional element of the TSS course involved mandatory, one-on-one consultations with each student every other week throughout the semester. Of all the students surveyed, 93% of students found the consultations helpful. Students noted that developing a working academic relationship with the instructor positively impacted overall feelings about course work, increased efficacy for completing assignments, and provided a sense that faculty members (represented by the TSS course instructor) cared about student success.

#### Significance of Study, Implications and Future Research

This study contributes to the research literature in four key ways. First, the study not only identifies several important and potentially problematic issues for many first-year students, but also provides an empirically-supported instructional model that effectively addresses many of these issues and has the potential to significantly improve students' intellectual, social, and emotional experiences at college. Second, the modified instrument and study design serves as a useful evaluation model for other institutions/programs who are concerned with evaluating the effectiveness of academic probation programs. Third, the study serves as a methodological framework for related studies, as the Rasch model minimizes common erroneous assumptions of survey research and provides a more valid and reliable approach to analyzing survey data. Further, the use of items maps can prove to be an invaluable asset to researchers looking for both "big picture" and comparative results. Finally, the findings of this study warrant further

investigation of issues relating to students on academic probation and additional applications of institutional research.

While the findings from this study support the TSS course as an effective intervention for first year students on academic probation, replication of the project is advisable to more fully identify what aspects of the course are most beneficial and which elements are in need of adjustment. Additionally, each generation of students presents new needs and issues, challenging the findings of previous groups. Therefore, the instrument will need to be re-assessed for future applications.

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