



SmarterServices™

---

# SmarterMeasure™ Research Plans

---

Version 1.1  
12/1/2011

Presented by:  
Dr. Mac Adkins

---

# SmarterMeasure™ Research Plan

---

## Background

The SmarterMeasure™ Learning Readiness Indicator is an online assessment of a learner's level of readiness for studying in an online or technology enriched environment. The assessment quantifies the learner's "goodness of fit" for learning in these modalities. Rather than being used as a gate keeper to prohibit learners from enrolling in these types of courses, it is a diagnostic device to identify learners who may be at-risk so that the school can provide appropriate services for remediation and/or support. SmarterMeasure does not make a value judgment indicating that a student should or should not take the courses. Rather it informs the student of their strengths and opportunities for growth in areas related to taking these type courses. If a student is indicated to be deficient in a certain area and then if the school provides appropriate remediation and/or support, then SmarterMeasure can serve as a retention tool by helping students succeed as they learn in the context of online or technology rich courses.

Since 2002 almost one million students from over 400 educational institutions have taken the SmarterMeasure™ Learning Readiness Indicator.

Research literature shows that maintaining high retention rates in distance education programs is a significant challenge. SmarterMeasure serves as an early warning device to identify students who may be deficient in the skills and attributes necessary for successful distance and technology rich learning and who may, therefore, be at risk of dropping out of these programs.

Educational institutions invest heavily in attracting and recruiting students. However, there is little return on the investment when students quickly drop out of the program. SmarterMeasure not only helps schools to identify the students who are likely to drop out, it also provides resources for remediation so that at-risk students can improve.

As individuals, students also invest thousands of dollars in their education and may be hesitant to continue their education for fear that they might not do well. SmarterMeasure helps students to recognize their strengths and provides resources to strengthen their weaknesses. Students who are confident of their readiness are much more likely to enroll in a distance learning course.

SmarterMeasure™ is designed to be a student service tool which can aid in the satisfaction and retention of students. In an optimal implementation plan someone at the school such as an orientation course instructor, academic advisor, or enrollment counselor discusses the learner's SmarterMeasure™ scores with them. While there are general resources for remediation and support provided in the score report, the strongest gains can be made when the SmarterMeasure™ scores are used as a discussion starter to then make the student aware of the resources for remediation and support that the school provides. SmarterMeasure™ is designed to be the diagnostic tool, not the full remediation and support system.

SmarterMeasure™ is a 124 item assessment that measures variables in the following scales and sub-scales:

**Table 1 SmarterMeasure™ Scales and Sub-scales**

<i>Scale</i>	<i>Sub-scales</i>	<i>Items</i>
Individual Attributes	Procrastination Time management Persistence Willingness to ask for help Academic attributes Locus of control	24
Life Factors	Availability of time to study Availability of a dedicated place to study Reason for continuing one's education Support resources from family, friends and employers Perception of academic skills	20
Learning Styles	Identifies the degree to which they possess each of the following learning styles: Visual Verbal Social Solitary Physical Aural Logical	35
Reading Skills	Reading rate On-screen reading recall	11
Technical Knowledge	Technology usage Technology in your life Technology vocabulary Personal computer/Internet specifications	23
Technical Competency	Computer competency Internet competency	10
Typing Skills	Typing rate Typing accuracy	1

## **Rationale**

### **Justification for the Research Plan**

In the current economic climate all institutions of higher education must be prudent and justify all expenditures. As schools use SmarterMeasure™ they often want to quantify the ways that it is benefitting their students individually and their school collectively. This Research Plan has been developed by SmarterServices™ (the provider of SmarterMeasure™) to identify several strategies that could be used by schools to measure the impact that SmarterMeasure™ is having. Schools using SmarterMeasure are encouraged to participate in as many of these research strategies as appropriate to fully understand the impact of the assessment.

In compliance with the Privacy Policy of SmarterServices™ schools are only allowed to use data from students from their institutions. If multiple institutions desire to combine data sets for an extended analysis, written letters of consent from an appropriate person at each institution must be submitted to SmarterServices™ prior to the creation of a combined data set.

---

## **Research Plan Options**

### **Multiple Points of Measurement**

The familiar story is told of several persons who were blindfolded and then allowed to feel of a part of an elephant. Each of them described what they felt, but a complete understanding of the elephant could only be obtained from a synthesis of the observations of all of the blindfolded persons. Academic research is much the same in that any singular measurement of a phenomenon rarely provides a complete analysis.

When schools desire to study the impact of SmarterMeasure™ the first, and sometimes only, analysis that is done is a correlation of SmarterMeasure™ scores and the student's grades. While this is certainly one analysis that should be conducted, it is limited in construct validity because the SmarterMeasure™ Learning Readiness Indicator is not designed to be a predictor of academic success. Rather, it is designed to be an indicator of learners who may not initially be a good fit for distance learning or learning in a technology-rich environment. Academic success is impacted by a myriad of factors including the learner's own academic aptitude, levels of prior knowledge, the effectiveness of the instructor, the design of the course, etc.

SmarterServices recommends that schools consider the following research strategies to obtain a full picture of efficacy of the assessment.

**Table 2 – Research Strategies**

<i>Construct</i>	<i>Analysis</i>	<i>Data Sources</i>
<p><b>Academic Success</b></p> <p>What is the correlation between SmarterMeasure™ scores and learner’s grades?</p>	<p><b>Correlation and Analysis of Variance (ANOVA):</b> Stronger relationships may be found with scores of individual attributes and academic achievement. Other <a href="#">case studies</a> have found individual attributes as the strongest indicator of academic success.</p>	<ul style="list-style-type: none"> <li>SmarterMeasure™ scores at the scale and sub-scale level as listed in Table 1</li> <li>Student’s grades in a specific course</li> <li>Student’s overall GPA</li> </ul>
<p><b>Student Engagement</b></p> <p>What is the correlation between SmarterMeasure™ scores and metrics of student engagement?</p>	<p><b>Correlation, Independent Samples t-tests, Discriminant Analysis:</b> Stronger relationships may be found with scores in technical competency and technical knowledge. This may especially be the case for learners in their first term of enrollment. As is demonstrated in the <a href="#">National Student Readiness Report</a> scores on technical competency and knowledge improve as the student gains experience in studying online or in a technology-rich environment. First-time online students are often confused about how to participate in an online course. See the section below labeled “Engagement Metrics” for more information.</p>	<ul style="list-style-type: none"> <li>SmarterMeasure™ scores at the scale and sub-scale level as listed in Table 1</li> <li>Numbers of discussion board postings</li> <li>Metrics of total “clicks” a student has made in a learning management system</li> </ul>
<p><b>Student Satisfaction</b></p> <p>What is the relationship between SmarterMeasure™ scores and metrics of student satisfaction?</p>	<p><b>Analysis of Variance (ANOVA), Independent Samples t-tests, Discriminant Analysis, Structural Equation Modeling:</b> Responses to end of course survey items such as “I would enroll in another online course” could be used to segment students into groups and then the means of the SmarterMeasure™ scale</p>	<ul style="list-style-type: none"> <li>SmarterMeasure™ scores at the scale and sub-scale level as listed in Table 1</li> <li>Student satisfaction measures such as items from end-of-course surveys</li> </ul>

<i>Construct</i>	<i>Analysis</i>	<i>Data Sources</i>
	scores could be compared across the groups.	
<p><b>Student Retention</b></p> <p>What is the relationship between SmarterMeasure™ scores and metrics of student retention?</p>	<p><b>Correlation, Independent Samples t-tests, Discriminant Analysis, Multiple Regression:</b> A comparison of SmarterMeasure™ scale scores between retained and non-retained students could be calculated.</p>	<ul style="list-style-type: none"> <li>SmarterMeasure™ scores at the scale and sub-scale level as listed in Table 1</li> <li>A listing of students who took SmarterMeasure™ which is adjusted to indicate whether or not the student enrolled for the subsequent term</li> </ul>
<p><b>Quantitative Student Feedback</b></p> <p>What is the relationship between SmarterMeasure™ scores and quantitative points of student feedback.</p>	<p><b>Correlation:</b> Students typically take SmarterMeasure™ near the beginning of their enrollment. After the students have completed their first term of enrollment encourage the students to submit a survey which allows the student to provide feedback about their experiences in the online or technology-rich courses. Then correlations between these reported experiences and the student's initial SmarterMeasure™ scores can be calculated as a measure of construct validity of SmarterMeasure. Questions which would be appropriate for this survey are provided below.</p>	<ul style="list-style-type: none"> <li>SmarterMeasure™ scores at the scale and sub-scale level as listed in Table 1</li> <li>Results from a post-course survey</li> </ul>
<p><b>Qualitative Student Feedback</b></p> <p>What is the relationship between SmarterMeasure™ scores and qualitative points of student feedback.</p>	<p><b>Comparison:</b> Assemble a focus group of students for a one-hour conversation about topics such as the construct of learner readiness and realities of online learning. A listing of possible discussion starting questions is presented below. Compare the observations made by the students either to their SmarterMeasure™ scores individually or to aggregate scores from the general</p>	<ul style="list-style-type: none"> <li>SmarterMeasure™ scores at the scale and sub-scale level as listed in Table 1</li> <li>Compilation of notes taken during the focus group. These notes can be categorized and quantified to facilitate data analysis</li> </ul>

<i>Construct</i>	<i>Analysis</i>	<i>Data Sources</i>
	population of students who have taken SmarterMeasure.	
<p><b>Integration Plan Comparison</b></p> <p>Is there a difference in SmarterMeasure™ scores between schools with strong and schools with weaker implementation plans?</p>	<p><b>Independent Samples T-test:</b> Considerable variance exists between the implementation plans of different schools/campuses. The impact that SmarterMeasure™ is having could be impacted by the strength of the implementation plan. A comparison of results of some of the suggested research strategies above could be made between schools with different implementation plans.</p>	<ul style="list-style-type: none"> <li>• SmarterMeasure™ scores at the scale and sub-scale level as listed in Table 1</li> <li>• A categorization of the strength of implementation plans of various schools/campuses. SmarterServices can assist in the classification of implementation plans based on our experience with other institutions</li> </ul>
<p><b>Comparison to other Standardized Tests</b></p> <p>What is the relationship between SmarterMeasure scores and scores on other standardized exams such as Compass or AccuPlacer?</p>	<p><b>Correlations:</b> Calculate the correlations between measurements of online student readiness and other measurements of student aptitude taken through other admissions assessments.</p>	<ul style="list-style-type: none"> <li>• SmarterMeasure™ scores at the scale and sub-scale level as listed in Table 1</li> <li>• Scale scores from third-party standardized tests</li> </ul>

---

## Third Party Analysis

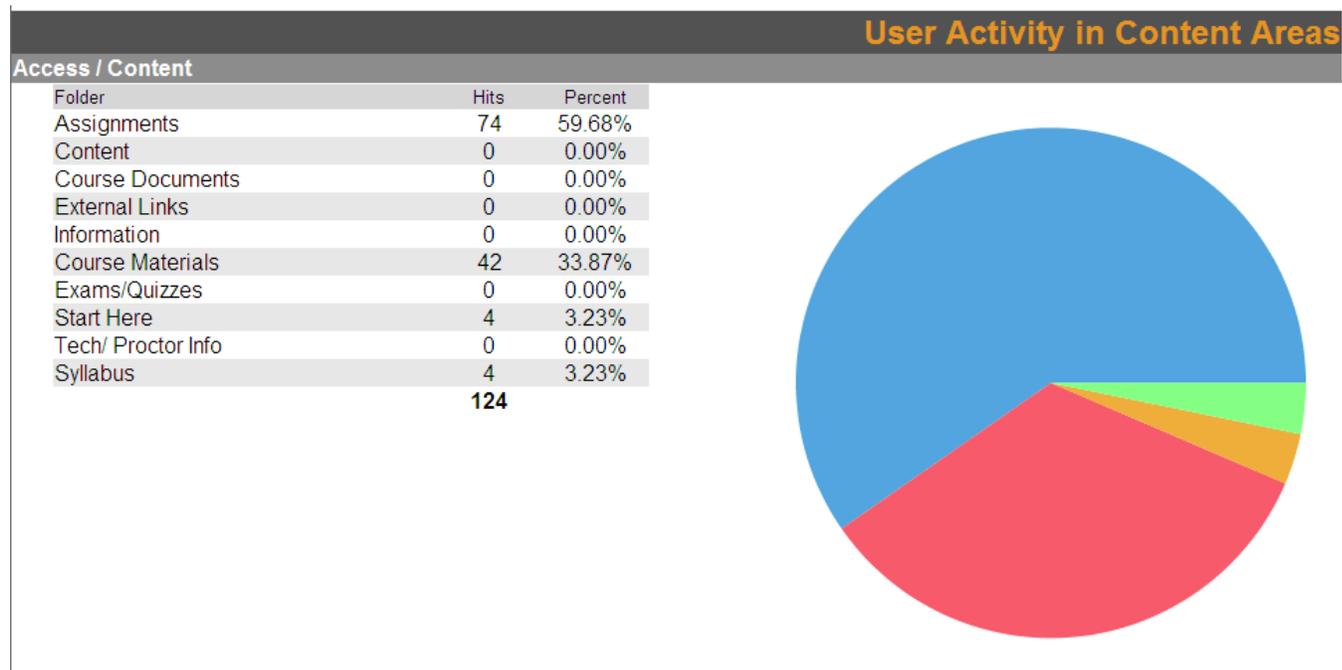
To ensure integrity in the data analysis it is recommended that schools consider using the services of a third-party company to conduct the data analysis. Schools are welcome to identify their own providers of this service, or they may choose to use [Applied Measurement Associates](#) in Tuscaloosa, Alabama. Statisticians from Applied Measurement Associates are familiar with data from SmarterMeasure™ because they have worked on projects with the data before. If schools do not want to incur the expense of using a third party provider for this service, then Dr. Mac Adkins, President of SmarterServices, can conduct any of the statistical analyses described above. These statistical analysis services are provided at a per-hour rate which is in addition to the existing license agreement. Schools are also welcome to use in-house expertise to conduct the analysis.

## Engagement Metrics

Most learning management systems provide to the faculty and/or administrators metrics about a student’s level of activity in the course. An example is shown below which indicates the level of activity on the course discussion board as well as the days since the last course access. Metrics such as this can be correlated to SmarterMeasure™ scores.

Last Name	First Name	Username	Role	Last Course Access	Days Since Last Course Access	Review Status	Adaptive Release	Discussion Board
Adkins	Mac	mac	Instructor	Feb 25, 2011 10:05:40 AM	0	0		<a href="#">18</a>
Mooley	Trevia	trmooley74207	Student	Feb 24, 2011 7:28:24 PM	0	0		<a href="#">15</a>
McDoy	Shayla	smcdoy	Student	Feb 23, 2011 6:39:47 PM	1	0		<a href="#">14</a>
Rivers	K	krivers000003	Student	Feb 20, 2011 8:12:59 PM	4	0		<a href="#">10</a>
Regere	Amy	aregere000005	Student	Feb 23, 2011 6:52:26 PM	1	0		<a href="#">14</a>

Another example of engagement metrics would be learner activity in content areas. The image below shows how the number of hits and the percentage of hits per content area could be calculated and then compared to SmarterMeasure™ scores.



## Quantitative Student Feedback

As stated in **Table 2 Research Strategies**, a useful metric of the impact of SmarterMeasure™ is a study to determine the degree to which a student’s SmarterMeasure™ scores are indicative

of their experience in an online or technology-rich course. The following questions could be used to quantify the learner’s experience and then these ratings could be correlated to the SmarterMeasure™ scale scores. These questions could be asked on a five-point likert type scale ranging from strongly agree to strongly disagree.

<i>Post-Course Survey Item</i>	<i>SmarterMeasure™ Scale Score</i>
It was easy for me to keep up with the reading required for my online course(s):	Reading Rate and Recall
It was easy for me to find time to complete my online course(s):	Life Factors
It was easy for me to complete my online course(s) with my level of computer skills:	Technical Competency
It was easy for me to complete my online course(s) with my level of technical knowledge.	Technical Knowledge
Generally speaking, online courses are a good choice for me:	Individual Attributes
I would take another online course in the future:	Learning Styles
It was easy for me to complete my online course(s) with my level of typing abilities.	Typing Rate and Accuracy

## Qualitative Student Feedback

The quantitative question items provided above could also be asked in individual interviews or to a focus group. In addition to these questions other qualitative questions which could be asked to foster dialogue about the students experience could include:

- **How was the experience of taking an online or technology-rich course different than you expected?**
- **Was the experience more or less difficult than you expected?**
- **What was the most difficult element of the course for you?**
- **What advice would you give to a student who is about to take their first online or technology-rich course?**
- **What is one thing that you wish you would have done differently in the course?**
- **What types of support from the school could have made your experience in the course even better?**

---

## Data Analysis Considerations

As a school plans a research project using SmarterMeasure™ data it should be noted that correlations and other comparisons of means can be calculated at the scale and sub-scale level. For example, in addition to correlating levels of student engagement to the scale score for Individual Attributes, a correlation could also be calculated for the sub-scale of motivation to student engagement.

To facilitate the comparisons of SmarterMeasure™ scores to other metrics of student success and satisfaction a paired dataset could be created. Identification variables could include first and last name, email address, and demographic factors (age range, gender). SmarterServices can assist schools in the production of a paired dataset. This service is considered “custom programming” for an hourly fee in addition to the SmarterMeasure™ license agreement.

---

## Aggregate Analysis of SmarterMeasure™ scores

In addition to the research strategies described above SmarterServices™ is also available to assist schools in an analysis of their aggregate dataset of SmarterMeasure™ scores. By looking at the means and standard deviations of a learner’s SmarterMeasure™ scores, compelling information may emerge. For example, it may be determined that a substantial majority of a school’s learners are of one dominant learning style. This fact could impact instructional design decisions. An aggregate analysis would also reveal levels of technical competency which could inform decisions regarding types and amounts of technical support that are needed to support a school’s students.

---

## Adjusting Readiness Ranges Values

Schools are encouraged to analyze their SmarterMeasure scores to determine if the default settings for the Readiness Ranges are appropriate for the students at their institution. The

default settings are based on the national averages from students across all institution types.

How can the decision made regarding the most appropriate settings for the Readiness Ranges at an institution? An analysis can be conducted to measure the relationships between individual students GPAs and their SmarterMeasure scores. We will be glad to perform the analysis for you, or we can inform you on how to conduct the analysis yourself.

For the analysis to be performed a paired dataset has to be created with individual student's SmarterMeasure scores and their grades. We can collaborate with you in the exporting of SmarterMeasure scores and will work with you as needed to create the paired data set. Typically unique identifiers such as name, email, and possibly even student numbers are used to match the data. Then using the paired data set an Analysis of Variance (ANOVA) is conducted to determine the strength of the relationship between the default Readiness Ranges settings. If the relationship is not statistically significant, then an analysis of the distribution of SmarterMeasure scores on each of the scales measured is conducted to identify potential adjusted Readiness Ranges (cut points). An ANOVA is then computed to measure the strength of the new settings with SmarterMeasure scores and grades. If the new settings are found to be statistically stronger, then a recommendation to adjust the settings is provided.

The table below is the actual results from this analysis that was recently computed for one of our client institutions. The table demonstrates that for four of the six scales measured a change was recommended to the Readiness Ranges settings. The chart illustrates the fact that by changing the settings a statistically significant relationship between the SmarterMeasure scores and GPA was achieved on three of the six scales. The default settings were not producing a statistically significant relationship on five of the six scales.

This analysis demonstrates that the three categorizations (pass, questionable, fail) provided by the Readiness Ranges can be used as a statistically significant indicator of academic success.

Analysis of Readiness Ranges compared to Academic Success - GPA

	Default Cut Points	Sig.	F	Adjusted Cut Points	Sig.	F	Change?
<b>Ind. Attributes</b>	70 / 85	0.11	2.213	80 / 90	<b>0.044</b>	3.155	Yes
<b>Life Factors</b>	70 / 85	0.065	2.435	80 / 90	0.045	2.723	Yes
<b>Reading Recall</b>	30 / 65	<b>0.046</b>	2.695	70 / 90	0.14	1.1832	No
<b>Tech Competency</b>	80 / 90	0.39	1.006	90 / 100	0.283	1.273	Yes
<b>Technical Knowledge</b>	50 / 75	0.071	2.367	70 / 80	<b>0.05</b>	2.623	Yes
<b>Typing Rate</b>	21 / 31	0.075	2.326	25 / 40	0.237	1.419	No

If you would like for an analysis of your Readiness Ranges settings to be conducted to improve the predictive nature of the Readiness Ranges classifications please let your Account Manager know. They will coordinate a conference call to plan for the project.

## Similar Research

SmarterServices™ encourages schools to do research with SmarterMeasure data regarding their own students. When schools plan to do an analysis of their SmarterMeasure data they often plan first to correlate SmarterMeasure scores to student's grades in the course. This is a welcomed analysis and typically results in statistically significant findings. The 2008 study

conducted by Atanda Research (described below) analyzed the SmarterMeasure scores of 2,622 random students representing over 300 schools. Correlations significant at the .05 level or higher were found with 11 of the 15 SmarterMeasure scores variables and student's grades. However, this analysis is really not the most appropriate way to measure the validity of SmarterMeasure scores because student's grades are impacted by a myriad of variables (prior academic experiences, IQ, etc.). SmarterMeasure is not designed to be an indicator of academic success. There are several tools such as the ACT, SAT, and GRE which serve this purpose. SmarterMeasure does not measure any constructs of content knowledge in areas such as math, science, history, etc. So to use SmarterMeasure solely as a predictor of academic success is not the most appropriate application.

In 2010 Middlesex Community College in Middletown, CT desired to create a culture of support for online students and improve failure rates of online students. They conducted a study of failure rates before and after using the SmarterMeasure™ learning readiness indicator. Their study found that after implementing SmarterMeasure™ the failure rate was cut in half. MCC conducted a correlational study to determine the relationships between SmarterMeasure™ scores and learner success. They found statistically significant correlations between the construct of Personal Attributes and student grades. The study concluded that "personal attributes, represented by self-motivation, self-discipline, and time management, plays a very important role in student success of online learning." MCC also analyzed the differences in grades between online students who did complete SmarterMeasure™ and on-ground students who did not. The finding of that study was that **"Noticeably, before SmarterMeasure™ was implemented, 6% to 13% more students failed online courses than students taking on-ground courses. After the implementation, the gaps were narrowed, 1.3% to 5.8% more online students failed than on-ground students."** The finding implies that SmarterMeasure™ assessment helps "at-risk" students to do better in online learning. In other words, the use of the SmarterMeasure™ assessment has contributed to better success in online learning particularly for students who are more likely to fail. This finding has moved the distance learning support beyond technical assistance to inspiring students to be highly motivated and disciplined, accompanied with using appropriate study strategies to ensure greater success. A case study of their research project is available at <http://www.smarterservices.com/documents/casestudies/middlesex-community-college.pdf>

In 2007 an external research firm (Atanda Research, Alexandria, VA) was commissioned to analyze the data gathered during a study concerning the relationship of SmarterMeasure scores and measures of academic success and goodness of fit of distance education as a measure of construct validity. The major findings of this report were that there were forty-two statistically significant correlations between SmarterMeasure variables and measures of academic success and goodness of fit. Of the five constructs measured by SmarterMeasure, the construct with the most correlation to academic success and goodness of fit was Individual Attributes. The variable of the participant's individual attributes scores were statistically significant at the .001 level with all measures of academic success and goodness of fit. The variable with the strongest correlation in the study was relationship between Grade Point Average and Reading Comprehension. A copy of his report is available at [http://smartermeasure.com/documents/READI\\_Correlational\\_Study.pdf](http://smartermeasure.com/documents/READI_Correlational_Study.pdf)

In 2008 the study conducted by Atanda Research was replicated as a part of a learner's dissertation research which involved 2,622 students who had taken SmarterMeasure representing over 300 schools. This replication yielded even stronger results than the original study. Of the possible 105 correlations measured, 74 were found to be statistically significant. The factor measured by SmarterMeasure that had the strongest correlations to measures of goodness of fit and academic success was individual attributes which yielded correlations in each of the seven categories which were statistically significant at the .01 level. This finding

mirrored the finding from the 2007 study which also indicated that individual attributes were the strongest indicator of goodness of fit of distance education.

It is worthy of note that in each of these three studies (Middlesex Case Study, Atanda Research and dissertation research) that the scale measured by SmarterMeasure™ that had the strongest correlation to academic success was individual attributes. The individual attributes section of SmarterMeasure measures traits, habits and attitudes that impact one's goodness of fit of distance education as a delivery system. The six attributes which are measured are time management, procrastination, persistence, academic attributes, locus of control, and willingness to ask for help. There are 24 items in this section with each of the six attributes being measured by four items. The items are measured on a four-point likert-type scale of not like me at all, not much like me, somewhat like me, or very much like me.

---

## **Making a Difference for Students**

### **Thermometer analogy**

As a parent I may observe my child to be playing lethargically and looking flush. So I suspect that they may be getting sick. So I use a thermometer to take their temperature. If my child has a fever then I have a decision to make. Should I give them some over the counter medicine or take them to the doctor? That decision may largely depend on the measurement of their temperature. If it is 100 degrees I may just give them some over the counter medicine. But if their temperature is 105 then I may decide to take them to the doctor. That night as I reflect on the day and my role as a parent should I feel good about the fact that I took my child's temperature? Yes, but what I should really feel good about is the fact that I used that measurement of temperature to inform a decision that prompted action.

SmarterMeasure™ is similar to a thermometer in that it provides a measurement of the learner's level of readiness for studying in an online or technology-rich environment. It is a rather sophisticated thermometer in that it gives multiple points of measurement, but nonetheless it is still just a measurement. While there are some benefits of providing the results of the measurement to the students, the real benefit of SmarterMeasure™ comes when schools look at the student's scores and then take appropriate action.

The research strategies above are parallel to computing correlations between a child's temperature and then some measure of their health. There would be benefit in doing that, but the real benefit would be identifying life habits that impact the child's health and focusing on reinforcing those habits. So while the intention of these research strategies is to determine the relationship between SmarterMeasure™ scores and metrics of student success and satisfaction, schools are encouraged to engage in a dialogue with SmarterServices™ about implementing integration strategies that impact student success.

---

## **Review of Related Literature**

With the shift toward online learning, it is important to explore the adoption of online education. Previous studies found that among academic leaders, 64 percent believe that it takes more discipline for a learner to succeed in an online course (Sloan Consortium, 2006); therefore, placing additional responsibility on students to be self-directed learners. Before the start of an online program or course, it should be determined if a learner's instructional need can be resolved through a distance education approach (Willis & Lockee, 2004). Assessing the pre-requisite skills of the distance learner is critical (Hsiu-Mei & Liaw, 2004; Simonson et al., 2003).

Learners need to have enough pre-requisite skills of technological proficiency and a strong motivation to learn by technology (Hsiu-Mei & Liaw, 2004). Because of the difficulty in accommodating a group of learners with a wide range of acquired skills, requirements for pre-requisite skills should be set (Falvo & Solloway, 2004). A researched method of examining the notion of online readiness is listed using three aspects: (a) Student's preference for online form of instructional delivery as compared to traditional face to face instruction; (b) Student confidence in using electronic communication for learning and competence and confidence in the use of Internet and computer-mediated communication; and (c) Ability to engage in autonomous learning (P. J. Smith et al., 2003). Hall (2008, para 27) stated that "the primary value of the surveys may lie in raising awareness for any student considering enrolling in a distance education course."

Pamela Dupin-Bryant of Utah State University - Toole conducted a study which was published in *The American Journal of Distance Education* titled "Pre-entry Variables Related to Retention in Online Distance Education". This study identified pre-entry variables related to course completion and non-completion in university online distance education courses. Four hundred and sixty-four students who were enrolled in online distance education courses participated in the study. Discriminant analysis revealed six pre-entry variables were related to retention, including cumulative grade point average, class rank, number of previous courses completed online, searching the Internet training, operating systems and file management training, and Internet applications training. Results indicate prior educational experience and prior computer training may help distinguish between individuals who complete university online distance education courses and those who do not. SmarterMeasure measures all of the variables that this study indicated as indicators of success except for class rank.

Association, (2004). Retrieved March 10, 2004 from <http://www.usdla.org>

Caverly, D., and MacDonald, L. (1998). Techtalk: Distance developmental education. *Journal of Developmental Education*, 2. Retrieved October 12, 2007 from Academic Search Premier

Dupin-Bryant, P. A. (2004). Pre-entry variables related to retention in online distance education. *American Journal of Distance Education*, 18(4), 199-206.

Falvo, D. A., & Solloway, S. (2004). Constructing community in a graduate course about teaching with technology. *TechTrends: Linking Research & Practice to Improve Learning*, 48(5), 56.

Hall, M. (2008, Fall). Predicting student performance in web-based distance education courses based on survey instruments measuring personality traits and technical skills. *Online Journal of Distance Learning Administration*, 11. Retrieved April 20, 2009, from <http://www.westga.edu/%7Edistance/ojdla/fall113/hall113.html>

Hsiu-Mei, H., & Liaw, S.-S. (2004). Guiding distance educators in building web-based instructions. *International Journal of Instructional Media*, 31(2), 125.

Perez, S., & Foshay, R. (2002). Adding up the distance: Can developmental studies work in a distance learning environment? *T H E Journal*, 29, pp. 16+. Retrieved May 22, 2007 from Questia.

Rhoda, K. R. & Burns, C. N. (2005). Developing and online writing center for distance learning courses. Paper presented at 21st Annual Conference on Distance Learning and Teaching. Retrieved October 13, 2007 from [http://www.uwex.edu/disted/conference/Resource\\_library/proceedings/05\\_1923.pdf](http://www.uwex.edu/disted/conference/Resource_library/proceedings/05_1923.pdf)

Sampson, N. (2003). Meeting the needs of distance learners. *Language, Learning and Technology*, 7, pp.103+. Retrieved June 13, 2007, from Questia.

Simonson, M., Smaldino, S., Albright, M., & Zvacek, S. (2003). *Teaching and learning at a distance*. Upper Saddle River, NJ: Pearson Education, Inc.

Smith, P. J., Murphy, K. L., & Mahoney, S. E. (2003). Towards identifying factors underlying readiness for online learning: An exploratory study. *Distance Education*, 24(1), 57. United States Distance Learning

Willis, L. L., & Lockee, B. B. (2004). A pragmatic instructional design model for distance learning. *International Journal of Instructional Media*, 31(1), 9.