



## **PRINCIPALS TECHNOLOGY LEADERSHIP ASSESSMENT**

### **- Dissemination and Licensing -**

The Principals Technology Leadership Assessment (PTLA) is intended to assess principals' technology leadership inclinations and activities over the course of the last school year (or some other fixed period of time). Based on ISTE's original National Educational Technology Standards for Administrators (NETS-A), the PTLA was developed and psychometrically validated by the American Institutes for Research as part of a grant CASTLE received from the United States Department of Education Fund for the Improvement of Postsecondary Education (FIPSE).

The PTLA is available to K-12 school organizations and educational leadership preparation programs for free. School organizations can download the PTLA assessment and instructions in PDF format. Organizations are responsible for their own data entry and analysis using Excel, SPSS, or some other data analysis software program. Data collection can be done by making a paper version or utilizing online survey software.

CASTLE believes in making the PTLA as freely available as possible to school organizations. The PTLA also is available for a small licensing fee to for-profit corporations and other entities that stand to make money from their usage of the PTLA. We are open to other creative possibilities for the PTLA; please contact us if you are interested in using this assessment.

You are being given this technology leadership assessment at the request of your school or district, which will use the results to guide its leadership training and professional development programming. Assessment items are based on the International Society for Technology in Education's (ISTE) National Educational Technology Standards for Administrators (NETS-A). The purpose of the assessment is to provide building-level administrators with detailed and comparative information about their technology leadership.

The individual items in the assessment ask you about the extent to which you have engaged in certain behaviors that relate to K-12 school technology leadership. Answer as many of the questions as possible. If a specific question is not applicable, leave it blank. For example, if a question asks about technology planning activities in your district, and your district has not engaged in any such activities, leave the item blank. Note that leaving multiple items blank may limit the usefulness of the assessment results.

As you answer the questions, think of your actual behavior over the course of the last school year (or some other fixed period of time). Do not take into account planned or intended behavior. As you select the appropriate response to each question, it may be helpful to keep in mind the performance of other principals that you know. ***Please note that the accuracy and usefulness of this assessment is largely dependent upon your candor.*** If done with care, the results can provide you with valuable information as you seek to extend or improve your leadership skills.

When assessing behaviors and performance, individuals have a tendency to make several types of errors. You should familiarize yourself with the following errors:

***Leniency error.*** This occurs when an individual gives himself an assessment higher than he deserves. This could occur for several reasons: the individual has relatively low performance standards for himself; the individual assumes that other individuals also inflate their ratings; or, for social or political reasons, the individual judges that it would be better not to give a poor assessment. As you assess yourself, you should understand that accurate feedback will provide you with the best information from which to base further improvement.

***Halo error.*** This occurs when an individual assesses herself based on a general impression of her performance or behavior, and the general impression is allowed to unduly influence all the assessments given. An example of halo error would be an individual who rates herself highly on every single assessment item. It is rare that individuals perform at exactly the same level on every dimension of leadership. It is more likely that an individual performs better in some areas than on others.

***Recency error.*** This occurs when an individual bases an assessment on his most recent behavior, as opposed to his entire behavior over some fixed period of time (e.g., the last year). This assessment should be based on your behavior over the entire year (or other fixed period of time).

The following terms appear throughout the assessment. Keep these definitions in mind as you read the items and make your response.

***Technology.*** Generally refers to personal computers, networking devices and other computing devices (e.g., electronic whiteboards and personal digital assistants (PDAs)); also includes software, digital media, and communications tools such as the Internet, e-mail, CD-ROMs, and video conferencing.

***Technology planning.*** Any process by which multiple stakeholder groups (e.g., district administration, school administration, faculty, and parents) convene to develop a strategy for the use or expanded use of technology in instruction and operations. Technology planning need not be separate from other planning efforts, but should be a recurring theme if integrated within a more comprehensive planning process.

***Research-based.*** A practice that employs systematic, empirical methods that draw on observation or experiment to provide reliable data. Research-based work uses research designs and methods appropriate to the research question posed and are presented in sufficient detail for replication. The strongest research-based practices typically obtain acceptance through peer-reviewed journals or expert panels.

***Assessment.*** A method of measurement used to evaluate progress. Student assessment typically refers to a method of evaluating student performance and attainment to determine whether or not a student is achieving the expected outcome(s).

**Average time to complete the assessment is about 15 minutes. To take the assessment, log on to**

## I. Leadership & Vision

1. To what extent did you participate in your district's or school's most recent technology planning process?

|            |           |          |               |       |
|------------|-----------|----------|---------------|-------|
| Not at all | Minimally | Somewhat | Significantly | Fully |
| 1          | 2         | 3        | 4             | 5     |

2. To what extent did you communicate information about your district's or school's technology planning and implementation efforts to your school's stakeholders?

|            |           |          |               |       |
|------------|-----------|----------|---------------|-------|
| Not at all | Minimally | Somewhat | Significantly | Fully |
| 1          | 2         | 3        | 4             | 5     |

3. To what extent did you promote participation of your school's stakeholders in the technology planning process of your school or district?

|            |           |          |               |       |
|------------|-----------|----------|---------------|-------|
| Not at all | Minimally | Somewhat | Significantly | Fully |
| 1          | 2         | 3        | 4             | 5     |

4. To what extent did you compare and align your district or school technology plan with other plans, including district strategic plans, your school improvement plan, or other instructional plans?

|            |           |          |               |       |
|------------|-----------|----------|---------------|-------|
| Not at all | Minimally | Somewhat | Significantly | Fully |
| 1          | 2         | 3        | 4             | 5     |

5. To what extent did you advocate for inclusion of research-based technology practices in your school improvement plan?

|            |           |          |               |       |
|------------|-----------|----------|---------------|-------|
| Not at all | Minimally | Somewhat | Significantly | Fully |
| 1          | 2         | 3        | 4             | 5     |

6. To what extent did you engage in activities to identify best practices in the use of technology (e.g. reviews of literature, attendance at relevant conferences, or meetings of professional organizations)?

|            |           |          |               |       |
|------------|-----------|----------|---------------|-------|
| Not at all | Minimally | Somewhat | Significantly | Fully |
| 1          | 2         | 3        | 4             | 5     |

## II. Learning and Teaching

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1. To what extent did you provide or make available assistance to teachers to use technology for interpreting and analyzing student assessment data?

|            |           |          |               |       |
|------------|-----------|----------|---------------|-------|
| Not at all | Minimally | Somewhat | Significantly | Fully |
| 1          | 2         | 3        | 4             | 5     |

2. To what extent did you provide or make available assistance to teachers for using student assessment data to modify instruction?

|            |           |          |               |       |
|------------|-----------|----------|---------------|-------|
| Not at all | Minimally | Somewhat | Significantly | Fully |
| 1          | 2         | 3        | 4             | 5     |

3. To what extent did you disseminate or model best practices in learning and teaching with technology to faculty and staff?

|            |           |          |               |       |
|------------|-----------|----------|---------------|-------|
| Not at all | Minimally | Somewhat | Significantly | Fully |
| 1          | 2         | 3        | 4             | 5     |

4. To what extent did you provide support (e.g., release time, budget allowance) to teachers or staff who were attempting to share information about technology practices, issues, and concerns?

|            |           |          |               |       |
|------------|-----------|----------|---------------|-------|
| Not at all | Minimally | Somewhat | Significantly | Fully |
| 1          | 2         | 3        | 4             | 5     |

5. To what extent did you organize or conduct assessments of staff needs related to professional development on the use of technology?

|            |           |          |               |       |
|------------|-----------|----------|---------------|-------|
| Not at all | Minimally | Somewhat | Significantly | Fully |
| 1          | 2         | 3        | 4             | 5     |

6. To what extent did you facilitate or ensure the delivery of professional development on the use of technology to faculty and staff?

|            |           |          |               |       |
|------------|-----------|----------|---------------|-------|
| Not at all | Minimally | Somewhat | Significantly | Fully |
| 1          | 2         | 3        | 4             | 5     |

### III. Productivity & Professional Practice

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1. To what extent did you participate in professional development activities meant to improve or expand your use of technology?

|            |           |          |               |       |
|------------|-----------|----------|---------------|-------|
| Not at all | Minimally | Somewhat | Significantly | Fully |
| 1          | 2         | 3        | 4             | 5     |

2. To what extent did you use technology to help complete your day-to-day tasks (e.g., developing budgets, communicating with others, gathering information)?

|            |           |          |               |       |
|------------|-----------|----------|---------------|-------|
| Not at all | Minimally | Somewhat | Significantly | Fully |
| 1          | 2         | 3        | 4             | 5     |

3. To what extent did you use technology-based management systems to access staff/faculty personnel records?

|            |           |          |               |       |
|------------|-----------|----------|---------------|-------|
| Not at all | Minimally | Somewhat | Significantly | Fully |
| 1          | 2         | 3        | 4             | 5     |

4. To what extent did you use technology-based management systems to access student records?

|            |           |          |               |       |
|------------|-----------|----------|---------------|-------|
| Not at all | Minimally | Somewhat | Significantly | Fully |
| 1          | 2         | 3        | 4             | 5     |

5. To what extent did you encourage and use technology (e.g., e-mail, blogs, videoconferences) as a means of communicating with education stakeholders, including peers, experts, students, parents/guardians, and the community?

|            |           |          |               |       |
|------------|-----------|----------|---------------|-------|
| Not at all | Minimally | Somewhat | Significantly | Fully |
| 1          | 2         | 3        | 4             | 5     |

#### IV. Support, Management, & Operations

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1. Support faculty and staff in connecting to and using district- and building-level technology systems for management and operations (e.g., student information system, electronic grade book, curriculum management system)?

|            |           |          |               |       |
|------------|-----------|----------|---------------|-------|
| Not at all | Minimally | Somewhat | Significantly | Fully |
| 1          | 2         | 3        | 4             | 5     |

2. To what extent did you allocate campus discretionary funds to help meet the school's technology needs?

|            |           |          |               |       |
|------------|-----------|----------|---------------|-------|
| Not at all | Minimally | Somewhat | Significantly | Fully |
| 1          | 2         | 3        | 4             | 5     |

3. To what extent did you pursue supplemental funding to help meet the technology needs of your school?

|            |           |          |               |       |
|------------|-----------|----------|---------------|-------|
| Not at all | Minimally | Somewhat | Significantly | Fully |
| 1          | 2         | 3        | 4             | 5     |

4. To what extent did you ensure that hardware and software replacement/upgrades were incorporated into school technology plans?

|            |           |          |               |       |
|------------|-----------|----------|---------------|-------|
| Not at all | Minimally | Somewhat | Significantly | Fully |
| 1          | 2         | 3        | 4             | 5     |

5. To what extent did you advocate at the district level for adequate, timely, and high-quality technology support services?

|            |           |          |               |       |
|------------|-----------|----------|---------------|-------|
| Not at all | Minimally | Somewhat | Significantly | Fully |
| 1          | 2         | 3        | 4             | 5     |

6. To what extent did you investigate how satisfied faculty and staff were with the technology support services provided by your district/school?

|            |           |          |               |       |
|------------|-----------|----------|---------------|-------|
| Not at all | Minimally | Somewhat | Significantly | Fully |
| 1          | 2         | 3        | 4             | 5     |

## V. Assessment & Evaluation

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1. To what extent did you promote or model technology-based systems to collect student assessment data?

|            |           |          |               |       |
|------------|-----------|----------|---------------|-------|
| Not at all | Minimally | Somewhat | Significantly | Fully |
| 1          | 2         | 3        | 4             | 5     |

2. To what extent did you promote the evaluation of instructional practices, including technology-based practices, to assess their effectiveness?

|            |           |          |               |       |
|------------|-----------|----------|---------------|-------|
| Not at all | Minimally | Somewhat | Significantly | Fully |
| 1          | 2         | 3        | 4             | 5     |

3. To what extent did you assess and evaluate existing technology-based administrative and operations systems for modification or upgrade?

|            |           |          |               |       |
|------------|-----------|----------|---------------|-------|
| Not at all | Minimally | Somewhat | Significantly | Fully |
| 1          | 2         | 3        | 4             | 5     |

4. To what extent did you evaluate the effectiveness of professional development offerings in your school to meet the needs of teachers and their use of technology?

|            |           |          |               |       |
|------------|-----------|----------|---------------|-------|
| Not at all | Minimally | Somewhat | Significantly | Fully |
| 1          | 2         | 3        | 4             | 5     |

5. To what extent did you include the effective use of technology as a criterion for assessing the performance of faculty?

|            |           |          |               |       |
|------------|-----------|----------|---------------|-------|
| Not at all | Minimally | Somewhat | Significantly | Fully |
| 1          | 2         | 3        | 4             | 5     |

## VI. Social, Legal, & Ethical Issues

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1. To what extent did you work to ensure equity of technology access and use in your school?

|            |           |          |               |       |
|------------|-----------|----------|---------------|-------|
| Not at all | Minimally | Somewhat | Significantly | Fully |
| 1          | 2         | 3        | 4             | 5     |

2. To what extent did you implement policies or programs meant to raise awareness of technology-related social, ethical, and legal issues for staff and students?

|            |           |          |               |       |
|------------|-----------|----------|---------------|-------|
| Not at all | Minimally | Somewhat | Significantly | Fully |
| 1          | 2         | 3        | 4             | 5     |

3. To what extent were you involved in enforcing policies related to copyright and intellectual property?

|            |           |          |               |       |
|------------|-----------|----------|---------------|-------|
| Not at all | Minimally | Somewhat | Significantly | Fully |
| 1          | 2         | 3        | 4             | 5     |

4. To what extent were you involved in addressing issues related to privacy and online safety?

|            |           |          |               |       |
|------------|-----------|----------|---------------|-------|
| Not at all | Minimally | Somewhat | Significantly | Fully |
| 1          | 2         | 3        | 4             | 5     |

5. To what extent did you support the use of technology to help meet the needs of special education students?

|            |           |          |               |       |
|------------|-----------|----------|---------------|-------|
| Not at all | Minimally | Somewhat | Significantly | Fully |
| 1          | 2         | 3        | 4             | 5     |

6. To what extent did you support the use of technology to assist in the delivery of individualized education programs for all students?

|            |           |          |               |       |
|------------|-----------|----------|---------------|-------|
| Not at all | Minimally | Somewhat | Significantly | Fully |
| 1          | 2         | 3        | 4             | 5     |

7. To what extent did you disseminate information about health concerns related to technology and computer usage in classrooms and offices?

|            |           |          |               |       |
|------------|-----------|----------|---------------|-------|
| Not at all | Minimally | Somewhat | Significantly | Fully |
| 1          | 2         | 3        | 4             | 5     |





## **PRINCIPALS TECHNOLOGY LEADERSHIP ASSESSMENT**

### **- Interpreting the Results -**

The attached documents show your individual results on the Principals Technology Leadership Assessment (PTLA), the nation's first assessment for principals based on ISTE's National Educational Technology Standards for Administrators (NETS-A), and the overall averages for all 77 principals taking the assessment in August 2005. If your school district had five or more principals participate in the assessment, you also should receive the overall averages for your district.

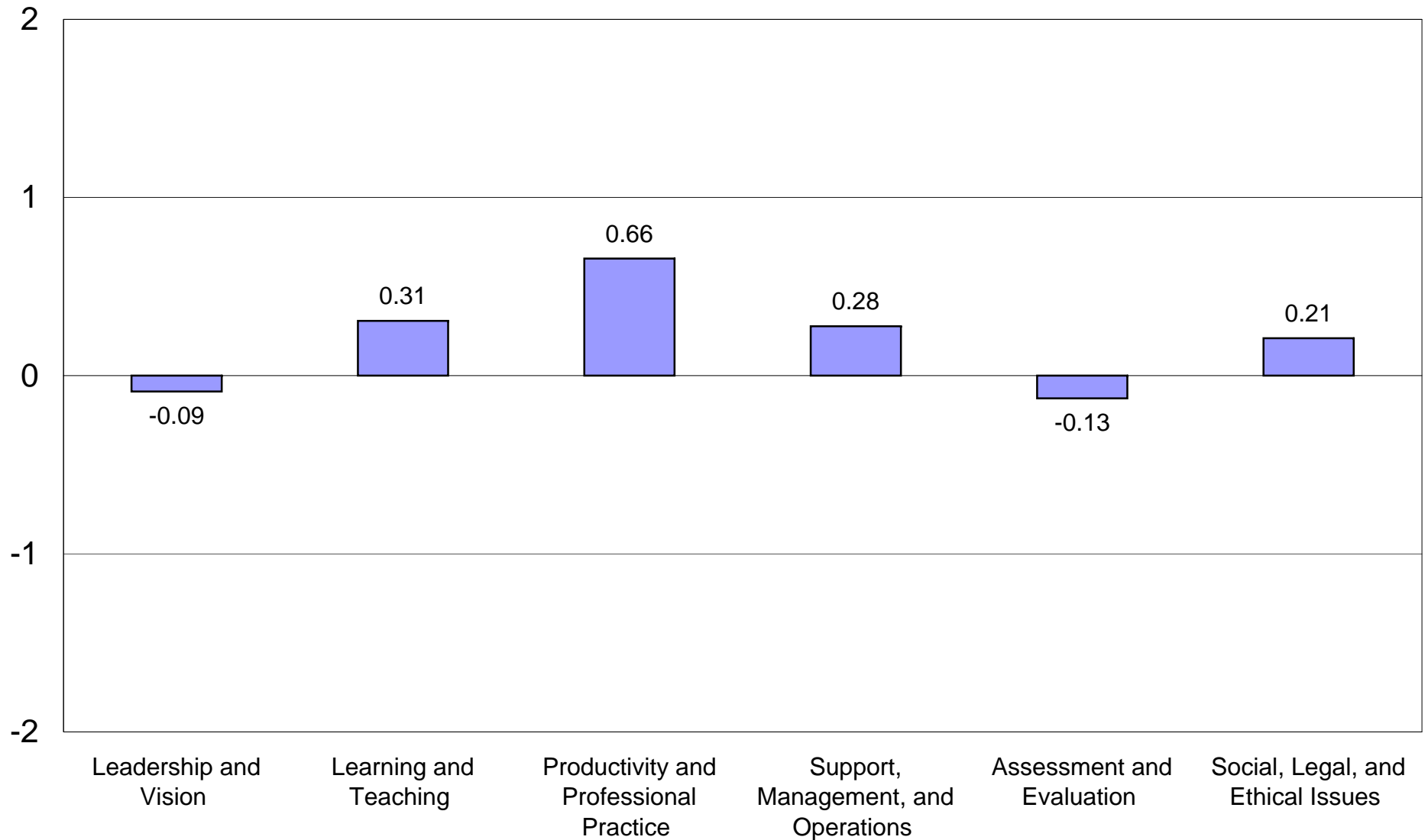
The six NETS-A standards, and their corresponding twenty-seven performance indicators, outline what a technology-savvy school leader knows and is able to do. Because of the tremendous time, instructional, and administrative demands facing most building-level leaders, the NETS-A represent an ideal, not a minimum standard. Please view the PTLA as a mechanism to highlight principals' relative strengths and needs in the area of technology leadership. The PTLA also can be a helpful tool to structure principals' dialogue with their school district about their technology-related professional development needs and interests.

PTLA results are centered around a midline of zero and range from +2 to -2. This scale is not precise but is a rough measure of reported activity in each of the NETS-A standards areas. The bar for each standard represents an average of responses to the survey questions representing that standard. A bar closer to +2 represents a strength or an area of frequent activity; a bar closer to -2 represents an area of need or an area of relative inactivity. Lower or negative bars may represent principals' personal knowledge, skill, and/or level of interest or may also reflect a lack of opportunity for involvement. The validity and reliability of the online PTLA survey questions have been psychometrically tested by the American Institutes for Research.

Please contact us if you have questions about the PTLA and/or the ways that the assessment results can be used to guide principals' professional development and training. Thank you.

# PRINCIPALS TECHNOLOGY LEADERSHIP ASSESSMENT

## Overall Averages



**NETS-A STANDARDS**

## PRINCIPALS TECHNOLOGY LEADERSHIP ASSESSMENT

### - Development of the Instrument -

The goal in developing the Principals Technology Leadership Assessment (PTLA) was to produce a short, multiple-choice assessment to measure the school technology leadership of an individual principal or school administrator. The following is an overview of the process and methodology that the American Institutes for Research (AIR) and the UCEA Center for the Advanced Study of Technology Leadership in Education (CASTLE) used to develop, test, and validate the assessment instrument.

#### Development Methodology

The assessment was designed to align with the existing National Education Technology Standards for Administrators (NETS-A). Development of the instrument therefore began with a review of NETS-A to identify specific behaviors, activities, and practices associated with each of the standards. In the end, the information gathered in the review was used to inform development of the assessment's individual items. The development team reviewed both the core NETS-A, as well as the more detailed set of standards outlined for school principals<sup>1</sup>. The team referenced Making Technology Standards Work for You<sup>2</sup> and other literature on school technology leadership to help gather additional detail on the standards.

The development team collected existing surveys and assessments, relevant literature, and solicited the advice of researchers to identify best practices in leadership assessment, self-assessment, and item development. The team reviewed surveys and assessments for school leaders and technology in attempt to identify existing items that aligned or related to NETS-A. While a number of existing instruments were discovered, only a handful contained items that were directly applicable to NETS-A. Items from less useful instruments were generally too generic and did not reference technology issues in any specific way, or were not designed to assess the leadership of a single individual<sup>3</sup>. The team drew on the language and concepts of the more useful instruments as appropriate.

The team also identified numerous existing leadership self-assessments and other leadership assessment systems. Of those identified, a few of the assessment systems with self-assessment components had evidence to support their validity (e.g., the Multifactor Leadership Questionnaire<sup>4</sup>). However, the team found little evidence to support the validity of purely self-administered leadership assessments. A few exceptions, the Rating Scale for Leadership and the Student Leadership Practices Inventory, have some evidence to support their validity. The Rating Scale for Leadership is a rather

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<sup>1</sup> "National Educational Technology Standards Poster." International Society for Technology in Education. [http://cnets.iste.org/tssa/pdf/NETS-A\\_Poster\\_PF.pdf](http://cnets.iste.org/tssa/pdf/NETS-A_Poster_PF.pdf).

<sup>2</sup> Brooks-Young, Susan. Making Technology Standards Work for You. International Society for Technology in Education. 2002.

<sup>3</sup> For example, "Principal Survey." Study of Educational Technology. inTASC. Boston College. <http://www.bc.edu/research/intasc/studies/USEIT/description.shtml>; "21<sup>st</sup> Century School Administrator Skills." National Association of Secondary School Principals. 2001; "Profiling Educational Technology Integration." SETDA Common Data Elements Committee and the Metiri Group. State Educational Technology Directors Association. <http://www.setda-peti.org/Intro.html>.

<sup>4</sup> Avolio, Bruce J. and Bernard M. Bass. "Multifactor Leadership Questionnaire, Manual and Sampler Set." Third Edition. Mind Garden, Inc. [www.mindgarden.com](http://www.mindgarden.com).

generic instrument used to identify potential leadership in students in grades 5-12<sup>5</sup>. The Student Leadership Practices Inventory has also undergone some validity testing, but is designed specifically for assessing leadership in college students in college environments (e.g., student governments and fraternal organizations)<sup>6</sup>. The items from these scales presented no immediate relevance to the development of items for a technology-oriented, behavior-specific assessment for school administrators.

The development team also reviewed literature on practices in self-assessment and solicited the advice of researchers from several fields, including experts in the areas of leadership development, organizational psychology, and psychometrics. One outcome of this outreach was generic information about ways to optimize assessment items and scales so as to elicit more reliable responses. For example, the assessment items ask respondents about past behaviors (rather than intended behaviors) and ask that they focus their assessment on a discrete period of time. The assessment instrument also includes an introduction that identifies common errors in self-assessment and defines important terms used throughout the assessment to help ensure consistent interpretation between the developers and respondents.

Draft items were reviewed by individuals on the development team to assess general face validity and alignment with the six dimensions of NETS-A. Checking for alignment with the standards required that reviewers assign each of the proposed items to one of the six NETS-A dimensions (e.g., Leadership and Vision, Learning and Teaching, etc.). If the reviewers assigned an item to different categories, the item was revised until the reviewers agreed that it was aligned with the same, specific NETS-A dimension. As a related activity, the instrument was reviewed multiple times against NETS-A to ensure that each of the major themes of the standards were addressed. The entire process led to a draft instrument of approximately 35 items with four to six items per NETS-A dimension.

### Expert Review and Validation

The draft instrument was subsequently reviewed by ten content experts in the field of education technology and school leadership. The expert reviewers were identified by CASTLE and participated on a volunteer basis. Each reviewer completed a scoring sheet, which included two 5-point scales for each item in the draft instrument; one scale addressed the item's relevance to NETS-A and one addressed the overall quality of the item. The scoring sheet also allowed reviewers to provide open-ended comments on each item, as well as comments on all the items for any one dimension of NETS-A. Summary results are presented in Exhibit 1.

| <b>Exhibit 1.<br/>Reviewer Feedback (n=10)</b> | <b>Scale of Item Relevance<br/>to NETS-A (1-5)</b> | <b>Scale of Item Quality (1-5)</b> |
|--|--|------------------------------------|
| Lowest Average (single item)                   | 4.13   | 3.38                               |
| Highest Average (single item)                  | 5.00   | 4.71                               |
| Lowest Median Value (single item)              | 4.00   | 3.00                               |
| Highest Median Value (single item)             | 5.00   | 5.00                               |
| Overall Average                                | 4.70   | 4.21                               |

The expert review provided additional evidence of the assessment's face validity and helped confirm that both the standards and the assessment are aligned. The scores also allowed the development team to identify items that needed revision. The development team revised all but 7 of the 33 items in the draft instrument as a result of the feedback. A majority of the revisions were minor language clarifications to address relatively low item quality ratings. Two items were deleted, and four new items were added.

### Pilot and Internal Reliability Testing

<sup>5</sup> Shaunessy, Elizabeth and Frances A. Karnes. *Instruments for Measuring Leadership in Children and Youth*. Gifted Child Today Magazine. Winter 2004. Vol. 27, Issue 1.

<sup>6</sup> Posner, Barry Z. "A Leadership Development Instrument for Students: Updated." *Journal of College Student Development*. July/August 2004.

CASTLE piloted the test and collected data from 74 school principals in August of 2005. The respondents represented schools from seven states and provinces: Alberta (Canada), Arizona, Illinois, Minnesota, New York, Ohio, and Texas. The AIR development team used the data to test the instrument's reliability (i.e., its internal consistency) and other psychometric properties.

Descriptive statistics were run to examine the quality of the data. The majority of the items on the PTLA instrument demonstrated appropriate functioning; the mean for items was approximately 3 ("Somewhat") on the five-point scale; the standard deviation was approximately 1; and the responses showed appropriate distribution (i.e., near-normal). Item "ppp2," (mean = 4.3, standard deviation = 0.64), and item "sle7" (mean = 1.86, standard deviation = 1.04) were the only exceptions.

An analysis of internal consistency, or reliability, was conducted in STATA on the test as a whole and on each of the six factors. The results of these analyses are presented in the attached tables. For both analyses, it can be seen that there are less than 74 observations for some items, indicating that respondents did not select a response for that item. At most, there is a discrepancy of 4 (5.4%) respondents at the item level.

#### *Overall Analysis*

The reliability of the test as a whole is high: cronbach's alpha ( $\alpha$ ) = 0.95. The item-test correlations show the correlation between each item and the overall instrument; the range of item-test correlations is  $r$  = 0.39 to 0.80, with only 7 items correlated less than 0.50. The item-rest correlation shows how the item is correlated with a scale computed from all other items, minus the item under consideration. For all items, this correlation is lower than the item-test correlation, indicating that each item contributes to measurement of the PTLA construct. Further, the values associated with "Alpha if item removed" indicate that the instrument does not benefit from the removal of individual items.

#### *Dimension Analysis*

The PTLA, like NETS-A, is composed of items in six separate, but related dimensions, or sub-scales. Separate analysis of the six dimensions shows high reliability for five of the dimensions: Leadership & Vision ( $\alpha$  = 0.88); Learning & Teaching ( $\alpha$  = 0.84); Support, Management, & Operations ( $\alpha$  = 0.85); Assessment & Evaluation ( $\alpha$  = 0.84); and Social, Legal, & Ethical Issues ( $\alpha$  = 0.81). It should be noted that although the alpha coefficients for each dimension are lower than the overall reliability ( $\alpha$  = 0.95), this is expected and is a function of an analysis on fewer items; it is not an indication of difference in item or dimension functioning. Within each of the dimensions are also high item-test and item-rest correlations, indicating that the items function well within the dimensions.

One dimension, Productivity & Professional Practice ( $\alpha$  = 0.65), shows markedly lower reliability. The item-test and item-rest correlations are also lower. This decrease in reliability when compared to the five other dimensions indicates that, although the items may be appropriate when considered in the context of the overall instrument, this dimension should not be taken as an independent measure of the construct. The Productivity & Professional Practice dimension may be removed without detriment to, and only marginal enhancement of, the psychometric quality of the instrument.

Dimension-level results and analyses would be bolstered by additional items in each dimension; analyses and conclusions based on a scale of 5 to 7 items must be approached with caution. Generally, a sub-scale consisting of 20 or more items is necessary to draw conclusions about a dimension's reliability. Further, factor analysis could be conducted to examine the underlying structure of the PTLA instrument.

#### *Internal Reliability Test Conclusions*

Overall, the PTLA instrument evidences high reliability which is not to be further enhanced or decreased by the removal of individual items. According to the overall analysis, no item appears to function poorly or warrants removal. The PTLA instrument appears to appropriately measure the desired construct of school technology leadership.

**Table 1: Overall Test Analysis**

| Item       | Obs | Sign | Item-test correlation* | Item-rest correlation** | Average inter-item covariance | Alpha if item removed |
|------------|-----|------|------------------------|-------------------------|-------------------------------|-----------------------|
| lv1        | 74  | +    | 0.51                   | 0.47                    | 0.42                          | 0.95                  |
| lv2        | 74  | +    | 0.61                   | 0.58                    | 0.42                          | 0.95                  |
| lv3        | 74  | +    | 0.57                   | 0.54                    | 0.42                          | 0.95                  |
| lv4        | 73  | +    | 0.72                   | 0.69                    | 0.41                          | 0.95                  |
| lv5        | 73  | +    | 0.70                   | 0.67                    | 0.41                          | 0.95                  |
| lv6        | 74  | +    | 0.70                   | 0.68                    | 0.41                          | 0.95                  |
| lt1        | 74  | +    | 0.52                   | 0.49                    | 0.43                          | 0.95                  |
| lt2        | 74  | +    | 0.51                   | 0.47                    | 0.43                          | 0.95                  |
| lt3        | 74  | +    | 0.79                   | 0.77                    | 0.42                          | 0.95                  |
| lt4        | 73  | +    | 0.69                   | 0.66                    | 0.41                          | 0.95                  |
| lt5        | 73  | +    | 0.80                   | 0.78                    | 0.41                          | 0.95                  |
| lt6        | 73  | +    | 0.75                   | 0.73                    | 0.42                          | 0.95                  |
| ppp1       | 74  | +    | 0.63                   | 0.60                    | 0.43                          | 0.95                  |
| ppp2       | 74  | +    | 0.39                   | 0.37                    | 0.44                          | 0.95                  |
| ppp3       | 73  | +    | 0.46                   | 0.42                    | 0.42                          | 0.95                  |
| ppp4       | 74  | +    | 0.42                   | 0.38                    | 0.43                          | 0.95                  |
| ppp5       | 74  | +    | 0.40                   | 0.36                    | 0.43                          | 0.95                  |
| smo1       | 74  | +    | 0.54                   | 0.51                    | 0.43                          | 0.95                  |
| smo2       | 71  | +    | 0.68                   | 0.65                    | 0.42                          | 0.95                  |
| smo3       | 71  | +    | 0.57                   | 0.53                    | 0.42                          | 0.95                  |
| smo4       | 72  | +    | 0.71                   | 0.68                    | 0.41                          | 0.95                  |
| smo5       | 74  | +    | 0.63                   | 0.60                    | 0.42                          | 0.95                  |
| smo6       | 72  | +    | 0.70                   | 0.67                    | 0.41                          | 0.95                  |
| ae1        | 73  | +    | 0.58                   | 0.54                    | 0.42                          | 0.95                  |
| ae2        | 71  | +    | 0.68                   | 0.65                    | 0.42                          | 0.95                  |
| ae3        | 71  | +    | 0.65                   | 0.62                    | 0.42                          | 0.95                  |
| ae4        | 70  | +    | 0.77                   | 0.75                    | 0.42                          | 0.95                  |
| ae5        | 73  | +    | 0.65                   | 0.62                    | 0.42                          | 0.95                  |
| sle1       | 73  | +    | 0.65                   | 0.62                    | 0.42                          | 0.95                  |
| sle2       | 73  | +    | 0.69                   | 0.66                    | 0.42                          | 0.95                  |
| sle3       | 73  | +    | 0.55                   | 0.52                    | 0.42                          | 0.95                  |
| sle4       | 73  | +    | 0.54                   | 0.51                    | 0.42                          | 0.95                  |
| sle5       | 72  | +    | 0.42                   | 0.39                    | 0.43                          | 0.95                  |
| sle6       | 73  | +    | 0.45                   | 0.41                    | 0.43                          | 0.95                  |
| sle7       | 71  | +    | 0.55                   | 0.52                    | 0.42                          | 0.95                  |
| Test scale |     |      |                        |                         | 0.42                          | 0.95                  |

\*: item-test correlation shows how highly correlated each item is with the scale.

\*\* : item-rest correlation shows how the item is correlated with a scale computed from only the other items.

**Table 2: Test Analysis by Each of the Five Factors**

| Item      | Obs | Sign | Item-test correlation* | Item-rest correlation** | Average inter-item covariance | Alpha if item removed |
|-----------|-----|------|------------------------|-------------------------|-------------------------------|-----------------------|
| lv1       | 74  | +    | 0.75                   | 0.63                    | 0.76                          | 0.86                  |
| lv2       | 74  | +    | 0.83                   | 0.75                    | 0.74                          | 0.84                  |
| lv3       | 74  | +    | 0.75                   | 0.63                    | 0.77                          | 0.86                  |
| lv4       | 73  | +    | 0.80                   | 0.70                    | 0.71                          | 0.85                  |
| lv5       | 73  | +    | 0.79                   | 0.68                    | 0.71                          | 0.85                  |
| lv6       | 74  | +    | 0.78                   | 0.67                    | 0.74                          | 0.85                  |
| Sub-scale | *** |      |                        |                         | 0.74                          | 0.88                  |
| lt1       | 74  | +    | 0.70                   | 0.56                    | 0.53                          | 0.82                  |
| lt2       | 74  | +    | 0.67                   | 0.53                    | 0.55                          | 0.83                  |
| lt3       | 74  | +    | 0.80                   | 0.70                    | 0.49                          | 0.79                  |
| lt4       | 73  | +    | 0.74                   | 0.57                    | 0.49                          | 0.82                  |
| lt5       | 73  | +    | 0.80                   | 0.68                    | 0.47                          | 0.79                  |
| lt6       | 73  | +    | 0.75                   | 0.64                    | 0.51                          | 0.80                  |
| Sub-scale |     |      |                        |                         | 0.51                          | 0.84                  |
| ppp1      | 74  | +    | 0.58                   | 0.36                    | 0.32                          | 0.61                  |
| ppp2      | 74  | +    | 0.66                   | 0.52                    | 0.30                          | 0.58                  |
| ppp3      | 73  | +    | 0.67                   | 0.34                    | 0.27                          | 0.64                  |
| ppp4      | 74  | +    | 0.73                   | 0.50                    | 0.23                          | 0.54                  |
| ppp5      | 74  | +    | 0.64                   | 0.39                    | 0.28                          | 0.60                  |
| Sub-scale |     |      |                        |                         | 0.28                          | 0.65                  |
| smo1      | 74  | +    | 0.56                   | 0.42                    | 0.84                          | 0.85                  |
| smo2      | 71  | +    | 0.80                   | 0.69                    | 0.65                          | 0.81                  |
| smo3      | 71  | +    | 0.70                   | 0.54                    | 0.70                          | 0.84                  |
| smo4      | 72  | +    | 0.83                   | 0.72                    | 0.60                          | 0.80                  |
| smo5      | 74  | +    | 0.76                   | 0.65                    | 0.69                          | 0.82                  |
| smo6      | 72  | +    | 0.86                   | 0.78                    | 0.60                          | 0.79                  |
| Sub-scale |     |      |                        |                         | 0.68                          | 0.85                  |
| ae1       | 73  | +    | 0.76                   | 0.58                    | 0.65                          | 0.82                  |
| ae2       | 71  | +    | 0.83                   | 0.72                    | 0.57                          | 0.78                  |
| ae3       | 71  | +    | 0.77                   | 0.62                    | 0.63                          | 0.82                  |
| ae4       | 70  | +    | 0.79                   | 0.66                    | 0.63                          | 0.81                  |
| ae5       | 73  | +    | 0.78                   | 0.61                    | 0.62                          | 0.81                  |
| Sub-scale |     |      |                        |                         | 0.62                          | 0.84                  |
| sle1      | 73  | +    | 0.74                   | 0.64                    | 0.44                          | 0.78                  |
| sle2      | 73  | +    | 0.78                   | 0.67                    | 0.39                          | 0.77                  |
| sle3      | 73  | +    | 0.74                   | 0.62                    | 0.43                          | 0.78                  |
| sle4      | 73  | +    | 0.69                   | 0.55                    | 0.44                          | 0.79                  |
| sle5      | 72  | +    | 0.59                   | 0.45                    | 0.49                          | 0.81                  |
| sle6      | 73  | +    | 0.65                   | 0.48                    | 0.44                          | 0.80                  |
| sle7      | 71  | +    | 0.61                   | 0.46                    | 0.48                          | 0.80                  |
| Sub-scale |     |      |                        |                         | 0.44                          | 0.81                  |

\*: item-test correlation shows how highly correlated each item is with the scale.

\*\* : item-rest correlation shows how the item is correlated with a scale computed from only the other items.

\*\*\*: this value provides a measure of reliability for the sub-scale