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The *Personal Learning Insights Profile*®
Research Report

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Development of the *Personal Learning Insights Profile*® Model

Development of the *Personal Learning Insights Profile*® began with a review of published theories and research on the subject of learning. The literature includes two different terms, *learning styles* and *cognitive styles*.

Learning styles is the term most often used by teachers and corporate trainers, whose goal is to relate instructional methods to students' preferred learning strategies and environment. *Cognitive styles* is the term preferred by academic researchers studying cognitive psychology and perception — fields where the goal is to understand how individuals receive information and process it intellectually.

Instrument Development

Studies that focus on field-dependent and field-independent learning styles were selected from the review of literature, and their content was summarized in a written report. This document served to define the subject matter of the instrument and guide its development.

Alpha Test Form

Three subject-matter experts were asked to provide a draft of items to measure field-dependent and field-independent learning styles. Each expert holds a faculty appointment in a college or university and teaches or uses learning strategies. They were provided with a copy of the research summary with written instructions and examples for item development. They were asked to furnish items measuring field-independent and field-dependent learning styles separately.

Input from subject matter experts was selected and refined by research and development staff at Inscape Publishing. The alpha test version of the instrument contained a merged set of 70 items with one field-dependent and field-independent response option for each item. Respondents chose the response option they preferred.

This test form was completed by a total of 816 respondents, whose demographic features are represented in Table 1.

Table 1: Demographic characteristics of alpha test respondents (*N*=816)

Characteristic	Number	Percent	Characteristic	Number	Percent
Gender:			Age:		
Male	219	27%	under 18	17	2%
Female	591	73	18-25	255	31
			26-35	157	19
			36-45	193	24
			46-55	125	15
			56 or older	67	8
Education:			Heritage:		
Up to high school grad	4	<1%	African-American	44	5%
High school graduate	86	11	Asian-American	11	1
Some college	278	34	Caucasian	692	85
Technical/trade school	30	4	Hispanic	32	4
College graduate	233	29	Native American	12	1
Graduate/professional degree	185	23	Other	21	3
Employment:			Industrial classification:		
Secretarial/clerical	56	7%	Manufacturing	60	8%
Executive	28	4	Finance/ins./real estate	61	9
Mid-level management	82	11	Public administration	30	4
Supervisory	25	3	Wholesale/retail trade	68	9
Professional	121	16	Business services	87	12
Mechanical/technical	11	1	Educational services	153	21
Skilled trades	6	1	Health services	99	14
Warehouse/gen. labor	16	2	Transportation/utilities	22	3
Assembly worker	6	1	Other	136	19
Customer service	60	8			
Sales	42	5			
Health care worker	21	3			
Teacher/educator	144	19			
Custodial/housekeeping	4	1			
Work at home	13	2			
Other	133	17			

Note: Any variation of column totals from *N*=816 is the direct result of missing data.

Analysis & Results

Alpha Test Version

Analyses of alpha test responses were designed to determine

- how many scales the instrument would contain, since each scale must measure one aspect of learning;

- on which scale individual items belonged. All the items assigned to a scale must measure that aspect of learning. The instrument was designed to be bipolar so that the scales on the *Personal Learning Insights Profile*® measure items that can be compared on a single dimension. A familiar example of a bi-polar scale is temperature, which contrasts hot and cold.

Factor Analysis was used to examine relationships among item responses within the test sample in order to efficiently improve the scales.

Factor Analysis

Item responses were submitted to Factor Analysis using the Principal Components Method with Varimax rotation. A three-factor solution was selected as the most meaningful, and items were assigned to scales based on their factor loadings (partial correlation of the item with the factor). Items with loadings of .30 or higher were retained for further study.

The first question was answered when three meaningful factors were identified. There were three aspects or scales on which learning strategies could be distinguished. When the particular items associated with each scale (factor) were studied, it was evident that the following aspects of learning were being measured:

- the purpose or value of the learning experience
- the way new information is structured
- the degree of active involvement

Factor Analysis also indicated which items in the alpha version should be assigned to a scale by the pattern of factor loadings obtained. On this basis, further refinements were made to create a three-scale instrument for analysis in the beta-test phase of development.

Nineteen items were eliminated because they were not clearly associated with one of the three scales. Six items were rewritten because responses were extremely skewed (i.e., most people selected only one of the two response options).

Beta Test Version

The beta test version contained seventeen items for each scale. Each item included a pair of statements representing field-independent and field-dependent learning strategies. The wording and order of statements in the beta test version was the same as in the initial alpha test version for the items retained.

The beta version was administered to 237 individuals, with a special effort to include more male and non-Caucasian respondents than were present in the alpha test sample.

Beta test responses were analyzed in the same manner as the alpha version of the instrument (i.e., the factor was analyzed using the method of Principal Components with Varimax rotation). Item factor loadings and internal consistency coefficients were studied and compared with alpha test findings. Response distributions were also examined.

Results confirmed that the appropriate model for describing field-dependent versus field-independent learning strategies, as measured by the *Personal Learning Insights Profile*™, is a three-factor model. However, differences were observed among items included in both the alpha and beta test samples, suggesting that further analyses were required. The two samples differed on demographic characteristics that could affect outcome, particularly gender and heritage. Finally, the alpha sample was not as representative of the target population as the beta sample. For these reasons, a composite of the two respondent samples was constructed to provide a more reliable sample on which to base further analyses.

Further Analyses

The third test sample included all 237 members of the beta test group and an additional 237 members selected randomly from the alpha test sample. Results obtained from this respondent group (*N*=474) produced the most clear results, and formed the basis for the final instrument. The demographic characteristics of this research sample are shown in Table 2 which follows.

Table 2: Demographic characteristics of the selected research sample (*N*=474)

Characteristic	Number	Percent	Characteristic	Number	Percent
Gender			Age		
Male	191	41%	under 18	12	3%
Female	273	59	18-25	95	20
			26-35	93	20
			36-45	133	28
			46-55	89	19
			56 or older	46	10
Education			Heritage		
Up to high school grad	10	2%	African-American	77	17%
High school graduate	61	13	Asian-American	11	2
Some college	120	26	Caucasian	345	74
Technical/trade school	19	4	Hispanic	20	4
College graduate	143	31	Native American	5	1
Graduate/professional degree	114	24	Other	8	2
Employment			Industrial classification:		
Secretarial/clerical	37	8%	Manufacturing	35	8%
Executive	23	5	Finance/ins./real estate	26	6
Mid-level management	47	10	Public administration	17	4
Supervisory	17	4	Wholesale/retail trade	48	11
Professional	96	21	Business services	52	12
Mechanical/technical	12	3	Educational services	75	17
Skilled trades	12	3	Health services	66	15
Warehouse/gen. labor	3	1	Transportation/utilities	38	9
Assembly worker	2	<1	Other	72	17
Customer service	24	5			
Sales	18	4			
Health care worker	15	3			
Teacher/educator	58	13			
Custodial/housekeeping	4	1			
Work at home	13	3			
Other	69	15			

Note: Any variation of column totals from *N*=474 is the direct result of missing data.

Definition of Scales

A clear, three-factor structure emerged during the third phase of development. It was confirmed by internal-consistency analyses and a measure of independence among scales (low intercorrelation). The content of items assigned to scales defined the meaning of each scale as follows:

Scale 1

Scale 1 refers to the *purpose* a learner has for engaging in the learning process. Field-dependent learners want to learn when information is *practical* — when they have an immediate use for what they learn. Field-independent learners want to learn when the information is new and *informative* and they can use it to generate ideas and learn new things.

People who prefer learning to be Practical tend to choose statements like the following:

- I most enjoy learning when I see how I'll be able to use it.
- I like to learn about things that relate to things I already know.

Individuals who prefer learning to be Informative tend to choose statements like the following:

- I most enjoy learning when it presents a challenge.
- I am satisfied with a learning opportunity when it teaches me important things I didn't know before.

Scale 2

Scale 2 measures how much *structure* a person likes to have provided for the learning task. Field-dependent learners want to receive information in a *specifically* defined structure. They prefer to have an outline in place, or objectives defined before getting into the details, so they have a "place" for new information.

Field-independent learners are less concerned about how they receive new information. They like information organized in a *general* manner, so they can organize it themselves.

Individuals who prefer a Specific structure are likely to endorse the following statements:

- When a new learning assignment is being introduced, I prefer to get specific directions, including an actual sample.
- I like to learn systematically—for example, by using a model, hypothesis or diagram.

Those who prefer General structure are likely to choose statements such as the following:

- I prefer to get general directions without too much detail.
- I like to learn by trial and error.

Scale 3

Scale 3 measures how *active* individuals prefer to be during the learning process. At one end of this scale, field-dependent learners prefer to actively *participate* in the learning task and at the other end, field-independent learners prefer to be more *reflective*.

Those who prefer Participative learning are likely to choose statements like the following:
- I learn more from discussion with others.
- I enjoy the learning experience when I can physically handle the learning material.

Those who prefer Reflective learning are likely to choose statements such as the following:
- I learn best when I can decide for myself what it means.
- I enjoy the learning experience when I can move at my own pace.

When scores are generated based on these scales, it becomes possible to compare score distributions across respondents and between demographic subgroups.

Scale Reliability

The internal consistency of each of the three bipolar scales in the *Personal Learning Insights Profile*™ was measured using Cronbach's *alpha* coefficient. This statistic represents the average correlation among all items on the scale. As such, it describes the extent to which all items are measuring the same thing.

When a measure is constrained or limited by such features as the number of items in the scale, the way responses are obtained, and the number of respondents in a sample, it is customary to assume that *alpha* is an underestimate of the true reliability of the scale and adjust the statistic to better approximate true reliability. To adjust for number of items in a scale, the Spearman-Brown formula is used. Reliabilities reported below and in Table 3 have been adjusted to provide a better estimate of true reliability.

The following scale reliabilities are obtained from the selected sample of 474 respondents, on which the final scale development was based.

Scale 1 - Learning Purpose $\qquad r_{yy'} = .77$

Scale 2 - Learning Structure $\qquad r_{yy'} = .82$

Scale 3 - Learning Activity $\qquad r_{yy'} = .89$

Validity

There are several ways to demonstrate the validity of a measure. One is to determine whether the model presented by an instrument is validated by the statistical relationships among the scales. Another is to examine the extent to which the scales' content represents what is known about the subject being measured – in other words, the assumptions made in constructing the instrument, and whether those assumptions were justified.

The *Personal Learning Insights Profile*™ offers a model of cognitive learning strategies based on two assumptions:

First, field-dependent and field-independent learning preferences, as defined earlier, are bipolar concepts. In this manner, when a respondent selects a field-dependent preference, it is likely the field-independent preference with which it is paired is considerably less appealing, and vice versa.

This assumption was based initially on the review of published research addressing field-dependent and field-independent learning styles. Research had already identified polar attributes characteristic of each style. Subject matter experts also produced a number of bipolar items. These attributes were incorporated into the items developed for this instrument and thereby contributed to its content validity.

In reviewing results of the alpha test, two observations helped identify items that did not measure truly bipolar features:
- the relationship of items to a scale
- comments offered by respondents who found it difficult to choose among paired responses

What remains in the present instrument are those 42 items that best met the assumption of bipolarity.

The second assumption is that there are three distinct aspects of a person's preference for field-dependent versus field-independent learning.

This assumption emerged empirically from analysis of test versions of the *Personal Learning Insights Profile*™. It is validated by a measure of intercorrelation between scales. Low intercorrelation (approaching zero) indicates a scale is independent of the other scales (i.e., it measures something that the other scales do not measure).

In the group of 474 respondents on whom scale reliabilities were calculated, inter-scale correlations ranged from -.07 to .01, indicating that in this sample each scale was entirely independent. Among all respondents combined (N=1066), inter-scale correlations ranged from .05 to .27. Influenced as it is by the predominately female and Caucasian alpha-test respondents, this larger sample offers an indication of how much correlation between scales may occur in a more homogeneous group. "True" associations are more likely to be found in heterogeneous samples; thus the smaller but more representative sample is probably more dependable as an indication of the true independence of each scale.

One important way to examine the internal validity of an instrument is to look at the scale reliabilities (association of items within a scale) in relation to the inter-scale correlations (association of items between scales). These relationships are shown in Table 3.

Table 3. Reliabilities and intercorrelations among scales of the *Personal Learning Insights Profile*® (N=474)

	Activity	Structure	Purpose
Activity	*.89*		
Structure	.02	*.82*	
Purpose	-.07	.01	*.77*

Note: Reliabilities are shown in italics along the diagonal.

Based on the degree of independence among the three scales of the *Personal Learning Insights Profile®*, a third assumption is also justified: Individual learning preferences are likely to reflect any possible combination of field-dependent and field-independent learning styles across the three scales.

This assumption was examined by scoring a profile for each member of the entire sample of respondents (N=1066), using their responses to items included in final versions of each scale. By looking at scores on each of the three scales, learners could be categorized as field-dependent, field-independent, or as a combination of both cognitive styles.

Results indicated that all but one combination of scores did, in fact, occur. No single combination represented more than 12 percent of the total sample.

Summary and Implications

A number of differences in average preferences were found on the *Personal Learning Insights Profile®* for various demographic subgroups. Some were in the expected direction:

- Minority group members tended to prefer the field-dependent learning option on Scales 2 and 3.
- There was a general association of level of education with the preference for field-independent learning experiences.

Other findings were not expected, but they are explained partly by the fact that the present instrument measures learning preferences by using three aspects of learning not been clearly separated in previous research. Thus, while no appreciable difference is noted between male and female respondents *overall*, significant differences do become evident, and in opposite directions, on two of the three *individual scales*.

Differences by age of respondent were also noted. But given the likely association between age and level of education, these differences may be explained by education, not age.

These findings suggest demographic differences may need to be taken into consideration in developing a learning plan. Further research is needed, however, to cross-validate the associations found here and to provide additional insight into what they mean in a formal learning environment.