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Intentional Learning in an Intentional World: Audience Analysis and Instructional System Design for Successful Learning and Performance

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Abstract

How do we support successful, lifelong learners and performers and help them competently respond to rapidly changing opportunities in the 21st century. The answer to this question lies in how well we understand audiences differentiated by key learning differences and consider how these differentiations influence winning learning and performance. Historically, cognitive-rich explanations have tended to underplay the dominant impact of affective and conative factors on thinking and learning. Recently, these dimensions have gained considerable importance as contemporary multidisciplinary research has begun to demonstrate how intentions and emotions can influence, guide, and, at times, override our thinking and other cognitive processes. More importantly, research suggests that intentions and emotions are a dominant, powerful influence on learner success.

Introduction

Background

In any sport, a champion is expertly skilled at winning performance. Yet, it is ultimately passion, commitment, and desire to work hard and win that lead to continuous achievement and victory. Similarly, for a musician it is ultimately the passion, commitment, and desire to practice often and play perfectly that leads to a virtuoso performance. This article introduces learning orientation to explore these dominant sources for successful individual learning differences from a new perspective. This perspective highlights the importance of intentions and emotions and describes how these powerful factors work together to develop, guide, and manage cognitive (thinking) processes. It is passion to discover new knowledge, will to work hard and set high-standard

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learning goals, or different desires for highly structured, low learner control, low risk environments that really distinguish us a learners. This perspective is in contrast to traditional cognitive perspectives that may have minimized or isolated the impact and guiding influence of intentions and emotions. Too often contemporary highly cognitive learning solutions focus on learning styles and strategies while emotions and intentions play a secondary role in learning. Using multiple, repeated-measures, univariate ANOVAs, this study exhibits how learning orientation (learner-difference profiles) accounts for significant variance, effects, and interactions.

Using learning orientations as meta-level learner-difference profiles, the study results demonstrate useful ways to differentiate the audience before designing solutions and environments that carefully consider the impact of emotions and intentions on learning. In the real world, these influences are an integral part of learning and cannot be separated from learning and thinking ability, that is, we cannot consider one without considering the other. With practice, the solutions and environments matching these higher-order differences will be less expensive and produce better results because individuals learn to assume greater responsibility for improving performance. These solutions are even more successful when self-motivated audiences internalize better learning skills that lead to higher standards and learning orientations. After years of strong cognitive traditions (See Appendix A for a historical review of research developments), our cognitive-rich constructs, studies, and methodologies need a strong infusion of conative and affective research. If the cardinal rule for technical communicators and instructional designers is to "know thy audience," then we need more sophisticated lifelong and online learning theories and models that identify and support fundamental human needs, such as intentions and emotions. How well we understand and use learner-difference analysis and strategies, sound theoretical foundations, and reliable instructional design methodologies is increasing in importance as schools, universities, and corporations scramble to satisfy the increasing demand for change, continual learning, and increasingly sophisticated instruction.

Table 1. Psychological learning factors influencing learner behaviors and performance.

Conation
The aspect of mental processes directed toward action. Conation includes aspects such as intent, inclination, determination, deliberateness, resolve, drive, desire, will, or striving.

Affective
Influenced by or resulting from the emotions. Affective includes aspects such as passion, frustration, satisfaction, distress, joy, fulfillment, gratitude, comfort, arrogance, or disinterest.

Cognition
The mental process of knowing or acquiring to know. Cognition describes how people become aware of, gain, manage, and build new knowledge about the world. This term includes aspects such as awareness, creativity, perception, reasoning, comprehension, analysis, synthesis, evaluation, application, judgement, concept learning, memory, problem solving, task sequencing, goal setting, and progress monitoring.

Social
Relating to with matters affecting human welfare and experience. Social includes aspects such as communication, collaboration, gathering, modeling, and interaction with the world.

Audience Analysis and Instructional System Design (ISD) for "Mass Customization" Includes Emotions and Intentions

Too often traditional cognitive-rich instructional models foster fuzzy, "one-size-fits-all" solutions for audiences imperceptibly treated as a homogeneous, conglomerate whole. A more realistic, comprehensive view of learning considers the differing influence and complex relationships between conative, affective, cognitive, social, and other relevant learning-related factors (see Table 1).

Successful learner-difference analysis and Instructional System Design (ISD) methodology

should acknowledge that individuals are feeling, intentional, thinking, and social human beings. This study introduces intentional learning theory (see Appendix B) and learning orientations (see Appendix C), describes higher-order psychological attributes and learner-difference variables for successful learning, offers explanations for fundamental learning differences, and suggests strategies for matching and accommodating learning needs for audiences profiled by learning orientation. Learning orientations, based on the dominant learner-difference variables, are profiles which (1) introduce higher-order psychological aspects into audience analysis and instructional design methodology, (2) provide guidelines for differentiating audience types, and (3) address individual learning differences.

...how well we support successful learning depends on how well we recognize and support individual needs and economically...individualize... solutions

Learning orientations represent how individuals, with (to some degree) varying beliefs, emotions, intentionality, and ability, plan and set goals, commit and expend effort, and then autonomously experience learning to attain goals. There are four learning orientation categories that appear as ranges on a continuum: intentional, performing, conforming, and resistant. These learner profiles describe a learner's proclivity to learn or perform, and they provide specific scales for measuring learner-difference attributes. Learning orientations (described in Appendix C) are an effective way to differentiate audiences according to the higher-order psychological factors that powerfully impact learning and performance success. In fact, these factors guide or foster how we develop our primarily cognitive learning preferences, strategies, skills, and process.

This simple approach to breaking the audience analysis into four orientation categories is possible because learning orientations recognize the higher-order, dominant power and influence of intentions and emotions. Similarly, neuroscience research explains how intentions and emotions may guide or override our thinking and learning responses, strategies, skills, and processes (Goleman, 1995; Ledoux, 1998). In fact, these factors are found in the part of the brain that evolved first before the thinking parts: the neocortex. Contributing additional evidence on the power of intentions, Woodward (1998) demonstrates how babies are already highly goal-oriented and use intentions to guide learning by six months of age.

Explanations about learning orientation help educators understand learning differences, predict, and support learning in different environments, match instruction, content, and presentation, and adapt and manage solutions and learning environments with greater success. Intentional learning researchers hypothesize that:

- Intentional learners need sophisticated, discovery-learning situations for assertive, high-standard, high-effort, high learner control, highly skilled learning.
- Performing learners need low-risk, energizing, competitive, interactive settings that obscure the need for extra effort and difficult standards and entice them into internalizing more intentional learning performance.
- Conforming learners need scaffolded, structured, low learner control, non-risk environments that initially help them learn safely and comfortably, then gradually help them internalize more intentional learning performance.

This study recognizes that how well we support successful learning depends on how well we recognize and support individual needs and economically individualize or customize solutions that foster increasingly successful learning and performance. This transition from a one-size-fits-all approach to mass customization is already happening. It is apparent in the growing use of standards, templates, and learning objects for multimedia (Martinez, 1999a).

Study Purpose

In this study, the investigator developed a web course that offered three learning environments with adapted solutions for an audience differentiated by three learning orientations. These environments and learner profiles were designed to recognize the individual's general intentions, emotions, approach, ability, needs, and expectations towards learning. The study purpose was to determine if learning orientation, time, and learning environment accounted for significant variance, effects, and interactions on the dependent research variables. Significance levels would indicate the importance of differentiating learning audiences to recognize learning orientations and match instruction to the major attributes or learner-difference variables identified for each learning orientation.

In this study, the investigator did not expect everyone in the learning audience to learn alike. In fact, the investigator used learning orientations (see Appendix C) to predict how individuals, (identified by these "mass customization" profiles) would learn better in matched environments and less successfully in mismatched environments. The investigator hypothesized that using learner-difference profiles is more discerning and robust than typical cognitive explanations (such as, learning styles and strategies) because it specifically highlights the dominant impact of emotions and intentions before integrating the influence of secondary cognitive and social processes.

A secondary study objective was to test a promising new Web learning environment to see how successfully it could match instruction to learning orientations and, at the same time, serve as a research model for collecting information on learning differences. This instructional research model was called the System for Intentional Learning and Performance Assessment (SILPA). Developed during previous study (Martinez, 1997), the SILPA was designed to identify and match learning orientations, individually provide a customized course of instruction, systemize presentation, measure and support successful learning performance, and collect data about learning performance. The evolving theory behind this model postulates that a learner experiences greater positive effects to the extent that the instruction, content, and environment can appropriately match, support, and improve the individual's learning orientation. This unique model also used the Learning Orientation Questionnaire (LOQ) (see Appendix B) as a pre-diagnostic instrument to identify learner orientation in advance of the course.

Three research questions determined the selected dependent research variables:

1. Do learning orientations influence satisfaction, learning efficacy, achievement, or intentional learning performance?
2. Do learners using intentional learning environments (Group EX1) benefit more than learners not using intentional learning environments (Control Groups CO1 and CO2)?
3. Do learning orientations influence group interactions (Group EX1 and Control Groups CO1 and CO2)?

Method

Before taking the "Discovering the Web" course, the learners took the Learning Orientation Questionnaire to identify each individual's learning orientation. Next, the computer randomly assigned each individual by learning orientation to one experimental and two control research groups. Descriptions for the three research groups (comprised of three distinctly different learning environments) appear in Table 2.

The group assignment to a learning environment did not necessarily match the learner's learning orientation. After group assignments, the subjects received instruction on taking the web course in the form of an introduction to taking the Web course. This instruction was different for each of the three research groups (see Table 2). As the learners completed course instruction and assessments, the SILPA collected data to test what effects the environments and learning orientations had on the student's satisfaction, learning performance, learning efficacy, and achievement.

Intervention and Experimental Research Design

Using the three research questions as the study focus, the investigator developed an experimental

Table 2: Description of the three learning environments (research groups).

Web Learning Environment 1 was the experimental group (Group EX1) and presented an intentional learning environment. It offered the treatment that matched and supported the three learning orientations (intentional, performing, and conforming), fostered intentional learning performance, and delivered the intervention, called Intentional Learning Training (ILT), at the beginning of the course (intervention treatment). The intentional learning resources included a special *Center* interface that allowed learners to examine course content, self-assess progress in the *Map*, and sequence tasks.

Web Learning Environment 2 was the first control group (Group CO1) and presented the performing learning environment. It offered the same instructional setting and resources presented for Group EX1 but omitted the special ILT intervention instruction.

Web Learning Environment 3 was the second control group (Group CO2) and presented the conforming learning environment (described in the previous section). It offered a restricted, linear-sequenced, menu-driven version. It did not offer the intentional learning resources or the ILT intervention.

factorial research design and conducted multiple, repeated-measures, univariate analyses of variance (ANOVA). A factorial design was used to analyze the independent and interactive effects of two independent variables (learning orientation and intentional learning training) on four dependent variables (satisfaction, learning efficacy, intentional learning performance, and achievement).

An advantage of the factorial approach is that you can control variables that you know will influence the analysis, such as the time variable. To allow for the effects of time, the investigator introduced the repeated measure aspect in this design for multiple hypotheses testing. The repeated measure design means that the subjects are tested several times for a measure of each independent variable. A third important advantage of this research design is that the factorial approach lets the researcher manipulate, control, and analyze "interactions," in addition to "effects." For example, if learning orientation accounts for significant interactions with GROUP or TIME on the dependent variables, then the results would suggest some possible explanations on the nature of learning and provide guidance for supporting learning differences.

Using this 3-by-3 factorial experimental research design (see Table 3) and multiple, repeated -measures, univariate analyses of variances (ANOVA), the investigator examined the effects and interactions on the four dependent variables: satisfaction, learning efficacy, intentional learning performance, and achievement over three time periods (the repeated measures appear as A_1, A_2, and A_3 in Table 3).

Table 3: Repeated measures research design for three research groups.

<table>
<tr><td>Step 2. Intervention</td><td></td><td>A_1</td><td>A_2</td><td>A_3</td></tr>
<tr><td rowspan="3">1. GROUP EX1
with International Learning Training and
with Center Resources</td><td>Cat. 1 (Intentional Learners)</td><td rowspan="3">Y Measures
•satisfaction
•learning efficiency
•int. learng performance
•achievement</td><td rowspan="3">Y Measures</td><td rowspan="3">Y Measures</td></tr>
<tr><td>Cat. 2 (Performing Learners)</td></tr>
<tr><td>Cat. 3 (Conforming Learners)</td></tr>
<tr><td rowspan="3">2. GROUP CO1
with International Learning Training and
with Center Resources</td><td>Cat. 1 (Intentional Learners)</td><td rowspan="3">Y Measures</td><td rowspan="3">Y Measures</td><td rowspan="3">Y Measures</td></tr>
<tr><td>Cat. 2 (Performing Learners)</td></tr>
<tr><td>Cat. 3 (Conforming Learners)</td></tr>
<tr><td rowspan="3">3. GROUP CO2
with International Learning Training and
with Center Resources</td><td>Cat. 1 (Intentional Learners)</td><td rowspan="3">Y Measures</td><td rowspan="3">Y Measures</td><td rowspan="3">Y Measures</td></tr>
<tr><td>Cat. 2 (Performing Learners)</td></tr>
<tr><td>Cat. 3 (Conforming Learners)</td></tr>
<tr><td colspan="5">Step 3. Analysis</td></tr>
</table>

The table shows subjects in three research groups with or without the Intentional Learning Training (independent variable 1) and Center(tools) resources: Group EX1 is the experimental group, and Groups CO1 and CO2 are the control groups. The three orientation categories appear as Cat. 1, Cat. 2, and Cat. 3 to stratify or distinguish the subjects within the three research groups. These categories represent the learning orientations (independent variable 2): intentional, performing, and conforming learners, respectively. Resistant learners are not part of this study. A_1, A_2, and A_3 are the repeated measure treatments, divided into three instructional units (comprised of a total of eight lessons joined with assessments) and delivered similarly to all research groups. Y measures (organized by treatment 1-3) show the outcomes for the four dependent variables, including satisfaction, learning efficacy, intentional learning performance, and achievement.

This research design is unique because it overlays learning orientation (Cat. 1, Cat. 2, and Cat. 3) as a separate dimension to (1) guide design and development of the research environment, content, presentation, and instruction and (2) differentiate the audience before analyzing the learner, introducing the treatment, and examining the results. This dimension is especially important because it distinguishes learners as individuals with predominant psychological characteristics in comparison to traditional methods that treat learners as a uniform group with generalized, homogeneous conative, affective, and social influences. The introduction of intentional learning and multiple variables examined by orientation is an effort to reflect the diversity of learning differences and then provide mass customizable solutions that support the diversity more economically, perceptively, and accurately.

Instructional Materials and Assessment

Learners received course introduction materials after registering and taking the Learning Orientation Questionnaire. The introductory material included directions for taking the "Discovering the World Wide Web" course on the Web. The course had eight lessons that presented instruction integrated with practice, feedback, and assessment activities. For the experimental Group EX1, extra guidance appeared in the course introduction. This material included information on intentional learning, special resources (such as, the "Center" for managing performance or "Map" for monitoring progress), and specific intentional learning performance strategies.

While the first Control Group CO1 received the same environment and tools as the Experimental Group EX1, this group did not receive the encouragement or guidance for using intentional learning strategies. The students in the second Control Group CO2 did not receive the intentional learning guidance or the extra intentional learning tools and resources. The students in CO2 only had access to a linear, menu-driven version of the course, an environment distinctly different (more linear and simpler) from the other two environments.

It is important to note that short assessments were introduced for each lesson. Also, achievement was added as a dependent research variable using a highly exploratory perspective. This means that the assessments were not adapted using learning orientations because more research was needed to learn how to integrate conative and affective factors into contemporary assessment models adequately. Instead, the investigator introduced the achievement variable as an opportunity to collect evidence showing how the different learning orientations achieved in the different environments. In this study, the achievement variable was not expected to show any statistical significance and was included as a basis for observation, data collection, and a beginning point in the examination of how to develop assessments using a broader set of psychological factors.

Also, achievement means for each group were expected to average out to the performing learning orientation, the learner majority in this sample. The understanding was that regardless of how the intentional or conforming learners achieved, the means would reflect the performing learner orientation, since they were the majority. Russell (1997) would call this the no-significant-difference majority. Another key consideration or limitation regarding the accuracy of the achievement data was that the volunteers had nothing to gain or lose in taking the Web course. This study had to rely

on their desire to learn how to use the Web and therefore achieve to a general achievement standard set by the majority orientation, in this case, the performing orientation.

Treatment and Procedures

Seventy-one adults (49 women and 22 men; mean age = 22) took the Web course. They were volunteers from local businesses, universities, and households, had very limited or no Web experience, and showed a desire to learn how to use the Web. Most of the learners came from psychology and sociology undergraduate students attending a local western university. Although a large percentage of the sample were undergraduate college students, the investigator made an effort to survey a diverse set of volunteers from the general public, including white- and blue-collar employees in diverse positions at all levels of business, corporate trainers, young and older housewives, university and high school faculty, retirees, and high school and university graduate and undergraduate students. The effort to get a broad sample was helpful in generalizing the results to the public. The majority of subjects scored in the range for performing learner orientation. Most of the subjects appeared motivated to learn the course and showed a willingness to sit in front of the computer for a long period. Nevertheless, this was not an formal academic situation that might advantageously influence (for example, with grades or credit) the subject's commitment to achievement, truthfulness, and finishing the course.

Overall, the experiment was accomplished in three phases:

Phase 1: Students visited the research lab where computers (loaded with Netscape), SILPA software, and the Web Course displayed the registration form. The students registered as first-time users and took the pre-course diagnostic to identify learning orientation.

Phase II: The computer used the stratified random sampling method to assign the students, by learning orientation (intentional, performing, and conforming learners), to three independent groups (EX1, CO1, CO2). Using the group assignment, the computer displayed specific instructions for each group. The instructions provided the intervention to GROUP EX1 as described in the "Instructional Materials" section.

Phase III: After reading the instructions, students worked on the course at their own pace, beginning and stopping as necessary. Students finished the course by completing the assessments for eight lessons, generally in one session. They typically took one and a half to two hours to finish the course.

Data Collection

The repeated measures research design increased data collection points and resulted in four data sets. This more complex collection method was useful in reflecting the dynamics of change in learning, as students realistically experience learning. The first data set came from the precourse registration and the other three from the practice and assessment activities in the three instructional units. Lessons one through four comprised the first unit, five and six the second unit, and seven and eight the third unit. At the end of lessons three through eight, the students could write comments or rate themselves on two questions which provided information for two dependent variables.

1. Satisfaction Variable: How would you rate this lesson? (5 = Enjoyable for Me, 1 = Frustrating for Me).
2. Learning Efficacy Variable: How do you feel about your learning progress? (5 = Very Satisfied, 1 = Very Dissatisfied).

The SILPA automatically collected and stored the answers and scores for the practice and assessment questions and created an activity log for each learner. The log was a record of the learner's activity during the course. It showed times (learning time per task), sequencing of tasks (learning paths), and frequency of use for different SILPA resources. Additional supplemental qualitative evidence was collected during a brief exit interview.

Repeated Measure Univariate ANOVAs

The next step in this factorial experiment was to conduct a series of univariate analyses of variance on the data collected from the experimental and two control groups. Since time had been introduced into the research design (Y measures collected

on different occasions), the investigator used an analytical model that would treat the time variable as repeated subintervals of the instructional cycle between and among the three research groups. According to Littel et al., "repeated measures data need mixed models because of correlations between measurements on the same subject" (Littel, Milliken, Stroup, and Wolfinger, 1996, p. 97). Following this approach, the investigator used a modified mixed-model repeated-measures example (with special parameters for learning orientation treated as a continuous subject variable) from Littell, Freund, and Spector (1991) in the SAS system (PROC MIXED).

Results

The evidence suggests that learning orientation is a rational and useful way to (1) provide theoretical foundations considering a comprehensive view of learning, (2) recognize dominant psychological factors, other than just cognitive aspects, that influence learning (3) analyze and differentiate the audience, an important aspect of determining what works for the audience, and (4) guide design, development, implementation, and evaluation of solutions or treatments. As expected, the mixed model analyses revealed interesting information on main effects and interactions on the dependent variables. The results exhibited significant GROUP effects and interactions on satisfaction and learning efficacy and time effects. The nonsignificant results were equally interesting, especially for achievement, when combined with the supplemental evidence gathered by analyzing group means by learning orientation.

Multiple repeated measure ANOVA results for four dependent variables

Table 4 presents the significant main effects and interactions for the dependent variables using ILO (learning orientation), GROUP (EX1, CO1, and CO2), and TIME (three instructional units) variables. The results show statistically significant :

1. GROUP (learning environment) effects on satisfaction ($p = .0074$) and learning efficacy ($p = .0024$) at a significance level of .01 (99%).
2. ILO * GROUP interactions on satisfaction ($p = .0027$) and learning efficacy ($p = .0245$) at a significance level of .01 (99%) and .05 (95%), respectively.
3. TIME effects on learning efficacy ($p = .0001$) and intentional learning performance ($p = .0001$) both at a significance level of .0001 (99.9%).

Thus GROUP, TIME and ILO * GROUP have significant effects and interactions on the sample population (as shown in Table 4) regarding satisfaction, learning efficacy, and learning performance. Specifically, these results suggest the importance of understanding GROUP and TIME effects and ILO * GROUP interactions as factors in supporting and improving learner attitudes, learning efficacy,

Table 4: Analysis of variance for three dependent variables by ILO, group, and time (tests of fixed effects).

Source	NDF	DDF	Type I F	Pr > F
Satisfaction Dependent Variable				
GROUP	2	65	5.30	0.0074
ILO*GROUP	2	65	6.48	0.0027
ILO*TIME	2	130	9.80	0.0001
Learning Efficacy Variable				
GROUP	2	65	6.64	0.0024
TIME	2	130	31.82	0.0001
ILO*GROUP	2	65	3.93	0.0245
Intentional Learning Performance				
TIME	2	90	14.77	0.0001

NDF = Numerator Degrees of Freedom, DDF = Denominator Degrees of Freedom, ILO = Individual Learning Orientation

and intentional learning performance. As expected, the ANOVAs presented nonsignificant results for achievement.

Group means and standard deviations by time

To supplement the ANOVA analyses, the investigator also examined group means (M) and standard deviations (SD) by time for each of the dependent variables. These results, organized into sections for the four dependent variables, appear in Table 5. Additionally, Section 4 in Table 5 exhibits detailed information on achievement organized by learning orientation; this shows how the learning orientations achieved within the groups. Overall, these results show that Group EX1, the intentional learning environment, had higher overall group means for three of the four dependent variables. A closer look at the overall group means (percentage correct) by learning orientation appears in Table 5: Section 4. The results are very similar (M = .83, M = .85, and M = .84). As expected, the achievement means averaged out to the sample's majority orientation, in this case the performing learner orientations. More importantly, Table 5: Section 4 reveals that the results for each of the learning orientations were highest in the matching learning environment (EX1: M = 94 for intentional learners, CO1: M = 91 for performing learners, and CO2: M = 87 for conforming learners).

Table 5: Means for four dependent variables by group and time.

Section 1. Satisfaction.

Means for Satisfaction Dependent Variable by GROUP and TIME using a 5-point Likert scale (5 = This lesson is very enjoyable for me, 1 = This lesson is very frustrating for me). The higher the rating, the greater the satisfaction with the course.

Group Means

GROUP	N	TIME 1	TIME 2	TIME 3	OVERALL
EX1 Group	26				
M		4.23	4.19	4.62	4.35
SD		0.82	0.88	0.70	
CO1 Group	23				
M		4.04	3.59	4.21	3.95
SD		0.69	1.06	0.67	
CO2 Group	22				
M		4.06	3.40	3.82	3.76
SD		0.98	1.20	1.14	
GRAND OVERALL		4.11	3.73	4.22	4.02

Section 2. Learning efficacy.

Means for Learning Efficacy Dependent Variable by GROUP and TIME using a 5-point Likert scale (5 = Very Satisfied with my learning progress, 1 = Very Dissatisfied with my learning progress). The higher the rating, the greater the learning efficacy.

Group Means

GROUP	N	TIME 1	TIME 2	TIME 3	OVERALL
EX1 Group	26				
M		4.42	4.17	4.62	4.40
SD		0.69	0.84	0.57	
CO1 Group	23				
M		4.17	3.65	4.22	4.01
SD		0.61	0.65	0.60	
CO2 Group	22				
M		3.80	3.45	4.19	3.81
SD		0.10	0.97	0.59	
GRAND OVERALL		4.13	3.76	4.34	4.08

Section 3. Intentional learning performance.

Means for Intentional Learning Performance Dependent Variable by GROUP and TIME using a 4-point scale (4 = High, 1 = Low) to rate the students' use of the different intentional learning performance elements, including the Center, Map, and task sequencing. This rating is indicative of how much the learner is willing to contribute toward learning. Control Group CO2 does not appear in this table because it is not an intentional learning environment, that is, it is a linear, menu-driven setting.

Group Means

GROUP	N	TIME 1	TIME 2	TIME 3	OVERALL
EX1 Group	26				
M		1.50	2.12	2.19	1.94
SD		0.99	1.11	0.94	
CO1 Group	23				
M		1.52	2.00	2.22	1.91
SD		0.73	1.00	0.95	
GRAND OVERALL		1.51	2.06	2.20	1.93

Section 4. Achievement.

Mean Percentage Correct for Achievement Dependent Variable by GROUP and TIME. This table shows the mean achievement scores (1.00 = High, 0 = Low) by GROUP and subgrouped by learning orientation.

Group Means

GROUP	N	TIME 1	TIME 2	TIME 3	OVERALL
EX1 Group	26				
M		0.88	0.88	0.76	0.84
SD		0.14	0.12	0.16	
Intentional Learner					0.94
Performing Learner					0.78
Conforming Learner					0.82
CO1 Group	23				
M		0.89	0.92	0.75	0.85
SD		0.10	0.10	0.18	
Intentional Learner					0.79
Performing Learner					0.91
Conforming Learner					0.84
CO2 Group	22				
M		0.94	0.80	0.76	0.83
SD		0.09	0.20	0.22	
Intentional Learner					0.80
Performing Learner					0.83
Conforming Learner					0.87
GRAND OVERALL		0.90	0.87	0.76	0.84

Bivariate plot of orientation and the achievement dependent variable

The ANOVA analyses were unable to describe learning performance by learning orientation. However, bivariate plotting is a useful way to exhibit how individuals, grouped by learning orientations, performed within the GROUP (learning environment) and by TIME. To get specific information showing how the three orientations performed within the groups and over time, the investigator plotted eight graphs for each dependent variable. Using the PROC REG procedure in the SAS system and the nonstandardized regression weights for the predicted intercept and slope by GROUP or TIME, weights were used to plot the regression lines between X and Y.

One of the eight plots examined in this study appears in Figure 1. This plot specifically describes activity by learning orientation within the three environments (GROUP) for the achievement

dependent research variable. The higher the achievement dependent variable score (Y-axis: 0-1.0), the greater the achievement in the course. In contrast, the higher the learning orientation score (X-axis: 1-7), the higher the learning orientation. This evidence exhibits the group interaction by learning orientation. It shows that as learning orientation increased, the students in Group EX1 exhibited the highest achievement and, in the other two environments, the students' achievement improved less.

the slope of GROUP EX1 is steep enough (Figure 1) to suggest that refinements to the assessment models may contribute to significant effects and interactions in the future.

Discussion

A discussion of the results appears in the context of the study's three research questions.

Research question 1: Do learning orientations influence satisfaction, learning efficacy, achievement, and intentional learning performance?

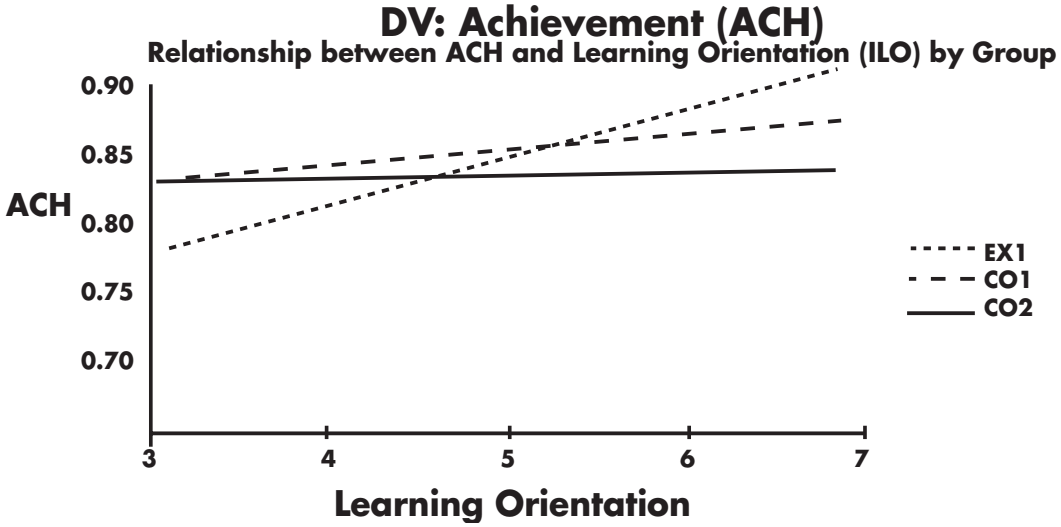

Figure 1. Linear equations for achievement showing the regression of Y on X by GROUP.

The ANOVA results for achievement are not significant and the group achievement means are similar. However, a closer examination reveals a different story. Using Figure 1 and the group means data in Table 5: Section 4 to consider achievement by orientation within the GROUP, it appears that the matching or mismatched environment did impact the achievement means. The results in Figure 1 are interesting because they depict the effects of the matched and mismatched learning environment (GROUP) on learning orientation and achievement as the learning orientation score increases or decreases. This plot exhibits how Group CO2's restrictive learning environment may limit achievement as learning orientation increased above 5.0. In contrast, Group EX1 and CO1 environments appeared to have supported improved course achievement for the higher learning orientations. It is also important to note that

The ANOVA results in Table 4 do not show significant effects or interactions for ILO (learning orientations). These results suggest that learning orientations alone do not influence the four dependent variables. Instead, it is the interaction between ILO and other variables that shows the significant effects on the dependent variables. The third research question discusses how learning orientation interactions are more likely to influence learning in different environments with different treatments.

Research question 2: Do learners using intentional learning environments (Group EX1) benefit more than learners not using intentional learning environments (Groups CO1 and CO2)? Group EX1 offered the learning environment had the highest group means for three dependent variables: satisfaction, intentional learning performance, and learning efficacy. However, a comparison of the group means by

learning orientation for achievement (Table 5: Section 4) showed that individuals did best in the environments which best suited their learning orientation. Figure 1 (and all the plots not shown in this article) also support this evidence as it specifically shows how learners with higher orientations had higher achievement in the more sophisticated learning environments 1 and 2. Additionally, the ANOVA results in Table 4 show statistically significant GROUP effects for satisfaction ($F = 5.30$, $p < 0.01$) and learning efficacy ($F = 6.64$, $p < 0.01$) and statistically significant ILO * GROUP interactions for satisfaction ($F = 6.48$, $p < 0.01$) and learning efficacy ($F = 3.93$, $p < 0.05$). These GROUP effects indicate the 99% probability that learning environments influenced learning satisfaction and efficacy and this success depends on how the environment supports and matches the learning orientation. How time is managed is also a relevant factor since the TIME effects were statistically significant (Table 4) for satisfaction, learning efficacy, and learning performance.

Research question 3: Do learning orientations influence group interactions (Groups EX1, CO1, and CO2)? The ANOVA results in Table 4 show statistically significant ILO * GROUP interactions for satisfaction ($F = 6.48$, $p < 0.01$) and learning efficacy ($F = 3.93$, $p < 0.05$). These findings indicate how likely the interactions between learning orientation and environment seem to have impacted satisfaction (99%) and learning efficacy (95%). The evidence suggests that recognizing and being sensitive to the learning orientations in advance is useful in guiding the design of instructional solutions and environments.

It is also important to note that although students achieved best in the environment which closely suited their learning orientation, those in the two control groups were not in an environment that would help them experiment and improve intentional learning ability. The investigator will use these research findings to guide development of intentional learning environments that are more sensitive to performing and conforming learners. These developmental efforts will focus on making these learning orientations more comfortable, engaged, and willing to perform in an intentional learning environment that uses elements to match their learning orientation and subtly provides support that helps the learner improve learning ability.

Conclusions

This study investigates the importance of learning orientation and (1) using it to determine and explain key learner-difference variables, (2) integrating it into audience analysis and instructional design methodologies to customize solutions that support individual learning difference, and (3) supporting it for more satisfying, successful learning and improved learning performance. The results highlight the need to identify audiences with greater sophistication and specificity than today's primarily cognitive perspective often encourages. The results also provide evidence on specific factors that may impact learning and offer suggestions for customizing better environments for improved learning. The investigator hopes that these results will revitalize an often-ignored, human perspective that recognizes the more dominant conative and affective factors along with the more commonly explored cognitive and social learning factors.

These findings also suggest that the primary purpose of an audience analysis is not merely to describe a homogenous audience with a "one-size-fits-all" description but rather to identify and discern fundamental "one-on-one" audience attributes using reliable "metalevel" learner-difference or performance-difference criteria. Once recognized, the complete set of important learner-difference variables needs to be considered and used to guide the design of successful learning and performance models and solutions.

With practice, matched solutions for differentiated audiences will be less expensive and offer promise of better results because individuals learn to assume greater responsibility for learning and performance, to set and attain increasingly higher goals, to expend greater effort, and to improve learning and performance (e.g., problem solving, setting and attaining higher-standard goals, selecting treatments, sequencing tasks, and monitoring goals and progress). These solutions are even more likely to be successful when learners increasingly

internalize improved learning ability that leads to higher learning orientation and higher performance standards.

This study described the functionality of the SILPA learning environment and showed its usefulness for mass customizing instructional solutions. The SILPA identified learner orientation, adapted instruction to different learning orientations, monitored learning activity, and encouraged more intentional learning performance as individuals practiced, performed, and accomplished course objectives. These results suggested that learners enjoyed greater success in learning environments that adapted and supported their individual learning orientation. In contrast, the learners learned less successfully in the unmatched environments that conflicted with their learning orientation.

In conclusion, this study

1. Demonstrates the need for sound theoretical foundations that consider and incorporate the influence and relationship between higher-order psychological factors into measurable whole-person learning constructs.
2. Highlights the importance of measuring a comprehensive set of affective, conative, cognitive, and social learner-difference variables that influence learning.
3. Offers explanations on how learners individually adapt to interventions and how some benefit from one type of solution and others do not.
4. Offers analysis and design strategies and models for mass customization, ones that identify and match differentiated-audience solutions to foster improved learning and performance.
5. Outlines a learning environment that can (1) differentiate the audience by learning orientation, (2) match individual and mass customized solutions, (3) offer components that help learners support and internalize more intentional learning performance, and (4) collect and measure data as the learning occurs.

This research also has implications for reaching other diverse groups and professions that can equally benefit from identifying and understanding the higher-order psychological factors that can specifically influence or differentiate their audiences. There are obvious connections to professions in other fields, such as organizational behavior and development, career development, and human resource development, that recognize learners or performers as continually acquiring more learning expertise in face of rapidly changing workplace requirements.

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Appendix A: Individual Difference Research

The question of how people differ in the rate, style, and quality of their learning is one which has concerned psychologists for a great many years. --- (Gagné, 1967. p. xi)

In 1965, Gagné organized a major conference to discuss and explore individual differences in learning (1967, p. xii). During the conference, Melton (1967) suggested "that we frame our hypotheses about individual difference variables in terms of the process constructs of contemporary theories of learning and performance" (Melton, p. 239). The conference's consensus was that conceptual processes, that is, information or knowledge processing, intervened between stimuli and response, the prevalent behavioral learning perspective (Frederico, 1980, p. 3). Critical to this research was the view that intelligence and achievement relied heavily on specific intrinsic cognitive processing. "It was suggested strongly that these psychological mechanisms be examined in order to comprehend more completely the processes basic to intellectual behavior. This conference reflected a change in the conceptualization of intelligence as measured performance to mental mechanisms" (Frederico, 1980, p. 3).

Today much of our evolving understanding and research on individual learning differences remains broadly focused on cognitive interests and intrinsic or extrinsic mechanisms for information processing. This research generally examines how the degree of control and management of cognitive processes involve interaction among four classes of phenomena: (a) metacognitive knowledge, (b) goals, (c) metacognitive experience, and (d) actions (Flavell, 1992, 1987, 1979; Masur, McIntyre, and Flavell, 1973). Glaser (1984, 1976, 1972) described similar reasoning when he offered his conceptualization of the "new aptitudes," the cognitive learning processes managed for intellectual competence. Most of the research in this area continues to highlight cognitive aspects, such as cognitive preferences and learning styles, skills, processes, and strategies.

In contrast to the preponderance of primarily cognitive perspectives, many contemporary researchers recognizing the importance of other psychological factors, such as emotions and intentions, eventually extended their investigation to include conative and affective influences on learning differences (Garcia and Pintrich, 1996; McCombs, 1996, 1994, 1993, 1991a, 1991b; Purdie, Hattie, and Douglas, 1996; Pintrich, 1995; Bereiter and Scardamalia, 1993, 1989; Corno, 1993, 1989; Deci et al, 1991; Schunk, 1991; Snow, 1989, 1987; Snow and Farr, 1987; Brown, 1987; Dweck, 1986; Kuhl and Atkinson, 1986; Deci and Ryan, 1985; Bunderson, 1975; Weiner, 1972; Weiner et al., 1971).

This body of research highlights the importance of conative and affective aspects (personal desire, will, striving, motivation, efficacy, pride, fear, frustration, and satisfaction). In this research area, the resulting learning theories, still largely an extension of primarily cognitive study, describe intrinsic, extrinsic, and achievement motivation, and other important influences (to some degree, wanting to set and attain goals, desiring personal or self-development, enjoying learning, or liking to self-direct learning). These perspectives are still largely cognitive because they lack the emphasis of the dominant power of intentions and emotions

over thinking processes. This is a critical aspect and useful in distinguishing this perspective from primarily cognitive and constructivist perspectives. From a completely different research perspective other disciplines also describe conative and affective factors as discriminating sources for learning and performance differences. In contrast to traditional cognitive perspectives, emotions and intentions are portrayed as dominant psychological influences (more dominant than cognitive processes) on learning. Joseph Ledoux (1996), neuroscientist at the Center for Neural Science at New York University and author of the *Emotional Brain*, and Daniel Goleman (1995), author of *Emotional Intelligence*, suggested that emotions and passions influence, guide, and, at times, override our thinking (cognitive) processes. Additionally, child development expert Amanda Woodward (1998) described how humans are highly goal oriented and use intentions to guide learning and development of cognitive and other processes as early as age six months. This dominant conative and affective perspective is an integral part of this study. As Ledoux (1996), Goleman (1995), and Woodward (1998) would probably advise, recognizing the power of emotions and intentions is also an important lesson for educators. Professionals that can knowingly tap into the audience's emotions and intentions have a powerful advantage.

However, after many years of strong cognitive traditions and secondary emphasis on emotions and intentions, explanations about successful learning are still fuzzy or ambiguous. Snow and Farr (1987) suggested that sound learning theories are incomplete or unrealistic if they do not include a whole person view that integrates cognitive, conative, and affective aspects (p. 1). Although, they championed this critical perspective they were unable to integrate it into their own work successfully. Voicing the concerns of many about fuzzy or ambiguous solutions, Bangert-Drowns and Rudner (1991) suggested that for every study that contains a recommendation, there is another, equally well documented study, challenging the conclusions of the first. No one seems to agree with anyone else's approach. But more distressing: no one seems to know what works. Maddux (1993) proposed that some of the problems are due to lack of sound constructs and ambiguous explanations of how learner and learning variables interact with new teaching variables (such as, new technology, formats, mediums, objectives, and presentation and delivery methods) and affect specific dependent variables. Reeves (1993) echoed similar sentiments advocating stronger, more reliable theoretical foundations when he suggested that "much of the research in the field of computer-based instruction is pseudoscience because it fails to live up to the theoretical, definitional, methodological, and/or analytic demands of the paradigm upon which it is based."

Even when common sense, research, and experience suggest that people learn differently, many professionals continue to treat learners as a homogeneous audience with a "one-size-fits-all" approach. After a lengthy metareview of research comparing the effectiveness of instructional technology, Russell (1997) proposed that educators should identify and acknowledge learning differences and make "maximum use of the technology to serve them accordingly." He advised that "when lumping all the students together into a fictional 'mass' those who benefit from the technology are balanced by a like number who suffer; when combined with the no-significant-difference majority, the conglomerate yields the widely reported 'no significant difference' results." Clearly, the many ambiguous, conflicting, or inconsistent results from these comparison studies are subtly indicating something critical is missing from the cognitive-rich learning theories, constructs, and solutions.

What are the clearcut explanations and proven solutions that support successful learning? How can we economically, efficiently, and appropriately address individual learning needs? And following Russell's advice, how do we "maximize the technology" to serve the needs of online learners successfully and economically. Similar to Reeves (1993), this investigator believes that we need to develop theoretical foundations that realistically unveil the broad set of fundamental sources and interrelationships that measureably contribute to successful learning.

Appendix B: Intentional Learning Theory

In previous studies, based on a review of the literature (Martinez, 1999b, 1998, 1997) and a blueprint specification about learning differences, the investigator developed the Intentional Learning Theory and Construct (Martinez, 1998, 1997), Learning Orientation Model (Martinez, 1999, 1998, 1997), and Learning Orientation Questionnaire (Martinez, 1999b). The intentional learning theory presents a foundation for understanding learning from a comprehensive perspective that considers the diverse set of psychological factors that influence learning. This perspective includes the wealth of traditional cognitive and social research yet demonstrates the higher-order dominance of conative and affective factors. This theory considers how emotions, attitudes, beliefs, and intentions (in addition to the more commonly recognized cognitive and social factors) influence, support, or undermine learning and performance opportunities. Secondly, it uses the learning orientation construct as a necessary dimension in the consideration of other factors that may influence learning and performance for the targeted audience (e.g., environments, technology, learning objectives and requirements, or disabilities). Finally it provides sophisticated guidelines for other strategies, analyzes, methodologies and models that need to recognize and suppport key learner-difference variables.

The Learning Orientation Construct (LOC) portrays characteristics, influences, and relationships between three key construct factors: (1) conative and affective aspects, (2) committed learning effort, and (3) learning autonomy. Combined, these three higher-order psychological factors greatly influence an individual's general learning orientations or proclivity to learn.

The Learning Orientation Model (LOM) presents ranges on a continuum for four dominant learner-difference profiles which generally represent an individual's approach to learning: Intentional Learners, Performing Learners, Conforming Learners, and Resistant Learners.

The Learning Orientation Questionnaire (LOQ) is a 25-item measurement tool that has been developed during two previous studies. It measures the three key construct factors that influence learning differences and determine learning orientation. The results indicate how the individuals scored on each of the three construct factors and provide an overall learning orientation score for one of the four learning orientations.

Appendix C: Descriptions for Learning Orientations

Intentional learners. At one end of the continuum are intentional learners. Deeply influenced by an awareness of the psychological aspects that motivate them, intentional learners place great importance on personal strengths, intrinsic resources, ability, committed, persistent, assertive effort, sophisticated learning, performance, planning and problem-solving strategies, and positive expectations to self-manage learning successfully. These learners manage holistic to partist learning strategies, short- and long-term goals, and enjoy using learning to acquire expertise; they will even risk making mistakes to attain greater expertise.

Intentional learners seldom rely heavily on short-term tasks, schedules, deadlines, normative performance standards, expected social or instructional compliance, or others for extrinsic learning motivation. Intentional learners enjoy taking responsibility and control of their learning and willingly become actively involved in managing the learning process. They typically use holistic perspectives, sophisticated problem-solving, and stimulating, intrinsic influences, such as intentions, passions, personal principles, and desires for personal goals and high standards, to self-direct intentional achievement of challenging, long-term goals. Using an autonomous, reflective, goal-oriented, and self-assessment framework, intentional learners expertly adapt suitable strategies to manage the resources and meet the challenges in any learning situation. These learners learn best in open, discovery, or challenging learning environments that encourage and support expertise building; risk-taking; mentoring relationships; self-directed learning; complex, problem-solving or case study situations; transformative processes; high learning

standards, and long-term personal accomplishments and change.

Performing learners. In comparison, a performing learner is a low-risk, skilled learner that consciously, systematically, and capably uses psychological processes, strategies, preferences, and self-regulated learning skills to achieve average-standard learning objectives and tasks. In contrast to intentional learners, performing learners are short-term and task-oriented, and often extrinsically motivated. They take fewer risks with mistakes and challenging or difficult goals, focus on grades, rewards, and normative achievement standards, and most often rely on coaching relationships, available external resources, and social influences to accomplish a task. Performing learners need an important reason to push themselves toward more intentional performance.

Performing learners will selectively commit great effort to learn topics and skills that they highly value and find particularly interesting. Otherwise, more often than not, performing learners will clearly acknowledge that they want to limit or constrain learning effort (for example, they do not have enough time) by only meeting stated objectives, getting the grade, or avoiding exploratory steps beyond learning requirements. These learners learn best in semi-structured learning environments that add competition, fun, interaction, and coaching for encouraging self-motivation to learn.

Conforming learners. Compared to intentional or performing learners, conforming learners are more complying and passively accept knowledge, store it, and reproduce it to conform, complete assigned tasks if they can, and please others. The conforming learner does not typically use initiative, think critically, like to make mistakes, reflect on progress, synthesize feedback, or give knowledge new meaning to change themselves or the environment. These learners are less skilled and have difficulty solving complex problems and accepting or managing change. They have little desire to control or manage their learning or set challenging personal learning goals.

Conforming learners prefer to have simple standards set for them, rely on others for guidance, need simple, explicit feedback, and learn best with linear, step-by-step instruction. In supportive, comfortable, uncomplicated learning environments, conforming learners will, with careful guidance, successfully work to achieve simple, clearly explained goals.

Resistant learners. These learners doubt that (1) they can learn or enjoy achieving any goals set by others (2) academic learning and achievement can help them achieve personal goals or initiate desired changes, and (3) their personal values and goals can benefit from academic influence. Too often resistant learners will suffer repeated, long-term frustration from conflicting values, expectations, and goals, painful misunderstandings, perceived academic or social inadequacy, disappointment, or instruction that confuses or does not challenge or help them. They do not believe in formal education or academic institutions as positive, necessary, or enjoyable influences that add value or benefit to their life.

Resistant learners may be passive and disinterested while others may be aggressive and angry. Ironically, some resistant learners may find the challenge of not learning far more interesting and rewarding and may commit great effort to resisting goals set by others. Resistant learners are a complex mixture of skilled or unskilled, motivated or bored, satisfied or frustrated, passionate or apathetic. To differing degrees they may be discouraged, defensive, or disobedient learners or in contrast, passionately assertive non-learners.