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ABSTRACT

The purpose of this study was to determine if learning orientation, time, and learning environment accounted for significant variance, effects, and interactions. The investigator developed a course for adults, entitled "Discovering the Web," presented it in three World Wide Web learning environments, and provided adapted solutions for audiences differentiated by three learning orientations (i.e., intentional, performing, and conforming learners). Two research questions were developed to examine the effects of learning orientations on the selected dependent research variables: do learners using intentional learning environments benefit more than learners not using intentional learning environments? and do learning orientations influence group interactions? The results indicate the need to provide: (1) sophisticated, discovery learning situations for intentional learners when they want to be assertive, high-standard, high-effort learners; (2) non-risk, competitive, interactive settings that help performing learners overlook requirements for extra effort and difficult standards; (3) and scaffolded, structured, non-risk settings that help conforming learners learn safely and comfortably, then gradually help them internalize more intentional learning performance. (Contains 13 references.) (MES)

A New Paradigm for Successful Learning on the Web

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Abstract: How do we support successful, lifelong learners and help them competently respond to rapidly changing opportunities in the 21st century. The answer lies in how well we understand the sources for successful learning and consider audiences differentiated by individual learning differences. After years of cognitive traditions, lack of *whole-person* theoretical foundations, and imperfect *one-size-fits-all* designs, today's paradigms are still overlooking the significant, higher-order impact of affective and conative influences on learning. The investigator introduced learning orientations (learner-difference profiles) to examine learning in different environments. This is a unique perspective that considers how conative and affective factors guide, manage, and sometimes override cognitive (thinking) processes. The ANOVA results show how learning orientation, time, and environments account for significant effects and interactions. These results demonstrate useful ways to analyze and differentiate the audience before designing solutions for more successful learning and performance.

1. Introduction

If the cardinal rule for instructional designers is to know thy audience then we need greater understanding of learning audiences, especially as we move from the classroom to Web learning. After years of cognitive traditions, a review of individual learning difference research (Martinez, 99b) stills shows a heavy focus on cognitive processes and information processing mechanisms. Today's cognitive-rich paradigms need a stronger infuse of conative and affective research for a more realistic view of successful learning. To ignore or subjugate the importance of a learner's intentions and emotions is to create fuzzy, *one-size-fits-all* solutions for audiences treated as global learners with homogeneous intentions and feelings about learning. In contrast, a more realistic, comprehensive understanding of learning differences considers the complex influences and relationships between conative, affective, cognitive, social, and other relevant factors.

For many years Russell (97) has been conducting comprehensive comparative research on using technology for distance education. After compiling data from 355 research studies to examine what works or does not work, Russell (97, p. 1) states that research results are largely ambiguous and that individual differences in learning dictate that technology will facilitate learning for some, but will probably inhibit learning for others, while the remainder experience no significant difference. He adds 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. In conclusion, Russell (97) advises that the real challenge facing educators today is identifying the student characteristics and matching them with the appropriate technologies. Reeves (93) echoed parallel sentiments as he advocated the inclusion of stronger, more reliable theoretical foundations that explain individual learning differences. 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, and it thus leads to ambiguous results. Similarly, after his review of educational research Bangerter-Downs and Rudner (91) concluded that no one knows what really works.

The confusing or inconsistent results arising from the research literature clearly indicates something critical is missing from our cognitive-rich learning constructs and educational technology theories. Snow and Farr (87, p. 1) suggested that sound learning theories are missing and realistically require a whole person view that integrates cognitive, conative, and affective aspects. The two researchers wrote that educators cannot ignore or overlook the key psychological aspects that interact in complex ways to support learning and performance outcomes. Otherwise, explanations about learning differences will be ambiguous and *isolated* from reality (Snow & Farr, 87).

2. Intentional Learning Theory

What theories and models can help us analyze and differentiate the audience and accommodate individual learning needs for successful Web learning? Clearly, successful learning paradigms need to acknowledge that individuals are feeling, intentional, thinking, and social human beings. Hence, the new Web learning paradigms need to (a) recognize diverse, fundamental sources for human response, (b) differentiate the audience using higher-order psychological explanations for learning differences, and (c) offer methodology that recognizes, explains, matches, and manages the impact of primary learner-difference variables. This study investigates individual differences by using *learning orientations* (unique learner-difference profiles) to differentiate the audience, guide design of the instruction and environment, and customize solutions that achieve objectives and improve learning ability. Learning orientations use the *intentional learning theory*, which describes higher-order psychological attributes and learner-difference variables for successful learning, as its theoretical foundation. There are four learning orientation categories: *intentional, performing, conforming*, and *resistant*. The 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. This approach to audience analysis is possible because learning orientations encompass the higher-order, dominant influence of intentions and emotions. Researchers in other fields (Ledoux, 96; Goleman, 95) also show that emotions and passions influence, guide, and, at times, override thinking (cognitive) processes. Woodward (98), a child development researcher, also described how humans are highly goal oriented and use intentions to guide learning as early as age six months. Recognizing the power of emotions and intentions is also an important lesson for educators. Educators who can knowingly tap into a learner's emotions and intentions have a powerful advantage. This study recognizes that how successfully we support learning depends on how well we support individual needs with customized solutions that foster increasingly successful learning and performance. This transition from *one-size-fits-all* to *mass customization* is already happening. It is apparent in the growing use of templates and learning objects for multimedia (Martinez, 99a).

3. Study Purpose

The study purpose was to determine if learning orientation, time, and learning environment accounted for significant variance, effects, and interactions. For this study, the investigator developed a course, presented it in three Web learning environments, and provided adapted solutions for audiences differentiated by three learning orientations. After the analysis, significance levels would indicate how likely a result or relationship was true (that is, not due to chance). Significance would indicate the importance of analyzing learning audiences to identify learning orientations and match solutions to the major learning attributes for each learning orientation. Since individuals were not expected to learn alike, the investigator used learning orientations to hypothesize how individuals would learn more successfully in matched environments and less successfully in mismatched environments. Learning orientations helped to represent and examine human learning variability more realistically. This method for audience analysis 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 on cognitive and social processes. The investigator developed two research questions to examine the effects of learning orientations on the selected dependent research variables. (1) Do learners using intentional learning environments (Group EX1) benefit more than learners not using intentional learning environments (Control Groups CO1 and CO2)? (2) Do learning orientations influence group interactions?

4. Method

Before taking the *Discovering the Web* course, the learners took the Learning Orientation Questionnaire, which identified the individual's learning orientation, and were randomly assigned to a research group, that is, one of three Web learning environments, where they received different instructions (the intervention) for taking the course.

1. *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 and intentional learning performance. The instructions delivered the intervention, called Intentional Learning Training (ILT), at the beginning of the course to encourage intentional learning performance.
2. *Web Learning Environment 2* was the first control group (Group CO1) and presented the performing learning environment. It offered the Group EX1 instructional setting but omitted the special ILT intervention instruction.

3. *Web Learning Environment 3* was the second control group (Group CO2) and presented the conforming learning environment. It offered a menu-driven version, but not the intentional learning resources or the ILT intervention.

These Web learning environments were part of an instructional and research model called the System for Intentional Learning and Performance (SILPA). The assignment to an environment did not necessarily match the learner's learning orientation. Learners took the course on their own, stopping as necessary, until they completed the eight lessons and assessments. Learners typically took one and a half hours in one session to finish. 49 women and 22 men (mean age = 22) volunteered to take the Web course. All adult subjects had very limited or no Web experience. Most of the volunteers were undergraduate students from a local Western University. Other volunteers were from the general public, including white- and blue-collar employees in positions at all levels of business, corporate trainers, young and older housewives, university and high school faculty, retirees, and high school and university graduate students. Obtaining a broad sample was helpful in generalizing the results to the public. The course assessments were not adapted using learning orientations since preliminary research was needed to integrate conative and affective factors adequately. The investigator introduced the achievement variable to collect evidence showing how the learning orientations achieved in the three groups. In this study, achievement was not expected to show any statistical significance and was included as a basis for observation, data collection, and a beginning in the examination of how to develop instruction with assessments using a broader set of psychological factors.

4.1 Experimental Research Design

The investigator developed an experimental factorial research design and conducted multiple repeated measures univariate analyses of variance (ANOVA). This factorial design helped in the analysis of 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)*. Factorial designs are useful because researchers can examine *effects* more realistically by controlling and analyzing more than one variable simultaneously. A second advantage of the factorial approach is that you can control additional variables that you know will influence the analysis. To allow for the effects of time, the investigator used repeated measures to test subjects several times (three times in this study) for a measure of each independent variable. A third advantage of this design is that the factorial approach lets the researcher manipulate, control, and analyze *interactions*, in addition to *effects*. This research design is unique because it overlays learning orientation as a separate dimension to (a) guide design and development of the research environment, content, and presentation, and (b) differentiate the audience before introducing the treatment and examining the results. This step is especially important because it distinguishes learners as individuals with predominant psychological characteristics in comparison to traditional methods that may treat learners unrealistically as a global group with homogenous influences.

Treatment	Orientations	A_1	A_2	A_3
1 GROUP EX1 (with ILT & iCenter)	Cat. 1 - 3	Y Measures	Y Measures	Y Measures
2 GROUP CO1 (w/o ILT, with iCenter)	Cat. 1 - 3	Y Measures	Y Measures	Y Measures
3 GROUP CO2 (w/o ILT & iCenter)	Cat. 1 - 3	Y Measures	Y Measures	Y Measures

Note. The table shows three research groups with or without the Intentional Learning Training (independent variable 1) and *iCenter* 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 differentiate the subjects within the three research groups by three learning orientations (independent variable 2): intentional, performing, and conforming learners, respectively. Resistant learners are not included. The repeated Y measures for the four dependent variables appear in columns A_1, A_2, and A_3.

Table 1: Repeated Measures Research Design

The repeated measures design resulted in four data sets: (1) pre-course registration and (2) three sets from the practice and assessment activities in the three time periods. To analyze the data, 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 (Littell et al. 96). Following this advice, the investigator used a modified mixed model repeated measures

(PROC MIXED) example from Littell, Freund, and Spector (91) in the SAS system (with special parameters for learning orientation treated as a continuous subject variable).

5. Results

The study's evidence suggests that learning orientation is a rational and useful way to (a) provide theoretical foundations using a comprehensive view of learning, (b) recognize dominant psychological factors, other than just cognitive aspects, that influence learning (c) analyze and differentiate the audience an important aspect of determining what works for the audience, and (d) guide design, development, implementation, analysis, and evaluation of solutions and environments.

5.1 Multiple Repeated Measure ANOVA Results

Using *ILO* (learning orientation), *GROUP* (EX1, CO1, and CO2), and *TIME* (A_1, A_2, and A_3 for three instructional units) as variables, the ANOVA results exhibited significant main effects and interactions for three dependent variables

1. GROUP effects on satisfaction ($\underline{F} = 5.30$, $\underline{p} = .0074$) and learning efficacy ($\underline{F} = 6.64$, $\underline{p} = .0024$) at a significance level of .01 (99%)
2. ILO * GROUP interactions on satisfaction ($\underline{F} = 6.48$, $\underline{p} = .0027$) and learning efficacy ($\underline{F} = 3.93$, $\underline{p} = .0245$) at a significance level of .01 (99%) and .05 (95%), respectively
3. TIME effects on learning efficacy ($\underline{F} = 31.82$, $\underline{p} = .0001$) and intentional learning performance ($\underline{F} = 14.77$, $\underline{p} = .0001$) both at a significance level of .0001 (99.9%)

Significance levels exhibit whether there is a statistically significant difference between two means. Significance levels of .0001, .01, and 05 are the values commonly used to show statistical significance. In academic fields, a theory should have at least a 95% chance (.05 significance level) of being true. The first significance level, such as .01, means that the finding has a one percent (.01) chance of not being true, which is the converse of a 99% chance of being true. In contrast, the high significance level for TIME effects (.001) has a 99.9% chance of being true. Examining these results, the investigator concluded that GROUP, TIME and ILO * GROUP have significant effects and interactions on the sample population regarding satisfaction, learning efficacy, and learning performance. Specifically, these results suggested the importance of understanding GROUP and TIME effects and ILO * GROUP interactions as factors in supporting and improving learner attitudes, learning efficacy, and intentional learning performance. As expected, the ANOVA analyses (not shown) presented nonsignificant results for the achievement variable.

To supplement the ANOVA analyses, the investigator examined group means and standard deviations by time for the four dependent variables. These results show that Group EX1 had the highest overall group means for three of the four dependent variables. However, the overall group means for achievement are very similar between groups (Group EX1: $\underline{M} = .83$, Group CO1: $\underline{M} = .85$, and Group CO2: $\underline{M} = .84$). As expected, each group mean averaged out to the group's majority orientation (that is, performing learners for each group). Yet, if we look closely at the achievement results (organized in the groups by learning orientation), the findings show that each of the learning orientations performed highest in the group with their matching learning environment (Group EX1: $\underline{M} = 94\%$ for intentional learners, Group CO1: $\underline{M} = 91\%$ for performing learners, and Group CO2: $\underline{M} = 87\%$ for conforming learners).

5.2 Bivariate Plots by Learning Orientation

It was not possible to use ANOVA analyses to examine specific performance by learning orientation within the groups. However, the investigator used eight bivariate plots to exhibit how individuals, grouped by learning orientations, performed within the GROUP and by TIME. Using the SAS system's PROC REG and the unstandardized regression weights for the predicted intercept and slope by GROUP or TIME, the investigator plotted the regression lines between X and Y. One of the eight plot (shown in Figure 1) describes achievement by learning orientation within the three GROUPs. These results suggest that as learning orientation increased, the learners in Group EX1 exhibited the highest achievement and vice versa. In the other two learning environments the learner's achievement barely improved, regardless of the learning orientation. Interestingly, 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.

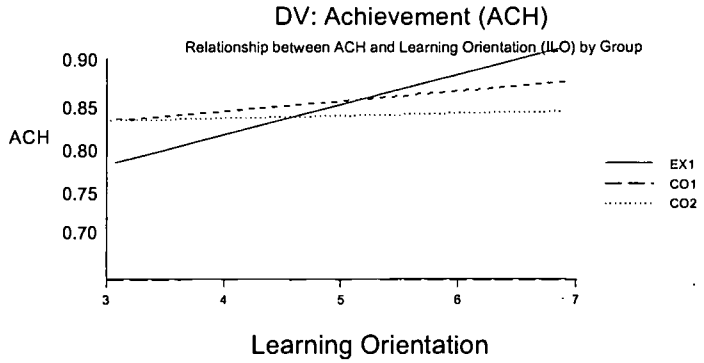

Figure 1. Linear Equations for Achievement (ACH) Showing the Regression of Y on X by Group

Research Question 1: 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 with the highest group means for three dependent variables (satisfaction, intentional learning performance, and learning efficacy) and highest achievement means for intentional learners. As was previously mentioned, the achievement group means showed that individuals did best in the environments which best suited their learning orientation. The ANOVA results (Section 5.1) indicate the 99% probability that learning environments impacted learning satisfaction and efficacy. The group means showed that the learning environments impacted all the dependent variables. These findings suggest that learning environments influence learning outcomes depending on how successfully it matches and supports the learning orientation and individual learning differences.

Research Question 2: Do learning orientations influence group interactions? The ANOVA results (Section 5.1) indicate how 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 is useful in guiding the design of instructional solutions and environments. Although learners achieved best in the environment which suited their learning orientation, it is important to consider that they were not in an environment that would help them experiment and improve intentional learning ability. The investigator will use these findings to focus development efforts on making the performing and conforming learning orientations more comfortable, engaged, and willing to perform in environments that subtly help them improve learning ability.

6. Conclusion and Contributions

This study investigates the importance of learning orientation and (a) using it to determine and explain key learner-difference variables, (b) integrating it into audience analysis and design methodologies to differentiate audiences and customize solutions, and (c) supporting it for more satisfying, successful learning and improved learning performance. These findings highlight how to support differentiated audiences with greater sophistication and specificity then primarily cognitive perspectives permit. Supporting the research hypothesis, the results indicate the need to provide (a) sophisticated, discovery learning situations for intentional learners when they want to be assertive, high-standard, high-effort learners, (b) non-risk, competitive, interactive settings that help performing learners overlook requirements for extra effort and difficult standards, and (c) scaffolded, structured, non-risk settings that help conforming learners learn safely and comfortably, then gradually help them internalize more intentional learning performance. The investigator hopes that these results revitalize the often-ignored, human perspective for differentiating audiences using conative and affective factors along with the more commonly explored cognitive and social learning factors. With practice, the matched solutions for differentiated audiences will be less expensive and offer better results because the individual assumes greater responsibility, sets and attains increasingly higher goals, expends greater, faster effort, and enjoys continually improving learning and performance. As a contribution to study of individual learning differences, this study

(1) Highlights the importance of considering a comprehensive set of affective, conative, cognitive, social, and other related learner-difference variables. (2) Demonstrates the need for sound theoretical foundations that incorporate the influence and relationship between higher-order psychological factors into measurable whole-person learning constructs. (3) Offers explanations on how some learners benefit from one type of solution and others do not. (4) Provides a Web learning

environment that can differentiate the audience by learning orientation, match individual and mass customized solutions, offer components that help learners internalize more intentional learning performance, and enhance use of learner-managed instructional treatments. (5) Offers analysis and design strategies for mass customization, that is, ones that identify and match differentiated-audience solutions to foster improved learning and performance.

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Appendix A
Learning Orientations

Intentional Learners Deeply influenced by an awareness of the passions and intentions 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 skills and strategies, and positive expectations to self-manage learning successfully. These learners manage holistic to partist 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 enjoy taking responsibility and control of their learning and willingly become actively involved in self-managed learning. These individuals learn best in open or discovery environments that support expertise building; risk-taking; mentoring relationships; self-directed learning; complex, problem-solving or case study situations; and high learning standards.

Performing Learners Performing learners are low-risk, skilled learners that consciously and capably use strategies, preferences, and self-regulated learning skills to achieve average-standard learning objectives. Performing learners, in contrast to intentional learners, are short-term thinkers, task-oriented, and often extrinsically motivated. They take fewer risks with mistakes and difficult goals, focus on grades, rewards, and normative achievement standards, and often rely on coaching relationships, available external resources, and social influences to accomplish a task. Performing learners will selectively work hard to learn topics and skills that they highly value and find particularly interesting. Otherwise, they clearly acknowledge that they want to limit learning effort (e.g., they do not have enough time) by only meeting stated objectives or getting the grade. These learners learn best in semi-structured learning environments that add competition, fun, interaction, and coaching for self-motivation.

Conforming 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.

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