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ABSTRACT

This paper examines the research question of whether the distribution of learning orientations among university students enrolling in World Wide Web-based courses differs from those in the general student population. Using the Learning Orientation Questionnaire (LOQ), statistically significant differences in learning orientations were found between science students in a Web-based course and those in a more traditional classroom stetting. The implications of this finding on sample bias in educational research studies of Web-based courses and on the instructional design of university Web-based courses are discussed. General instructional design considerations for the three major learning orientations (conforming, performing, and transforming) are described. (Contains 13 references.) (MES)

LEARNING ORIENTATIONS IN UNIVERSITY WEB-BASED COURSES

EDWARD R. JONES † AND MARGARET MARTINEZ ‡

ABSTRACT. This paper examines the research question of whether the distribution of learning orientations among university students enrolling in web-based courses differs from those in the general student population. Using the Learning Orientation Questionnaire (LOQ) [7] statistically significant differences in learning orientations were found between science students in a web-based course and those in a more traditional classroom setting. The implications of this finding on sample bias in educational research studies of web-based courses and on the instructional design of university web-based courses are discussed.

1. INTRODUCTION

Today, stimulated by legislative and educational initiatives designed to encourage development of web-based courses, an increasing number of web-based courses are being offered by universities. Increasingly, students have a choice of whether to include web-based courses in their selection of classes. Many are preferring to enroll in traditional courses rather than web-based courses.

If students attending web-based courses are atypical, then the results of educational studies of these courses are subject to sample bias. This raises the possibility that current characterizations of university web-based courses may not scale to larger, more traditional student populations. A key research question is whether today's web-based students are typical students, with typical learning orientations, or whether they differ from the general university student population.

Answering this question is important for several reasons. Increasingly, some university courses are offered only in a web-based format. This is particularly common among speciality, upper-division, low-enrollment courses. For these courses, students may not have a choice to take the course in a traditional format. It is important that the design of web-based courses appeal not only to today's population of web-based students, but also to a broader student population who may not have developed effective study habits for web-based learning.

This paper describes the results of research into possible differences between students in web-based courses and those who prefer to attend traditional classes. A new instrument developed for the instructional design of online courses, the Learning Orientation Questionnaire (LOQ), was used to quantify differences in learning orientations between students enrolling in web-based courses versus those who preferred a more traditional classroom setting. It was also evaluated as a tool for early identification of students at-risk of not completing the course.

2. BACKGROUND

One of the first widely reported studies of student performance in web-based courses was a randomized study conducted in 1996 by Dr. Schutte at California State University - Northridge. His remarkable claim that students in his web-based statistics course scored 20% higher than students taking the same course in a traditional setting was reported in the news [1]. As a result, a larger but non-randomized study was conducted at Texas A&M University Corpus Christi in an attempt to reproduce these results [4].

This second study also reported that students in the web-based class scored higher, although a closer investigation found that this improvement could be accounted for by differences in student GPA's [5]. It also found higher withdrawal rates in the web-based class than the traditional class. Since the study was non-randomized, students self-selected the course they wanted to attend. This

Key words and phrases. Instructional Design, Web-Based Classes, LOQ, Personalized learning, Learning Orientation Questionnaire.

Thanks to Dr. Mike Hardy for his assistance distributing the LOQ surveys.

TABLE 1. Learning Orientations (adapted from [5])

Learner Orientation	LOQ Range	Description
Resistant Learner	LOQ < 3.5	Resistant learners lack a fundamental belief that academic learning and achievement can help them achieve personal goals or initiate positive change.
Conforming Learner	$3.5 \leq$ LOQ < 4.6	Conforming learners are less successful online learners since they prefer highly structured learning environments.
Performing Learner	$4.6 \leq$ LOQ < 5.6	Performing learners are sophisticated students who are typically self-motivated and self-directed only in areas that they value. Otherwise, they rely on external support, e.g. instructors.
Transforming Learner	$5.6 \leq$ LOQ	Transforming learners are likely successful online learners with sophisticated online learning skills. They are highly self-motivated, self-directed, self-assessed and independent.

raised the question of whether the higher withdrawal rate might be explained by learning orientation differences between students in web-based courses and those in traditional classes.

To answer this question, the LOQ was used to quantify learning orientation preferences of students in web-based and traditional classes. The LOQ was originally developed to help tailor online instruction by identifying learning orientation preferences among students [6]. It consists of 25 Likert scale questions which can be answered in 10-20 minutes. LOQ scores range from 1-7, and are used to classify learners into one of four categories, see Table 1.

It is important to understand the difference between *learning orientations* and the more commonly used term *learning styles.* Learning styles is commonly used to describe a construct that considers cognitive factors as the dominant influence on how people learn differently. This traditional construct generally subjugates or overlooks the impact of emotions, intentions, will-to-succeed, and social factors on learning. In contract, the LOQ identifies a student's learning orientation. Learning orientations reverse the construct of *how people learn differently* to the dominant influence of affective, conative, and social factors on learning.

This is a key difference between traditional and online classes. In a traditional classroom good teachers instinctively manage differences in learning orientation, i.e., differences in intentions, motivation, etc. In this environment, it makes sense for classroom teachers to focus on learning style rather than orientation. However, it is much more difficult to influence these factors in an online course, where we are asking students to learn or their own. The problem of *self-motivated, independent, and self-directed learners* becomes an obstacle to learning and success in online courses.

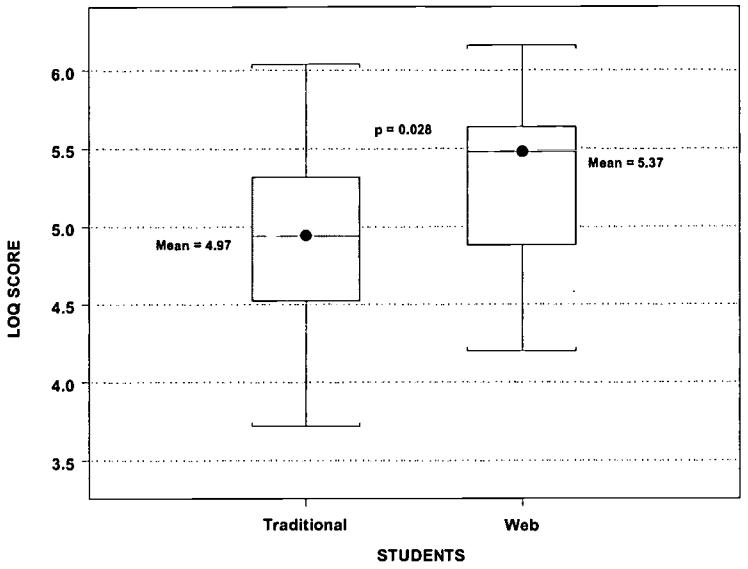
3. Learning Orientation Comparisons

In this study, the LOQ was administered to 56 university science students taking an introductory course in statistics. Thirteen of them were enrolled in a web-based course and the remainder were enrolled in a traditional version of the same course. The percentage of students in each of the four learner categories is shown in the following distribution of learner orientations:

Resistant	Conforming	Performing	Transforming
0%	23%	57%	20%

In this general population of science majors, the majority are classified as performing learners, with almost an equal number of conforming and transforming learners.

FIGURE 1. LOQ Scores for Traditional vs. Web-Based Students



The question of whether students deciding to enroll in today's web-based courses have a different learning orientation from those in the general student population is answered by these data. In this study, the average LOQ for students in the web-based statistics course was statistically significantly higher than similar students in the traditional version of the same course, see Figure 1. An examination of the learning orientation distribution between the web-based and traditional classes found that 93% of the students in the web-based class were either performing or transforming learners, see Figure 2. This is much higher than the same percentage for the traditional class, where only 68% of the students in the traditional class were performing or transforming learners.

Higher LOQ scores for students in web-based courses has important implications for the design and management of university web-based courses. First, it emphasizes the point that instructors can not just transfer their course materials to online courses and expect to be successful, without addressing the fundamental issues of student learning orientation in the instructional design of their online course.

This is not to say that every online course must have three separate learning environments, corresponding to the three major learning orientations. The instructional design of online courses can be developed under a single environment that offers a streamlined interface for conforming learners, and more advanced user interfaces for performing and transforming learners. Similarly, the content design can be offered it its entirety to conforming learning, a subset to performing learners and an even smaller subset to transforming learners.

The second important finding in this research is that the general student population includes a higher percentage of conforming learners. This suggests that instructors should not expect their web-based course to be successful with a general student population. Higher LOQ scores for our current web-based students indicates that the most successful web-based courses today are those designed for performing and transforming learners. On the other hand, web-based courses being developed for a broader student population must be designed to support conforming learners from the general student population.

Dr. Martinez discusses the instructional design implications as a function of the student's learning orientation [7]. Table 2 summarizes some of the suggested design considerations for the top three learning orientations. In general, Conforming Learners have a better chance of succeeding in an online course that is highly structured, providing detailed guidance, step-by-step assignments and

FIGURE 2. Learner Distributions for Traditional vs. Web-Based Students

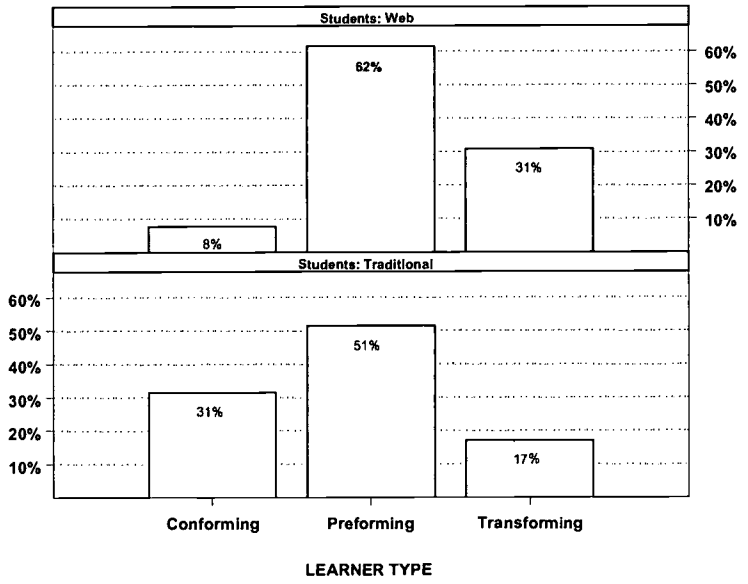
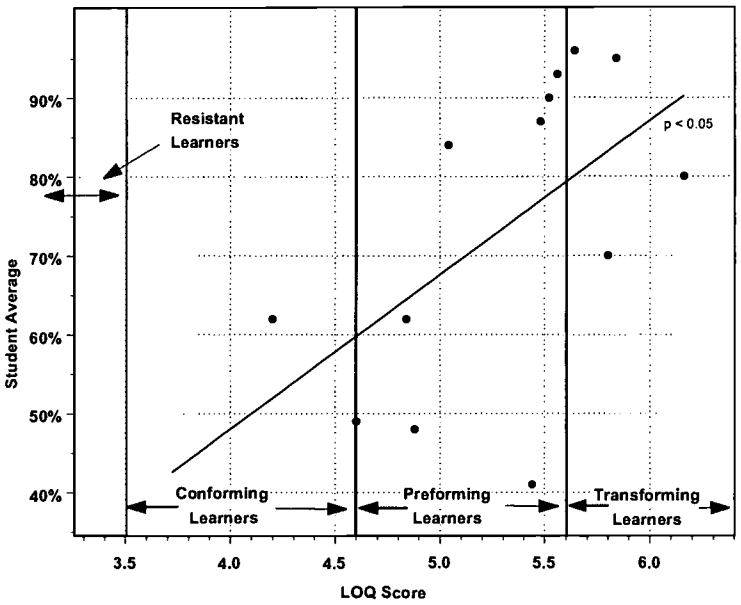


TABLE 2. General Instructional Design Considerations for the Three Major Learning Orientations

Orientation	Preferred Instructional Design
Conforming Learners	Courses with structured, guiding environments that help students avoid mistakes. Prefer less self-directed learning, simple step-by-step assignments, and guiding instructors. Course should provide explicit feedback with longer, focused and detailed guidance.
Performing Learners	Courses that are semi-structured, coaching environments that provide creative interactions. Prefer some self-direction in areas of high interest, task-oriented assignments which are somewhat challenging, and coaching instructors. Course should provide concise feedback with medium or brief guidance. It is important to focus on practical applications, and use learning modules of medium size that focus on applications.
Transforming Learners	Courses that are loosely structured environments that promote challenging discovery. Prefer self-directed goals and learning, challenging projects or case studies, and mentoring instructors. Course should be built around discovery and the freedom for students to design their own content structure. Learning modules should be short, concise and provide links to details, if needed.

focused guidance. In general, university courses tend to focus on developing general problem-solving, and knowledge, rather than skill development. Upper-level university courses, in particular, tend to be designed to incorporate some level of self-direction and exploration. A survey of today's university web-based courses would likely find that most of them follow the performing or transforming models described in Table 2.

FIGURE 3. LOQ Scores versus Student Averages



Lastly, as previously mentioned , higher student withdrawal rates are being reported for web-based courses [5]. The final research question is whether student LOQ scores could be used to screen students enrolling in web-based courses to identify students at-risk of not completing the course.

To evaluate the usefulness of using student LOQ scores for screening students enrolling in online courses, the correlation between LOQ scores and the students grade was examined, see Figure 3. A statistically significant correlation between LOQ and grades was found, suggesting that LOQ scores might be used to identify at-risk students. This correlation suggests that student learning orientations should be identified before the course begins. Conforming and resistant learners should be identified and their course material tailored to their need for structure and guidance. They should not be expected to perform well on case studies and loosely structured projects. They will need more guidance and longer, detailed instructions for assignments and examinations. It may be even more important for them to be screened to ensure they have adequate prerequisites for the course.

4. SUMMARY & RECOMMENDATIONS

It is clear that today, that a new paradigm must be used when designing online courses. Courses developed for a tradition classroom setting should not be transferred to an online environment with consideration for the importance of learning orientation rather than learning style on the instructional design of web-based courses. The learning orientation distribution of students in web-based courses is different from the general student population. In particular, it appears that the current population of university students enrolling in web-based courses consist of more transforming and performing students than the general university student population. Moreover, since most web-based courses tend to be designed to encourage self-direction, exploration, coaching and mentoring, this study found a significant correlation between LOQ scores and student grades.

This suggests that LOQ scores can be used to design web-based courses by tailoring the content and user interface to the learner orientation of individual students. Ideally, the user interface, assignments, content and course structure should be adapted to match individual student learning orientations. There are an increasing number of tools for developing content that adapts to individual orientations [3, 2] stemming from research in adaptive learning.

In addition, this study found that LOQ scores can be used to identify students at-risk of not completing an online course. Instructors should identify students with low LOQ scores and ensure

that they have the necessary prerequisites for the course. In some cases, they may need one-on-one tutoring and additional guidance from their instructor.

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