

Learning From the Pros: Influence of Web-Based Expert Commentary on Vicarious Learning About Financial Markets*

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ABSTRACT

Web-based financial commentary, in which experts routinely express market-related thought processes, is proposed as a means for college students to learn vicariously about financial markets. Undergraduate business school students from a regional university were exposed to expert market commentary from a single financial Web site for a 6-week period. When compared to a control group, students in the experimental group were found to possess higher levels of financial market awareness. Degree of engagement, as approximated by measures of project exposure time and effort, was significantly related to market awareness. Finance majors were found to be more engaged in the process than nonfinance majors. Although this study should be considered exploratory in nature, findings support the notion of using Web-based vicarious learning processes in financial education. Future research can extend the generalizability of these findings, as well as shape vicarious learning mechanisms for use across business disciplines.

Subject Areas: Decision Making, Financial Markets, Learning Processes, and Web Learning Technology.

INTRODUCTION

Deep smarts are a potent form of expertise based on first-hand life experiences, providing insights drawn from tacit knowledge, and shaped by beliefs and

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social forces . . . They are based on know-how more than know what—the ability to comprehend complex, interactive relationships and make swift, expert decisions based on that system level comprehension but also the ability, when necessary, to dive into component parts of that system and understand the details (Leonard & Swap, 2005, p. 2).

Many financial decisions seem to require such deep-seated intelligence. In Schwager's (1989) study of successful traders, for instance, individuals often drew from a tacit "feel" of market conditions when making buying and selling decisions. Scholars of corporate finance have noted the existence of similar complex processes involved with capital allocation decisions (e.g., Brealey & Myers, 1991). This complexity is compounded by myriad behavioral defects that hinder effective decision making in financial contexts (e.g., Kahneman & Tversky, 1979; Thaler & Johnson, 1990).

One approach for facilitating transfer of tacit, complex knowledge is vicarious learning. Known also as observational learning or mastery modeling, vicarious learning is linked to social cognitive theory (Bandura, 1977, 1986) and stems from the notion that most learning generated by direct experience can occur by observing the behavior of others (Manz & Sims, 1981; Rosenthal & Zimmerman, 1978). Vicarious learning has been shown to facilitate knowledge transfer in organizational contexts related to management (e.g., Burke & Day, 1986), marketing (Meyer & Raich, 1983), information systems (Compeau & Higgins, 1995), and finance (Chakrabarti & Roll, 1999).

Employing vicarious learning approaches in collegiate environments has historically been constrained by a paucity of practical experts from whom students can model behavior as part of coursework. However, the advent of Internet and Web-based technologies might permit students to connect with expert instructors from remote locations. In the context of financial education, qualified role models might be sourced from the large pool of authors that generate online commentary on financial market Web sites. To the extent that Web site commentary expresses expert-level thought processes, it is plausible that novices could observe these mental models by reading the commentary and, over time, adopt similar patterns of thought. Carefully integrated into a curriculum, Web-based commentary could facilitate vicarious development of financial market intelligence among college students.

In this article, we explore the utility of Web-based expert commentary for facilitating student learning about financial markets in a business school setting. First, we theorize about the cognitive consequences of exposure to Web-based financial market commentary in a collegiate context. Then, we study the effects of exposing a group of undergraduate business school students to market commentary from a single financial Web site, focusing primarily on the relationship between Web site engagement and development of financial market knowledge and awareness. Finally, we interpret our findings and offer implications for research and practice.

BACKGROUND AND HYPOTHESIS DEVELOPMENT

Business school programs, including those related to finance, are increasingly focused on developing practical competence in graduates (Sherwood, 2004; Siam,

2005; Weaver, 1993). However, financial markets are complex social phenomena (Peters, 2003). When complexity of a knowledge domain is high, lecture-based training can be an inadequate transfer mechanism (Boh, Killough, & Koh, 2001). Instead, complex intelligence is often better conveyed by approaches that immerse students in the social context of the knowledge domain (Bandura, 1977, 1986).

Experiential venues provide a means for exposing students to real-life contexts. Business schools have been adding more reality-based, experiential content to their programs (Kolb & Kolb, 2005). In financial programs of study, for example, many instructors require students to read financial periodicals, such as the *Wall Street Journal*, with the objective of increasing student awareness of market realities (Moy, 1995). Other approaches have been designed to facilitate active, hands-on learning. Computer-based market games and simulations (e.g., Ball & Holt, 1998), investment clubs (Grinder, Cooper, & Britt, 1999), and trading labs (Siam, 2005) promote a learn-by-doing approach to financial education.

A drawback of many experiential venues is that learning depends primarily on the direct consequences of student behavior. Individuals will tend to increase behavior that has been experienced to produce positive consequences and decrease behavior that has been experienced to produce negative consequences (Manz & Sims, 1981). Learning that depends on direct behavioral consequences may result in many costly mistakes and require considerable time before complex skills are mastered (Bandura, 1977).

Vicarious learning processes overcome some of the limitations of experiential trial-and-error instruction. When learning vicariously, students observe the behavior and experiences of a model (Gioia & Manz, 1985). By observing an effective model in action, learners gain a sense of behavior needed to produce effective outcomes in advance, rather than relying on the direct consequences of their own behavior to tell them what to do (Bandura, 1977). An effective expert instructor essentially serves as a role model for students to emulate. Rather than pure mimicry, however, the objective is robust competence development, because learners must adapt their skill sets to particular contexts (Wood & Bandura, 1989). Vicarious learning processes may help students develop richer capabilities in a more efficient manner than instructional venues grounded in trial and error-based experiential processes (Manz & Sims, 1981).

A primary barrier to incorporating vicarious learning approaches into university programs has been a lack of on-campus experts with modeling influence. Effective role models must possess a master's stock of knowledge usually gained from long periods of practical experience, as well as credibility, motivation, and skill for transferring expertise to novices (Gioia & Manz, 1985; Leonard & Swap, 2005). While some college faculty possess these traits, many fall short of the industry qualifications necessary for achieving legitimacy as practical experts in the eyes of students.

Financial Web sites, and individuals who post market commentary on them, may offer a valid pool of practical expertise for vicarious learning in university settings. Sources of Web-based market commentary vary greatly, from columnists who routinely post observations on publicly accessible Web portals, to entrepreneurs who publish proprietary content on Web sites for paying subscribers. Although much Web-based financial commentary is dispensed as advice (e.g., "Here are

stocks I think you should buy.”), some commentary is conveyed as less prescriptive thought processes (e.g., “Here is what I’m seeing, thinking, and doing relative to the markets.”). It is the latter type of Web-based commentary that is intriguing from a vicarious learning perspective. Plausibly, novices could observe expert thought processes as expressed in well-chosen Web site commentary and, over time, adopt similar patterns of thought.

Various factors shape the potential of vicarious learning from Web-based financial commentary. Individuals who serve as role models wield significant influence on the process. Those who possess interpersonal skills, credibility, status and competence, and ability to display behavior in a vivid, detailed fashion tend to exert considerable modeling influence (Manz & Sims, 1981). Despite their remote location, Web-based commentators would likely need to exhibit similar characteristics, and students must recognize and respect these qualifications to be motivated to learn vicariously from them. Characteristics of the Web site venue itself should also influence the effectiveness of online vicarious learning processes. Because effective observational instruction must capture learner attention, permit mental rehearsals and comparisons, and motivate subsequent use of the observed behavior (Wood & Bandura, 1989), a venue that does not provide an engaging learning environment will likely produce few gains.

Implementing Web-based vicarious learning processes in collegiate contexts raises several issues. Vicarious learning is sometimes enhanced when role models adjust content and delivery to suit student needs (Leonard & Swap, 2005). In a Web-based environment, the remote connection between expert and student can make it difficult for an instructor to gauge the effectiveness of knowledge transfer and adjust accordingly. Once model conduct is observed, students must rehearse the behavior to solidify it and routinize performance (Gioia & Poole, 1984). Many college students may not have an immediate application for the behavior they have observed and thus would have difficulty enacting the behavior in a reinforcing manner. Another issue involves the extent to which sophisticated capabilities can truly be cultivated during college coursework. Considerable study and experience, perhaps totaling 10 years or more, must be accrued to achieve expert status in many disciplines (Simon, 1987). Absent the proverbial career student, few college learners can allocate the time necessary to develop expert-level decision-making skill from their coursework alone.

Such problems are not intractable, however. When necessary, Web sites could incorporate elements such as chat rooms or question/answer structure to help instructors gauge student knowledge levels. Classroom instructors could assist students in rehearsing behavior observed online by conducting in-class discussions and other exercises. Given the novice status of most college students with respect to their financial market understanding, it is more likely that initial exposure to Web-based market commentary manifests in establishing core mental frameworks upon which students can subsequently build more sophisticated competence. In particular, exposing novices to expert commentary should help develop situational awareness of market context. Situational awareness is a state of knowledge that precedes decision making and performance which involves perceiving critical factors in an environment, understanding their meaning, and projecting what can happen

to a system in the near future (Endsley, 1995). Accounts of expert financial decision makers suggest that these individuals often possess acute situational awareness of markets (e.g., Lefevre, 1923; Soros, 1987; Steinhardt, 2001). Although situational awareness may be developed by various means (Bedney & Meister, 1999), permitting novices to observe Web-based experts navigating real-life conditions should advance situational knowledge development through vicarious mechanisms. Stated formally:

H1: Students who are exposed to Web-based market expert commentary will exhibit higher levels of situational financial market awareness than will unexposed students.

Degree of engagement in a Web-based vicarious learning process should influence the development of knowledge and awareness. Engagement is the harnessing of self when performing a task or role that is reflected by tendencies for people to employ or express themselves physically, cognitively, and emotionally during role performances (Kahn, 1990, p. 694). Putting in extra time or effort beyond a standard or minimum requirement can be indicative of personal engagement in a project (Kahn, 1990). Engagement should enhance learning from Web-based financial market commentary because engaged students will involve themselves more in the vicarious study process and in the subsequent rehearsal of observed behaviors that solidify knowledge and skill acquisition. Therefore, we posit that:

H2: Higher levels of student engagement in the study of Web-based market expert commentary will be positively related to situational financial market awareness.

A student's academic background should also influence cognitive development from Web-based vicarious learning processes. Majors in financially oriented disciplines should be more interested in projects associated with financial markets than other majors should be. Interest can be a powerful motivator and an important driver of learning (Steinmetz & Patten, 1967). Moreover, interest level, perceived meaningfulness of an activity, and the availability of relevant cognitive resources affect engagement (Kahn, 1990), suggesting that students with financial academic backgrounds should be more engaged in learning processes related to financial markets. Because behavior observed vicariously must be rehearsed in order to build competence (Gioia & Manz, 1985), finance majors should be more capable of relating observed behavior to knowledge or experience that promotes reinforcement. In contrast, novices with less relevant background may lack venues for enacting observed behaviors in a reinforcing manner. As such, finance majors should learn more from vicarious study of financial market experts than should other majors. It follows that:

H3a: Finance majors will exhibit higher levels of engagement in the study of Web-based market expert commentary than will other majors.

H3b: Finance majors will gain more situational financial market awareness from the study of Web-based market expert commentary than will other majors.

METHOD AND MEASURES

Method

In research that explores new domains, perspective is often obtained by selective and focused designs (Pettigrew, Woodman, & Cameron, 2001). Because of this investigation's exploratory nature, we studied the effects of exposing students to expert commentary from a single financial Web site. We selected the site based on our assessment of the commentators' qualifications as expert models, the Web site commentary's potential for developing financial market knowledge and decision-making capacity, and the Web site's general structure for promoting Web-based learning. The Web site is the central operation of a New York City-based for-profit media venture. The venture was founded by a Wall Street professional who perceived entrepreneurial opportunity in establishing a Web-based platform for learning about financial markets during the trading day. The founder, who is also a primary contributor to the Web site commentary, possesses extensive Wall Street experience as an equities and derivatives trader; he achieved positions of vice president at a major brokerage house and president of a \$400-million-dollar hedge fund prior to founding the venture. More than two dozen other professionals, labeled "professors," also contribute Web site commentary while working their careers. Like the founder, all contributors possess notable professional experience and performance records. All potential contributors are screened by the founder to ensure that their motivations fit with the Web site's educational mission, which is to help readers become more financially literate and develop capacity for informed decision making. Access to most of the Web site is free although there is some premium content. At the time of the study, the subscription base numbered about 2,500.

Web site commentary is delivered through two primary venues. In one section, contributors post daily columns that address market topics, issues, and subscriber questions. A second more dynamic venue contains less structured commentary centered on what contributors are experiencing in their daily market activities. This stream also includes additional answers to subscriber questions and news flow from major financial media outlets. The output resembles a blog-like stream of consciousness flowing from the contributors in close to real time. The Web site generates considerable content during the typical trading day. A random sample of 6 days drawn from a recent 3-month period found an average of more than 10 feature-length columns and over 100 streaming comments posted daily.

A noteworthy feature of the Web site's format is the use of metaphorical imagery and other literary devices by the contributors, who frequently link their thoughts to pop culture, animated characters, and even poetry. Use of metaphors and stories can increase rates of knowledge transfer in experiential learning environments (Swap, Leonard, Shields, & Abrams, 2001) and may be particularly important in shaping attitudes toward online venues (Chen & Wells, 1999; Wolfe, 2001). In summary, the qualifications of the contributors, the venture's educational mission, and Web site structure offered an attractive venue for exploring vicarious learning in a Web-based context.

Respondents for this study were undergraduate business school students enrolled at a regional public university. Business school enrollment included

Table 1: Demographic breakdown (counts and percent totals).

<i>Age</i>			<i>Gender</i>		
≤19	7	7.3%	Male	52	53.1%
20–24	69	71.9%	Female	46	46.9%
25–29	11	11.5%	Total	98	
30–34	3	3.1%	<i>Major</i>		
35–39	0	0.0%	Accounting	6	6.1%
≥40	6	6.2%	Bus Admin	4	4.1%
Total	96		Economics	1	1.0%
<i>Class</i>			Finance	18	18.4%
Freshman	1	1.0%	IS	6	6.1%
Sophomore	22	22.4%	Management	31	31.6%
Junior	39	39.8%	Marketing	8	8.2%
Senior	36	36.7%	Sports Business	2	2.0%
Total	98		Undecided	1	1.0%
<i>Groups</i>			Other	21	21.4%
Unguided	23	23.5%	Total	98	
Guided	45	45.9%			
Control	30	30.6%			
Total	98				

approximately 2,100 undergraduates at the time of the study. Extra credit was used as incentive to solicit participation from several class sections. Four sections were core management courses required for all business majors; one section was a senior-level management elective; two sections were finance electives. Participants were randomly assigned to either a Web site group or control group. The Web site group was granted access to the study site for 6 weeks; the control group was not granted access. Before heading to the site initially, students in the Web site group were provided a brief in-class orientation on how to navigate the Minyanville Web site, and a logbook in which to record time spent on the site and to briefly record a diary of weekly experiences such as what they were learning, what they liked and didn't like about the Web site, and so on. However, decisions about what particular content to read on the Web site were left largely to the students' discretion. After 6 weeks, Web site participants submitted their completed logbooks, and both groups completed a questionnaire designed to measure financial market knowledge and awareness as well as background demographic information. A total of 98 students successfully completed the study, which included 68 in the Web site group and 30 in the control group.

The demographic profile of the respondents (Table 1) reflects the convenience nature of the sample. The sample was weighted toward finance and management majors as students were drawn from courses in these disciplines. About 20% of the sample was categorized as "Other." Most of these students were from disciplines outside the college and were taking business classes as electives or to satisfy core curriculum requirements. Most participants were in their early to mid twenties. Nearly four out of five participants were of junior class standing or higher.

Measures

Main Study Variables

Situational Market Awareness: Situational awareness is grounded more in experiential context rather than sterile concepts (Endsley, 1995). Therefore, rather than employing stock instruments sourced from textbook concepts, we developed a series of empirically grounded scales for measuring situational financial market awareness. These scales were developed with the assistance of a group of financial industry professionals. Based on their contribution and review, these practitioners confirmed that, based on their experience, the items in each section adequately reflected the domain of practical knowledge and awareness being measured. The involvement of these professionals helped establish face validity of the market awareness scales.

Five scales were developed to measure financial market awareness. One scale asked respondents to rate familiarity (1 = *not familiar at all*; 5 = *very familiar*) with 16 market terms such as price-to-earnings ratio and volatility. Familiarity with terms constitutes a fundamental level of understanding in cognitive development (Bloom, Englehart, Furst, Hill, & Krathwohl, 1956). Responses to the 16 items were summed to reflect a familiarity score for each individual. A second scale reflected understanding of market terms. Using a multiple-choice format, respondents were asked to match market terms with definitions for 14 items such as the Dow Jones Industrial Average and bearish market behavior. Correct responses were summed to reflect each individual's market definitions score.

A third scale reflected understanding of current market context. Grasp of environmental context is an important element of cognition and decision making (Aguilar, 1967; Bandura, 1986; Bazerman & Tenbrunsel, 1998). As such, an 18-item scale assessed student understanding of contextual factors such as current price levels and trends of various financial asset classes. Correct responses were summed into a market context score for each individual. Each of the 18 context items included a "Don't Know" response choice. A count of a respondent's Don't Know selections constituted a fourth scale. The premise of this scale was that even if students did not select the correct answer, a decrease in the number of Don't Know choices reflected more cognitive market awareness.

A fifth scale required students to interpret market signals and relationships, such as the relationship between corporate bond spreads and investor concern about a company's creditworthiness. In many ways, this was the most challenging scale because it assessed capacity for integrating concepts in a manner reflective of a higher level of knowledge in Bloom et al.'s (1956) taxonomy. Correct responses to the 9-item scale were summed into a market relationships score for each respondent. The Appendix includes all scales used in this study.

Engagement: Because both time and effort can be indicative of personal engagement in a project (Kahn, 1990), two engagement measures were employed. A time-related measure was obtained by summing self-reported hours spent on the project into an estimate of exposure time. Average exposure time for Web site group participants was 7.83 hours, or about 1.3 hours per week. An effort-related measure was obtained by rating the logbook diaries on each of three dimensions: presence of weekly entries, completeness of the entries, and overall thoughtfulness

of the entries. Each dimension was rated on a scale of 1 (*minimal*) to 5 (*extensive*) and then combined into an average logbook quality measure for each Web site group participant. Average logbook quality was 3.46. The bivariate correlation between the exposure time and logbook quality measures of engagement was highly significant ($R = .72, p = .000$).

Finance major: Participants indicated their major on the questionnaire. A dummy variable was created to separate nonfinance from finance majors (0 = nonfinance major; 1 = finance major).

Context and Control Variables

Age: Because market awareness might vary with maturity, participants indicated their age on the questionnaire.

Gender: Market awareness might vary by gender, as suggested by research on risk taking and financial decision making (e.g., Byrnes & Miller, 1999; Barber & Odean, 2000). Participants indicated their gender (0 = male; 1 = female).

Class standing: Participants indicated their class standing (1 = freshman; 4 = senior). Descriptive statistics and bivariate correlations for all study variables appear in Table 2.

RESULTS

We employed a number of multivariate analysis of variance (MANOVA) procedures to test our hypotheses. A general assumption in analysis of variance (ANOVA) is that population variances of comparison groups are equal. Stevens (2002) suggests that the homogeneity of variance assumption is robust if the ratio of largest to smallest sample size is less than 1.5. However, in some of our analyses, group sample sizes were significantly uneven. For example, the ratio of Web site to control group sample size exceeded 2. Therefore, during each phase of the analyses, we used Box's test of homogeneity of covariance to assess the validity of the equality of variance assumption across sample groups. No significant differences were detected, suggesting that the homogeneity of variance assumption was reasonably upheld during the analyses.

To evaluate the overall relationship between Web site exposure and financial market awareness, a MANOVA was conducted using the study's five measures of market awareness as dependent variables and a categorical variable separating the Web site treatment group from the control group as a fixed factor independent variable. The MANOVA indicated a significant overall difference across the market awareness measures (Wilks' Lambda = .856, $F = 3.10, p = .012$). Univariate ANOVA results in Table 3 indicate that the Web site group possessed significantly higher levels of awareness about financial market context ($p = .074$), significantly lower Don't Know levels of market context ($p = .005$), and significantly higher levels of awareness about relationships between market factors ($p = .027$). These findings support the relationship between financial Web site exposure and market awareness posited in H1.

To evaluate the relationship between project engagement and financial market awareness, a multivariate analysis of covariance was conducted using the study's

Table 2: Descriptive statistics and bivariate correlations of study variables.

	Mean	SD	1	2	3	4	5	6	7	8	9	10
1 Age	23.55	6.329										
2 Gender	0.47	0.502	-.12									
3 Class Standing	3.12	0.790	.25*	-.23*								
4 Finance Major	0.19	0.389	.09	-.02	.09							
5 Exposure Time	5.43	6.000	.29**	-.04	.06	.12						
6 Logbook Quality	2.40	1.907	.07	.06	-.01	.07	.72***					
7 Familiar Mkt Tems	45.79	11.295	.15	-.27**	.34**	.31*	.29**	.17†				
8 Mkt Definitions	6.76	2.229	.17†	-.30**	.24*	.47***	.29**	.31*	.40***			
9 Mkt Context	4.86	3.407	.22*	-.30**	.19†	.18†	.29**	.35**	.40***	.39***		
10 Don't Know Context	9.70	5.124	-.15	.16	-.20*	-.20*	-.33**	-.40***	-.44***	-.37***	-.81***	
11 Mkt Relationships	3.91	1.422	.23*	-.20*	.24*	.12	.24*	.23*	.02	.27**	.33**	-.19†

† $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.

Table 3: Mean comparisons of sample group market awareness measures^a.

	Web Site	Control	Difference (Web Site – Control)
N	68	30	38
Age	23.4	23.9	-0.5
Gender	1.5	1.5	0.0
Class Standing	3.1	3.2	-0.1
Exposure Time	7.83	–	–
Logbook Quality	3.46	–	–
Familiar with Market Terms	45.8	45.7	0.1
Market Definitions	7.0	6.3	0.7
Market Context	5.3	3.9	1.4 [†]
Don't Know Market Context	8.8	11.9	-3.1**
Market Relationships	4.1	3.4	0.7*

[†] $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$; ^aUnivariate analysis of variance.

five measures of market knowledge and awareness as dependent variables, and the two measures of engagement as covariates. Here, the sample was limited to the 68-person Web site group sample as we were interested in detecting whether varying degrees of engagement influenced market awareness. Results indicated no significant relationship between exposure time and market awareness although the p value approached the 10% significance level (Wilks' Lambda = .876, $F = 1.73$, $p = .142$). However, a highly significant relationship was detected between logbook quality and market awareness (Wilks' Lambda = .771, $F = 3.61$, $p = .006$).

As an additional test, five multivariate regression models were estimated using the two engagement measures of exposure time and logbook quality as independent variables (Table 4). Each model employed one of the five measures of financial market awareness as the dependent variable and included age, gender, and class standing as control variables. Exposure time and logbook quality were both found to be significantly related ($p < .05$) to familiarity with market terms. Logbook quality, but not exposure time, was found to be significantly ($p < .01$) related to understanding of market definitions and the two measures of market context. Neither exposure time or logbook quality was found to be significantly related to the market relationships variable; the lower R^2 and F statistic suggested less fit compared to the other models. In general, these findings support H2 and the posited relationship between project engagement and financial market awareness. The strength of the relationship between logbook quality and market awareness suggests that measures of effort other than time spent on the project may be more salient determinants of Web-based vicarious learning.

To evaluate the influence of finance major on project engagement, a MANOVA was conducted using the engagement measures of exposure time and logbook quality as dependent variables and the categorical variable separating finance from nonfinance majors as a fixed-factor independent variable. Once again, the sample was limited to the 68 Web site respondents in order to investigate differences within the treatment group. Results indicated a significant overall difference across the engagement measures (Wilks' Lambda = .878, $F = 4.52$,

Table 4: Regression analysis using various measures of student financial market awareness as dependent variables.

	Dependent Variable				
	Familiarity	Definitions	Context	Don't Know	Relationships
Age	-.009	.104	.269*	-.138	.324*
Gender	-.227*	-.219 [†]	-.363**	.165	-.238*
Class Standing	.208 [†]	.229*	.005	-.125	.135
Exposure Time	.297*	.018	-.118	.019	-.053
Logbook Quality	.268*	.394**	.507***	-.423**	.073
R^2	.356	.312	.411	.261	.215
Adjusted R^2	.302	.255	.362	.200	.149
F	6.62***	5.45***	8.37***	4.25**	3.29*

[†] $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$;

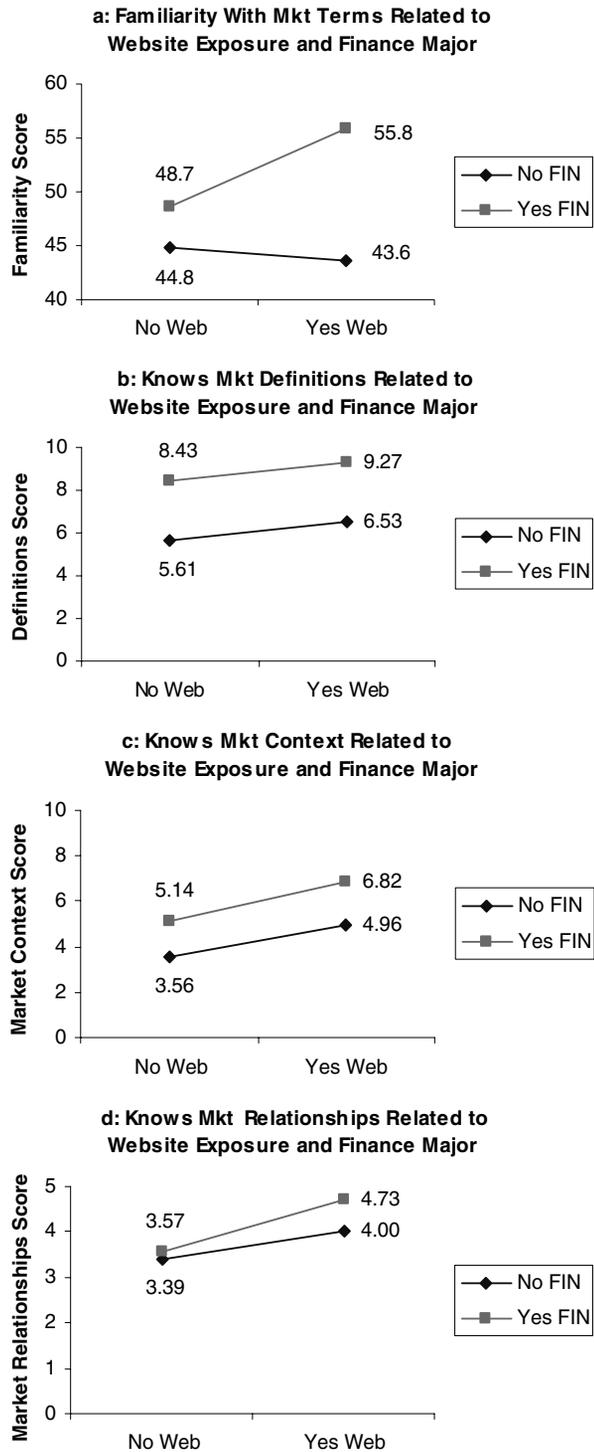
Table 5: Multivariate analysis of variance of market awareness measures using Web site treatment and finance major as independent variables.

	Wilks' Lambda	F	p
Web site treatment	.879	2.48	.037
Finance major	.759	5.71	.000
Web site treatment * finance major	.964	.66	.653

$p = .015$). Compared to nonfinance majors, finance majors spent more time on the Web site (11.4 hours vs. 7.1 hours, $p = .023$) and produced higher quality logbooks (4.36 vs. 3.28, $p = .007$). These findings support H3a, which posited that finance majors would exhibit higher levels of project engagement than nonfinance majors.

To evaluate the influence of finance major on development of market awareness, a MANOVA was conducted using the study's five measures of market awareness as dependent variables and categorical variables for the Web site treatment group participants and finance majors as fixed-factor independent variables. The full 98-respondent sample was employed. Although results (Table 5) indicated the significance of both Web site exposure ($p = .037$) and finance major ($p = .000$), the key result was that no significant interaction could be detected between Web site exposure and finance major ($p = .653$), suggesting that, overall, finance majors did not gain more market awareness than nonfinance majors from exposure to the Web site. Although no overall interaction effect was observed, scrutiny of individual relationships portrayed graphically (Figure 1a–1d) does suggest some interaction tendency. Figures 1a and 1d and, to a smaller extent, 1c hint that finance majors may have indeed realized superior gains in some dimensions of market awareness. These findings provide marginal support for outsized gains in market awareness by finance majors exposed to the Web site commentary as posited by H3b.

Figure 1:



DISCUSSION

Although effectively employed in many organizational contexts to transfer complex knowledge and skills (e.g., Burke & Day, 1986; Chakrabarti & Roll, 1999; Compeau & Higgins, 1995), vicarious learning approaches have not been widely used in business school environments. In part, this is because many collegiate settings are not populated with enough practical experts who qualify as role models. Web-based technologies could compensate for on-campus expert deficiency by linking students to qualified role models remotely. Findings from this study support the notion of using Web-based vicarious learning processes in a business school environment. Students exposed to Web site commentary written by financial market experts exhibited higher levels of situational financial market knowledge and awareness than did those who did not receive the Web site treatment. Given the vast quantity of financial commentary available online, and the recognized need to inject more reality into finance programs (e.g., Siam, 2005; Weaver, 1993), the merits of this approach should be further explored.

The scope of the exploration process extends beyond the realm of financial education. Web-based vicarious learning approaches might help students develop capabilities in other business disciplines as well. Marketing majors, for example, might benefit from commentary posted in Web logs or chat rooms by advertising executives. In the future, perhaps business school professors will send their students to Web sites where they can peer into the minds of executives on a daily basis. Exposure to commentary from practicing managers might help learners from various business school disciplines build a foundation for deep-seated knowledge and skill development.

This study provides a starting point of sorts, given the limitations that restrict the generalizeability of our findings and shape the future research agenda. Our findings were based on studying student exposure to expert commentary at a single financial Web site. Although selectivity and focus are useful for gaining perspective when exploring new research domains (Pettigrew et al., 2001), results flowing from narrow designs must usually be interpreted in a tempered fashion. Future research should determine the extent to which the outcomes realized from our experimental site apply to other Web-based venues. Results will almost certainly depend on factors pertaining to a particular site, such as the site commentator qualifications as expert models and the Web site's general structure for promoting vicarious learning. Future work that seeks to clearly determine the factors that influence Web-based vicarious learning's effectiveness will be worthwhile. Comparative studies of multiple financial market Web sites would be particularly useful in this regard.

Future studies could also improve upon the student sample used here. This study employed a convenience sample of undergraduate business school students from a single regional university who earned extra credit for participating. Demographic characteristics of student body populations, as well as motivations for participating, likely play a role in vicarious learning outcomes. For example, given this study's findings that students with finance backgrounds are more engaged in the process, samples from schools that possess strong ties to the finance community may exhibit more positive treatment effects than schools with weak ties. A

cross-institutional sample plan that controls for various participant motivations would generate more generalizable findings.

A plausible rival explanation for this study's findings is that higher levels of situational financial market awareness observed among Web site group participants stemmed from a methodological Hawthorne effect. The Hawthorne effect generally refers to the notion that behavior during an experiment can be influenced by subjects' awareness that they are part of the study, thus creating artifactual outcomes (Jones, 1992). Detecting and controlling for this category of artifact has preoccupied many researchers for some time, although evidence is mixed as to the actual presence of Hawthorne effects in experimental results (Adair, Sharpe, & Holt, 1989). Our finding that situational market awareness was related to degree of engagement among Web site group participants provides some evidence that outcomes were not dominated by a one-time Hawthorne-like stimulus. To reduce the likelihood further, future studies should extend the treatment time longer than the 6-week period employed in this investigation. Indeed, because of the long time periods often required to develop high levels of discipline-specific knowledge and wisdom (Simon, 1987), it would be of considerable interest to study the effects of longer Web site exposure periods on the nature and extent of knowledge development. For instance, longitudinal designs that illuminate the shape of Web-based vicarious learning curves would be very interesting.

Research opportunities are also apparent in issues related to implementing Web-based vicarious learning processes in college programs. While likely subject to socio-technical factors that hinder implementation of any new instructional technology (e.g., Peluchette & Rust, 2005), incorporating Web-based vicarious approaches into existing courses may be highly dependent on factors related to the course instructor. For example, our experience suggests that many finance faculty shy away from the Web-based vicarious learning idea because they lack situational market awareness themselves. Absent much "street smarts," they may feel incompetent working with a learning technology that is empirically based. Others appear reluctant to cede instructional control to an outsider whom they may never have met personally.

Upon viewing the Web site employed in this study, some faculty admitted that they did not know what to do with the technology. The absence of familiar structure, such as quizzes and lesson plans, that often accompanies traditional instructional devices kept many of them away. Applied research aimed at developing effective structure for facilitating Web-based vicarious learning constitutes another opportunity. Chat rooms, question- and- answer sessions, online quizzes, and other feedback mechanisms might satisfy course instructor needs for structure. Moreover, these feedback mechanisms might permit online experts to better adapt their instructional approach to student needs and enhance the effectiveness of vicarious learning in a Web-based environment. Students should benefit from well-designed structure as well, because many are confused about what to do when first immersed in a Web-based vicarious learning experience. Higher quality knowledge transfer often results when entry-level students receive guidance as they engage in learning processes (Hickman, 1994). Partnerships between online experts and classroom instructors might facilitate feedback-driven guidance in Web-based vicarious learning situations.

Finally, because student attitudes influence learning in economics and finance (Kartensson & Vedder, 1974), an opportunity exists to examine relationships between attitudinal and cognitive components when learning vicariously about financial markets in a Web-based context. Studies suggest that student attitudes related to economics and finance are multidimensional (e.g., Phipps & Clark, 1993). Incorporating attitudinal factors such as interest (Krapp & Renninger, 1992), perceptions of threat and intimidation (Staw, Sandelands, & Dutton, 1981), and self-efficacy (Cervone & Peake, 1986) should enrich studies of financial market knowledge development via Web-based vicarious approaches.

CONCLUSION

Calls for developing more practical capabilities in business school graduates are increasingly common (Sherwood, 2004). The socially complex nature of business contexts suggests that improving deep-seated skill development at the collegiate level will likely require methods not yet explored. In this study, we have considered a novel approach using Web-based technologies to enable students to peer into the minds of practicing experts. While more research is necessary to develop this approach, vicarious learning mechanisms that permit students to observe professionals in action could extend practical skill development in college programs of study.

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APPENDIX

Summary of Questionnaire Item Scales

Demographics

Age
Gender
Class standing
Major

Market Awareness

Familiarity (1 = Not Familiar at All; 5 = Very Familiar)

Price-to-earnings ratio	Junk Bonds
Downtrend	Resistance
Bond spreads	Standard & Poor's 500
Liquidity	Producer Price Index
DXY	Earnings per Share
Volatility	Alan Greenspan
Head and shoulders pattern	Bullish Sentiment
Breakout pattern	Put to Call Ratio

Market Terms and Definitions (multiple choice; correct answers provided here in **bold**)

The Dow Jones Industrial Average is an example of a	Market Index
Graphing a security's price history in an attempt to identify trends is an example of	Technical Analysis
Lowering the cost of borrowing during times of market crisis is an example of	Providing Liquidity
Buying a security in anticipation that its price will increase is an example of	Bullish Behavior
The Central Bank of the United States is called the	Federal Reserve
A price level thought to make it difficult for a security to trade lower is called	Support
The value by which a commodity can be settled in cash immediately is called the	Spot Price
Selling a security in anticipation that its price will decrease is an example of	Bearish Behavior

Determining whether a company's earnings will increase in the future is often part of	Fundamental Analysis
A call option is one example of a	Derivative
When the price of an interest-bearing bond increases, the effective yield of the bond	Decreases
A market situation where participants want to sell at any price is known as	Capitulation
A reduction in the purchasing power of a currency is an example of	Inflation
Stocks are often referred to as ___ while bonds are often referred to as ___	Equities; Fixed income
Current Market Context (multiple choice; correct answers at time of administration in bold)	
Current value of the Dow Jones Industrial Average is between	10,000–12,000
Current value of the S&P 500 Index is between	1000–1500
Current value of the NASDAQ Composite is between	1900–2400
Current yield on 10 yr U.S. Treasury Bond is between	3%–5%
Owners of the most (by value) U.S. Treasury Bonds are currently	Governments of Japan and China
Compared to 12 months ago, the average Interest rate on a 30 year fixed rate mortgage is: (Note: bps = basis pts; 100 bps = 1%)	Within 75 bps of same value
Compared to 12 months ago, 10 yr U.S. Treasury Bond prices are	Within 15% of same value
Compared to 5 years (60 months) ago, the current value of the S&P 500 Index is	More than 10% lower
Compared to 6 months ago, the value of the S&P 500 Index is:	More than 5% higher
Compared to 24 months ago, the value of the Commodity Research Bureau Index (CRB) is	More than 10% higher
Current spot price of a barrel of crude oil is between	\$40–\$55
Current spot price of an ounce of gold is between	\$400–\$450
Current Federal Funds Rate set by the Federal Reserve is between	2–3%
Compared to 24 months ago, the value of the U.S. dollar against a basket of major foreign currencies is	Significantly lower
Current values of stock market implied volatility (e.g., VIX) suggest that concern about a sudden large move in price is	Relatively low
Current spreads between 10 yr Treasury and low quality corporate bonds suggest	Significant desire for riskier bonds
Compared to a 50 yr long term average (LTA), the current price to earnings ratio (trailing 12 month) of S&P 500 index is	More than 10% above LTA
Compared to a 50 yr long term average (LTA), the ratio of current total stock market value to GDP is	More than 10% above LTA
Interpreting Market Signal & Relationships (multiple choice; correct answers in bold)	
Fundamental, __, structural, and __ are key factors for assessing market conditions.	Technical, psychological
A sharp rise in volatility indices (e.g., VIX, VXO) is usually deemed indicative of:	Fear
A “head and shoulders” chart pattern is usually deemed:	Bearish
Prolonged periods of low interest rates usually encourage:	Borrowing and debt

Concern that corporations cannot repay debt usually causes bond spreads to:	Widen
The stock of a company with increasing cash flows and dividends is usually:	Not enough info to tell
High levels of debt usually cause the value of a country's currency to:	Decrease
Most market participants tend to be bullish when prices are:	Higher
In stock markets, an advance/decline ratio far below one commonly suggests:	A rally is unlikely soon

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