Understanding Student Preferences: Improving Outcomes in Computer Simulation Experiential Learning Activities

W. Keith Story, Mariya A. Yukhymenko-Lescroart. and George D. Deitz

Purpose of the Study: Research shows that the use of computer simulations to enhance student learning experiences is beneficial in several ways. Because benefits are universally expected, some instructors may use computer simulations as a "one-size-fits-all" approach to improving student outcomes. This research examines student traits that may influence their experience with a computer simulation experiential learning activity and how much they perceive their skills and knowledge grow, thereby increasing the value of the experience to students.

Method/Design and Sample: Expectancy theory suggests that individual motivation to invest resources is influenced by the expectation of achieving outcomes of value. Students (N=172) in an undergraduate principles of marketing class participated in a computer simulation experiential learning activity. Via survey, undergraduate students were asked about individual traits related to achieving learning outcomes and their feelings about participating in groups. Using structural equation modeling, we examined relationships between factors that influence motivation to learn, team dynamics, and perceived learning outcomes.

Results: Consistent with expectancy theory, results suggest that perceived learning outcomes are influenced by student traits and their feelings about working in teams. Also, the use of learning strategies and subject matter interest indirectly influenced the relationship between need for cognition and learning outcomes. The study suggests that by understanding the traits and motivational factors of students, instructors can increase the educational and personal value of computer simulation experiential learning activities.

Value to Marketing Educators: This research informs the design of future computer simulation experiential learning activities so instructors can provide experiences that maximize student development and the value received.

Keywords: perceived learning, computer simulation, experiential learning, marketing education

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INTRODUCTION

The marketing education literature has emphasized the importance of augmenting traditional lecture-based teaching approaches with more participatory learning experiences (Forman, 2012; Frontczak, 1998). Experiential learning activities (ELA) are broadly thought to encourage students to become more highly involved with course content by requiring them to apply theory to real-life decisions involving ambiguity, change, and risk (Lewis & Williams, 1994). ELA have also been found to increase student engagement, performance, and perceived value of the experience (Myers, 2010). Marketing scholars have reported on the effectiveness of a wide variety of active gaming activities (e.g., E. R. Cadotte, 2016; Mottner, 2009; Peterson & Albertson, 2006) and advances in information technology have led to greater use of computer simulations as a tool for creating more realistic, experiential learning environments (Bell, Kanar, & Kozlowski, 2008).

Computer simulation experiential learning activities are useful in helping students make connections between classroom content and the dynamic real-world contexts in which such knowledge is routinely applied (O'Reilly, 2015). Studies have linked marketing computer simulation experiential learning activities to a variety of positive outcomes including strategy formulation skills, integration of marketing concepts and tools, improved problem-solving, and communication, and teamwork skills (E. R. Cadotte, 2016; Zantow, Knowlton, & Sharp, 2005). In addition to content learning, simulations are commonly thought to be a vehicle for enhancing student critical thinking (Lovelace, Eggers, & Dyck, 2016). Moreover, since students most often participate in computer simulation experiential learning activities as members of a team, these exercises provide opportunity for students to strengthen group management and interpersonal skills as well as gain sensitivity to cultural and gender differences – the types of soft skills increasingly prized by corporate employers (O'Reilly, 2015). Administrators and instructors frequently cite the benefits of such group projects to student learning (Herman, Keldsen, & Miller, 2001) particularly when elements of group goals and individual accountability are present (Slavin, 1988).

Critical thinking has been identified as an important skill with respect to business marketing students (AACSB, 2013; Duke, 2002) and future employees (Allen & Fellows, 2014; Institute, 2011). Critical thinking skills are significant in that they enable students to develop the ability to understand, analyze and evaluate the views of others as well as define one's own well-supported arguments (Roy & Macchiette, 2005). Likewise, improving a student's ability to apply critical thinking to the real-world by evaluating, reflecting upon, and drawing conclusions about information is important in the 21st Century (Dwyer, Boswell, & Elliott, 2015).

It is important, when leveraging technology for marketing education support systems, to account for differences in students (Northey, Bucic, Chylinski, & Govind, 2015). However, because of the many benefits that can be realized by introducing computer simulation experiential learning experiences into the classroom, instructors may not consider student individual preferences and tendencies which can impact the effectiveness of such educational tools. Different students have different experiences when participating in simulation experiences (Brennan & Vos, 2013), and those varying experiences can lead to different learning outcomes (Kolb & Kolb, 2005). When participating in computer simulation experiential learning activities, how individuals learn is influenced by a variety of factors such as personality type, past life experiences, and career interests (Kolb & Kolb, 2005). Given the benefits that participating in computer simulation experiential learning activities can provide students, it is important to understand what factors influence individual learning outcomes in order to develop valuable student experiences. Research tends to look at the design of the experience (Young, Caudill, & Murphy, 2008) as a way to improve outcomes, and being sensitive to individual differences in students when executing simulation experiences in a class may be a way to further this goal.

Our study focuses on individual preferences related to team dynamics and their impact on perceived learning outcomes. We also look at the mediating effect of factors related to student outcome expectations on the relationship between individual learning preferences and perceived learning outcomes. This discussion will emphasize lone wolf tendencies and team performance anxieties as individual team dynamics behaviors, and cognitive strategy use and interest in marketing as mediating motivational factors of individual need for cognition. All constructs will be related to the perceived learning outcomes of perceived increase in marketing learning and perceived increase in critical thinking skills.

The paper will proceed as follows: First we will discuss the theoretical foundations underlying study hypotheses. Next, we present our research design, including details relating to our sample and measures. Finally, we present results of our analysis and discuss study findings.

LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

Expectancy theory (Porter & Lawler, 1968; Vroom, 1964) can provide a theoretical framework to better understand the relationships between student preferences, learning behaviors, student interests, and perceived learning outcomes. Expectancy theory posits individual motivation is influenced by the expectation that effort will result in performance improvement, a belief that performance will result in desired outcomes, and that the outcome of one's effort is valuable (Friedman, Cox, & Maher, 2008; Gerhart & Rynes, 2000). Motivation can be seen as the reasons why a student may invest time and energy into learning activities and why they choose the methods they use (Rothstein, 1990; Woolfolk, 1990) to learn. Students can be motivated by how interested they are in a subject, and/or they can be motivated because of a belief that a learning strategy will help them achieve an outcome they value (Harter, 1981; McEvoy, 2011; Young, 2005).

How a student perceives their knowledge gain can be suggestive of how much value the student believes they get out of the learning experience (Lamont & Friedman, 1997), and how well they believe they are being developed or prepared for the future (Duke & Reese, 1995; Glynn, Rajendran, & Corbin, 1993; James & Casidy, 2018). Perceived learning is also important when students are making quality assessments of their learning experience (Jackson & Helms, 2008) and the effectiveness of the course (Arbaugh & Rau, 2007; So & Brush, 2008). Student perceptions of a course are significant when it comes to their evaluation of the course (Ramsden & Dodds, 1989), and using methods and tools that align with their expectations may impact their evaluation of education quality. The perceptions students have of the quality of their education may influence persistence in a discipline or what line of work they pursue after graduation. Meeting student expectations of increased learning and skill development can help change attitudes towards the field of marketing, attitudes towards their program, and have implications on program reputation (Friedman et al., 2008; Gerhart & Rynes, 2000; James & Casidy, 2018).

Factors influencing student efforts to achieve perceived learning outcomes

<u>Subject Matter Interest</u>

When individuals have an interest in something, it can impact their motivation for learning (McEvoy, 2011) and their learning outcomes (Love, Love, & Northcraft, 2010). Individual levels of interest have also been shown to impact the length of persistence, amount of attention, level of affect, and the knowledge that a person will acquire (Hidi, 1990; Hidi & Renninger, 2006). Making instructional material more personally relevant to students is a way to increase interest and performance, particularly with complex subject matter (López & Sullivan, 1992). The increased relevance of the material to the student may help with recall of the information, more meaningfulness of the material, and lower cognitive demands for solving problems associated with the material (López & Sullivan, 1992). Additionally, these feelings of interest are related to the use of cognitive learning strategies and tactics (Ahmed, Van der Werf, Kuyper, & Minnaert, 2013).

Learning experiences such as simulations that can be adapted and modified to incorporate the individual interests of students may be an effective way to provide instruction (Hidi & Renninger, 2006). Past research shows that instructional methods that are interesting to students can increase their engagement, focus, and dedication to the work (Flowerday, Schraw, & Stevens, 2004). Because a student interested in a topic will tend to have more knowledge about it when they begin the class, they will have a perception of how much they currently know. They will have a greater level of desire to learn that material and will be able to judge more accurately the gaps in their knowledge. The interest they have will increase the work they are willing to put into being successful in the class and impact their levels of cognitive engagement (Lee, Lee, & Bong, 2014), shrinking the gap between current knowledge and desired knowledge. Therefore, we hypothesize:

> ***H1a**: Interest in marketing is positively related to student perceptions of increased marketing learning.*
> ***H1b**: Interest in marketing is positively related to student perceptions of increased critical thinking skills.*

<u>Learning Strategies</u>

A learning strategy can be defined as "a set of processes or steps that can facilitate the acquisition, storage, and/or utilization of information." (Dansereau, 1985, p. 210). These strategies refer to the tactics and methods that a student uses to learn new material. Learning strategies are student-controlled processes they use in order to increase their ability to learn, and can include planning, self-monitoring, and information processing activities to improve material mastery and performance. Learning strategies are effective in improving student outcomes (Schunk, 2004) and are used by students in order to improve their ability to memorize and recall information (Schunk, 2004). Students use these methods to help them acquire new knowledge via their own agency, which can impact their self-perceptions (Zimmerman & Pons, 1986). Students that use learning strategies should have a stronger sense of their ability to execute necessary behaviors that lead to an increase in their knowledge (Lee et al., 2014) and that impact their academic performance. We hypothesize:

> ***H2a**: Student use of learning strategies positively influences student perceptions of increased marketing learning.*
> ***H2b:** Student use of learning strategies positively influences student perceptions of increased critical thinking skills.*

<u>Need for cognition</u>

Need for cognition (NFC) refers to an individual's "need to structure relevant situations in meaningful, integrated ways … [and] a need to understand and make reasonable the experiential world" (Cohen, Stotland, & Wolfe, 1955, p. 291). Theory suggests that while all individuals have the need to make sense of their world, people differ in their tendency to enjoy and take part in challenging cognitive endeavors (J. T. Cacioppo & Petty, 1982). Prior research has demonstrated a strong positive correlation between NFC and measures of scholastic aptitude, such as student GPA and ACT scores (e.g., Olson, Camp, & Fuller, 1984). In addition, studies have shown high NFC individuals recall greater amounts of information (J. T. Cacioppo, Petty, & Morris, 1983), pay more attention to the quality of information available (Petty & Cacioppo, 1981), generate a higher number of task relevant thoughts (Axsom, Yates, & Chaiken, 1987), make more thoughtful judgments (Verplanken, 1989), and perform better in various cognitive tasks (Dornic, Ekehammar, & Laaksonen, 1991).

Since simulation-based games, by design, offer challenges, autonomy, and freedom for students to engage in cognitive processes, this format should be more attractive to students who enjoy effortful thought. Because high-NFC individuals are intrinsically motivated to work hard on cognitive endeavors (Wu, Parker, & De Jong, 2014), this should lead them to think more deeply (Briñol & Petty, 2005) about game-related information and the linkages between their game decisions and round-by-round performance. As a result of this iterative evaluation of input-output relations, high NFC students should be more aware of changes in their knowledge and capabilities, work to correct poor decisions, and reinforce successful learning strategies. Thus:

> ***H3a**: Student need for cognition positively influences student perceptions of increased marketing learning and student perceptions of improved critical thinking skills indirectly through cognitive learning strategies.*
> ***H3b:** Student need for cognition positively influences student perceptions of increased marketing learning and student perceptions of improved critical thinking skills indirectly through interest in marketing.*

Team dynamics factors
Lone Wolf

Teams are used in marketing education and business education in part to mirror real-world workplace environments. The projects are not only intended to simulate the work content and skills used in real-work situations, they are also intended to simulate the experiences one would have when working with others. However, not all students enjoy working on teams and some prefer to work alone. Students with this preference can sometimes be labeled as "lone wolves." Dixon, Gassenheimer, and Barr (2003) define a lone wolf as an individual that:

> "*prefers to work alone when making decisions and setting/accomplishing priorities and goals. When working with others, persons operating as a lone wolf will have little patience for group process, see others as less effective than themselves, and seldom value the ideas of others (G. Blau & Boal, 1989; G. J. Blau & Boal, 1987; Griffeth, Gaertner, & Sager, 1999; Ingram, Lee, & Lucas, 1991)*"

Lone wolf tendencies are typically seen as negative traits that have an undesirable effect on team dynamics and performance (Barr, Dixon, & Gassenheimer, 2005). Dixon et al. (2003) suggest lone wolves tend to focus on the completion of the task rather than interpersonal relationship development. Lone wolf students are often intolerant of the inadequacies of others and can become frustrated when working on a team. They often feel less flexible in thought, less competent, and less enthusiastic at the end of their project (Shankar & Seow, 2010). In turn, the literature suggests students that hold negative feeling towards a pedagogical approach (such as group or team projects) can experience frustration, anxiety, and insecurity (Gregorc & Butler, 1984). These feelings reduce the value they see in participating in the learning experience (Chapman & Van Auken, 2001), resulting in a lower assessment of their personal growth and improvement in skills via the exercise. We propose:

> ***H4a:*** *Student lone wolf tendencies negatively influence student perceptions of increased marketing learning.*
> ***H4b:*** *Student lone wolf tendencies negatively influence student perceptions of increased critical thinking skills.*

Team performance anxiety

Even if an individual does not exhibit lone wolf characteristics, they may still have increased stress or worry due to expectations placed upon themselves or others with respect to their individual performance (and resulting impact on the team), or the performance of others (and the resulting impact on the team). When individuals worry, they tend to have negative thoughts about some future event (Borkovec, Ray, & Stober, 1998), and these thoughts can lead to increased anxiety, loss of sleep (Watts, Coyle, & East, 1994), and have a negative impact on academic performance (Owens, Stevenson, Hadwin, & Norgate, 2012). The increased stress may come from a perceived difference in capabilities between themselves and their teammates (Gijlers & De Jong, 2005), level of preparation (N. Webb & Kenderski, 1984; N. M. Webb, 1980), or even demographic differences (Wilkinson & Fung, 2002). The stress could also be caused by intra-group frustrations, which could impact the student's beliefs about the value of the experience (Lerner, 1995). Increased anxiety over team performance outcomes may mean that the full benefit of participating in the experiential team activity may not be realized (Micari & Pazos, 2014), thus having a negative impact on perceived learning outcomes. We advance:

> ***H5a:*** *Anxiety over team performance negatively influences student perceptions of increased marketing learning.*
> ***H5b:*** *Anxiety over team performance negatively influences student perceptions of increased critical thinking skills.*

The full conceptual model is illustrated in Figure 1.

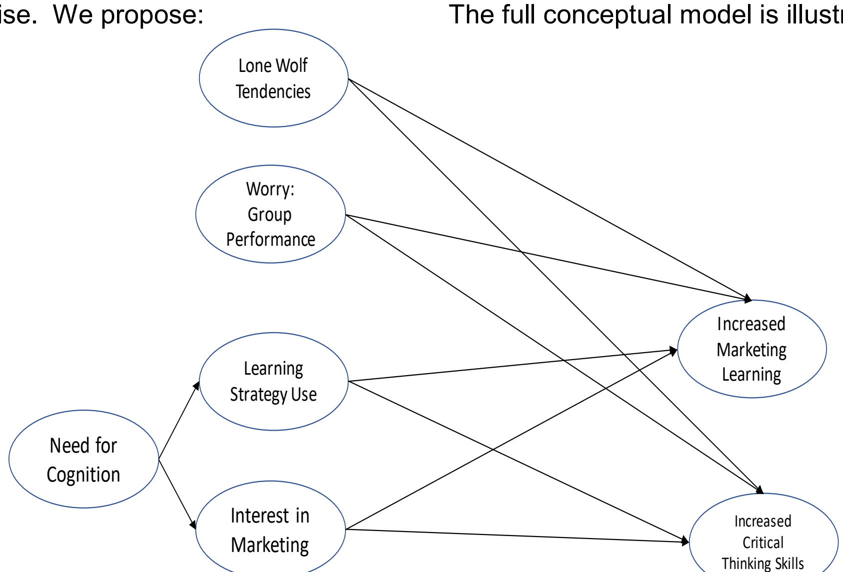

Figure 1. Hypothesized structural model.

METHODOLOGY

Participants

172 business students (48.3% of males) enrolled in two consecutive semesters (n = 110 in Fall semester and n = 62 in Spring semester) of an undergraduate principles of marketing class at a major southern university participated as team members in the Marketplace6 simulation (E. Cadotte, 2009) and completed a short management report for class credit. The majority of participants (57.0%) were employed part-time, followed by those employed full-time (26.2%) and not employed (16.9%). In addition, over the course of the semester, student respondents completed a series of online and offline surveys that assessed individual traits (e.g., NFC), learning preferences, and perceptions of this experiential learning activity (e.g., enhanced critical thinking ability). All measures were drawn from prior research and adapted. Perceived marketing learning, interest in marketing , and perceived increases in critical thinking were adapted from Alavi (1994); lone wolf tendency items were adapted from Dixon et al. (2003); cognitive learning strategy use items were adapted from Pintrich (1991); group performance perceptions were adapted from the work of Cassady and Johnson (2002); and finally, need for cognition items were adapted from John T. Cacioppo, Petty, and Kao (1984).

Data Analysis

Research questions were addressed using structural equation modeling (SEM), which combines factor analysis (i.e., measurement model) and multiple regression analysis (i.e., structural model) and has an advantage of reducing the measurement error of theoretical constructs and improving statistical estimation of the relationships between constructs by accounting for the measurement error (Hair Jr, Black, Babin, Anderson, & Tatham, 2010). First, the measurement model was estimated, in which all observed variables were specified to represent their intended latent factors of marketing learning, simulation perception, interest in marketing, learning strategy, lone wolf tendencies, worrying about team performance, and need for cognition. At this stage, we also examined reliability for each subscale, which was assessed based on construct reliability, with values over .70 indicating good reliability (Hair Jr et al., 2010). Then, the structural model was tested, in which need for cognition was specified as a predictor of learning strategies and interest in marketing, and learning strategies, interest in marketing, and working in groups (lone wolf tendencies and worrying about team performance) were specified as predictors of perceived critical thinking skills improvement and marketing learning (see Figure 1). All analyses were performed in Mplus Version 8 (Muthén & Muthén, 2012-2017) using maximum likelihood estimation method with robust standard errors. The statistical significance of indirect effects was tested using a bootstrapping procedure (Bollen & Stine, 1990; Shrout & Bolger, 2002) with 2,500 bootstrapped samples. Model fit was evaluated based on Hu and Bentler (1999) recommendations.

RESULTS

Measurement Model

The results of confirmatory factor analysis were explored and showed that some items created poor fit statistics. After examining modification indices, alternative models were explored. Alternative models included a hierarchical model, in which the four factors were specified as indicator of a higher-order factor, and a bi-factor model, in which each item loaded directly on the four subfactors as well as on the broad factor. The fit of bi-factor model was superior to other models for cognitive strategy use. The final measurement model showed an acceptable fit to the data (Satorra-Bentler $\chi^2_{(634)}$ = 880.37, p < .001, CFI = .929, TLI = .921, RMSEA = .048, 90% CI [.040, .055], SRMR = .071 and all reliability estimates exceeded α = .70 for all constructs. Table 1 shows factor loadings and reliability estimates by subscale. Table 2 shows correlations among latent factors.

Table 1.
Factor Loadings and Reliability Omega for the Measured Variables

Items	Factor Loadings for single-factor solution	Factor loadings for bifactor solution: General Factor	Factor loadings for bifactor solution: Specific Factors	Reliability Estimate
Factor 1. Marketing learning				
1. Increased learning marketing basics	.93	n/a		
2. Learn factual materials about marketing	.98			
3. Identify central marketing issues	.95			
Reliability				.97
Factor 2. Critical thinking				
1. Increased critical thinking	.94	n/a		
2. Increased ability to integrate info	.96			
3. Ability to critically analyze issues	.95			
4. Enhanced confidence expressing ideas	.92			
5. Value other's point of view	.83			

6. Interrelate topics and ideas	.91			
Reliability				.97
Factor 3. Lone wolf tendencies				
1. Rather work alone	.83	n/a		
2. Prefer solitude over social	.58			
3. Working with others poses a threat	.72			
4. More successful by myself	.82			
5. With others is a hassle	.84			
6. Little tolerance for others mistakes	.44			
Reliability				.86
Factor 4. Worried: group performance				
1. Lost sleep thinking about simulation	.73	n/a		
2. Worried about simulation	.91			
3. Consequences of team performing poorly	.60			
Reliability				.80
Factor 5. Interest in marketing				
1. Discuss marketing outside of class	.81	n/a		
2. Additional reading on related topics	.85			
3. Thought about marketing myself	.90			
4. Taking additional courses	.75			
Reliability				.90
Factor 6. Learning strategy				
1. Memorize everything	.26	.13	.49	
2. Memorize terms and concepts	.30	.19	.80	
3. Read notes over	.57	.59	.18	
4. Outline important concepts	.49	.59	.81	
5. Brief summaries of main ideas	.42	.58	.40	
6. Apply ideas from course readings	.55	.46	-.25	
7. Make connections	.51	.46	.57	
8. Set study goals	.55	.46	.47	
9. Skim chapter before reading	.26	.34	-.14	
10. Ask myself questions	.54	.42	.48	
11. When I get confused	.39	.32	.18	
Reliability				.76
Factor 7. Need for cognition				
1. Relying on thought to make it to the top	.54			
2. Deliberating about issues	.70			
3. Satisfaction in deliberating	.66			
4. Enjoy coming up with new solutions	.53			
5. Thinking abstractly appeals to me	.55			
Reliability				.73

Note. For learning strategy, a bi-factor model was specified with 1 general factor and 4 specific factors: items 1 through 3; item 4; items 5 through 7; and items 8 through 11.

Table 2

Correlations Among Latent Factors, N = 172

Factor	1	2	3	4	5	6
1. Marketing learning	-					
2. Critical thinking	0.75*** [0.66, 0.85]	-				
3. Lone wolf tendencies	-0.10 [-0.25, 0.05]	-0.07 [-0.24, 0.09]	-			
4. Worried: group performance	-0.14 [-0.33, 0.05]	-0.13 [-0.32, 0.07]	0.33*** [0.15, 0.50]	-		
5. Interest in marketing	0.71*** [0.58, 0.83]	0.63*** [0.49, 0.76]	-0.16 [-0.33, 0.02]	0.02 [-0.19, 0.22]	-	
6. Learning strategy	0.44*** [0.28, 0.61]	0.43*** [0.27, 0.58]	0.04 [-0.18, 0.25]	0.18 [-0.04, 0.39]	0.48*** [0.31, 0.66]	-
7. Need for cognition	0.22* [0, 0.43]	0.23* [0.03, 0.43]	-0.06 [-0.25, 0.14]	0.05 [-0.2, 0.29]	0.35 [0.15, 0.55]	0.52*** [0.3, 0.73]

Note. 95% confidence intervals for correlations are presented in brackets. **p* < .05, ***p* < .01, ****p* < .001.

Structural Model

The structural model (see Figure 2) showed adequate fit to the data, χ^2 (643, N = 172) = 904.22, $p < .001$, CFI = .925, TLI = .918, RMSEA = .049, 90% CI [.041, .056], SRMR = .081. Figure 2 shows results for proposed structural relationships. The final model explained 52.6% of the variance in marketing learning and 42.6% of the variance in simulation perceptions. Additionally, it explained 16.3% of the variance in interest in marketing and 31.5% in cognitive strategy use.

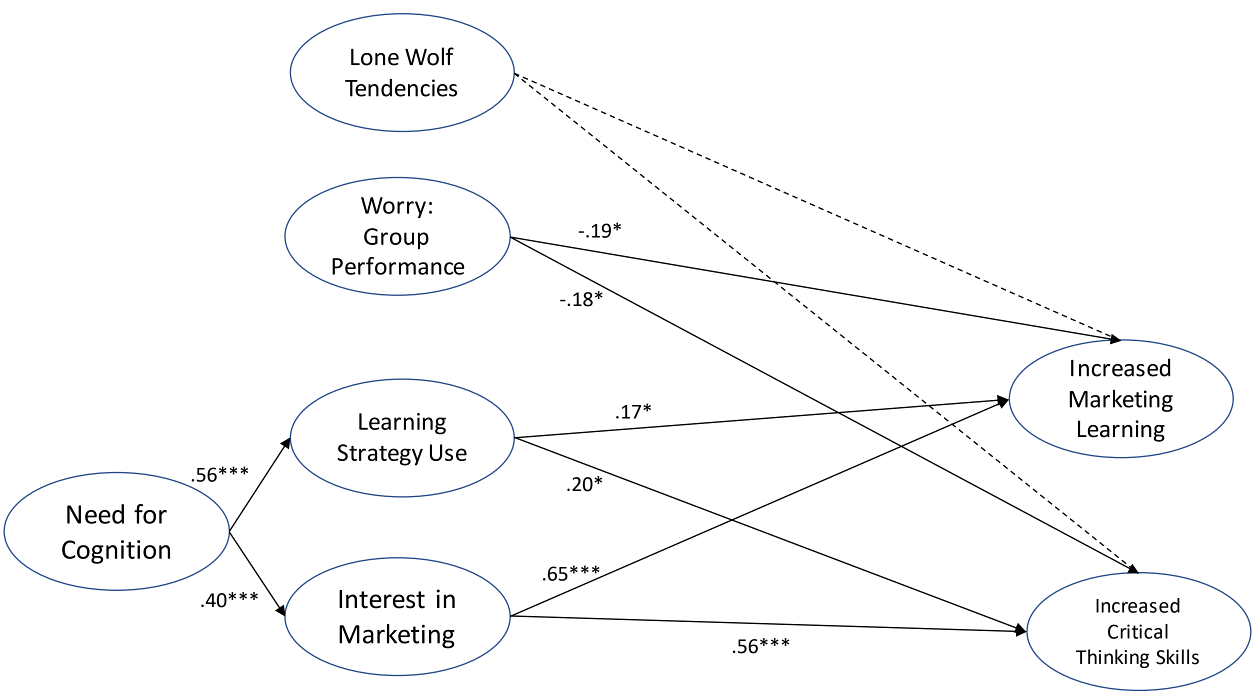

Figure 2. Final structural model. The non-significant paths are denoted by a dashed line. The correlation between simulation perceptions and marketing learning was *r*(170) = .52, 95% *CI* [.37, 68], *p* < .001. The correlation between lone wolf tendencies and being worried about team performance was *r*(170) = .33, 95% *CI* [.15, 50], *p* < .001.
**p* < .05, ***p* < .01, ****p* < .001

Hypothesis Testing

In support of H1a and H1b, our results indicate that interest in marketing is positively related to student increases in perceived marketing learning (β = .65, $p < .001$) and student perceived increases in critical thinking skills (β = .56, $p < .001$).

In support of H2a and H2b, our results indicate that the use of cognitive learning strategies is positively related to student perceived increase in marketing learning (β = .17, $p = .033$) and a perceived increase in critical thinking skills (β = .20, $p = .029$).

In support of H3a and H3b, student need for cognition positively influences student perceived increase in marketing learning (β = .40, $p < .001$) and cognitive strategy use (β = .56, $p < .001$). Also, the anticipated indirect relationships emerged. The indirect relationship between need for cognition and marketing learning emerged through interest in marketing (β = .26, *SE* = .07, 95% *CI* [.11, .40], $p < .001$) and through cognitive strategy use (β = .09, *SE* = .05, 95% *CI* [.02, .19], $p = .038$). The total indirect effects were β = .35, *SE* = .09, 95% *CI* [.18, .52], $p < .001$. The indirect relationship between need for cognition and simulation perception emerged through interest in marketing (β = .22, *SE* = .07, 95% *CI* [.10, .37], $p = .001$) and through cognitive strategy use (β = .11, *SE* = .05, 95% *CI* [.03, .22], $p = .025$). The total indirect effects were β = .33, *SE* = .08, 95% *CI* [.16, .47], $p < .001$. As a final step, a saturated model in which all terms were specified was tested to ensure that no possible relationships were missed. The links between need for cognition and simulation-based learning were non-significant. Likewise, need for cognition did not significantly correlate with lone wolf tendencies and worrying about team performance.

In testing the relationships related to team dynamic factors, we found no significant influence of lone wolf tendencies on perceived marketing learning or on perceived critical thinking skill increases (H4a and H4b). We did, however, find support for anxiety about team performance having a negative influence on perceived marketing learning increases (H5a: β = -.19, $p = .011$) and perceived critical thinking skill increases (H5b: β = -.18, $p = .026$). Table 3 summarizes study findings.

Table 3

Standardized Coefficients for the SEM Model, N = 172

	Estimate	95% *CI*	*SE*
Interest in marketing → marketing learning	0.65***	[0.51, 0.78]	0.07
Learning strategy use → marketing learning	0.17*	[0.01, 0.32]	0.08
Lone wolf tendencies → marketing learning	0.05	[-0.08, 0.17]	0.06
Worried: group perf. → marketing learning	-0.19*	[-0.33, -0.04]	0.07
Interest in marketing → critical thinking	0.56***	[0.4, 0.72]	0.08
Learning strategy use → critical thinking	0.20*	[0.02, 0.37]	0.09
Lone wolf tendencies → critical thinking	0.06	[-0.08, 0.2]	0.07
Worry: group perf. → critical thinking	-0.18*	[-0.34, -0.02]	0.08
Need for cognition → interest in marketing	0.40***	[0.19, 0.61]	0.11
Need for cognition → cognitive strategy use	0.56***	[0.32, 0.8]	0.12

Note. *CI* = confidence interval. *$p < .05$, **$p < .01$, ***$p < .001$.

DISCUSSION

Results suggest that motivational factors such as interest in the subject matter and the use of cognitive learning strategies have a positive impact on perceived learning outcomes. These findings support prior research indicating that a student's level of self-assessed knowledge is related to their desire to achieve and learn (Sitzmann, Brown, Casper, Ely, & Zimmerman, 2008) and with findings that students motivated by their interest in a subject perceive that they have both improved learning outcomes (Harackiewicz, Durik, Barron, Linnenbrink-Garcia, & Tauer, 2008) and increases in their achievement levels (Bernacki & Walkington, 2018).

The use of cognitive learning strategies was also shown to have a positive relationship to perceived increases in marketing learning and critical thinking skills. This finding is in line with Venkatesh, Morris, Davis, and Davis (2003) in that students who proactively use various tactics to improve information processing and material mastery are investing both time and energy with the expectation of performing better. Students could have these perceptions because a computer simulation experiential learning activity allows for practice of skills that can reinforce their knowledge of the material and provides a higher degree of self-confidence about their abilities (Bandura, 1977), which can increase their perception of how much they have learned.

Student feelings about teams also influenced their perceived learning outcomes. Although there was no significant relationship between perceived learning outcomes and lone wolf tendencies, the current study found that anxiety about team performance has a negative impact on perceived learning outcomes. Anxiety and worry has been found to impact performance negatively (Owens et al., 2012) and the resulting performance that is less than desired can leave students feeling like they did not learn as much as expected.

Findings also reinforce the significance of motivation and cognitive processing in experiential learning exercises. High aptitude alone is not enough to impact a student's sense of learning and critical thinking development when using simulations (Lee et al., 2014). The current research suggests that students must possess some type of motivation and an affinity for engaging in effortful thought in order to see improvement in the way they view their own abilities in marketing or critical thinking ability.

In support of expectancy theory, our results show that motivational factors mediate the relationship between NFC and perceived learning outcomes. Better performance of the team in the simulation reinforces thinking that the student is more capable and better skilled in the tasks required to be successful. Evidence of content mastery can lead to perceptions that more knowledge has been gained through their exposure to the game (Brennan & Vos, 2013). Conversely, poor team performance may lead to negative perceptions about student learning via the simulation.

The finding that the relationship between individual need for cognition (effortful thought) and perceived learning outcomes is mediated by motivational factors is interesting. The trial and error aspect of computer simulation experiential learning activities allows students to try different approaches to solving problems and think about new ways to apply them in order to perform better on assignments. Students that have high NFC enjoy opportunities to think and engage with information (J. T. Cacioppo & Petty, 1982) and are more likely to generate ideas and develop strong positive attitudes towards their work (Wu et al., 2014). Self-confidence should be higher, resulting in a greater perception of their growth in marketing knowledge or critical thinking ability.

Teaching Implications

Computer simulation experiential learning activities are not one size-fit all for students. Even though there is research showing the benefit of experiential learning (E. R. Cadotte, 2016; Forman, 2012), it should not be used as a blanket tool to improve all student outcomes. The use of computer simulation experiential learning activities is an impactful way to help students improve their skills in marketing and business (E. R. Cadotte, 2016). To ensure students get the best experience possible when these types of tool are used, it is important that experiences are designed to account for the differences in students.

Different students have different characteristics that allow them to get more out of computer simulation experiential learning activities than other students (Brennan & Vos, 2013). For teachers using computer simulation experiential learning activities as part of their pedagogical toolkit, understanding these relationships will help them better use such activities to improve student perceived learning outcomes. Based on the findings of our study, there are several implications that can improve outcomes when instructors use simulations as part of their teaching toolkit. The finding that reinforces NFC as a significant driver of perceived learning outcomes indicates that instructors can impact the perceived learning outcomes of students by understanding the level of NFC present in their classes and tailoring their class sessions to incorporate activities that incorporate NFC. A way of achieving this is to issue a short, standardized pre-class online survey that asks about student NFC. Once levels of NFC are determined for the class, instructors may provide students with lower NFC some opportunities to reinforce topics to be presented in the simulation as a way to prepare for beginning the simulation. This could be in the form of review or supplementary modules that could be taken at their own pace. While the simulation is underway, providing students with opportunities to demonstrate concepts and skills learned through the game via incremental quizzing and student-led discussion of topics can help improve their belief that they are increasing their knowledge about areas focused on by the game. Also, when using computer simulation experiential learning activities as part of a curriculum, it may be worthwhile to evaluate the cognitive requirements of the activities to ensure they are of a level appropriate for the target class.

Our findings also show that student cognitive learning skills and their interest in the subject not only have a direct positive relationship with perceived learning outcomes, but they also mediate the NFC relationship on learning outcomes. For teachers, the findings of this study could help guide when in a student's education a simulation is most appropriate. Depending on their stage in their academic career, students may have developed varying levels of skill related to how they use or have acquired techniques to learn better (Ainscough, Stewart, Colthorpe, & Zimbardi, 2018). Memorization, note-taking, and other ways to better internalize material from the class may be more developed in upper-classmen rather than students just starting their college career (Ainscough et al., 2018). Instructors could also recommend strategies that have proven results as a way of helping students prepare and develop toolkits to successfully navigate the exercises and improve their learning. Also, using computer simulation experiential learning activities for students that have declared a major may be more effective given the influence that interest in subject matter has on perceived learning outcomes. Perhaps simulations are more suited towards more senior-level or declared-major classes versus introductory classes or classes for those that are mixed with non-majors that may be less interested in the material.

In some cases, when instructors are using computer simulation experiential learning activities in classes, they may implement some design elements intended to take into account student differences with respect to student team dynamics. In our research, we investigated the impact of student lone wolf tendencies and their worrying about team performance. Our findings show that student worry has a negative impact on perceived learning outcomes of both increased marketing learning and critical thinking improvement. This finding suggests that instructors should take care to ensure individual team members do not feel anxious due to their team composition. This could be accomplished by having "check-in" sessions to understand the inter-personal dynamics of the team and help ensure members are not feeling unintended stress due to team interactions. This could be in the form of in-person meetings with instructors or in the form of anonymous surveys or scorecards that are tracked during the length of the class.

Surprisingly, our findings found that student lone wolf tendencies had no impact on perceived learning outcomes. This implies that though the student may prefer working alone and have little confidence in teammates, these feelings did not influence the perceived improvement in critical thinking or marketing knowledge. For instructors, this may be relieving in that significant efforts to identify and manage lone-wolf students on computer simulation experiential learning activities teams may not be necessary to maintain high levels of student outcomes.

However, because increased perceived learning is mediated by subject matter interest and the learning skills students have developed, it may be valuable for instructors to get a more real-time view of where students stand with respect to their learning tools and their general interest in marketing. This could be done with some sort of pre-test, and then used to inform the instructor of areas students feel they are lacking skills needed to perform well or areas students need to study outside of class.

Limitations

There are several limitations that should be noted relating to the study's findings. First, measures utilized for the individual and group-based learning outcomes were perceptual, based upon self-reported measures. A second set of limitations relates to generalizability. Study data were drawn from undergraduate students at an urban university located in the southern U.S. who participated in a marketing simulation as part of their course requirements for a Principles of Marketing class. There could be variability in the demographic, trait, and perceptual learning responses of students at a different university, or those taking a different class.

These findings may not be universally applicable to graduate students. Since graduate school populations are composed of top students from a variety of disciplines, there is likely to be relatively less variability amongst students in terms of individual traits such as NFC. Further, perceptions of simulation-enhanced critical thinking and content learning may be affected by the fact that many MBA students possess significant prior work experience. More advanced grad students are likely to have had greater exposure to self-directed, experiential learning exercises in previous classes. In such cases, it seems likely that individual and group assessments of learning outcomes may be more dependent upon team dynamics and the complexity of the simulation game and related assignments. Given key differences between undergraduate and graduate students and curricula, further research aimed at optimizing the benefits of simulation training for graduate students would be beneficial.

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