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Constituting, testing and validating the gender learner profiles of serious game participants

Lawrence L. Garber Jr.[a,b,*], Eva M. Hyatt[c,d], Ünal Ö. Boya[a,d]

[a] University of North Carolina at Chapel Hill, NC, USA
[b] Elon University, 2075 Campus Box, Elon, NC, 27244, USA
[c] University of South Carolina, USA
[d] Appalachian State University, 4098 Peacock Hall, Boone, NC, 28608-2037, USA

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ABSTRACT

Though it may be commonly believed that well-developed gender-based learner profiles exist, this is far from the case. This research is focused on compiling complete profiles for female and male learners from a dated and piecemeal literature and validating them for participants of serious games. Two hundred twenty undergraduate business students played *The Marketing Game!* and completed exit surveys soliciting their attitude toward the game experience on four learning dimensions that serious games teach, as well as an inventory designed to reveal learning styles. Results establish empirical support for the gender-based learner profiles of serious game participants on all hypothesized learning dimensions. Theoretical and pedagogical implications are discussed.

1. Introduction

A significant literature references the widely held belief that females and males learn differently. However, a review of the literature that underpins this belief leads us to conclude, surprisingly, that it is not well-founded. That literature, though sizeable, is incomplete, piecemeal and unclear, and there are as yet no definitive sources that provide complete and unequivocal learner profiles for both genders.

For example, our review of the literature indicates that the most commonly referenced work on gender learning profiles remains Gilligan (1982, 1993), a fine work that is a seminal resource. Nonetheless, Gilligan and other studies dealing with gender-based differences in learning are limited for several reasons. They are dated. They are qualitative research, and not empirically generalizable. They are narrow in scope - examining, for example, a small number of female Harvard doctoral candidates (Gilligan, 1982; 1993). They speak more directly to gender-based behavioral profiles rather than learner profiles per se. They offer a far less developed profile of men than women, who were the primary focus of the literature at the time the studies were conducted (for a review, see Pearson, 1992), as is evidenced by the following quotation:

> "The subject of gender differences is fraught with dangers. For many people, any suggestion of difference immediately brings to mind a hierarchy where one group is better and the other worse. Women fear that noticing gender differences will mean that women will be seen as having "special needs" which need remediation or that they will be viewed as polar opposites of men. However, since ignoring difference has a price for women - especially those women most unlike the men who set the norm - it is important to address the issue. The challenge then is to confront it, insofar as possible, in its full complexity. We do not have to all

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* Corresponding author. Elon University, 2075 Campus Box, Elon, NC, 27244, USA.
  E-mail addresses: lgarber@elon.edu (L.L. Garber), hyattem@appstate.edu (E.M. Hyatt), boyauo@appstate.edu (Ü.Ö. Boya).

be the same to be equally important. Perhaps the most cutting-edge development in education today is the understanding of different gifts. When we understand that people learn differently, it opens the possibilities of tapping everyone's true potential" (Pearson, 1992, p. 2).

The early gender learning profiles based on qualitative research such as Gilligan's do offer some consistency as to the behavioral and learning profiles of women and, to a lesser extent, men, and do form the basis for the duly held beliefs of today. However, subsequent efforts to find empirical confirmation of them are far less consistent, failing to take us much past Gilligan, and certainly fall short of providing a definitive set of gender-based learner profiles.

What does exist in the way of empirical research is very much a mixed bag whose findings are difficult to reconcile for several of reasons. First, most of this empirical research examines aspects in narrow frames – e.g., students at certain grade levels within specific disciplines—with little overlap (for reviews, see Brew, 2001; Honigsfeld & Dunn, 2003; McCabe, 2014; and Severiens & ten Dam, 1994). Secondly, most studies examine certain learning dimensions but not all those that would constitute comprehensive female and male learner profiles.

Thirdly, a number of disparate learning style inventories have been applied (McCabe, 2014). These can differ widely in terms of the learning theories upon which they are based and the learning dimensions into which they are decomposed. For example, the Kolb Learning Styles Inventory (Kolb, 1984) profiles learners on the basis of cognitive dimensions; whereas, in contrast, the Productivity Environmental Preference Survey (PEPS) (Dunn, Dunn, & Price, 1996) profiles learners according to the environmental conditions in which students prefer to learn (sound, light, temperature, room design), "emotional" factors that contribute to or inhibit learning (motivation, persistence, responsibility, structure), and social context (preference for learning alone, in pairs, with peers, with teachers, or mixed). Thus, it is hard to generalize on the results of these studies. For a review of available learning style inventories and the dimensions they propose, see Ramayah, Sivanandan, Nasrijal, Letchumanan and Leong (2009).

And, further, results of different studies are at times mixed or contradictory (McCabe, 2014). Finally, means of analysis are often superficial or unsophisticated – e.g., correlations and other univariate methods – and may not get from the data all that is there.

In this paper, we extend the examination of gender based learner profiles to the participants of serious games. Specifically, we: (1) review the literature on gender based learning styles; (2) develop a set of hypotheses, which if supported in their entirely, would define gender-based learner profiles for serious game participants; (3) provide an empirical test of the hypotheses; and, (4) discuss theoretical and pedagogical implications.

2. Kolb's Experiential Learning Theory and gender-based learning

Even though we argue that the results of prior empirical research examining gender-based learning profiles is piecemeal and conflicting, our review of the literature does reveal a pocket of reliability, namely those studies based on Kolb's Experiential Learning Theory (Kolb, 1984) and measured with his Learning Styles Inventory (LSI) (Kolb, 1984, 1976). This research draws consistent learning profiles for men and women, respectively, across a number of gender-based learning studies that utilize it, showing that it is sensitive to gender (Brew, 2001). Though generally consistent, those gender learner studies using Kolb's LSI are relatively few in number.

The theory upon which Kolb's LSI is based is Kolb's Experiential Learning Theory (ELT) (Kolb, 1984). ELT is an adult form of learning predicated on the notion that learning comes from experience (McCabe, 2014). According to ELT, knowledge comes from the transformation of experience, which has two parts, referred to by Kolb (1976) as grasping and transforming. There are two opposing modes of grasping experience, Concrete Experience or feeling (CE) and Abstract Conceptualization (AC) or thinking, and two opposing modes of transforming experience, Reflective Observation (RO) or watching, and Active Experimentation (AE) or acting. These four modes have been portrayed by some (e.g., Garland & Martin, 2005; Orthun, 2007) as distinct activities that follow each other in a sequence that executes the learning process: feeling (CE), watching (RO), thinking (AC), and acting (AE). This sequence comprises a cycle or spiral that is continuously recurring as the next experience is encountered, and is directed by individual needs and goals (Joy & Kolb, 2009). Learners select what it is they choose to learn, in other words.

Different learning styles arise from the notion that individuals prefer to learn in different ways, i.e., each individual has a preference for one or more of the four learning modes over others, which is measured by the LSI. By extension, individual learners can be grouped according to similarity of learning style, as may be the case with female and male learners. For example, prior research indicates that male learners prefer Abstract Conceptualization (thinking) (Kolb, 1976, 1984; Leathwood, 2006). This has been shown for distance learners using Blackboard (Garland & Martin, 2005), for undergraduate arts and science students at an Australian university (Wilcoxson & Prosser, 1996), and for freshman undergraduates at a private university in the northeastern US (McCabe, 2014). Female learners prefer Concrete Experimentation (feeling) (Kolb, 1976, 1984; Leathwood, 2006). This has been shown for undergraduate arts and science students at an Australian university (Wilcoxson & Prosser, 1996), and for first year undergraduates in a general psychology course at Stockholm University (Heffler, 2010).

Further research has shown that male learners prefer AC over CE, whereas, female learners prefer the converse, CE over AC. This has been shown for non-students from seven countries who ranged in age and educational level (Joy & Kolb, 2009), for undergraduate arts and science students at an Australian university (Wilcoxson & Prosser, 1996), for students enrolled at Penn State Berks (Kulturel-Konak, D'Allegro, & Dickinson, 2011), for 5th semester mathematics students at Anadolu University in Turkey (Orthun, 2007), for first year undergraduates in a general psychology course at Stockholm University (Heffler, 2010), and for freshman undergraduates at a private university in the Northeastern US (McCabe, 2014).

A more recent study based on Kolb's LSI found that male undergraduate business students show themselves to be Abstract

Conceptualizers, viewing themselves as learners who are logical, analytical and present-oriented graspers of experience. Their female counterparts show themselves to be Concrete Experiencers, viewing themselves as learners who are accepting, feeling, and receptive graspers of experience (Garber, Hyatt, & Boya, 2017). Further, this study found that male learners are more present-oriented and favor a more logical and analytical approach, while female learners are more accepting, feeling and receptive than their male counterparts (Garber et al., 2017).

The aforementioned consistency of the results for those gender learning style studies using Kolb's LSI is notable because, more broadly, there is some controversy over the reliability and validity of this instrument. See Coffield, Moseley, Hall, and Ecclestone (2004) for a review. With respect to reliability, there is evidence of some level of instability over time and across learning environments, career paths and life experiences. These threats to reliability are minimized in this study due to the homogeneity of the subject/learner pool and the uniformity of the learning environment. Respondents are traditional undergraduates aged 18 to 22 at a US public university playing a serious competitive game as an out-of-class experience as part of their principles of marketing class. The survey from which the data is taken was administered at the end of the game as an exit interview. Across subjects the time of administration, immediate learning environment, career paths and life experiences are all relatively uniform. These same characteristics, though assuring reliability and validity of the tests herein, also constitute limitations to the generalizability of these results that are addressed in that section.

With respect to validity, Coffield et al. (2004) review indicates mixed results, finding no conclusive evidence for the existence of Kolb's two dimensions – AC-CE and RO-AE, again underscoring the consistent results on each of these dimensions for gender based learning preferences using the LSI. To speak further on behalf of our choice of the Kolb LSI, there are those who find the Kolb LSI to be sensitive to gender differences (e.g., see Brew, 2001), which may in part account for its record of consistency when applied to gender effects.

3. Gender-based learning style differences from sources other than Kolb

Outside the confines of Kolb's ELT and its four learning modes, empirical support for gender-based learning differences is surprisingly sparse, piecemeal, narrow in scope, equivocal and in some cases unscientific. Indeed, the tone of the literature from which gender profiles are often taken at times appears speculative in nature, as when Gilligan (1982, 1993), in speaking of gender differences in learning, says, "For example, it seems obvious to me, as a psychologist, that differences in the body, in family relationships, and in societal and cultural position would make a difference psychologically (p. xi)." In spite of this, there persists the common belief that the learning preferences of the genders, along with cognition, differ, and consistently so to the point where those commonly understood gender-based cognitive and learner profiles are virtually stereotypical. So there is a need to empirically test for evidence of these commonly believed but largely unsupported gender-based learning differences.

4. Gender based learner profiles

This research departs from most prior research on the subject in that it endeavors to draw *full* learner profiles for both genders, and not simply examine their differences. This research must then consider the learning preferences that females and males have in common as well as what distinguishes them. However, when it comes to hypothesis construction, we encounter a problem.

As previously stated, most prior research examines only the differences between female and male learners. It is convention that hypotheses be stated in agreement with prior research. Further, it is convention within many disciplines including management that hypotheses be stated only in terms of the differences between groups, not their similarities. Therefore, following proper form, the hypotheses developed herein, listed in Table 1 for the convenience of the reader, and the arguments leading to them, are confined to the differences between female and male learners found in prior research. We reserve the reporting of those results indicating what learning preferences female and male serious game participants have in common to the Discussion section.

Table 1
Hypotheses.

Female Serious Game Participants as Learners are:		
Subjective	H1a:	Females as learners use "elaborative" processing to seek personal relevance and individual connections to course material, and see their success as being directly related to their efforts in the classroom.
Introspective	H1b:	Females as learners are more introspective and self-critical, have less confidence in their own abilities, and perceive themselves as performing less well than they actually do.
Collaborative	H1c:	Females as learners are reliant on group support from other students, and seek greater social interaction with other students.
Hesitant	H1d:	Females as learners experience feelings of alienation, and are reluctant to speak in group discussions.

Male Serious Game Participants as Learners are:		
Analytical	H2a:	Males as learners have a preference for rational evaluation and logic, do not accept personal causality, and attribute their success in the classroom to external causes, such as teaching.
Confident	H2b:	Males as learners are more externally focused, more confident in their performance, and more achievement oriented.
Solitary	H2c:	Males as learners tend to be solitary.
Assertive	H2d:	Males as learners are assertive in the classroom.

4.1. Female serious game participants as learners are collaborative

Gilligan (1982, 1993, p. xx) observes this about women and men in terms of their perceived relationships with others: "The difference between women and men which I describe center on a tendency for women and men to make different relational errors – for men to think that if they know themselves, following Socrates' dictum, they will know [others], and for women to think that if only they know others, they will come to know themselves." Gilligan (1982, 1993, p. 66) goes on to report qualitative research that shows "… a sense of vulnerability that impedes these [sic] women from taking a stand, what George Eliot regards as the girl's 'susceptibility to adverse judgments by others, which stems from her lack of power and consequent inability 'to do something in the world.'" These inclinations are echoed in research by Roval and Baker (2005), who find that female online graduate education students felt more connected to other students in their courses. Thus, Gilligan (1982, 1993, p. 17) says, "… women not only define themselves in a context of human relationship but also judge themselves in terms of their ability to care." And, so, we hypothesize that:

H1a. Female serious game participants as learners are reliant on group support from other students, and seek greater social interaction with other students.

4.2. Female serious game participants as learners are subjective

According to McCaulley, MacDaid and Kainz (1985), female learners tend to prefer the feeling mode (i.e., CE à la Kolb, 1984), "liking classrooms and assignments which are personal and caring (even intimate), focus on issues of value and meaning, are concerned with the relevance of ideas to life or to improving people's lives, and develop the skills of cooperation and collaboration" (Pearson, 1992, p. 3). This defines subjective learning. There are a host of theories that provide further perspective on this learning mode.

Witkin, Moore, Goodenough, and Cox (1977) would characterize subjective learners as field dependent and field sensitive. Field sensitive learners "think holistically and prefer to make connections among facts, theory, and personal experience. They are also highly influenced by the context in which learning takes place: personal interactions and feelings about the teacher, the support of peers, and what they are experiencing in other parts of their lives. Field independent learners, on the other hand, are more interested in concepts for their own sake, prefer learning isolated information in a more impersonal environment, and are more likely to have self-defined goal" (Pearson, 1992, p. 3). Howard (Witkin et al. (1977) and Howard (1987)) find that females tend toward field sensitivity.

Belenky, Clinchy, Goldberger, and Tarule (1986) express similar notions when they argue that females tend naturally to what they call "connected knowing," a form of learning that they describe to be consciously subjective, involved, integrative, and empathetic.

According to the "selectivity hypothesis" (Meyers-Levy, 1989), women tend to be detailed, elaborative, and comprehensive processors of promotional information than men (Darley & Smith, 1995), more subjective and intuitive in their processing of information, and are greater responders to subtle cues (Broverman, Klaiber, Kobayashi, & Vogel, 1968). Green and Oxford (1995) found that females resort to a broader range of learning strategies and learning tools to learn, and use them more extensively than men. Gilligan (1982, 1993, p. 73) via her qualitative research exploring the psychology of women, observes a "… shift in perspective toward increasingly differentiated, comprehensive, and reflective forms of thought [which] appears in women's responses to both actual and hypothetical dilemmas."

Further, females' language usage is more of an interpretive mode that is subjective and evaluative (Haas, 1979), so that they engage in more creative, associative, imagery-based interpretations (Paivio, 1969) provide a greater interpretation of stimuli in terms of feeling and motivation (Gleaser, Gottschalk, & Gottschalk, 1959), and are subjective and intuitive processors (Broverman et al., 1968). Thus, we hypothesize that:

H1b. Female serious game participants as learners use "elaborative" processing to seek personal relevance and individual connections to course material, and see their success as being directly related to their efforts in the classroom.

4.3. Female serious game participants as learners are introspective

Gilligan (1982, 1993, p 157), speaks of the powerlessness expressed by women who were part of a literature class at a women's college, discussing the moral dilemmas and the choices they faced: "The women saw themselves … [as] helpless, powerless, and constantly compromised." As Meyers-Levy and Sternthal (1991, p. 94) have stated, "Females have traditionally assumed a submissive and subordinate role in our culture in relation to the more dominant agentic role assumed by males" (Meyers-Levy & Sternthal, 1991, p. 94). Kahle and Meece (1994) found that women tend have lower beliefs in their own capability in science studies. Burge (1998) finds that women enrolling in online courses need a "psychological safety net." Jenkins (1991) reports that freshman female learners show a greater need for structure, and favor authoritative sources, and Honigsfeld and Dunn (2003) find that female learners in grades 7 to 12 are more responsible and conforming. We therefore hypothesize that, when comparing females and males:

H1c. Female serious game participants as learners are more introspective and self-critical, have less confidence in their own abilities, and perceive themselves as performing less well than they actually do.

4.4. Female serious game participants as learners are hesitant classroom participants

The public arena is a domain from which women have traditionally felt themselves to have been excluded (Leathwood, 2006), prompting Gilligan (1982, 1993, p. xiii) to ask: "How do women come to speak of themselves as though they were selfless, as if they did not have a voice … ?" In answer, Gilligan (p. 67) interprets results of some of her qualitative research about the psychology of women to conclude that, "When women feel excluded from direct participation in society, they see themselves as subject to a consensus or judgment made and enforced …" And, again, Gilligan (1982, 1993, p. 16) observes: "The difficulty women experience in finding or speaking publicly in their own voices emerges repeatedly in the form of a divided judgment, a public assessment and private assessment which are fundamentally at odds."

Burge (1998) finds similar results with respect to women entering academe, indicating that women tend to feel discomfort and alienation on college campuses. We therefore hypothesize that:

H1d. Female serious game participants as learners experience feelings of alienation, and are reluctant to speak in group discussions.

5. Male serious game particpants as learners

As previously stated, male behavior and learning preferences have been addressed less often and perhaps less completely than female behavior and learning preferences, presumably because the greater part of their development arose in the 1980's and 90's, when primary concern and focus was on female learners disadvantaged by classrooms seen to be oriented to the learning preferences of males – "… this ideal independent learner is constructed not as female, but as male, white, middle class and able-bodied (Ruddick, 1996)" (Leathwood, 2006, p. 615). For example, according to Pearson (1992, p. 3), "higher education, from the Greeks through the great English universities and into the Americas, was a male-only privilege until well into the 19th century. When women entered academe, differences from the male norm were simply assumed to be deficits."

Thus, male learner traits and preferences have not been examined nearly as much and tend to be rather less well developed than those for female learners. Therefore, those that we are able to compile have largely come indirectly from three sources. One of these is descriptions of male-oriented classrooms (e.g., those from Leathwood, 2006; Pearson 1992) from which we can infer what must in turn be favored male learning modes. Another is from traditional notions of the "ideal learner" in Western philosophical terms, which writers on pedagogy of the 1980's and '90's find to be decidedly masculine (for reviews, again see Leathwood, 2006; Pearson 1992). And, third, articles whose subject is female learners but who mention male traits as contrasting examples.

5.1. Male serious game participants as learners are analytical

As mentioned in the discussion leading to H_{1a}, Belenky et al. (1986) find that female learners prefer "connected knowing, as opposed "separated knowing," the latter characterized as objective, removed and abstract. Belenky et al. do not go so far as to say that male learners prefer "separated knowing," which would seem to complete this thought.

For example, males are shown to be analytical and logical in their information processing orientation by Broverman et al. (1968), to tend to prefer the thinking mode (i.e., AC à la Kolb, 1984) by Kolb (1984, 1976), and to "like classrooms and assignments which are objective and fair and which focus on skills of analysis, critique, and debate (McCaulley, MacDaid, & Kainz, 1985)" by Pearson (2002, p. 3). Therefore, we propose that:

H2a. Male serious game participants as learners have a preference for rational evaluation and logic, do not accept personal causality, and attribute their success in the classroom to external causes, such as teaching.

5.2. Male serious game participants as learners are confident

According to David Kolb, people can perceive new information either by direct apprehension of immediate concrete experience (subjective learning, preferred by females – see H_{1a} above) whose information is processed either by an internal system of observation (introspection, preferred by females - see H_{1b} above) - *or* by indirect comprehension of symbolic representations of experience. This latter, preferred by males (Garland Martin, 2005; Garber et al., 2017; Kolb, 1984, 1976; McCabe, 2014; Wilcoxson & Prosser, 1996) "refers to our capacity to separate our awareness of a concrete item or experience (such as a chair) from its context, translate the experience to a symbol or abstraction of a chair which enables us to isolate that component of our experience, categorize it, name it, and file it away in order that we might establish the concept of "chair" (Pearson 2002, p. 3). Such a capacity for separation is referred to here as being externally focused. And so we hypothesize the following:

H2b. Male serious game participants as learners are more externally focused, more confident in their performance, and more achievement oriented.

5.3. Male serious game participants as learners are self-sufficient

As stated earlier in the lead-up to H_{1a}, Witkin et al. (1977) would characterize subjective learners as field dependent and field sensitive, a preferred learning mode of females. Conversely, it may be argued that males tend to be Field independent learners, more

interested in concepts for their own sake, prefer learning isolated information in a more impersonal environment, and are more likely to have self-defined goals.

Field independent learners share common traits with what Leathwood (2006) refers to as independent learners, who goes on to point out that "independence and autonomy are important concepts in western philosophical traditions, but they have been regarded as the preserve of [white] men" (Leathwood, 2006, p. 612). Leathwood goes on to argue "that the 'independent learner' is a gendered construction" (Leathwood, 2006, p. 630). We therefore conclude that:

H2c. Male serious game participants are solitary learners.

5.4. Male serious game participants as learners are assertive

It was pointed out above, with respect to H_{2b}, that males tend to be solitary, independent and autonomous learners. By extension, as Leathwood (2006, p. 612) argues, to be autonomous is to act rationally in the public arena, a domain from which women have traditionally been excluded. We therefore predict that:

H2d. Male serious game participants as learners are assertive in the classroom.

In summary, the profile of the male serious game learner drawn from the hypotheses set out above aligns with what has been thought to be a male-oriented learning tradition attributed to Western pedagogical practice. According to Leathwood (2006): "Independence and autonomy are important concepts in western philosophical traditions, but they have been regarded as the preserve of [white] men. To be autonomous is to act rationally in the public arena, a domain from which women have traditionally been excluded. Pateman (1988) demonstrated how, in the foundation of the liberal state, only men were regarded as individuals and able to enter into contracts, whilst Griffiths (1995) pointed to the contributions of Hegel, Kant, Rousseau, amongst others, to the enduring construction of independent autonomous individuals as male in western society." A bias toward the analytical, externally focused, solitary and assertiveness learner, the full male learner profile hypothesized here, are all reflected in the above.

We argue that the sum of these respective female and male hypothesis sets defines learner profiles for each in all aspects treated by prior research, and that a finding of empirical support for all of them would serve to validate respective female and male learner profiles.

6. Method

6.1. Subjects and task

Undergraduate business students in eight sections of Principles of Marketing (n = 220) at a public university in the Southeastern US participated in *The Marketing Game!* (Mason & Perreault, 2003), as an in- and out-of-class exercise. All eight sections were taught by the same instructor who administered the game in the same manner across all the sections. Firms generally consisted of 4–5 members who were self-selected. A number of interactive exercises in the first and second class meetings allowed students to meet and get to know each other before groups were formed. Upon completion of the game the participants then completed an exit survey.

6.2. The exit survey

The paper-and-pencil exit survey consisted of three parts. First was a 46-item inventory soliciting the attitudes of game participants toward serious games on the learning dimensions that such games are intended to teach (Garber, Hyatt, Boya, & Ausherman, 2012). The 46 attitudinal statements were rated using a seven-point valence scale, where students report their level of agreement or disagreement with each of the statements according to how well each statement describes their game experience in some particular way. Second was the Kolb LSI (1976). Last was a brief section soliciting personal information including gender, class year, major and GPA.

6.3. Attitude toward serious games

We measure game participants' attitudes toward learning using the 46 statement inventory taken from Garber et al. (2012), shown in the Appendix. It is designed to measure perceptions of learning on the four learning goals that serious games are intended to teach, those being: the learning experience and learning outcomes from applying marketing principles in context [referred to henceforth as Marketing Knowledge]; the strategy aspects of serious games [Analysis and Problem Solving]; the decision-making experience gained through serious games [Competition]; and the teamwork experience provided through serious games [Collaborative Learning]. (See the Appendix for a list of the items included under each learning dimension.)

6.4. The Kolb (1984) learning style inventory (LSI)

Kolb's LSI (Kolb, 1976) consists of nine sets of four descriptors. Students rank order the four descriptors within a set according to how well each descriptor describes themselves as learners. These rankings are then combined to calculate a score for each of the four learning modes. The set of four scores comprises a learning profile that may be interpreted as that student's distinct learning style.

6.5. The marketing game! (TMG)

TMG (Mason et al., 2003) functions similarly to and is representative of most functional marketing games, in particular Markstrat, after which it appears to have been patterned. The simple, elegant design of TMG makes it particularly suitable for undergraduate students. It simulates a software industry consisting of four firms, with a student team serving as each of the four firm's marketing departments. The market consists of six consumer segments served by two channels of distribution. Student teams must allocate a budget to various activities including advertising, sales, product design and development, and marketing research. Firms also make decisions regarding the sales force (size, commission rate, proportion of non-selling time, and allocation to channels), the intensity of distribution, the type of advertising, price, and production levels. Teams are given the objective of maximizing contribution margin.

7. Learner profile results for female and male serious game participants

A series of single and group t tests were run using SAS PROC TTEST (2017) to reveal the learning preferences of female and male game participants on all hypothesized learning dimensions according to their responses to Kolb (1976) LSI, and the 46-item attitude-toward-the-serious-game inventory. Results are shown in Tables 2–4. Tables 2 and 3 contain results of a series of single group one-tail t tests for female and male students, respectively. The equality for the null hypothesis is at the point representing indifference on those scales related to the Kolb LSI ($H_o \leq 2.5$ on a four point forced choice scale) and on the 46-item attitude-to-the-serious-game inventory it is at the point representing "somewhat agree" ($H_o \leq 5$ on a seven-point Likert type agree/disagree scale). Statistically significant mean response greater than the point of indifference on each item at a level of $p \leq 1$ is considered to reveal an association between that aspect of learning and the respondent.

Table 4 contains results of a series of group t tests comparing the mean responses of women and men on the Kolb LSI and the 46 attitudinal inventory referenced above. A significantly greater difference in means at the $p \leq 0.1$ level is taken to be evidence of an association between that aspect of learning and that group, female or male, with the larger mean response.

7.1. Evidence for female serious game participants as collaborative, subjective, introspective, and reluctant

7.1.1. Evidence for female participants as collaborative

Viewing themselves as receptive learners ($\overline{x} = 3.04$, $p < .0001$), female game participants' attitude toward the group experience was reported very positively, indicating that "Everyone in my group got along really well" ($\overline{x} = 6.68$, $p < .0001$), "I did not feel completely ignored by other group members" ($\overline{x} = 6.56$, $p < .0001$), "I felt really comfortable in my group" ($\overline{x} = 6.45$, $p < .0001$), "My group was not too large to be really effective" ($\overline{x} = 6.37$, $p < .0001$), "I think that everyone had a chance to have their say and contribute" ($\overline{x} = 6.33$, $p < .0001$), "My group did not vehemently disagree" ($\overline{x} = 6.11$, $p < .0001$), "My group was really great at getting down to business" ($\overline{x} = 5.81$, $p < .0001$), "My group wasn't too small to be effective" ($\overline{x} = 5.94$, $p < .0001$), "It wasn't very hard for my group to get down to business" ($\overline{x} = 5.79$, $p < .0001$), "I think we worked very hard on the game" ($\overline{x} = 5.70$, $p < .0001$) and "It is important that the game is fun to play to be valuable" ($\overline{x} = 5.31$, $p = .0097$).

These qualities taken together (Coefficient Alpha = .83) would appear to support the notion that females appreciate the group aspect of the game, the support, and the social interaction that it provides, in support of H_{1a}.

7.1.2. Evidence for female participants as subjective

Female learners reveal themselves as Concrete Experiencers ($\overline{x} = 16.04$, $p = .0021$) and Active Experimenters ($\overline{x} = 16.25$, $p = .0002$) who favor learning by direct experience ($\overline{x} = 3.24$, $p < .0001$), are receptive learners ($\overline{x} = 3.04$, $p < .0001$) and observing ($\overline{x} = 2.92$, $p = .0014$). They see themselves to be doers ($\overline{x} = 2.77$, $p = .0193$), responsible ($\overline{x} = 3.29$, $p < .0001$), active ($\overline{x} = 3.07$, $p < .0001$), and thinking ($\overline{x} = 2.68$, $p = .0678$). They are not conceptualizers ($\overline{x} = 1.80$, $p = 1.000$) nor tentative ($\overline{x} = 2.27$, $p = .9997$) nor reserved ($\overline{x} = 2.11$, $p = .9975$) nor watchers ($\overline{x} = 2.26$, $p = .9672$). Relative to males, female learners are responsible ($\overline{x} = 3.29$ vs. 2.84, $p = .0006$), feeling ($\overline{x} = 2.35$ vs. 1.94, $p = .0093$), accepting ($\overline{x} = 2.58$ vs, 2.21, $p = .0247$), receptive ($\overline{x} = 3.04$ vs. 2.71, $p = .0255$) and, again, observation oriented ($\overline{x} = 2.84$ vs. 2.57, $p = .0615$), indicating that their way of learning is personal, personally relevant, and connected to themselves as individuals.

Female game participants see the game primarily as a learning tool, indicating their serious intent as learners, by their agreement with statements related to gaining a detailed knowledge of marketing principles and competitive strategy, and working hard in general. For example, those statements related to gaining a detailed knowledge of marketing and competitive strategy with which female game participants agree include "In our strategy, we took careful account of competitor activity" ($\overline{x} = 5.97$, $p = .0001$), "My experience in the game leads me to believe that target segmentation is absolutely essential" ($\overline{x} = 5.67$, $p < .0001$), "I believe that I got a good sense of how all the marketing mix decisions must work together" ($\overline{x} = 5.42$. $p = .0070$), "I feel it was crucial to buy the marketing research reports" ($\overline{x} = 5.38$, $p = .0101$), and "I think that differentiating your product is important to doing well" ($\overline{x} = 5.38$, $p = .0145$).

Those statements indicating female learners' intent and willingness to work hard to learn include "It wasn't very hard for my group to get down to business" ($\overline{x} = 5.79$, $p < .0001$), "I think we worked very hard on the game" ($\overline{x} = 5.70$, $p < .0001$), and "I do not think that the game was too challenging and difficult to be useful" ($\overline{x} = 5.29$, $p = .0405$). Interestingly, there are three statements that concern having fun playing the game, and the female responses to these two of these statements together further indicate the intent of female game participants as serious learners. Female participants agree that "It is important that the game be fun to play in order for it to be a valuable learning experience" ($\overline{x} = 5.31$, $p = .0097$), but significantly disagreed with "I thought that playing the

Table 2

Results of single group t tests for female game participants.

	Mean Ratings	t Value	P
Attitude to the Game (H_o ≤ 5, Top Box Criterion) Rank Ordered by t Value			
Everyone in my group got along really well.	6.68	14.22	< .0001
I did not feel completely ignored by other group members.	6.56	13.31	< .0001
I felt really comfortable in my group.	6.45	12.57	< .0001
My group was not much too large to be really effective.	6.37	12.32	< .0001
I think that everyone had a chance to have their say and contribute to my firm's decisions.	6.33	9.73	< .0001
In our strategy, we took careful account of competitor activity.	5.97	7.52	< .0001
My group did not vehemently disagree a great deal on what our strategy should be, and we had great difficulty in coming to consensus.	6.11	6.94	< .0001
My group was really great at getting down to business.	5.81	5.66	< .0001
My group wasn't too small to be really effective.	5.94	5.55	< .0001
My experience in the game leads me to believe that target segmentation is an absolutely essential competitive strategy.	5.67	4.91	< .0001
My understanding of the game got a lot better as the game went along.	5.77	4.79	< .0001
It wasn't very hard for my group to get down to business whenever we met.	5.79	4.53	< .0001
I think we worked very hard on the game.	5.70	4.37	< .0001
I don't think that those who won the game learned a great deal more than those who lost.	5.61	3.60	.0003
I believe that I got a good sense of how all the marketing mix decisions must work together for an overall marketing strategy to be effective.	5.42	2.52	.0070
It is important that the game be fun to play in order for it to be a valuable educational experience.	5.31	2.39	.0097
I feel it was crucial to buy the marketing research reports, to do well in the game.	5.38	2.37	.0101
I thing that differentiating your product is important to doing well in the game.	5.38	2.23	.0145
I do not think that the game was too challenging and difficult to be useful.	5.29	1.77	.0405
It was very important to me to finish first in our industry.	5.21	1.34	.0925
My group had very strong leadership.	5.18	1.13	.1313
I am an extremely competitive person.	5.18	1.00	.1603
I don't think I could have done a lot better in the game if I had done it on my own.	5.08	0.41	.3423
I feel that I learned a lot about how to function effectively within a group by playing the game.	4.97	−0.15	.5586
My experience in the game leads me to believe that target segmentation is an absolutely essential competitive strategy.	4.96	-.25	.5987
I feel that the game provided a really valuable educational experience.	4.93	−0.32	.6251
I feel that the game experience gave me a much better sense how competition affects marketing outcomes in the real world.	4.97	−0.33	.6276
I feel that the game does a great job of integrating all the concepts presented in the class.	4.89	−0.68	.7517
I don't think the game was really easy.	4.76	−1.39	.9159
I think that total net contribution is the very best measure of financial performance in the game.	4.78	−1.47	.9273
I feel as if I really understood how the game worked.	4.68	−1.53	.9344
I think that those who struggled at some point in the game learned a lot more than those who never struggled	4.72	−1.56	.9382
The game gave me a great sense of how channels of distribution actually work	4.71	−1.59	.9414
I feel that the game experience gave me a much better sense how product design affects marketing outcomes in the real world.	4.69	−1.62	.9454
I feel that the game gave me a much better sense of how promotion actually works in the real world.	4.58	−2.12	.9812
Sales volume is the best indicator of game performance.	4.62	−2.18	.9836
I feel that the game gave me a much better sense of how pricing actually works in the real world.	4.58	−2.30	.9879
Market share is the very best indicator of financial performance in the game.	4.63	−2.70	.9956
I feel that I am now much better able to cope with ambiguity and uncertainty in business, having played the game.	4.49	−2.82	.9969
I always had great confidence in my ability to do well in the game.	4.49	−2.83	.9970
I thought that playing the game was a lot of fun.	4.32	−3.05	.9984
I had a lot of fun playing the game.	4.31	−3.15	.9988
I think that performance within target segments, and not overall performance, is the very best indicator of game performance.	4.39	−3.76	.9998
I feel that game is a very true representation of how business actually works.	4.14	−4.74	1.0000
The uncertainty of the game did not make me feel uncomfortable.	3.79	−5.58	1.0000
I think that you have to be a very analytical person to play the game well.	3.85	−6.33	1.0000
Kolb's Learning Modes (Ho ≤ 15)			
Active Experimentation	16.25	3.74	0.0002
Concrete Experience	16.04	2.96	0.0021
Reflective Observation	14.75	−0.57	0.7159
Abstract Conceptualization	14.59	−0.88	0.8084
Kolb's LSI Items (H_0 ≤ 2.5)			
Practical (AE)	3.27	8.49	< .0001
Responsible (AE)	3.29	8.40	< .0001

Table 2 (*continued*)

	Mean Ratings	t Value	P
Attitude to the Game (H$_o \leq 5$, Top Box Criterion) Rank Ordered by t Value			
Experience (CE)	3.24	7.24	< .0001
Active (AE)	3.07	5.25	< .0001
Receptive (CE)	3.04	5.00	< .0001
Observing (RO)	2.92	3.68	0.0002
Observation (RO)	2.84	3.10	0.0014
Doing (AE)	2.77	2.11	0.0193
Rational (AC)	2.69	1.65	0.0516
Thinking (AC)	2.68	1.51	0.0678
Present-Oriented (CE)	2.61	0.84	0.2024
Logical (AC)	2.60	0.80	0.2122
Evaluative (AC)	2.59	0.69	0.2458
Accepting (CE)	2.58	0.61	0.2734
Reflecting (RO)	2.47	− 0.24	0.5952
Analytical (AC)	2.37	− 0.97	0.8330
Feeling (CE)	2.35	− 1.01	0.8424
Intuitive (CE)	2.35	− 1.08	0.8586
Watching (RO)	2.26	− 1.87	0.9672
Tentative (RO)	2.27	− 3.48	0.9997
Experimentation (AE)	2.17	− 2.52	0.9930
Reserved (RO)	2.11	− 2.91	0.9975
Conceptualization (AC)	1.80	− 5.85	1.0000
Pragmatic (AE)	1.83	− 6.13	1.0000

game was a lot of fun" ($\overline{x}$ = 4.32, p = .9984) and "I had a lot of fun playing the game" ($\overline{x}$ = 4.31, p = .9988).

Further evidence for female participants' concern for the game as a learning tool, and their zeal for wanting to learn more, lies in several statements with which they significantly disagreed. These indicate dissatisfaction with the game for failing to teach certain aspects of the marketing mix or competitive strategy well. These include "I [don't] feel the game is very true representation of how business actually works" ($\overline{x}$ = 4.14, p = 1.000), "I feel that the game gave me a much better sense of how pricing actually works" ($\overline{x}$ = 4.58, p = .9879), and "I feel that the game gave me a much better sense of how promotion actually works" ($\overline{x}$ = 4.58, p = .9812). Relative to male game participants, female participants did not find the game to be easy ($\overline{x}$ = 4.76 vs. 4.07, p = .0017), and felt they worked hard on the game ($\overline{x}$ = 5.70 vs. 5.10, p = .0102).

These qualities taken together (Coefficient Alpha = .72) would appear to support the notion that female learners are elaborative processors who seek personal relevance and individual connections to course material, and see their success to be directly related to their efforts in the classroom, in support of H$_{1b}$.

7.1.3. Evidence for females participants as introspective

Female learners are again Concrete Experiencers ($\overline{x}$ = 16.04, p = 0021) who are responsible ($\overline{x}$ = 3.29, p < .0001), receptive ($\overline{x}$ = 3.04, p < .0001), and observing ($\overline{x}$ = 2.92, p < .0002), indicating their tendency to introspection. Evidence comes from statements with which female respondents significantly disagreed, indicating what they feel they are not. These would include "The uncertainty of the game [made] me feel uncomfortable" ($\overline{x}$ = 3.79, p = 1.000), "I [did not have] a lot of fun playing the game," ($\overline{x}$ = 4.31, p = .9988), "I [did not think] that the playing the game was a lot of fun" ($\overline{x}$ = 4.32, p = − .9984), "I [did not] always [have] great confidence in my ability to do well in the game," ($\overline{x}$ = 4.49, p = .9970), I [do not] feel that I am now much better able to cope with the ambiguity and uncertainty of business, having played the game" ($\overline{x}$ = 4.49, p = .9969). Relative to male game participants, female participants more strongly agreed with the statements "I don't think the game was really easy" ($\overline{x}$ = 4.76 vs. 4.07. p = .0017) and "I don't think I could have done a lot better in the game if I had done it on my own" ($\overline{x}$ = 5.08 vs. 4.56, p = .0428).

Further evidence would appear to come from those statements indicating what female participants felt the game did not teach them. These would include "I [did not] feel the game is a very true representation of how business actually works" ($\overline{x}$ = 4.14, p = 1.000), "I [do not] feel that the game gave me a much better sense of how pricing actually works" ($\overline{x}$ = 4.58, p = .9812) and "I [do not] feel the game gave me a much better sense of how promotion actually works" ($\overline{x}$ = 4.58, p = .9812).

These qualities taken together (Coefficient Alpha = .80) would appear to support the notion that females are not confident as learners and self-critical, in support of H$_{1c}$.

7.1.4. Evidence for females as reluctant classroom participants

Female learners are Concrete Experiencers ($\overline{x}$ = 16.04, p = 0021) who are, relative to male learners (who tend to assertiveness in the classroom), feeling ($\overline{x}$ = 2.35 vs. 1.94, p = .0093), accepting ($\overline{x}$ = 2.58 vs. 2.21, p = .0247), receptive ($\overline{x}$ = 3.04 vs. 2.71, p = .0255) and observation oriented ($\overline{x}$ = 2.84 vs. 2.57, p = .0615), tendencies indicating a basis for their reluctance to participate in class - as much as these qualities also indicate their tendency toward introspection. Further, as with evidence for female learners to

Table 3

Results of single group t tests for male game participants.

	Mean Ratings	t Value	P
Attitude to the Game (H$_o$ ≤ 5, Top Box Criterion) Rank Ordered by t Value			
Everyone in my group got along really well.	6.50	17.59	< .0001
I did not feel completely ignored by other group members.	6.34	13.71	< .0001
I think that everyone had a chance to have their say and contribute to my firm's decisions.	6.22	13.04	< .0001
My group wasn't too small to be really effective.	6.08	12.21	< .0001
My group was not much too large to be really effective.	6.16	12.10	< .0001
I felt really comfortable in my group.	6.20	11.53	< .0001
My group did not vehemently disagree a great deal on what our strategy should be, and we had great difficulty in coming to consensus.	5.99	9.74	< .0001
My experience in the game leads me to believe that target segmentation is an absolutely essential competitive strategy.	5.75	7.97	< .0001
My understanding of the game got a lot better as the game went along.	5.77	7.39	< .0001
It wasn't very hard for my group to get down to business whenever we met.	5.84	7.15	< .0001
My group was really great at getting down to business.	5.72	6.74	< .0001
I am an extremely competitive person.	5.69	6.56	< .0001
In our strategy, we took careful account of competitor activity.	5.67	6.46	< .0001
I do not think that the game was too challenging and difficult to be useful.	5.62	5.58	< .0001
My group had very strong leadership.	5.47	4.29	< .0001
It is important that the game be fun to play in order for it to be a valuable educational experience.	5.44	3.96	< .0001
I feel it was crucial to buy the marketing research reports, to do well in the game.	5.36	2.80	< .0001
I believe that I got a good sense of how all the marketing mix decisions must work together for an overall marketing strategy to be effective.	5.24	2.23	0.0136
I always had great confidence in my ability to do well in the game.	5.25	2.21	0.0142
It was very important to me to finish first in our industry.	5.25	1.90	0.0298
I don't think that those who won the game learned a great deal more than those who lost.	5.12	1.15	0.1255
I feel that the game provided a really valuable educational experience.	5.12	0.83	0.2041
I think we worked very hard on the game.	5.10	0.74	0.2306
I feel as if I really understood how the game worked.	5.05	0.36	0.3506
I feel that the game experience gave me a much better sense how competition affects marketing outcomes in the real world.	4.97	−0.26	0.6031
I thing that differentiating your product is important to doing well in the game.	5.06	−0.49	0.3107
My experience in the game leads me to believe that the various principles taught in basic marketing are entirely correct in practice.	4.90	−0.91	0.8189
I think that total net contribution is the very best measure of financial performance in the game.	4.88	−1.13	0.8708
I feel that the game gave me a much better sense of how pricing actually works in the real world.	4.84	−1.42	0.9210
I feel that the game experience gave me a much better sense how product design affects marketing outcomes in the real world.	4.81	−1.70	0.9546
I had a lot of fun playing the game.	4.74	−1.76	0.9596
I feel that I learned a lot about how to function effectively within a group by playing the game.	4.77	−1.79	0.9619
I feel that the game does a great job integrating all the concepts presented in the class.	4.71	−2.38	0.9906
I thought that playing the game was a lot of fun.	4.62	−2.54	0.9939
I feel that the game gave me a much better sense of how promotion actually works in the real world.	4.65	−2.75	0.9967
Market share is the very best indicator of financial performance in the game.	4.71	−2.94	0.9981
I don't think I could have done a lot better in the game if I had done it on my own.	4.56	−2.96	0.9982
I think that those who struggled at some point in the game learned a lot more than those who never struggled	4.54	−3.34	0.9995
Sales volume is the best indicator of game performance.	4.44	−4.37	1.0000
I feel that I am now much better able to cope with ambiguity and uncertainty in business, having played the game.	4.42	−4.49	1.0000
The uncertainty of the game did not make me feel uncomfortable.	4.36	−4.62	1.0000
The game gave me a great sense of how channels of distribution actually work	4.35	−5.08	1.0000
I think that performance within target segments, and not overall performance, is the very best indicator of game performance.	4.39	−5.93	1.0000
I think that you have to be a very analytical person to play the game well.	4.12	−6.94	1.0000
I don't think the game was really easy.	4.07	−7.31	1.0000
I feel that game is a very true representation of how business actually works.	3.99	−8.12	1.0000
Kolb's Learning Modes Rank Ordered by t Value (H$_0$ ≤ 15)			
Active Experimentation (AE)	15.93	3.25	.0007
Abstract Conceptualization (AC)	16.01	2.77	.0032
Concrete Experience (CE)	14.73	-.98	.8366
Reflective Observation (RO)	14.05	−2.92	.9980

(*continued on next page*)

Table 3 (*continued*)

	Mean Ratings	t Value	P
Attitude to the Game (H$_o$ ≤ 5, Top Box Criterion) Rank Ordered by t Value			
Kolb's LSI Items Rank Ordered by t Value H$_0$ = 2.5)			
Practical (AE)	3.27	11.08	< .0001
Active (AE)	3.19	9.23	< .0001
Experience (CE)	3.12	7.58	< .0001
Logical (AC)	3.15	7.48	< .0001
Rational (AC)	2.91	4.82	< .0001
Analytical (AC)	2.93	4.67	< .0001
Responsible (AE)	2.84	4.47	< .0001
Thinking (AC)	2.90	4.43	< .0001
Present-Oriented (CE)	2.87	4.03	< .0001
Doing (AE)	2.80	3.26	0.0007
Observing (RO)	2.76	3.19	0.0009
Receptive (CE)	2.71	2.38	0.0092
Evaluative (AC)	2.62	1.35	0.0899
Observation (RO)	2.57	0.76	0.2242
Watching (RO)	2.47	−0.36	0.6410
Experimentation (AE)	2.58	−0.47	0.6821
Reflecting (RO)	2.37	−1.68	0.9521
Accepting (CE)	2.22	−3.06	0.9987
Intuitive (CE)	2.20	−3.45	0.9996
Tentative (RO)	2.27	−3.48	0.9997
Reserved (RO)	2.07	−4.64	1.0000
Conceptualization (AC)	1.94	−6.15	1.0000
Feeling (CE)	1.94	−6.67	1.0000
Pragmatic (AE)	1.83	−8.08	1.0000

tend toward introspection, reasons for female learners' reluctance in the classroom comes from statements for which female respondents feel they are not associated. These would include other qualities whose mean response is significantly less than it is for male learners. Thus, female learners, relative to male learners (those who are assertive in the classroom), feel that they are less logical ($\bar{x}$ = 2.60 vs. 3.15, p = .0004), analytical ($\bar{x}$ = 2.37 vs. 2.93, p = .0006), experimental ($\bar{x}$ = 2.17 vs. 2.46, p = .0711) and present-oriented ($\bar{x}$ = 2.61 vs. 2.87, p = .0976).

Like those statements in support of female learners as introspective, evidence for female learners as hesitant, or reluctant, in the classroom, come from statements with which female respondents were significantly negatively associated: "The uncertainty of the game [made] me feel uncomfortable" ($\bar{x}$ = 3.79, p = 1.000), "I [did not have] a lot of fun playing the game" ($\bar{x}$ = 4.31, p = .9988), "I [did not think] that playing the game was a lot of fun" ($\bar{x}$ = 4.32, p = .9984), "I [did not] always [have] great confidence in my ability to do well in the game" ($\bar{x}$ = 4.49, p = .9970), and "I [do not] feel that I am now much better able to cope with ambiguity and uncertainty" ($\bar{x}$ = 4.49, p = .9969).

These statements, coupled with certain of those statements for which female respondents rated themselves significantly higher than male respondents include "I don't think the game was really easy ($\bar{x}$ = 4.76 vs. 4.07, p = .0017), and "I don't think I could have done a lot better in the game if I had done it on my own" ($\bar{x}$ = 5.08 vs. 4.56, p = .0428). These qualities coupled with the fact that female game participants did not feel that their teams had great leadership ($\bar{x}$ = 5.18, p = .1313) when (the more assertive) male participants did ($\bar{x}$ = 5.47, p < .0001), would appear to support the notion that female learners are hesitant to participate in the classroom, particularly in the presence of male learners who tend to be confident and assertive in the classroom.

These qualities taken together (Coefficient Alpha = .76) would appear to support the notion that females are not confident as learners and self-critical, in support of H$_{1d}$.

7.2. Evidence for male serious game participants as analytical, confident, solitary and assertive

7.2.1. Evidence for male participants as analytical

Male learning game participants characterized themselves as Abstract Conceptualizers ($\bar{x}$ = 16.01, p = .0032) who are logical ($\bar{x}$ = 3.15, p < .0001), rational ($\bar{x}$ = 2.91, p < .0001), analytical ($\bar{x}$ = 2.93, p < .0001), thinking ($\bar{x}$ = 2.90, p < .0001), present-oriented ($\bar{x}$ = 2.87, p < .0001), observing ($\bar{x}$ = 2.76, p = .0009) and receptive ($\bar{x}$ = 2.71, p = .0092). Relative to female respondents, male respondents rate themselves significantly more highly on logical ($\bar{x}$ = 3.15 vs. 2.60, p = .0004), analytical ($\bar{x}$ = 2.93 vs. 2.37, p = .0006), experimental ($\bar{x}$ = 2.46 vs. 2.17, p = 0711), and present-oriented ($\bar{x}$ = 2.87 vs. 2.61, p = .0976). These qualities taken together would seem to support the notion that male learners view themselves as rational evaluators, logical, who attribute their success to external causes, in support of H$_{2a}$.

Table 4

Results of two group t tests comparing means for female and male serious game participants.

	Mean Response Females	Mean Response Males	t Value	P
Attitude to the Game Rank Ordered by t Value ($H_0 \leq 5$, top box criterion)				
I don't think the game was really easy.	4.76	4.07	3.18	0.0017
I think we worked very hard on the game.	5.70	5.10	2.59	0.0102
I don't think I could have done a lot better in the game if I had done it on my own.	5.08	4.56	2.04	0.0428
I don't think that those who won the game learned a great deal more than those who lost.	5.61	5.16	2.00	0.0469
In our strategy, we took careful account of competitor activity.	5.97	5.67	1.77	0.0776
The game gave me a great sense of how channels of distribution actually work	4.71	4.35	1.59	0.1129
I thing that differentiating your product is important to doing well in the game.	5.38	5.06	1.48	0.1411
I felt really comfortable in my group.	6.45	6.20	1.47	0.1439
I did not feel completely ignored by other group members.	6.56	6.34	1.32	0.1892
My group was not much too large to be really effective.	6.37	6.16	1.31	0.1926
Everyone in my group got along really well.	6.68	6.50	1.23	0.2189
I believe that I got a good sense of how all the marketing mix decisions must work together for an overall marketing strategy to be effective.	5.42	5.24	0.93	0.3519
I feel that I learned a lot about how to function effectively within a group by playing the game.	4.97	4.77	0.89	0.3751
I feel that the game does a great job of integrating all the concepts presented in the class.	4.89	4.71	0.85	0.3976
Sales volume is the best indicator of game performance.	4.62	4.44	0.79	0.4287
I think that those who struggled at some point in the game learned a lot more than those who never struggled	4.72	4.54	0.77	0.4431
I feel that game is a very true representation of how business actually works.	4.14	3.99	0.70	0.4863
My group did not vehemently disagree a great deal on what our strategy should be, and we had great difficulty in coming to consensus.	6.11	5.99	0.68	0.4962
My group was really great at getting down to business.	5.81	5.72	0.46	0.6450
I feel that I am now much better able to cope with ambiguity and uncertainty in business, having played the game.	4.49	4.42	0.32	0.7528
My experience in the game leads me to believe that the various principles taught in basic marketing are entirely correct in practice.	4.96	4.90	0.29	0.7730
I feel it was crucial to buy the marketing research reports, to do well in the game.	5.38	5.34	0.23	0.8149
My understanding of the game got a lot better as the game went along.	5.77	5.77	0.01	0.9932
I think that performance within target segments, and not overall performance, is the very best indicator of game performance.	4.39	4.39	−0.01	0.9952
I feel that the game experience gave me a much better sense how competition affects marketing outcomes in the real world.	4.94	4.97	−0.15	0.8793
It wasn't very hard for my group to get down to business whenever we met.	5.80	5.84	−0.20	0.8387
It was very important to me to finish first in our industry.	5.21	5.25	−0.21	0.8361
I feel that the game gave me a much better sense of how promotion actually works in the real world.	4.58	4.65	−0.31	0.7587
Market share is the very best indicator of financial performance in the game.	4.63	4.71	−0.48	0.6326
My experience in the game leads me to believe that target segmentation is an absolutely essential competitive strategy.	5.66	5.75	−0.55	0.5851
I feel that the game experience gave me a much better sense how product design affects marketing outcomes in the real world.	4.69	4.81	−0.57	0.5677
I think that total net contribution is the very best measure of financial performance in the game.	4.78	4.88	−0.58	0.5629
I feel that the game provided a really valuable educational experience.	4.93	5.12	−0.74	0.4597
It is important that the game be fun to play in order for it to be a valuable educational experience.	5.31	5.44	−0.75	0.4563
My group wasn't too small to be really effective.	5.44	6.08	−0.76	0.4503
I thought that playing the game was a lot of fun.	4.32	4.62	−1.13	0.2588
I think that you have to be a very analytical person to play the game well.	3.85	4.12	−1.21	0.2216
I feel that the game gave me a much better sense of how pricing actually works in the real world.	4.58	4.84	−1.22	0.2233
I feel as if I really understood how the game worked.	4.68	5.05	−1.42	0.1561
My group had very strong leadership.	5.18	5.47	−1.57	0.1168
I had a lot of fun playing the game.	4.31	4.74	−1.64	0.1019
I do not think that the game was too challenging and difficult to be useful.	5.30	6.62	−1.69	0.0933
The uncertainty of the game did not make me feel uncomfortable.	3.79	4.36	−2.31	0.0219
I am an extremely competitive person.	5.18	5.69	−2.62	0.0095
I always had great confidence in my ability to do well in the game.	4.49	5.25	−3.71	0.0003

(*continued on next page*)

Table 4 (*continued*)

	Mean Response Females	Mean Response Males	t Value	P
Attitude to the Game Rank Ordered by t Value ($H_0 \leq 5$, top box criterion)				
Kolb's Learning Modes Rank Ordered by t Value ($H_0 \leq 15$)				
Concrete Experience	16.04	14.73	2.84	0.0049
Reflective Observation	14.75	14.05	1.25	0.2134
Active Experimentation	16.25	15.93	0.68	0.4382
Abstract Conceptualization	14.59	16.01	−2.30	0.0224
Kolb's LSI Items Rank Ordered by t Value ($H_0 \leq 2.5$)				
Responsible (AE)	3.29	2.84	3.50	0.0006
Feeling (CE)	2.35	1.94	2.63	0.0093
Accepting (CE)	2.58	2.21	2.26	0.0247
Receptive (CE)	3.04	2.71	2.25	0.0255
Observation (RO)	2.84	2.57	1.88	0.0615
Observing (RO)	2.92	2.76	1.12	0.2632
Experience (CE)	3.24	3.12	0.91	0.3639
Intuitive (CE)	2.34	2.20	0.87	0.3842
Reflecting (RO)	2.47	2.37	0.76	0.4604
Reserved (RO)	2.11	2.07	0.28	0.7823
Tentative (RO)	2.28	2.27	0.14	0.8895
Practical (AE)	3.27	3.27	0.02	0.9834
Pragmatic (AE)	1.83	1.83	−0.01	0.9931
Doing (AE)	2.77	2.80	−0.13	0.8938
Evaluative (AC)	2.59	2.62	−0.17	0.8649
Conceptualization (AC)	1.80	1.94	−0.93	0.3521
Active (AE)	3.07	3.19	−0.94	0.3468
Watching (RO)	2.26	2.47	−1.37	0.1711
Thinking (AC)	2.68	2.90	−1.45	0.1480
Rational (AC)	2.69	2.91	−1.54	0.1241
Present-Oriented (CE)	2.61	2.87	−1.66	0.0976
Kolb's LSI Items Rank Ordered by t Value ($H_0 \leq 2.5$) (cont.)				
Experimentation (AE)	2.17	2.46	−1.81	0.0711
Analytical (AC)	2.37	2.93	−3.47	0.0006
Logical (AC)	2.60	3.15	−3.63	0.0004

7.2.2. Evidence for male participants as confident

Male learners significantly agree with the statement "I always had great confidence in my ability to do well in the game" ($\bar{x}$ = 5.25, p = −0142), agree with it to a significantly greater extent than females ($\bar{x}$ = 5.25 vs. 4.49, p = .0003), and also significantly agree with the statement "My understanding of the game got a lot better as the game went along" ($\bar{x}$ = 5.77, p < .0001). There are additional, less direct indicators of confidence, including tendencies toward competitiveness and to consider the game easy. With respect to competitiveness, male participants strongly agree with the statements "I am an extremely competitive person" ($\bar{x}$ = 5.69, p < .0001), agree with it to a significantly greater degree than female respondents ($\bar{x}$ = 5.69 vs. 5.18, p = .0095) and agree as well with the statements "It was very important to me to finish first in our industry" ($\bar{x}$ = 5.25, p = .0298) and "We took careful account of competitor activity" ($\bar{x}$ = 5.67, p < .0001).

Strong male agreement with "My group had very strong leadership" ($\bar{x}$ = 5.47, p < .0001), and "I felt really comfortable in my group" ($\bar{x}$ = 6.20, p < .0001), in combination with significant disagreement with the statement "I don't think I could have done a lot better in the game if I had done it on my own" ($\bar{x}$ = 4.56, p = .9982) indicates a tendency for males to identify themselves leaders, which in turn belies a certain confidence. Females do not significantly agree or disagree with these statements. With respect to males viewing the game as easy, male respondents strongly disagree with "I [do] think the game was really easy" ($\bar{x}$ = 4.07, p = 1.000), "I [don't] think you have to be very analytical to play the game well" ($\bar{x}$ = 4.12, p = 1.000), and rated themselves significantly more highly than female respondents on "The uncertainty of the game did not make me feel uncomfortable" ($\bar{x}$ = 4.36 vs. 3.79, p = .0219) and "I do not think the game was too challenging and difficult to be useful" ($\bar{x}$ = 6.62 vs. 5.30, p = .0933).

These qualities taken together (Coefficient Alpha = .67) would seem to support the notion that male learners are externally focused, confident in their abilities, and achievement oriented, in support of H_{2b}.

7.2.3. Evidence for male participants as self-sufficient

Male learners report themselves not to be reflective observers ($\overline{x}$ = 14.05, p = .9980) who are not accepting ($\overline{x}$ = 2.22, p = .9987), both indications of detachment. They highly disagree with the statements "I [do not] think I could have done a lot better in the game if I had done it on my own" ($\overline{x}$ = 4.56, p = .9982) and "I [do not] feel that I learned a lot about how to function effectively within a group" ($\overline{x}$ = 4.77, p = .9619). Self-sufficiency is also revealed by the inclination of male participants, particularly with respect to female participants who tend to frame the game as a learning exercise, to frame the game as a competition – "I am an extremely competitive person" ($\overline{x}$ = 5.69, p < .0001), "My group had very strong leadership" ($\overline{x}$ = 5.47, p < .0001) – the latter becomes pertinent here because males are confident and assertive, whereas females are tentative and reluctant in the classroom, making it rather likely that male respondents are thinking of themselves as the leaders who are strong - "I always had great confidence in my ability to do well in the game" ($\overline{x}$ = 5.25, p = .0142), and "It was very important to me that to finish first in our industry" ($\overline{x}$ = 5.25, p = .0298). Relative to female participants, male participants show themselves once again to be competitive – "I am an extremely competitive person" ($\overline{x}$ = 5.69 vs. 5.18, p = .0095).

These qualities taken together (Coefficient Alpha = .71) would seem to support the notion that male learners tend to view themselves as solitary learners, in support of H_{2c}.

7.2.4. Evidence for male participants as assertive in the classroom

Male learners characterize themselves as Active Experimenters ($\overline{x}$ = 15.93, p = .0007) who are responsible ($\overline{x}$ = 2.84, p < .0001), present-oriented ($\overline{x}$ = 2.87, p < .0001), doing ($\overline{x}$ = 2.80, p = .0007), not reserved ($\overline{x}$ = 2.07, p = 1.000), not tentative ($\overline{x}$ = 2.27, p = .9997), not accepting ($\overline{x}$ = 2.22, p = .9987) and unreflecting ($\overline{x}$ = 2.37, p = .9521). The proclivity for male game participants to frame the game as a competition and to see themselves as highly competitive and as leaders all tend to support the notion of male learners as assertive within groups and in the classroom, in support of H_{2d}.

8. Discussion

Support for all hypotheses confirms and consolidates those learning preferences attributable to each gender by prior research, and extends them to participants of serious games. In the context of Kolb (1984) ELT, Female serious game participants prefer the learning mode Concrete Experience (CE), viewing themselves as learners who are accepting, feeling, and receptive graspers of experience. Females participants are collaborative learners, feel comfortable learning in groups and work very hard. Male serious game

Table 5
Results of two group t tests for which female and male responses are significantly above the mean and not significantly different.

	Mean Response Females	Mean Response Males	t Value	P
Attitudinal Statements Grouped according to the Learning Dimensions Each is Designed to test. ($H_0 \leq 5$, top box criterion)				
The Game as Collaborative Learning				
I felt really comfortable in my group.	6.45	6.20	1.47	0.1439
I did not feel completely ignored by other group members.	6.56	6.34	1.32	0.1892
My group was not much too large to be really effective.	6.37	6.16	1.31	0.1926
Everyone in my group got along really well.	6.68	6.50	1.23	0.2189
My group did not vehemently disagree a great deal on what our strategy should be, and we had great difficulty in coming to consensus.	6.11	5.99	0.68	0.4962
My group was really great at getting down to business.	5.81	5.72	0.46	0.6450
It wasn't very hard for my group to get down to business whenever we met.	5.80	5.84	−0.20	0.8387
My group wasn't too small to be really effective.	5.44	6.08	−0.76	0.4503
My group had very strong leadership.	5.18	5.47	−1.57	0.1168
The Game as Analytical Exercise				
I think that differentiating your product is important to doing well in the game.	5.38	5.06	1.48	0.1411
I believe that I got a good sense of how all the marketing mix decisions must work together for an overall marketing strategy to be effective.	5.42	5.24	0.93	0.3519
I feel it was crucial to buy the marketing research reports, to do well in the game.	5.38	5.34	0.23	0.8149
The Game as Learning Experience				
My understanding of the game got a lot better as the game went along.	5.77	5.77	0.01	0.9932
It is important that the game be fun to play in order for it to be a valuable educational experience.	5.31	5.44	−0.75	0.4563
The Game as Competition				
My experience in the game leads me to believe that target segmentation is an absolutely essential competitive strategy.	5.66	5.75	−0.55	0.5851
It was very important to me to finish first in our industry.	5.21	5.25	−0.21	0.8361
Kolb's Learning Modes Rank Ordered by t Value ($H_0 \leq 15$)				
Active Experimentation	16.25	15.93	0.68	0.4382

participants, on the other hand, prefer the learning mode Abstract Conceptualizer (AC), viewing themselves as learners who are logical, analytical and present-oriented graspers of experience. Male participants are individual learners, confident in their own abilities.

8.1. What female and male serious game participants as learners have in common

Though results in support of the above hypotheses serve to distinguish the learning styles of female and male serious game participants, our data also reveals some commonalities. We use Table 5 to isolate those items for which female and male responses are not significantly different and significantly above the mean (i.e., mean responses generally greater than five on a seven-point scale). There are 17 such items, grouped according to the learning dimensions each is designed to test, as shown in the Appendix.

Inspection of Table 5 shows that nine of the 17 items refer to collaborative learning, indicating that both female and male game participants respond positively to learning games as collaborative learning (the top four items by mean rating being: "I felt really comfortable in my group; " "I did not feel completely ignored by other group members; " "My group was not much too large to be really effective; " "Everyone in my group got along really well").

Among those items testing serious games as an analytical exercise, three strong associations are shared. Female and male game participants both feel that the game taught marketing strategy effectively, particularly positioning strategy ("I think that differentiating your product is important to doing well in the game; " "I believe that I got a good sense of how all the marketing mix decisions must work together for an overall marketing strategy to be effective") and understood that information is important ("I feel is it crucial to buy the research reports, to do well in the game"). Concerning the game as learning experience, both female and male participants believed that their understanding got a lot better as the game went along, and that the game should be fun to play for it to be a valuable educational experience. Concerning the game as competition, both genders believed that segmentation is an important competitive strategy, and both felt that it was important to finish first. Concerning Kolb's learning modes, both genders indicated that they preferred active experimentation.

8.2. Pattern model

Our research has tested hypotheses that identify learning traits that have been associated with one gender or another across a range of studies which have empirically tested them in a piecemeal fashion. By testing and finding support for all of them within a single population, participants of serious games, we feel we are making a contribution beyond finding support for each of those individual traits as they apply to women or men, but, on a more macro level, we are perhaps for the first time pulling these results together in a unifying format. And so we are able to declare support for the entirety of full, comprehensive gender based learner profiles. Such a case of explanation lends itself readily to analysis using the pattern model. As reported in Hunt (1983, p. 99), Kaplan (1964, pp. 332–35) defines and discusses the pattern model:

"Very roughly, [in the pattern model] we know the reason for something when we can fit it into a known pattern … something is explained when it is so related to a set of other elements that together they constitute a unified system. We understand something by identifying it as a specific part in an organized whole … in the pattern model we explain by instituting or discovering relations … These relations may be of various different sorts: causal, purposive, mathematical, and perhaps basic types, as well as various combinations and derivatives of these. The particular relations that hold constitute a pattern, and an element is explained by being shown to occupy the place it does occupy in the pattern …

The perception that everything is just where it should be to complete the pattern is what gives us the intellectual satisfaction, the sense of closure, all the more satisfying because it was preceded by the tensions of ambiguity."

We feel that, when looking across findings for each of the hypotheses tested here, a pattern is revealed that completes learner profiles for both female and male serious game participants, and provides closure. The unified patterns that we claim are in line with that pattern demonstrated in a piecemeal manner across a number of studies, serve to validate our results, and our results in turn unify and complete theirs.

8.3. Empirical and theoretical implications

Given the sparse and piecemeal nature of the empirical research performed to date to test the learning traits that many educators believe characterize females versus males as learners, this research contributes first by adding data points, by extending this research to the marketing area, to participation in serious games. This research also contributes by pulling all the gender-based research on learning profiles together in one place in order to generate comprehensive learning profiles for each gender, and then tests them empirically. Further, the fact that these are consistent with earlier studies using the Kolb LSI adds evidence to the notion that it is a reliable, valid, and sensitive instrument for the detection of differences in the learning preferences of females and males. It also adds support to the underlying Experiential Learning Theory.

8.4. Pedagogical implications

A primary goal of developing learner profiles, as Pearson (1992) stated, is to help "educators create learning environments which equally foster the intellectual development of both male and female students" (Pearson, 1992, p. 2). This research empirically confirms in the context of participation in serious games that females and males do have particular learning preferences on some learning dimensions for which serious games are designed. Female learners prefer to use elaborative processing strategies, are more self-critical and have less confidence in their abilities and performance. They attribute their outcomes in a class to their own efforts in the classroom. And while female learners rely more on support from other students and seek out more interaction with them, they also are more reluctant to speak out in group settings. Male learners, in comparison, have a preference for rational evaluation. They tend not to attribute their success in the classroom to their own efforts, but instead to external causes. Male learners are more confident in their performance and tend to be more achievement oriented. They are less socially interactive with other students, but are more assertive in group settings.

However, we also find some commonalities. Both genders appreciate the collaborative aspects of serious games, see them as a good means of learning marketing strategy, are made aware that it is important to compete, and, as active experimenters, are made to understand that management is an applied discipline for which a complete understanding includes knowing the ability to formulate actionable strategy.

One implication of the above is that female serious game participants may need more encouragement, and perhaps more frequent interaction with the instructor than do male participants. Ironically, females may be less likely to seek out such help. Previous research has shown that female participants often feel overwhelmed and helpless in the face of too much uncertainty and the prospect of failure, and tend to build problems or obstacles into more than they are, until they feel insurmountable. As a related issue, because of the value female participants place on the group with whom they work. Our results show that males also value the group with whom they work, it seems particularly important for the instructor to take steps to make sure that one person does not take over the group to the exclusion of other group members, which can be the tendency of male participants, who tend to be assertive.

Male participants, on the other hand, need to be held accountable. They can be quick to shift responsibility or blame elsewhere, and may foreclose on an excellent learning opportunity by choosing not to expend effort on working through the problems they encounter. Our results indicate that, though female participants appreciate the need to compete, they primarily see the game as an opportunity to learn, whereas, male participants tend to view the game first and foremost as a competition. As such, the latter tend to be *highly* competitive, tend to have confidence to the point of hubris, and tend to give short shrift to the details of the game.

In both circumstances, intercession is called for, though the nature of contact should be tailored to the respective needs of female and male serious game participants. Female participants are generally to be reassured, supported and encouraged, while male participants are generally to be made to acknowledge that their performance is a function of their own actions, that they may be too quick to come to decisions, and should be shown how a greater attention to the details of the game may lead to the formulation of more effective actions. More supportive interventions directed more cannily toward the specific needs of each participant should lead to a higher level of participation and focus, a greater studiousness and persistence in seeing the game through to its end. All of these qualities may lead to more effective learning from serious games.

These results may also provide insights into the learning dynamics of groups and teams that could aid instructors in administering them for optimal learning by all members. Our research indicates that serious game participants of both genders share an affinity for collaborative learning, but the manner in which they interact may differ. There is ample research demonstrating that diverse groups are better for accomplishing tasks of various types (for a review, see Phillips, Liljenquist and Neale 2009). And there is as well ample research demonstrating the benefits of group learning over individual learning on achievement, persistence and attitude in various contexts (for a meta-analysis, see Springer, Stanne, & Donovan, 1999). However, there is less research examining the effects of diversity, including gender diversity, on learning within groups (Springer et al., 1999). In particular, the gender-based learner profiles shown here for serious game participants would suggest that the dynamics of mixed gender groups may not work so well for learning purposes for females as males, not optimally in terms of overall group task effectiveness. Female participants tend to be the ones who really assimilate the details of the game and know how it works, yet are hesitant to assert themselves in groups, whereas, male participants tend to be assertive and dominate group functions. Could it be that there is merit to single gender groups particularly from the standpoint of encouraging female participants? Realization that such a dynamic exists could certainly provide an argument for the efficacy of homogeneous female learning groups – as well as provide a rationale for the recent growth of enrollment at women's colleges (Free, 2015).

On the other hand, perhaps it is better for learning how to function effectively within groups that they be diverse, and have the astute instructor intervene to balance the interactions, so that it becomes a learning opportunity about group interactions, and how to behave within diverse groups for the benefit of the individuals involved, as well as for the overall functioning of the group.

8.5. Limitations and future directions

In this study we examined a relatively homogeneous set of students enrolled in one university all taught by one instructor, all selected into groups in a similar manner, all participating in the same serious game. This uniformity provides experimental controls for a number of potentially confounding effects. On the other hand, future research should extend its findings to other schools, to

classes of other sorts, to non-traditional students, to other instructors, to other geographic regions, to other countries, and so on. In particular, there is a need to replicate these studies using other games, and test their effects using other learning models.

Additionally, there is a need to replicate these studies using other serious games, and test their effects using other learning models. Given the prior discussion concerning the gender compositions of groups playing serious games, it is also clear that more work is needed to understand the dynamics of interactions between male and female participants within both diverse and homogeneous groups to understand how learning is affected for both genders in both settings.

Acknowledgements

Appendix

Attitudinal statements[a] (Grouped according to the learning dimensions each is designed to test.)

The Game as Learning Experience
  My understanding of the game got a lot better as the game went along.
  I thought that the game was not too challenging and difficult to be useful.
  It is important that the game be fun to play in order for it to be a valuable educational experience.
  I feel that the game provided a really valuable educational experience.
  I always had great confidence in my ability to do well in the game.
  I feel as if I really understood how the game worked.
  I had a lot of fun playing the game.
  I think that those who struggled at some point in the game learned a lot more than those who never struggled.
  I thought that playing the game was a lot of fun.
  I feel that I am now much better able to cope with ambiguity and uncertainty in business, having played the game.
  I did not think the game was really easy.
  The uncertainty of the game did not make me feel uncomfortable.
  I feel that game is a very true representation of how business actually works.
The Game as Analytical Exercise
  I feel it was crucial to buy the marketing research reports to do well in the game.
  I believe that I got a good sense of how all the marketing mix decisions must work together for an overall marketing strategy to be effective.
  I think that differentiating your product is important to doing well in the game.
  My experience in the game leads me to believe that the various principles taught in basic marketing are entirely correct in practice.
  I think that total net contribution is the very best measure of financial performance in the game.
  I feel that the game does a great job of integrating all the concepts presented in the class.
  I feel that the game experience gave me a much better sense of how product design affects marketing outcomes in the real world.
  Market share is the very best indicator of financial performance in the game.
  I feel that the game gave me a much better sense of how promotion actually works in the real world.
  The game gave me a great sense of how channels of distribution actually work.
  Sales volume is the best indicator of game performance.
  I think that performance within target segments, and not overall performance, is the very best indicator of game performance.
  I don' t think that you have to be a very analytical person to play the game well.
The Game as Competition
  In our strategy, we took careful account of competitor activity.
  My experience in the game leads me to believe that target segmentation is an absolutely essential competitive strategy.
  I am an extremely competitive person.
  I think that those who lost the game learned no less than those who won.
  It was very important to me to finish first in our industry.
  I feel that the game experience gave me a much better sense of how competition affects marketing outcomes in the real world.
The Game as Collaborative Learning
  Everyone in my group got along really well.
  I felt included by other group members.
  I felt really comfortable in my group.
  I do think that everyone had a chance to have their say and contribute to my firm's decisions.
  My group was not too large to be really effective.

Attitudinal statements[a] (Grouped according to the learning dimensions each is designed to test.)

> My group was not too small to be really effective.
> My group had no trouble coming to agreement about our decisions.
> It wasn't very hard for my group to get down to business whenever we met.
> My group was really great at getting down to business.
> My group had very strong leadership.
> I think we worked very hard on the game.
> I feel that I learned a lot about how to function effectively within a group by playing the game.
> I don't think I could have done a lot better in The game if I had done it on my own.

[a] From Garber et al. (2012).

Appendix B. Supplementary data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.ijme.2018.02.005.

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