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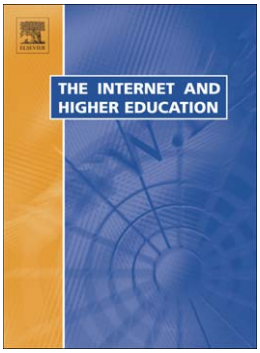

Student satisfaction with online learning in the presence of ambivalence: Looking for the will-o'-the-wisp

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STUDENT SATISFACTION WITH ONLINE LEARNING IN THE PRESENCE OF AMBIVALENCE: LOOKING FOR THE WILL-O'-THE-WISP

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Abstract
The authors contend that ambivalence students feel toward online courses modifies the dimensionally by which they evaluate their learning experiences. The data from this study show that as student ambivalence increases, so do the number of elements they use to evaluate their courses. As the student view of a course becomes more complex those elements by which they make judgments become much more independent of each other. The authors hypothesize that models students develop to evaluate course quality is a function of agency, psychological contracts, ambivalence, prototype theory, intuition, idealized cognitive models and satisfaction.

Keywords: online learning; student ambivalence; psychological contract; student satisfaction; prototype; idealized cognitive model

1. Introduction: The New Normal

By providing improved access and opportunity in higher education, online learning creates significant modifications in the learning environment. Contemporary students have more responsibility for contributing information, creating learning material in their courses, developing concepts and ideas, reflecting on the work of their peers and evaluating the quality of their learning experiences. Shirky (2008) demonstrates how these newfound changes expand the traditional class boundaries into a kind of educational multiverse where the student voice becomes one of the most important components of the learning environment. Often, instructors find themselves surrounded by many flexible learning networks (e.g., discussion groups, mobile

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learning, virtual environments, instant communication and social networks) that often carry the main signal of a course where class meetings, in whatever context, become support mechanisms for primary learning activities.

This transformation interacts with several course formats that students encounter on university campuses, including online, blended, lecture capture, among others. Often, contemporary learning environments comprise some combination of synchronous or asynchronous interaction where students can be co-located or at a distance from each other. Physical space takes on a diminished importance in these emerging educational worlds. Norberg, Dziuban, and Moskal (2011), for instance, point out that blended courses can be assembled quite effectively based on the concept of time where one evaluates learning environments by whether students need to interact simultaneously or not, irrespective of where they are located –essentially removing space from the process. Dziuban and Moskal (2011) have shown that students do not differentiate the dimensions by which they evaluate courses whether they are face-to-face, blended or online. This multiplicity of available learning formats results in what Cavanagh (2012) terms the *post modality era* where students no longer consider format a primary determining factor in deciding whether to enroll in a course. More and more students tend to mix courses seamlessly, primarily motivated by their program requirements, giving little consideration to modality or, for that matter, location. This has evolved into what Mayadas and Picciano (2007) term *localness* where students have access to comparable educational opportunities whether they are on campus, near campus or far from campus. Hinssen (2010) termed this *new normal*, where instructors and students see these learning technologies not as augmentation but rather as the mainstream educational process. However, this area needs further research into students' motivation and how it interacts with course modality selection.

1.1 Online Learning: The Index Case

The progenitor of the new normal in higher education has been the advent of online learning, a phenomenon that has led to the creation of many alternative teaching and learning modalities. As Norberg, Dziuban, and Moskal (2011) demonstrate, the real disruptive nature of this movement is the realization that the lecture need not be the center of the teaching and learning universe. Consistently, students in online learning environments report that by making these options available their institutions are responding to their lifestyle circumstances, that they feel more actively involved in their learning and that they feel technologically empowered to learn beyond what they experience in the typical classroom environment. To some degree, online education has moved the locus of control for learning from the instructor to the student. Technology has gained such traction in higher education that the U.S. Market for Self-Paced Learning Products and Services predicts a compound increase of 22% in the number of students who will be taking online courses in the next five years with the commensurate decrease in the numbers involved in traditional courses (Ambient Insight, 2011).

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This shift to student-initiated learning results in what Taleb (2007) terms a black swan, an event of great cultural and historic importance having a profound impact on society. There are many examples of these unpredicted black swans: Google, the Harry Potter novels, the 9/11 terrorist attacks, etc. In his book The Ghost Map, Johnson (2006) documents how John Snow, through careful and systematic observation, convinces the city council in the Soho section of London to remove the handle from the Broad Street pump thus ending the cholera epidemic of 1853 and proving that cholera was waterborne and not miasmic. Johnson argues that not all life-changing events are shocking and dramatic like the 9/11 attacks or the assignation of Archduke Ferdinand, but some black swans appear to be modest acts. However, they have equally important impact by quietly rippling through the following decades or centuries.

Online learning is a good example of this quiet black swan phenomenon. A few innovative and technologically-infatuated faculty members began experimenting with rather clunky platforms to assess whether or not they might extend the boundaries of learning by reaching out to students, thus increasing access to their courses and to each other. From this modest beginning a whole new education culture developed. Certainly, online learning has not been without its bumps along the way (academic integrity, flawed assessment methods, engagement issues, and difficulties with learning management systems); but it has transformed the face of education throughout the world by providing unprecedented access to a quality education.

1.2 Student Evaluation of their Online Learning Experience

Increased options and flexibility in the online learning environment have fueled intense interest in higher education about how students respond to these modalities. Student satisfaction is one of the metaphorical pillars endorsed by the Sloan Consortium (Moore, 2011) having led to constructs such as the community of practice structured from an evaluation perspective by cognitive, social and teaching presence (Garrison & Vaughan, 2008). Generally, the evaluation process has been consistent, where students rate their online classes using instruments constructed from the literature of the past decades such as the Student Evaluation of Instruction (SEI) (Dziuban & Moskal, 2011). However, much of the development of these student ratings forms happened before the advent of online courses and other instructional formats, thereby raising issues about the need for more responsive evaluation models. For instance, questions arise about whether items should be customized for course modality or, even further, if separate forms should be constructed for each modality even with the associated equating problem. In spite of these concerns, most institutions persist in gathering evaluative student data for their online courses at some level believing that there is inherent value in student feedback on instructional effectiveness.

1.3 Psychological Contracts as a Basis for Understanding Student Evaluation of Online Learning

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The syllabus for a course constitutes a formal contract with clearly specified obligations for students and for instructors. These formal agreements form the framework and scaffolding for the learning environment, for instance, the assignments required of students and how they will be evaluated. Usually, breaches of these contracts have negative consequences.

In addition to the formal contract for a course, there is a latent psychological contract that both students and instructors ascribe to but do not necessarily articulate or reach consensus. These contracts appear in industry as perceived mutual obligations by two parties in an employment relationship (Rousseau, 2004). Obviously, these latent contracts exist in college classrooms between students and their instructors often forming the basis of teaching reputations throughout the student culture. This construct appears to be playing an important role in higher education, fostered by increasingly complex relationships among faculty and students (Spies et al., 2010). Psychological contracts feature dynamic and evolving interactions and interdependencies through reciprocal exchanges in online classes that fulfill the notion of promise at a distance (Wade-Benzoni, Rousseau, & Li, 2006). Clearly, a disconnect in students' view of the implied promise by the instructor would produce a negative impact on satisfaction. This phenomenon involves much more than unmet expectations because ultimately it leads to an erosion of the trust relationship between students and their instructors. Since psychological contracts remain unspecified, however real, they exist outside the formal arrangement in class forming an important value proposition for instructional effectiveness. These assumed agreements appear to evolve throughout the course, forming continuous feedback loops. If one examines typical end-of-course student evaluation forms, they do seem to reflect some elements of psychological contracts in addition to formal elements that were established at the inception of the course. Wang, Dziuban and Moskal (2009) examined the dimensions of those expectations held by students finding three overriding components: the instructor's willingness to facilitate learning, his or her ability to communicate ideas, and showing respect and concern for students. Dziuban, Hartman, Moskal, and Brophy-Ellison (2007) identified seven elements that may comprise a psychological contract for online courses: an enriched learning environment, clearly specified rules of engagement, instructor commitment to student learning, instructor respect and concern, feeling of engagement, learning latitude and reduced ambivalence for the course. These psychological contracts establish critical components for how students view and evaluate their learning environments.

1.4 Ambivalence in the Learning Environment

Close examination of data on student satisfaction with online learning reveals three prototypical groups: the largest proportion by far that is satisfied with their experience, a much smaller proportion that is genuinely dissatisfied and a third cohort that is ambivalent, expressing simultaneous positive and negative feelings toward their online experiences. Often, this ambivalence takes the form of statements such as "I love the convenience of online learning but miss the face-to-face interaction with the instructor." Craig and Martinez (2005, p. 1) summarize ambivalence this way: "In retrospect it seems rather simplistic to think of attitudes as

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always being one-dimensional. After all who hasn't expressed mixed feeling about people, places and things that we have encountered or visited in our lives?" Weigert (1991), in an extensive analysis of the ambivalence phenomenon in contemporary society, defines it as a push and pull situation that drives an individual toward mutually exclusive courses of decision-making or action. He goes on to argue that modern culture fails to resolve ambivalence but instead increasingly generates it through change, incompleteness and complexity. He cites several contributors to these mixed emotions: a bewildering number of choices, instant communication, information production at an exponential rate, travel options that effectively shrink the globe and a society awash in technology that penetrates every aspect of life. Setenyi (1995), in addressing eastern European ambivalence toward democracy, describes the concept of uncertain mediation where the need for functionality in personal, organizational and civic lives results in forced decisions in the face of a lack of closure and incomplete information. Long (2011), in developing his theory of reactive behavior pattern in adolescents, bases his work on the ambivalence teenagers feel toward authority figures, especially their parents, being pulled by the need for independence and simultaneously being pushed to remain dependent on those authority figures. Ambivalence is a driving force for many characters in literature—Edna Pontellier in Kate Chopin's (2000) *The Awakening*, Nell in Tony Morrison's (1973) *Sula* and of course Tevia's famous line in *Fiddler on the Roof* (Stein, 1964), "on the other hand," for example. Metaphorically, ambivalence is important in society, taking on many forms through various clichés—a boundary, both sides of the fence and a location, neither here nor there, among several others (Lakoff & Johnson, 1980). Even the literature of educational technology features ambivalence with utopian books such as Bonk's (2009) *The World is Open* and Sunstein's (2006) *Infotopia* in direct opposition to the dystopian side of the argument, *You Are Not a Gadget* (Lanier, 2010) and *The Dumbest Generation* (Bauerlein, 2008). According to these authors, it is indeed the best of times and the worst of times—the ultimate ambivalence. Although this discussion may seem to range far afield, the authors make the point that ambivalence pervades many areas of our culture.

1.5 The Confluence of Forces Impacting Students Satisfaction with Online Learning

Forrester (1991) warns us that it is impossible to predict how interventions play out in complex systems and Taleb (2007) reminds us about how much difficulty one has in judging uncertainty. When considering students' satisfaction with online learning, one must deal with a complex and uncertain situation. Students' newfound sense of involvement confounds with their confusing ambivalence about emerging educational environments that deviate from the traditional. This is further complicated by the fact that students have multiple domains for engagement in their online courses. Initially, they encounter the course syllabus or the formal contract that specifies the rules of engagement for the course. In addition, however, they adhere to a latent, transactional contract where they create expectations for course and instructor that define the trust relationship for them in their learning environment. This second relationship appears to be equally important to student satisfaction levels—one that is organic, dynamic and

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possibly unique to each student in the class. To be sure, instructors construct a set of psychological contracts for their students as well. The purpose of this paper is to form a better understanding of the interplay among these constructs (satisfaction, ambivalence and psychological contracts) in attempting to understand students' evaluation of their online learning experience.

2. Methods

For a number of years the University of Central Florida has used a common end-of-course evaluation instrument comprised of 16 Likert scale items, the last of which is the overall rating (Dziuban & Moskal, 2011). This evaluation of an instructor and his or her course plays an important role in high stakes decisions in tenure, promotion, salary increases and teaching excellence. At UCF, the same instrument is used for all course formats (e.g., face-to-face, blended, online, lecture capture) (Appendix A). Over past years, students' responses to this instrument have produced a large data set for evaluation of instruction across all course modalities at the university. The current study involved student responses to their undergraduate online courses for the academic years 2008 through 2010 (n=64,502). The underlying question of this study was: is there a difference in the number of elements by which students evaluate their online courses depending on the degree of ambivalence they express about those courses? Further, if there is a difference, what are the dimensions and how do they relate to each other? At the psychometric level, the question becomes how many satisfaction factors evolve for students under varying ambivalence conditions and how are those factors intercorrelated? In this study, the final question on the form (overall evaluation of the instructor) was the marker for student ambivalence toward their educational experience. Since the responses conformed to an ordered five-point Likert scale it seemed reasonable that the students responding to the overall item at the extreme ends of the scale expressed considerably less ambivalence than those who responded toward the center point. This assumption seems to be validated by student comments about their online learning experiences. For instance, the majority of comments from students in the highly satisfied category conform to the following examples: "online class expectations are clear and very well organized," "I used new learning technologies and received excellent instructor feedback." Conversely, the narratives in the highly dissatisfied category were quite unequivocal in their dissatisfaction: "Online learning made the group projects very difficult to complete," "the whole course was an enormous challenge for me. I can't, no won't do online classes." Typically, comments from the middle group cited simultaneous positive and negative responses thus conforming to the Craig and Martinez (2005) ambivalence definition: "I very much enjoy submitting my assignments online but worry about my technology skills." "While I did well in my online course and enjoyed the format I can't help but feel that I might have learned more face-to-face." Table 1 presents empirical verification about the authors' assumptions for varying levels of students' ambivalence toward their online educational experiences. Because the overall course rating is used as the marker for ambivalence, an alternative item that was most highly correlated with that rating provides a good indication of the

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distributional characteristics within the marker item. In this case, it was item number 10 (communication of ideas and information, r=.97). Table 1 presents the results of that analysis. The table depicts each response category for the overall rating and the degree of ambivalence that it represents. The sample size for each ambivalence category indicates that the vast majority of students (n=31,544) are positive and non-ambivalent (highly satisfied) with their online learning experience; however, the means on the marker item increase monotonically with the degree of satisfaction. The skewness indices for communication confirm the expected distributional characteristic for degree of ambivalence. The mid category exhibits the greatest symmetry (SK=.22) with the extreme rating points showing the expected piling up in positive and negative directions (SK=2.20 and -3.39). The frequency distributions in Table 1 demonstrate more peakedness at the extreme points of the scale with a flattening of the distribution toward the midpoints.

Insert Table 1 Here

2.1 Data Collection and Analysis

The data were classified into five subsets described in Table 1 depending on the students' responses to their overall rating response. The result was five data sets for students who ranged from highly positive, non-ambivalent (Likert rating 5) through the highest ambivalence category (Likert rating 3) to highly negative, non-ambivalent (Likert rating 1). The correlation matrices for the remaining 15 items of the instrument were derived for each ambivalence category and factor analyzed using the alpha procedure (Kaiser & Caffrey, 1965). Factors were extracted according to the eigenvalues of the correlation matrices greater than one. Retained factors for each data set were transformed according to the promax criterion (Hendrickson & White, 1964). Pattern coefficients absolutely greater than .40 were used for factor interpretations. The average correlation among the factors for each ambivalence condition was computed using the procedure developed by Kaiser (1968). Prior to the application of any factoring procedures, however, the domain sampling properties of the items were assessed with Kaiser's (1968) measure of sampling adequacy. The index bases itself on a Guttman theorem that suggests that if one has an adequate sample of items from a specified domain, the correlation matrix inverse will tend toward an identity (Guttman, 1954). As MSA approaches 1.0, the domain sampling properties of the items improve and the investigator has some evidence that his or her set of items compromise an adequate sample from the domain of interest. This is the other sampling issue –the psychometric one that has to do with measurement properties. Dziuban and Shirkey (1974) recommended prior assessment of the data in hand before any factoring procedures are undertaken. As the MSA index declines toward .50 the sampling adequacy becomes deficient in that there is very little information contained in the data set. For each ambivalence condition solution, the MSA was computed for the residual correlation matrix after factoring to determine if the authors had extracted that majority of information from the data. An MSA approaching .50 on the residual matrix is a good additional indication that the correct number of factors has been extracted, protecting against over factoring. This procedure was also recommended by Dziuban

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and Shirkey (1993) as a sequential psychometric method for determining the correct number of factors.

2.2 Alpha Factor Analysis

According to Mulaik (1972), Kaiser and Caffrey (1965) capitalized on the relationship between the alpha reliability coefficient alpha (Cronbach, 1951) and principal components analysis. Accordingly, they developed a method of factoring that yielded positive factor reliability. Alpha takes a psychometric approach where it determines factors that have a generalizability in the Kuder-Richardson (Kuder & Richardson, 1937) sense. This procedure offers another advantage because it is a scale-free procedure being independent of the measurement units for the data. In this study, the combined use of the measure of sampling adequacy (MSA) and alpha factor analysis emphasizes the measurement properties of the data.

3. Results

The 15 item factor pattern matrices for each of the five ambivalence conditions are presented in Tables 2 through 6. The clear trend in these data finds that as assumed ambivalence toward the quality of the learning environments decreases so does the number of elements (factors) students use to evaluate the course. This pattern takes on the form of three factors at the extreme ends of ambivalence scale, four factors for the penultimate points and five factors for the middle (most ambivalent) category on the scale. When students are positive and non-ambivalent (rating=5, Table 2) about the course, they use three elements to evaluate their learning experience: a general course landscape, the degree to which the course is engaging, and ability to benchmark their progression (MSA=.95, Residual MSA=.60). The average correlation among these elements was quite substantial (r=.61) suggesting a more general reaction to courses under these conditions. Students tend not to differentiate their responses but rather evaluate a course more generally.

Insert Table 2 here

The positive with some ambivalence category (rating=4, Table 3) produced four factors: course rhythm, expectation rules, the degree to which the course is engaging, and ability to benchmark progression (MSA=.87, Residual MSA=.57). The average correlation among these factors (r=.41) was somewhat lower than the non-ambivalent, positive category indicating that when there is ambivalence in the presence of satisfaction, students tend to consider a course's aspects somewhat more separately.

Insert Table 3 Here

The middle category, ambivalent (rating=3, Table 4), yielded five factors: course rhythm, expectation rules, ability to benchmark progression, instructor engagement, and instructor responsiveness (MSA=.84, Residual MSA=.54). This was the most complex category with an

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average factor correlation of .38 again showing the tendency on the part of students to consider the elements of course quality more separately. An instructor might be viewed positively on one element but negatively on another resulting in a probable overall average rating of three or "good."

Insert Table 4 Here

The negative ambivalent category (rating=2, Table 5) produced the same number (4) and identical factors as did the positive ambivalent category (rating=4): course rhythm, expectation rules, instructor engagement, and ability to benchmark progression (MSA=.87, Residual MSA=.59). In this case, the average correlation among the factors (r=.36) was the lowest once again suggesting student tendencies to rate the various aspects of the course somewhat independently.

Insert Table 5 Here

The final category, negative, non-ambivalent (rating=1, Table 6) produced the same number and identical factors to the positive, non-ambivalent category (rating=5): general course landscape, ability to benchmark progression, and the degree to which the course is engaging (MSA=.95, Residual MSA=.60). The average factor correlation rose (r=.53) suggesting the more general response pattern. If an instructor is rated low on one dimension, then chances are better than average that he or she will be rated similarly on the other factors.

Insert Table 6 about Here

Table 7 presents a summary of the alpha factors by ambivalence categories on the overall rating scale. Several trends are evident. The ability of the instructor to engage his or her students and the ability of those students to track their progression through the courses appeared as evaluative elements in every category. For the extreme categories—both positive and negative with little or no ambivalence—students tend to form a general landscape opinion of the course that dominates their evaluation. For the three categories that feature some level of ambivalence (Likert ratings 2, 3, 4), the general landscape factor divides into an assessment of the course rhythm and the degree to which the instructor specifies course expectations. For the middle category (most ambivalent), the students evaluate one further element: the degree to which the instructor is responsive to them.

Insert Table 7 Here

4. Discussion

4.1 Ambivalence as a Mediator of How Students Relate to Their Online Learning Environment: The Facets of Satisfaction

The findings of this study confirm Craig and Martinez's (2005) contention that attitudes indexed by such things as student satisfaction with online learning are much more complex than

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commonly accepted. Unfortunately, a one dimensional model provides a poor fit to the data. Ambivalence forces students to migrate toward the midpoint of traditional measurement devices such as Likert scales. Interpreting these middle categories as neutrality fails to recognize that a large percentage of students in this position are not neutral at all but rather express simultaneous conflicting positive and negative attitudes toward their learning experience. Further, as students traverse the points of the scale, the manner in which they express their satisfaction changes dramatically. When students are extreme in their evaluation, their responses appear to be more intuitive but as their level of ambivalence increases, they become much more analytical and specific –making separate and independent judgments about the quality of their courses. The following are possible reasons for this.

4.2 Prototypes

Prototype theory provides an explanation for why students might become unsure about the quality of their instruction. Lakoff (1987) developed the prototype construct in his work toward clarifying how individuals make classification decisions. He argues that for every category devised, there is a prototype – or a best example of that category. Rosch (1973), in an investigation of the category *bird*, presented three example birds to her respondents: robin, ostrich and penguin, asking them to select to one that was most representative of the category bird. The majority selected the robin as the best example. Although all three examples were legitimate, somehow people relate to robin as being the prototype-the most representative of the category. Lakoff (1987) contends that for almost every category a prototype is devised. One possibility for this study is that students do the same for their instructors who conform or deviate from their personally held prototype. When this happens students have very little doubt about how they react. However, when instructors show some simultaneous conformity and deviation from student held prototypes, ambivalence sets in and students begin to examine many more aspects of their instructors' pedagogy. Possibly, this deviation from prototypes provides another definition of ambivalence.

4.3 Intuitionists and Empiricists

Colson Whitehead (1999), in his book The Intuitionist, offers an underlying theoretical difference in the methods hypothetical elevator inspectors used to judge the condition and safety of elevators in New York City – inspectors being both intuitionists and empiricists. The intuitionists simply rode the elevators, listened to them, and came to a decision about their safety and dependability. However, the empiricists climbed into the inner workings of the elevators and inspected for proper functioning, tolerances, wear on the cables, and the condition all working parts. The tension between the two approaches escalates when an elevator crashes for no apparent reason. In his work, Whitehead (1999) poses competing hypotheses for how people make decisions: those who conduct an analysis versus those who trust their intuitions. Students at the extreme ends of the rating scale evaluate the general landscape of the course, deferring any

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kind of specific analysis, and students in the middle (ambivalent) are by nature empiricists who examine teaching analogous to Whitehead's (1999), cable, gears and wires. Post course interviews with students tend to confirm this conclusion. Students who rate their courses in the extremes tend to give nonspecific generalized responses such as, "the course just didn't feel right from beginning to end" or "this guy was the best teacher I ever had." However, those students who rated at the midpoint chose many more and specific aspects of the course on which to comment—in some cases, describing several positive aspects and a few negative components or just the opposite. The important point is that they described many more characteristics of a course than their peers at the extreme points. Therefore, combining this work with Whitehead's, one might conclude that when students have ambivalent feelings they become much more analytical in evaluating their learning experience.

4.4 Idealized Cognitive Models

Lakoff (1987) proposed another possible explanation for what happened in this study through his concept of an idealized cognitive model. These models are concepts fabricated by human beings to help them better understand and cope with issues that society faces. They are completely arbitrary and do not exist in nature. For instance, Monday is an idealized cognitive model derived by societies to help them deal with the passage of time. Monday does not exist independently; it was in a sense "made up." Furthermore, Monday exists within another idealized cognitive model termed a week and so on. Note that this system is completely arbitrary in its derivation. Lakoff (1987) provides compelling evidence of this when he shows us that the Balinese developed a completely different arbitrary system for marking the passage of time. However, he goes on to point out that idealized cognitive models are critically important for being able to understand constructs and classification schemes.

Kahneman (2011) in his recent book *Thinking, Fast and Slow* derives two idealized cognitive models by which brains work: system 1 and system 2. According to him, system 1 functions automatically making rapid decisions with minimal effort and little sense of voluntary control or monitoring. System 1 seems akin to what Gladwell (2005) describes as "thin slicing" in his book *Blink*. System 2, on the other hand, allocates metal effort to such things as complex problem solving, analysis, and careful decision making that requires a good deal of cognitive work. Kahneman (2011) gives system 1 examples such as orienting to the source of a sudden sound, detecting hostility in a voice and driving a car on an empty road. According to him, examples of system 2 functioning might be searching memory to identify a surprising sound, parking in a narrow space, or filling out a tax form. System 1 comes to a conclusion very quickly while system 2 requires a much more deliberated and considered approach to analyzing a situation or solving a problem. Everyone has experienced situations where they have jumped to a conclusion (system 1) and, after some careful consideration, (system 2) find that the initial conclusion or solution was incorrect due to failure to apply appropriate problem solving techniques. Perhaps system 1 controls the student evaluation at the non-ambivalent point of the scale and system 2 takes over as ambivalence develops.

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5. Conclusions

Circling back to Forrester (1991), it seems clear that student satisfaction with online learning under varying conditions of ambivalence is indeed a complex system –one that defies simple explanation and one that demonstrates just how sensitive students are to their learning environment. Just like the will-o'-the-wisp, it becomes different for everyone who observes it. Susan Leigh Star (Bowker & Star, 1999) explained this phenomenon as a boundary object, a loosely confederated construct that brings a community of practice together but finds very little actual agreement on the definition of the object. Although the object is somewhat ill-defined in the community, it is quite specifically understood in the constituencies that make up the larger community although those individual definitions may not agree. Conceptualizing effective teaching as a boundary object helps us understand that definitions may not need to be correct or incorrect. They simply need to be functional.

The authors developed this study based on factors that, by definition, are latent variables and non-observable. The finding that ambivalent students use a higher and more complex dimensionality to evaluate courses suggests that those students have a better developed psychological contract for perceived quality in their courses. However, this assertion needs further investigation.

There are certain elements about students' satisfaction of which one can be sure. First and foremost, the student voice in higher education is becoming more evident and influential. Secondly, understanding that voice is critical to building an effective learning climate. Thirdly, the satisfaction learning space is fluid but fairly well bounded by a number of elements ranging from general course landscape to instructor responsiveness. Fourthly, as technology continues to impact higher education the student satisfaction space in online learning is very likely to continue emerging, becoming more and more complex. And, finally, that developing complexity is likely to put increasing pressure on the traditional protocols used for assessment. That pressure may well cause us to consider more interactive and alternate measurement models for determining how higher education interacts with students' perception of their learning experiences. In the future as course modalities continue to evolve, reevaluation of end of course protocols will become increasingly important. In addition, the phenomenon the authors identified in online courses needs to be evaluated on other course modalities to identify whether it is an online or educational phenomenon.

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Table 1

Distributional Characteristics of the Marker Item (Effective Communication)

		Positive Non-Ambivalent (PNA)	Positive Ambivalent (PA)	Ambivalent (A)	Negative Ambivalent (NA)	Negative Non-Ambivalent (NNA)
n		31,544	16,428	10,765	3,790	1,975
$\bar{x}$		4.86	3.96	3.05	2.18	1.40
Skewness		2.20	0.68	0.22	-0.57	-3.39
Item distribution percentage	PNA	**86.0**	15.3	3.1	1.3	1.2
	PA	12.3	**67.7**	17.5	4.9	1.8
	A	1.6	15.3	**64.1**	25.8	7.7
	NA	0.1	1.5	13.4	**47.9**	22.2
	NNA	0.0	0.1	1.8	20.1	**67.1**

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Table 2

*Factor Pattern for Positive, Non-Ambivalent (Likert 5, Excellent)**

	Course Landscape	Instructor Engagement	Progression
Description of course objectives and assignments	70	16	-19
Instructor's overall organization of course	67	-17	15
Continuity from one class to the next	59	-07	24
Communication of ideas and information	58	28	-14
Pace of course	56	-06	14
Texts and supplemental learning materials	45	08	04
Expression of expectations for performance	42	34	-02
Use of class time	40	-02	40
Respect and concern for students	-15	63	16
Stimulation of interest	16	53	02
Facilitation of learning	23	49	-01
Availability to assist students outside of class	-03	49	26
Feedback concerning performance in course	-01	05	68
Instructor's interest in learning	-10	24	64
Instructor's assessment of your progress	27	02	47
Eigenvalues	6.2	1.1	1.1

MSA = .95 Residual MSA = .60 Average Correlation = .61

*Factor Correlations**

	Course Landscape	Instructor Engagement
Course Landscape		
Instructor Engagement	67	
Progression	61	56

*Decimals Omitted

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Table 3

*Factor Pattern for Positive Ambivalent (Likert 4, Very Good)**

	Course Rhythm	Expectation Rules	Instructor Engagement	Progression
Continuity from one class to the next	69	-01	04	07
Pace of course	56	05	-00	-06
Use of class time	56	-13	12	20
Instructor's overall organization of course	55	16	-13	05
Texts and supplemental learning materials	22	21	12	-07
Description of course objectives and assignments	13	75	-07	-11
Communication of ideas and information	-01	70	08	02
Expression of expectations for performance	-05	57	09	17
Stimulation of interest	11	-02	74	-16
Facilitation of interest	17	04	60	-09
Respect and concern for students	-16	05	51	17
Availability to assist students outside of class	-19	11	38	30
Feedback concerning performance in course	04	-01	-15	78
Instructor's interest in learning	04	-12	23	53
Instructor's assessment of your progress	18	12	-06	45
Eigenvalues	4.4	1.6	1.3	1.2

MSA = .87 Residual MSA = .57 Average Correlation = .41

*Factor Correlations**

	Course Rhythm	Expectation Rules	Instructor Engagement
Course Rhythm			
Expectation Rules	54		
Instructor Engagement	44	43	
Progression	33	31	42

*Decimals Omitted

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Table 4

*Factor Pattern for Ambivalent (Likert 3, Good)**

	Course Rhythm	Expectation Rules	Progression	Instructor Engagement	Instructor Responsiveness
Continuity from one class to the next	90	-06	-07	-07	09
Instructor's overall organization of course	62	16	03	-15	-02
Use of class time	58	-09	11	13	04
Pace of course	56	01	-02	13	-10
Description of course objectives and assignments	08	78	-08	-01	-07
Communication of ideas and information	-03	68	05	02	10
Expression of expectations for performance	-05	65	11	-03	11
Feedback concerning performance in course	-04	-04	97	-06	-06
Instructor's assessment of your progress	06	13	48	05	-03
Instructor's interest in learning	06	-06	34	09	31
Stimulation of interest	-08	-03	-02	80	06
Facilitation of learning	10	02	01	55	04
Texts and supplemental learning materials	14	24	03	32	-18
Respect and concern for students	04	03	-12	07	61
Availability to assist students outside of class	-01	08	07	-04	56
Eigenvalues	4.4	1.7	1.3	1.2	1.1

MSA = .84 Residual MSA = .54 Average Correlation = .38

*Factor Correlations**

	Course Rhythm	Expectation Rules	Progression	Instructor Engagement
Course Rhythm				
Expectation Rules	56			
Progression	31	29		
Instructor Engagement	49	42	25	

*Decimals Omitted

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Table 5

*Factor Pattern for Negative, Ambivalent (Likert 2, Fair)**

	Course Rhythm	Expectation Rules	Progression	Instructor Engagement
Use of class time	73	-13	11	07
Continuity from one class to the next	72	03	15	-01
Pace of course	66	-02	-03	02
Instructor's overall organization of course	48	25	09	-17
Texts and supplemental learning materials	33	17	-17	19
Description of course objectives and assignments	11	78	-13	-08
Expression of expectations for performance	-06	67	15	03
Communication of ideas and information	-04	64	06	12
Feedback concerning performance in course	09	-02	76	-10
Instructor's assessment of your progress	15	08	45	-02
Instructor's interest in learning	05	-09	44	33
Stimulation of interest	14	-02	-12	71
Facilitation of learning	24	04	-08	51
Respect and concern for students	-17	02	19	46
Availability to assist students outside of class	-19	12	35	35
Eigenvalues	4.4	1.7	1.3	1.2

MSA = .87 Residual MSA = .59 Average Correlation = .36

*Factor Correlations**

	Course Rhythm	Expectation Rules	Progression	Instructor Engagement
Course Rhythm				
Expectation Rules	57			
Progression	23	29		
Instructor Engagement	36	36	30	

*Decimals Omitted

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Table 6

*Factor Pattern for Negative Non-Ambivalent (Likert 1, Poor)**

	Course Landscape	Progression	Instructor Engagement
Continuity from one class to the next	80	0	-01
Pace of course	70	-09	08
Description of course objectives and assignments	69	14	-09
Instructor's overall organization of course	69	08	-09
Use of class time	64	0	15
Texts and supplemental learning materials	51	-09	12
Communication of ideas and information	42	31	02
Feedback concerning performance in course	-01	62	04
Instructor's assessment of your progress	04	58	05
Expression of expectations for students	36	46	-05
Stimulation of interest	32	-09	49
Respect and concern for students	-13	30	48
Facilitation of learning	40	-10	47
Availability to assist students outside of class	-05	33	44
Instructor's interest in learning	-12	43	43
Eigenvalues	5.9	1.5	1.1

MSA = .94 Residual MSA = .59 Average Correlation = .53

*Factor Correlations**

	Course Landscape	Progression	Instructor Engagement
Course Landscape			
Progression	54		
Instructor Engagement	53	51	

*Decimals Omitted

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Table 7

Factor Summary for Each Ambivalent Condition

	Positive Non-Ambivalent	Positive Ambivalent	Ambivalent	Negative Ambivalent	Negative Non-Ambivalent
	General Landscape				General Landscape
		Course Rhythm Expectation Rules	Course Rhythm Expectation Rules	Course Rhythm Expectation Rules	
	Engagement	Engagement	Engagement	Engagement	Engagement
	Progression	Progression	Progression	Progression	Progression
			Instructor Responsiveness		
Average Correlation	.65	.41	.38	.36	.53
Squared Correlation	.42	.17	.14	.13	.29

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References

Ambient Insight (2011), 2011 Learning and Performance Technology Research Taxonomy, Ambient Insight, Monroe, WA.

Bauerlein, M. (2008). *The dumbest generation*. New York: Penguin.

Bonk, C. J. (2009). *The world is open.* San Franciso, CA: Jossey-Bass.

Bowker, G. C. and Star, S. L. (1999). *Sorting things out: Classification and its consequences*. Cambridge, MA: The MIT Press.

Cavanagh, T. B. (2012). The postmodality era: How 'online learning' is becoming 'learning.' In Oblinger, D. (Ed.), *Game Changers: Education and Information Technology* (215-228). Boulder, CO: EDUCAUSE.

Chopin, K. (1964). *The awakening, with introduction by Kenneth Eble*. New York: Capricorn.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika, 16,* 297-334.

Craig S. C. & Martinez M. D. (2005). *Ambivalence and the structure of political opinion*. New York: Palgrave Macmillian.

Dziuban, C. D., Hartman, J. L., Moskal, P. D. & Brophy-Ellison, J. (2007). Student involvement in online learning. A. P. Sloan Foundation Final Report.

Dziuban, C. & Moskal P. (2011). A course is a course is a course: Factor invariance in student evaluation of online, blended, and face-to-face learning environments. *Internet and Higher Education, 14,* 236-241.

Dziuban, C. D. & Shirkey, E. C. (1974). When is a correlation matrix appropriate for factor analysis? Some decision rules. *Psychological Bulletin, 81*(6), 358–361.

Dziuban, C. D. & Shirkey, E. C (1993, November). *S.D. 50 –A sequential psychometric criterion for the number of common factors.* Presented at the Annual Conference for Florida Educational Research Association, Destin, Florida.

Forrester, J. W. (1991). System dynamics and the lessons of 35 years, in Greene, K. B. D. (Ed.), *Systems-Based Approach to Policymaking*. Norwall, MA: Kluwer Academic.

Garrison, D. R. & Vaughan, N. D. (2008). Blended learning in higher education: Framework, principles, and guidelines. San Francisco, CA: Jossey-Bass.

Gladwell, M. (2005). *Blink: The power of thinking without thinking.* New York: Little, Brown and Co.

ACCEPTED MANUSCRIPT

Guttman, L. (1954). Some necessary conditions for common factor analysis. *Psychometrika*, 19, 149–161.

Hendrickson, A. E. & White, P. O. (1964). PROMAX: A quick method for rotation to oblique simple structure. *British Journal of Statistical Psychology, 17*, 65–70.

Hinssen, P. (2010). *The New Normal*, MachMedia, Edison, NJ.

Johnson, S. (2006). *The Ghost Map: The story of London's most terrifying epidemic, and how it changed science, cities, and the modern world.* New York: Riverhead.

Kahneman, D. (2011). *Thinking fast and slow.* New York: Farrar, Straus and Giroux.

Kaiser, H. F. (1968). A measure of the average intercorrelation. *Educational and Psychological Measurement, 28*(1), 245-247.

Kaiser, H. & Caffrey, J. (1965). Alpha factor analysis. *Psychometrika, 30*(1), 1-14.

Kuder, G. F. & Richardson, M. W. (1937). The theory of the estimation of test reliability. *Psychometrika, 2*(3), 151-160.

Lakoff, G. (1987). *Women, fire, and dangerous things.* Chicago: University of Chicago Press.

Lakoff, G. & Johnson, M. (1980). *Metaphors we live by.* Chicago, IL: University of Chicago Press.

Lanier, J. (2010). *You are not a gadget.* New York: Random House.

Long, W. A. (2011). *Your predictable adolescent*. Charleston, SC: BookSurge Publishing.

Mayadas, F. A. & Picciano, A. G. (2007). Blended learning and localness: The means and the ends. *Journal of Asynchronous Learning Networks, 11*(1), 3-7.

Moore, J. C. (2011). A synthesis of Sloan-C effective practices, December 2011. *Journal of Asynchronous Learning Networks, 16*(1), 91-115.

Morrison, T. (1973). *Sula*. New York: Bantam Books.

Mulaik, S. A. (1972). *The foundations of factor analysis.* New York: McGraw-Hill.

Norberg, A., Dziuban, C., & Moskal, P. (2011). A time-based blended learning model. *On the Horizon, 19*(3), 207-216.

Rosch, E. (1973). Natural categories. *Cognitive Psychology, 4(1),* 328-350.

Rousseau, D. M. (2004). Psychological contracts in the workplace: Understanding the ties that motivate. *The Academy of Management Executive, 18*(1), 120-127.

ACCEPTED MANUSCRIPT

Setenyi, J. (1995). Teaching democracy in an unpopular democracy. Paper presented at *What to Teach about Hungarian Democracy conference*. 12 May 1995, Kossuth Klub, Hungary.

Shirky, C. (2008). *Here comes everybody: The power of organizing without organizations.* New York: Penguin.

Spies, A. R., Wilkin, N. E., Bentley, J. P., Bouldin, A. S., Wilson, M. C., & Holmes, E. R. (2010). Instrument to measure psychological contract violation in pharmacy students. *American Journal of Pharmaceutical Education, 74*(6), 1-11.

Stein, J. (1964). *Fiddler on the roof.* New York: Crown.

Sunstein, C R. (2006). *Infotopia: How many minds produce knowledge*. Oxford, England: Oxford University Press.

Taleb, N. N. (2007). *The black swan: The impact of the highly improbable*. New York: Random House.

Wade-Benzoni, K. A., Rousseau, D. M., & Li, M. (2006). Managing relationships across generations of academics: Psychological contracts in faculty-doctoral student collaborations. *International Journal of Conflict Management, 17*(1), 4-33.

Wang, M.C., Dziuban, C.D., Cook, I. J., Moskal, P. D. (2009). Dr. Fox Rocks: Using data-mining techniques to examine student ratings of instruction. In M.C. Shelley, L.D. Yore, B. Hand, Eds. *Quality Research in Literacy and Science Education: International Perspectives and Gold Standards*, Dordrecht, The Netherlands: Springer, 383-398.

Weigert, A. J. (1991). *Mixed emotions: Certain steps toward understanding ambivalence.* Albany: State University of New York Press.

Whitehead, C. (1999). *The intuitionist.* New York: Knopf Doubleday Publishing Group.

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Appendix A

Student perception of instruction items*.

1 Feedback concerning your performance in this course was
2 The instructor's interest in your learning was
3 Use of class time was
4 The instruction's overall organization of the course was
5 Continuity from one class meeting to the next was
6 The pace of the course was
7 The instructor's assessment of your progress in the course was
8 The texts and supplemental learning materials used in the course were
9 Description of course objectives and assignments
10 Communication of ideas and information
11 Expression of expectations for performance
12 Availability to assist students in or outside of class
13 Respect and concern for students
14 Stimulation of interest in the course
15 Facilitation of learning
16 Overall assessment of instructor

*Rated on a 5-point Likert Scale: excellent, very good, good, fair, poor.

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Highlights

- We study the impact of students' ambivalence toward online courses and the dimensionality by which they evaluate their learning experiences.
- We show that as student ambivalence toward their online courses increases, so do the number of elements they use to make evaluative judgments.
- As student ambivalence toward online courses decreases, they tend to make much more general assessments that are more highly related to each other.

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