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Student Effort Expenditure in Online Versus Face-to-Face Courses: The Role of Gender, Team Learning Orientation, and Sense of Classroom Community

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Student Effort Expenditure in Online Versus Face-to-Face Courses: The Role of Gender, Team Learning Orientation, and Sense of Classroom Community

Abstract 1

This study focused on how gender, team learning orientation, and sense of classroom community predict college students' effort differently in online and face-to-face courses. The major findings were (a) there is a gender difference in effort expenditure across the two course delivery formats, with male students tending to expend more effort in online classes whereas females making more effort in face-to-face classes; (b) students' perceptions of value and interest in online courses were particularly crucial for learning engagement.

Abstract 2

The purpose of the study was to investigate different factors influencing student effort expenditure in online versus face-to-face courses. We specifically focused on how gender, team learning orientation, and sense of classroom community predict student effort differentially in online courses in comparison with face-to-face courses. We found a gender difference in the amount of student effort expenditure across the two class delivery formats, with male students inclined to invest more effort in online classes whereas females more invested in face-to-face classes. The overall predictive pattern of student effort significantly differed across the two course delivery formats, while perceived value and interest in course materials was a common

and the strongest predictor, suggesting that instructors need to render their classes valuable and interesting to nurture a sense of classroom community and promote student effort. The primary difference in the predictive pattern between the two course delivery formats was the multiple predictors of student effort in face-to-face classes in contrast to the single *value-interest* predictor in online classes after controlling for individual differences. The results suggested the need of instructional differentiation of the two course delivery formats and the importance of enhancing the value and interest of online courses to promote student effort in distance education programs.

Abstract 3

The study investigated the differential impact of sense of classroom community on effort in online versus face-to-face courses while controlling for potential effects of gender and team learning orientation. The interaction effects from ANOVA results suggested a gender difference across the two course delivery formats, with male students expending more effort than females in online classes while females put more energy than males in face-to-face classes. The hierarchical regression analyses results showed overall differential predictive patterns of student effort and indicated the need of instructional differentiation between the two class delivery formats.

Key words: Student effort; Sense of classroom community; Team learning orientation; Gender;

Course delivery format (online versus face-to-face)

Student Effort Expenditure in Online Versus Face-to-Face Courses: The Role of Gender, Team Learning Orientation, and Sense of Classroom Community

In response to the increasing needs of learners who are not able to participate in face-to-face courses, distance education emerged and thrived during the past few decades. It encompasses various programs such as virtual schooling, online learning, or hybrid courses that allow instructors and students to be physically apart during the learning process while maintaining communication in a variety of channels (Keeagan, 1986; Oliver, Kellogg, Townsend, & Brady, 2010). The rapid development of distance education programs from K through postsecondary school systems has prompted the need to revisit the course delivery format and study the potential instructional and learning differences between online and traditional face-to-face classes.

One potential difference is sense of community students may experience in online versus traditional face-to-face courses. Pigliapoco and Bogliolo's (2008) recent study examining the relationship between perceptions of sense of community by students enrolled in different formats of course delivery indicated that of the two groups, online students reported engaging in fewer interactions with other classmates, devoted less time to studying, and expended less study effort. In their comparison of asynchronous online and face-to-face course discussions, Wang and Woo (2007) found that although online discussants perceived the atmosphere more favorable for

participation by all members, responses often required more time to finish. In contrast, face-to-face discussions seemed more spontaneous and engaging, allowing multiple instant comments simultaneously. Sapp and Simon (2005) found that a disproportionately higher percentage of students failed to complete the course in an online environment due to instructional ineffectiveness and/or a lack of sense of belongingness. These studies indicate that students tend to make different efforts in coursework depending on their perceptions of the two course delivery formats. Student effort is often considered as an indicator of personal commitment and motivation to learn and has been shown to impact student academic achievement (Bernard et al., 2009). Volet (1997) reported that the amount of effort students put forth was a stronger predictor of coursework performance than overall grade-point average (GPA). In a meta-analytical study of an accumulative sample size of over 70,000 out of 80 research reports, Poropat (2009) found conscientiousness of the five-factor model of personality predicted academic performance as much as intelligence did, suggesting the importance of effort in the learning process. The increasing prevalence of distance education programs calls for a need to study underlying factors promoting effort in online classes and potential difference from face-to-face classes.

An interesting pattern that has emerged is gender differences in students' effort expenditure. Researchers found that female students tend to invest more effort compared to male students in their course work and thus tend to outperform males in academic achievement

(Castagnetti & Rosti, 2009; McCrea, Hirt, & Milner, 2008). McCrea, Hirt, & Milner (2008) discovered in their study that females value more effort, put forth more effort, and are less likely to withdraw practice effort than males in face of adversity. Similarly, Heckert, Latier, Rigwald-Burton, and Drazen (2006) found that females rather than males exerted more effort in campus held classes. However, it remains unclear whether the gender difference is consistent across course delivery formats.

Aside from course delivery formats and gender that may impact academic engagement and suggest instructional differentiation, social constructivism has highlighted the importance of social and collaborative aspects of learning (Schunk, 2008) by positing that individuals learn and achieve academic success through social interactions. Instructors in higher education settings strive to incorporate social activities such as collaborative group work into their teaching, which helps create academic engagement and learning interaction (Rovai, 2002). Although most students in higher education settings experience team learning (Butts, 2000), students tend to harbor different attitudes (Sadera, Robertson, Song, & Midon, 2009; Thompson, Anitsal, & Barrett, 2008). Team learning orientation refers to an individual's preference for working in a team, rather than working alone (Driskell, & Salas, 1992). The individual differences in team learning orientation impact the extent of effort expenditure, which in turn determines the effectiveness and efficiency of team work (Cantwell & Andrews, 2002). Motivational benefits

associated with team learning are well-documented in the literature (Cantwell & Andrews, 2002). For instance, Slavin (1994) argued that peer support of cooperative group learning is associated with mastery goal pursuit and a positive attitude toward learning, such that students with team learning orientation are likely to expend more effort and persist longer when faced with challenges. Cooperative team learning, according to Slavin and colleagues (1994, as cited in Sagor, 2002), boosts academic achievement and peer relationships and motivates quality effort. Moreover, students who prefer working in a group tend to feel a greater sense of classroom community and devote more effort to the course than those with individual learning orientation (Driskell & Salas, 1992). Thus, it appears that students' sense of classroom community may be affected by their individual differences such as team learning orientation.

Sense of Community

Sense of community has been described as feelings of belonging, value, mutuality, and involvement among members of a group (McMillan & Chavis, 1986). Drawing on the conceptualization of sense of community provided above, one can expect that members of classroom communities will have feelings of belonging and mutuality. There is a lack of consensus regarding the definition of sense of community (Graves, 1992; McMillan & Chavis, 1986; Westheimer & Kahne, 1993), but the various views suggested five essential components: shared goals and responsibility, student-instructor interaction, value and interest, peer respect,

and emotional connection (Cho, Bang, Mathew, Bridges, & Watson, 2010). Shared goals and responsibilities refers to the concept of the commonality of learning expectations and goals (McMillan & Chavis, 1986, Rovai (2002) in groups and working on common projects and forming attachments that result from common purposes (Strike, 2004). Student-instructor interaction occurs between students, their instructor, or through contact with course content (Bernard et al., 2009). Research indicates that when students experience positive interactions with their instructors, there is a greater likelihood that they will become attached to others within this community group and continue engaging in the learning process (as cited in Reio, Marcus, & Sanders-Reio, 2009). A previous study shows students' perceptions of value and interest of classroom learning activities and materials can affect their sense of classroom community (Booker, 2008). Peer respect is another important aspect of sense of classroom community. The classroom where students have respect for one another provides a psychologically safe environment for students to work collaboratively, share in discussions, and feel free to express their viewpoints. Research indicates that student evaluations of classes tend to be higher when students "perceive a mutually respectful relationship between classmates" (Booker, 2008, p. 13). Finally, the emotional connection students feel within a class result from perceptions of feeling connected, safe, and accepted as part of the classroom community (Osterman, 2000; Wighting, 2006).

In addition to a positive relationship found between student sense of learning community and student success in an online class (Sadera, Robertson, Song, & Midon, 2009), research demonstrates that students' sense of community predicts other academic outcomes including effort (Sanchez, Colon, & Esparza, 2005). Given the importance of sense of classroom community and its close relationship with team learning orientation, it would be beneficial to separate the unique contribution of sense of community to student effort from the effect of individual differences including team learning orientation and gender.

Based on previous studies on individual and contextual differences on learning outcomes, we hypothesized a conceptual model (Figure 1) in an attempt to explain student effort.

The present study

We examined the following research questions and hypotheses:

First, are there gender differences in student effort expenditure in online and face-to-face classes? Previous studies, although most of them did not differentiate varying class delivery formats, suggests a gender difference in perceiving and valuing effort (e.g., Stetsenko, Little, Gordeeva, Grasshof, & Oettingen, 2000). Based on the difference in the two learning environments, we hypothesized that female and male students may expend differential effort in online versus face-to-face classes.

Second, to what extent does team learning orientation predict student effort in online versus face-to-face classes, controlling for potential gender effect? Based on our review of previous studies on team learning orientation and academic achievement, we hypothesized that students with team learning preferences may put more effort in a class regardless of gender.

Third, to what extent does student sense of classroom community predict effort expenditure in an online versus face-to-face class, controlling for the potential effects of gender and team learning orientation? We hypothesized that the effects of sense of classroom community on student effort would be independent from the effects of individual differences in learning (i.e., gender and team learning orientation). We also hypothesized that the pattern of sense of classroom community effects on student effort will differ as a function of course delivery format.

Method

Procedures

Upon permission of instructors, a team of researchers went to individual courses where students were encouraged to participate in the study. Participants were instructed to pick either an online or face-to-face course and keep that course in mind while completing a survey about their sense of community in a particular class, their team learning orientation, and the amount of effort they put into that class as well as general demographic information. One thing worthy of

note is that students were not necessarily reporting the courses from which researchers collected the data to alleviate their pressure of instructor presence and encourage more candid responses. Therefore, each student completed the survey based on different courses of their choice (either online or face-to-face). Before the participants started to answer the survey questions, they were asked to provide course information regarding the course delivery format and the class size. The survey included a self report, anonymous questionnaire because the present study focused on capturing students' subjective experiences and perceptions of different courses that are related to student effort expenditure rather than assessing objective characteristics of variations that exist within and between courses. The study took place during the second semester of the 2007/2008 academic year. The same survey was administered in two ways, online and paper-based, depending on the availability of the students. Students' reports of their online or face-to-face classes were surveyed at the same time period.

Participants

The participants were 799 students (64.1% female), with 177 surveyed about their online courses and 619 about traditional face-to-face classes. The surveys were offered across colleges at a large comprehensive midwestern university. Although there is a significant difference in sample size of online and face-to-face groups, the ratio of the number of participants from online and face-to-face classes well represented the population at the institution, as more traditional

face-to-face courses were offered than online classes at the time of data collection. Online courses at the university were offered through *Desire To Learn*, an online course management system where students met and completed course assignments primarily online, while face-to-face courses were delivered in traditional classroom settings where students and instructors met physically on a regular basis. Although the two instructional formats differed in many characteristics including class size, teacher demands, course content, primary means of communication, this study focused on students' perception of their learning environment and how it predicts their effort expenditure rather than the actual objective features of their learning environment. The participants' mean age was 22.5 years ($SD=5.48$) and the vast majority of participants were Caucasians (78.5%). Most participants were single (88.9%) and few had children (8.0%). Although almost half of them were employed (51.6%), few of them worked over 20 hours a week (16.5%). Students were sampled from seven different colleges, primarily with 32.5% from the College of Arts and Sciences and 28.0% from the College of Human Environmental Sciences. Most participants (98.6%) had experience taking face-to-face classes, but almost half of them (43.2%) had no prior experience with online classes. Participants did not fill out course information to protect their anonymity so as to encourage more candid evaluations of the online/face-to-face courses of their choice.

Measures

The survey consisted of measures on students' sense of community, team learning orientation, and the amount of effort contributed towards any specific course. Participants were asked to complete the survey based on a course of their choice. All measures adopted a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*) in the study. Composite scores of the study variables were calculated and standardized for later analyses.

Team learning orientation

We measured students' team learning versus individual learning orientations using the fifteen items adopted from the Individual/collectivism scale (Wagner, 1995) (e.g., "I prefer to work with others than work alone" and "People in a group should be willing to make sacrifices for the group's wellbeing"). Factor analysis results of previous studies (Ramamoorthy & Carroll, 1998; Wagner, 1995) showed a five-factor structure (Solitary work preferences, competitiveness, self-reliances, supremacy of individual interests, and supremacy of individual goals), of which four factors except the competitiveness factor were included in the present study. Given the focus of the study is on measuring team learning orientation, items designed to measure individual learning orientation were reverse-coded so that higher ratings indicated a higher level of team learning orientation. We conducted an exploratory factor analysis to ensure a decent psychometric property of the revised instrument. We used principal component factor extraction procedure with varimax rotation. The Kaiser-Meyer-Olkin (KMO) measure of sampling

adequacy was .78, indicating that the data were appropriate for factor analysis (Gorsuch, 1983). Bartlett's test of sphericity led to the rejection of the null hypothesis ($p < .01$) that the correlation matrix was an identity matrix. Both the eigenvalues (4 factors with eigenvalues greater than 1) and the scree plot (4 prerotation factors accounting for 21.67%, 20.65%, 14.52%, 7.28% for a total of 64.12% of the variance) suggested a four-factor solution. Using a criterion of .40 as a cutoff point (Stevens, 2001), four items loaded on the first factor, three items on the second factor, five items on the third factor, and three items on the fourth factor as expected. It was clean factor loading ranging from .44 to .87. Factor 1 was labeled as "supremacy of team goals"(STG), Factor 2 as "team work" (TW), Factor 3 as "team-reliance" (TR), and Factor 4 as "supremacy of team interests" (STI). Internal consistency coefficients for the four factors were .82 (STG), .85 (TW), .67 (TR), .71 (STI). This revised scale produced an overall reliability coefficient of .69, which is moderately acceptable because reliability is considered satisfactory when coefficients of reliability are around or above .70 (Cohen, 1977; Nunnally, 1978). . The standardized composite scores of the entire scale rather than the four subscales were computed for later analysis as it was not the focus of the study.

Sense of classroom community

We measured students' sense of classroom community via Integrative Sense of Community Scale (Cho, Bang, Mathew, Bridges, & Watson, 2010) which has five components:

shared goals and responsibility, student-instructor interaction, value and interest, peer respect, and emotional connection. Shared goal and responsibility was measured by nine items; sample items were “There is a clear sense of shared goal in this class” and “Students in this class share responsibility”. The student-instructor interaction component comprised five items such as “The instructor supports student comments” and “Interactions with my instructor are generally positive”. The value and interest component had eight items; sample items were “The course content is not very interesting to me personally” (reverse coded), “The goals of this class are meaningful to the students in the class”, and “Students are genuinely interested in the topics in the course.” Peer respect was measured by five items (e.g., “Students value each others’ opinions” and “Students in this course treat each other with respect.”) And finally, three items were used to measure emotional connection; sample items were “In this class there is the feeling that students should not get too friendly” (reverse coded) and “The atmosphere in the class is somewhat impersonal” (reverse coded). The internal consistency coefficients for the subscales were .93, .94, .91, .88, and .66, respectively. A composite score for each subscale was created by averaging the item scores and was used in subsequent analyses. The overall Cronbach’s Alpha for the scale was .96.

Effort

The Effort/Importance subscale of Ryan's (1982) Intrinsic Motivation Inventory comprised of four items was used to assess how much effort the college students expended on studying and learning. Sample items were "I didn't put much energy into this course" (reverse coded) and "I put a lot of effort into this course". The overall Cronbach's Alpha for the scale was .94.

Results

Descriptives

Table 1 displays all means and standard deviations for each class delivery format and gender. Three measures included are student team learning orientation, five components of sense of community, and amount of effort expenditure. The descriptive statistics of the study variables for the overall sample are shown in Table 2, along with internal consistency coefficients and bivariate correlations.

Course delivery format and gender difference in student effort

To address the first research question, namely the potential effects of gender and class delivery format on effort, a two-way between-subjects analysis of variance (ANOVA) design was utilized with both gender and class delivery format as between subject factors. An interaction effect between course delivery format and gender was significant using a critical alpha of .01 ($F(1, 785) = 10.34, p = .001, \eta^2 = .01$). Examination of the means in Table 1 and

Figure 2 shows that female students reported more effort particularly in face-to-face classes compared to male students, whereas male students put more energy into online classes than females.

Predictors of student effort in online versus face-to-face classes

Hierarchical regression analysis was conducted to investigate the relative contribution of gender, team learning orientations (TLO), and sense of classroom community (SOCC) on effort. Separate hierarchical regression analyses were undertaken for the two course delivery formats. Gender was entered as a covariate in the first step (Model 1), *team learning orientation* was added in the second step to explore the potential incremental effect of students' learning orientations (Model 2), and five components of *sense of classroom community* were added at the last step to find out their unique predictive power in student effort (Model 3). In addition, each regression analysis included the interactions of gender by TLO, gender by SOCC, TLO by SOCC, and gender by TLO by SOCC. However, none of these interaction terms was related to effort outcome, so these interactions were dropped from the final models in the interest of model parsimony. Regression results showed significant difference in the predictive patterns of student effort in online versus face-to-face classes (Table 3).

Online Classes

Table 3 indicates that 37% of student effort expenditure was accounted by the explanatory variables listed. Gender accounted for 5% of the variance, with team learning orientation adding another 5%. Students' sense of classroom community predicted an additional 27% of the variance. Of the SOCC variables, *value and interest* subscale made the sole and greatest contribution to effort (Beta = .47, $t = 4.76$, $p < .001$). The more engaging and meaningful the online classes were perceived to be, the more effort students reported.

Face-to-face Classes

Unlike online classes, gender almost made no contribution to effort in face-to-face classes, with team learning orientation accounting for 5% of the variance in effort. Students' sense of classroom community (SOCC) added another 22% of the variance. Of all the SOCC variables, *value and interest* subscale (Beta = 0.43, $t = 8.12$, $p < .001$) made the greatest contribution to effort, followed by *peer respect* (Beta = 0.17, $t = 2.97$, $p < .01$) and *student-instructor interaction* (Beta = -.14, $t = -3.01$, $p < .01$). Students reported that they put more effort when they perceived more value and interest, and felt respected in the classroom. On the other hand, when they perceived more student-instructor interaction, they reported less effort.

Discussion and Conclusion

Our study focused on testing the effect of sense of classroom community on student effort while controlling for the potential effects of gender and team learning orientations in online

versus face-to-face classes. Results showed student effort was related to different factors in online versus face-to-face classes while demonstrating the importance of SOC in both course delivery formats.

Interaction effect of gender and course delivery format on student effort

As indicated by the statistically significant interaction effect, students reported a significant difference in the magnitude of effort expenditure as a function of interplay between gender and course delivery format. More specifically, male students reported more effort than female students in online classes, while females reported more effort in face-to-face classes than males. It is noteworthy that gender differences were more salient in online courses than face-to-face courses, and that course delivery format affected female more than male students. The effect of course delivery format on effort might need to be investigated from gender-specific student autonomy stance as indicated in an earlier study (Daniel & Marquis, 1979). Literature shows when students perceive their teachers as autonomy-supportive they are apt to be more engaged in classroom learning (Reeve et al., 2004). Better academic performance has been demonstrated by students who perceive greater autonomy support by their instructors (Black & Deci, 2000). Combined with the results of the current study, perhaps instructors showed differential autonomy support of female and male students in online versus face-to-face classes, which affected effort expenditure accordingly.

Team learning orientation and sense of classroom community as predictors of student effort

Team learning orientation played an important role in both online and face-to-face classes. Students who valued working with others and held a strong belief in benefiting from team work reported having spent more time and energy in their classes regardless of gender and course delivery format. This suggests that both online and face-to-face courses need to consider individual traits such as students' team learning orientations regarding the amount of effort students may be willing to invest in a particular class. This finding adds to previous study results that team learning orientations are positively associated with motivation and academic performance (Chan, 2003; Rogers & Spitzmueller, 2009).

Aside from individual differences in team learning orientation, the study results showed the impact of contextual variations in sense of classroom community on student effort in both online and face-to-face classes. Students who felt a greater sense of classroom community reported more effort expenditure in both online and face-to-face courses. This is parallel to previous arguments that building a sense of community in the classroom can nurture feelings of belongingness and make a class more motivating so that students will engage in a more effortful learning process (Sagor, 2002), and that when members of a community identify with and feel safe as part of a group they are more likely to invest resources in that group (McMillan & Chavis, 1986). This result also fits well with a conceptual model proposed by Kreijns,

Kirschner, and Jochems (2003) that sense of classroom community promotes effort investment through interaction among students.

While sense of classroom community significantly predicted student effort in both online and face-to-face classes, the predictive pattern differed. In contrast to the multiple predictors of student effort in face-to-face classes, value-interest was a single predictor in online classes after controlling for individual differences. The results indicate the particular importance of value-interest in online classes to promote student effort, whereas more channels are available to encourage student learning engagement in face-to-face classes. Therefore, more efforts need to focus on improving students' perceptions of value and interest of the online classes in distance education programs. In face-to-face classes, however, three components of students' sense of classroom community contributed to student effort, along with team learning orientation. Aside from interest-value, students who perceived fewer interactions with instructors and more peer respect reported more effort in face-to-face classes. This is consistent with a previous study that reported when students feel accepted and respected they "are more highly motivated and engaged in learning and more committed to school" (Osterman, 2000, p. 359), but seems disconcerting to an earlier argument that positive student-instructor interaction helps to nurture an inclusive classroom community characterized by a sense of belongingness and active contributions from class members (Wighting, 2006). While the study partially confirmed an

earlier result that student-instructor interaction is a statistically significant variable influencing student achievement and learning (Heckert et al., 2006), the conviction that students who perceive greater acceptance by their teachers are “more likely to be interested in and enjoy school and their classes” (Osterman, 2000, p. 331) was not supported in the current study.

Curricula and Instructional Implications

The different predictive patterns of student effort in online versus face-to-face classes suggested the need of instructional differentiation of the increasingly popular distance education programs in postsecondary education. The study results suggest that female and male students respond to online classes differently and that online classes are more vulnerable to the loss of student effort especially for female students than traditional classes. Perhaps we need to revisit a conclusion made in a previous study that online education presents a bias-free teaching and learning environment for both instructors and students because students usually cannot tell the gender of each other and their teachers (Palloff & Pratt, 2000). Online course designers and instructors may need to consider the different needs of female students in an online class to motivate them to put more effort into online learning. Not only that, online classes need to be structured in interesting and meaningful ways, and to create an online learning environment where the sense of learning community is facilitated via virtual social interaction.

The different predictive patterns of team learning orientation and sense of classroom community on student effort may be related to the inherent difference in the nature of online versus face-to-face classes, or related to students' different attitudes and perception of the two course delivery formats, or a mixture of both. Regardless, it appears critical that instructors, particularly online instructors improve the online learning environment that promotes students' positive class perceptions, particularly their perceptions of value and interest of online classes. One way is perhaps to discovering the best practices and methods for gaining and sustaining interest in learning communities because the level of students' interest in the content of their studies relates to their course satisfaction and the amount of effort expended in a class (Heckert, Latier, Ringwald-Burton, & Drazen, 2006). According to an earlier study, situational or environmental factors influencing students' interest and value levels include, but are not limited to: hands-on activities, discrepancy, novelty, social interaction, modeling, games and puzzles, content, fantasy, humor, and use of narrative texts (Bergin, 1999, Molinari, 2004).

Much different as online and face-to-face courses are, both types of courses cannot stress enough the importance of students' perceptions of value and interest in classes, in that students' perceived value and interest in course materials was a common and the strongest predictor of student effort in both online and traditional face-to-face courses. It suggests that both online and face-to-face instructors need to render classes valuable and interesting to nurture a sense of

classroom community and promote student effort. This finding is parallel to a previous research implication that instructors need to focus more on cognitive engagement, course meaningfulness, incorporation of educational mechanisms to enhance student motivation and attitude (Bernard et. al, 2009).

A disconcerting result found in the current study is that students' interaction with a face-to-face course instructor was negatively related to student effort. A closer examination of the survey items on student-instructor interaction indicates that the more comfortable students feel with the instructor and the more positive feedback the students receive, the less effort they tend to put in the course. A potential explanation is that students may have perceived positive feedback from an instructor as a sign of success in achieving their academic goals and as a result, they may have gradually withdrawn their effort and redirected their effort to other more challenging courses that need higher levels of effort to succeed. To motivate student effort, perhaps a certain degree of distance and tension between the instructor and students might be needed rather than having an overly friendly or overly comfortable relationship between instructor and students. Instructors may need to challenge students by providing critical and constructive feedback on student work instead of giving students constant positive feedback. A convincing explanation for this finding requires further empirical evidence to assess any latent effect of factors that might influence student effort in a face-to-face course, specifically with

regard to instructor presence, individual interaction preferences, and student perception of performance based on instructor presence (Ward, Garrett, & Marsh, 2006).

Limitations and future research

This investigation was limited because it focused entirely on the *perception* of learning environment. It did not determine whether or not the objective characteristics of the two learning environments such as instructor, student, and classroom characteristics were associated with students' effort expenditure. Future research needs to delineate perceived learning environment from actual learning environment in online versus face-to-face classes in terms of their effects. Research has demonstrated the relationship between teacher characteristics and student motivation (Reeve, Jang, Carrell, Jeon, & Barch, 2004; Reeve, 2006). Future research might explore other possible student, teacher, and classroom characteristics which may be influential in predicting student effort. Teacher characteristics, such as pedagogical philosophy (teacher or student-centered), teaching experience and response immediacy (especially in online classroom instruction) may also be important to consider for understanding student effort directed towards their class work. Since classrooms may vary not only in course delivery format (online vs. face-to-face) but also in classroom structure and organization, further exploration of within-classroom characteristics and across-classroom characteristics could also be helpful. Some classes may emphasize independent work by students whereas others may encourage group collaborative or

cooperative work. A caution worthy of note is not to discredit the importance of examining student perceptions of learning environments and their instructors. Previous research showed that students' perception of the interaction provided within the learning environment is a better predictor of student course satisfaction rather than empirical measurement of interaction irrespective of the extent to which interactions are utilized in the course (Fulford & Zhang, 1993).

An additional limitation of the study was its correlation-based methodology. Future research should endeavor to conduct experimental designs to determine the causal factors or student effort, particularly in online learning environment. A more objective measure of student effort needs to be implemented in future studies to eliminate participant bias in self-report measures.

Based on the result of this study, further research could focus on strategies that increase the perceptions of students that course content is valuable and interesting. In addition, despite the representativeness of the sample in comparison with the university student population makeup, the uneven sample size of participants from online versus face-to-face classes may have compromised the study results.

Further study is necessary to understand factors influencing student effort in coursework especially for women engaged in online classes. Through additional research, it is hoped that educators may become more knowledgeable of how to further nurture classroom sense of

community and team learning orientation in order to potentially promote student effort. By understanding different factors that facilitate student effort and engagement in online versus face-to-face classes, instructional and curricula differentiation practice may be strengthened.

The contradictory results of the current study on the negative relationship between classroom interaction and student effort call for more studies to look into interactions in both online and traditional face-to-face classes. A meta-analysis of distance education conducted by Bernard and colleagues (2009) examining the effects of types of interactional conditions between students, their instructors, and with course content, indicated that student achievement is especially promoted when learning tasks involve student participation with others (“student-student”) and when paired to curricular content (“student-content”). Future research is warranted on different types of interactions in classrooms and how they relate to student effort.

With the increase in online learning and the concerns about the disengagement of students in virtual learning environments, it has become a compelling issue to study learning engagement of students and factors contributing to student effort expenditure which may be different from traditional face-to-face classes. This study offered useful information on online learning environment to help improve distance education programs. The results suggested the need for online instructors to make the classes more valuable and interesting to students to

promote student effort while being aware of individual differences including gender issues and team learning orientations.

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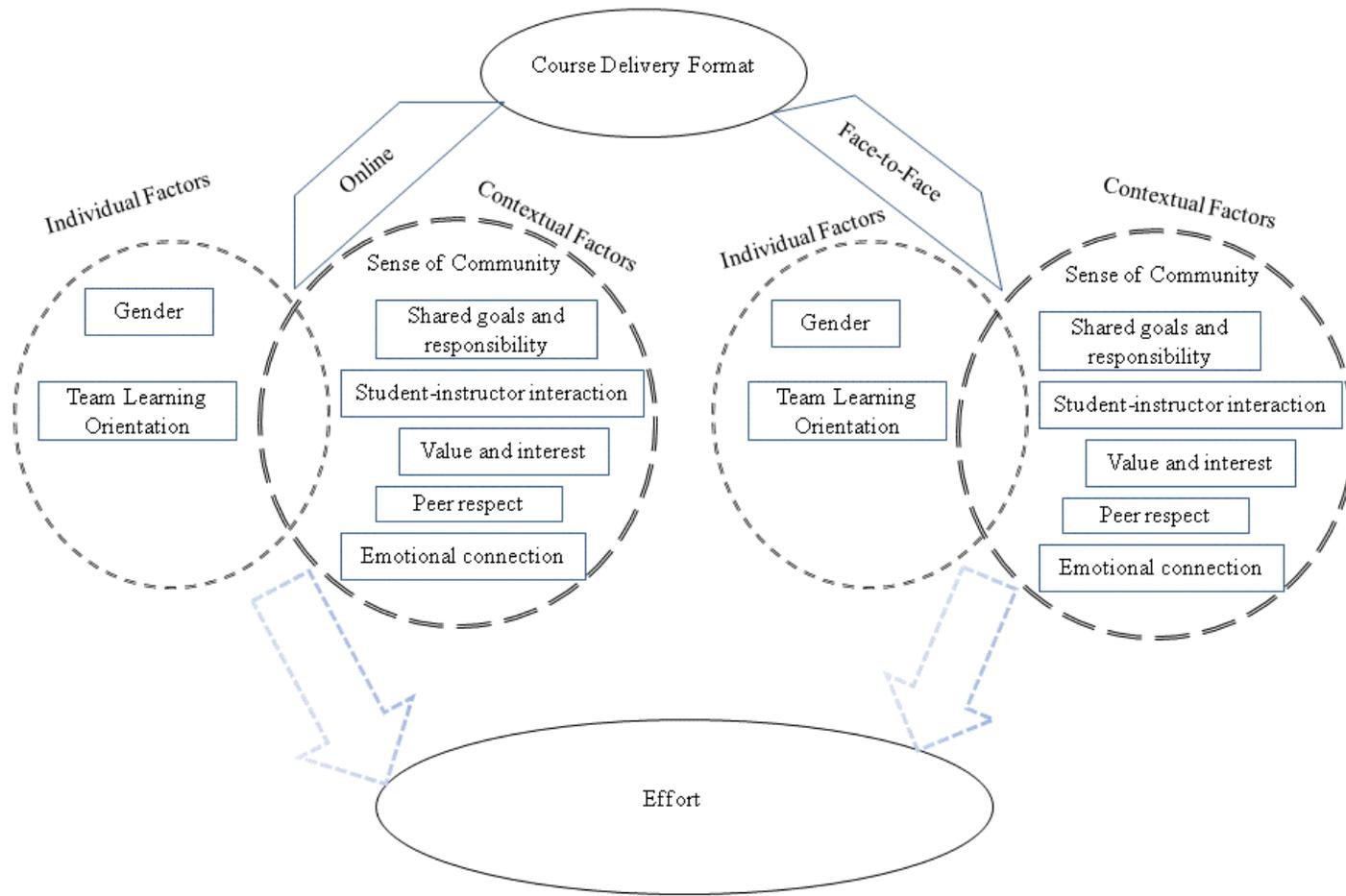


Figure 1: Conceptual model of individual and contextual factors contributing to effort.

Table 1

Means and standard deviations for each class delivery format across gender

Variable	Online class		Face-to-face class		All	
	n = 177		n = 619		N = 799	
	<i>Female</i> <i>M (SD)</i>	<i>Male</i> <i>M(SD)</i>	<i>Female</i> <i>M(SD)</i>	<i>Male</i> <i>M(SD)</i>	<i>Female</i> <i>M(SD)</i>	<i>Male</i> <i>M(SD)</i>
Team learning orientation	4.39 (.59)	4.42 (.63)	4.61(.67)	4.52 (.71)	4.56(.67)	4.49 (.70)
Sense of community						
Shared goals and responsibility	3.70 (1.17)	3.99 (1.09)	4.80 (1.21)	4.56 (1.08)	4.55(1.28)	4.44(1.11)
Student-instructor interaction	4.92 (1.50)	5.16 (1.30)	5.67 (1.30)	5.54 (1.24)	5.50(1.38)	5.46(1.26)
Value and interest	4.31 (1.29)	4.79 (1.04)	4.92 (1.34)	4.90 (1.18)	4.78(1.36)	4.87(1.15)
Peer respect	4.41 (1.24)	5.08 (1.14)	5.23 (1.23)	5.11 (1.09)	5.05(1.28)	5.10(1.10)
Emotional connection	4.21 (1.06)	4.05 (1.08)	4.93 (1.18)	4.69 (1.11)	4.76(1.19)	4.55(1.13)
Effort	4.41 (1.60)	5.16 (1.34)	5.14 (1.57)	5.02 (1.47)	4.98(1.60)	5.05(1.44)

Note. The number of participants evaluating online classes and face-to-face classes did not add up to the total of 799 due to three missing values.

Table 2

Descriptive statistics and Pearson's correlation coefficients of the study variables (N = 799)

Variables	Mean	SD	α	1	2	3	4	5	6
1. Team learning orientation	4.53	.67	.69						
2. Shared goals and responsibility	4.51	1.22	.93	.27**					
3. Student-instructor interaction	5.49	1.34	.94	.29**	.48**				
4. Value and interest	4.82	1.28	.91	.24**	.64**	.60**			
5. Peer respect	5.07	1.22	.88	.33**	.70**	.57**	.67**		
6. Emotional connection	4.69	1.17	.66	.23**	.56**	.46**	.54**	.48**	
7. Effort	5.01	1.55	.94	.24**	.39**	.28**	.51**	.44**	.26**

Note. ** $p < .01$. (2-tailed).

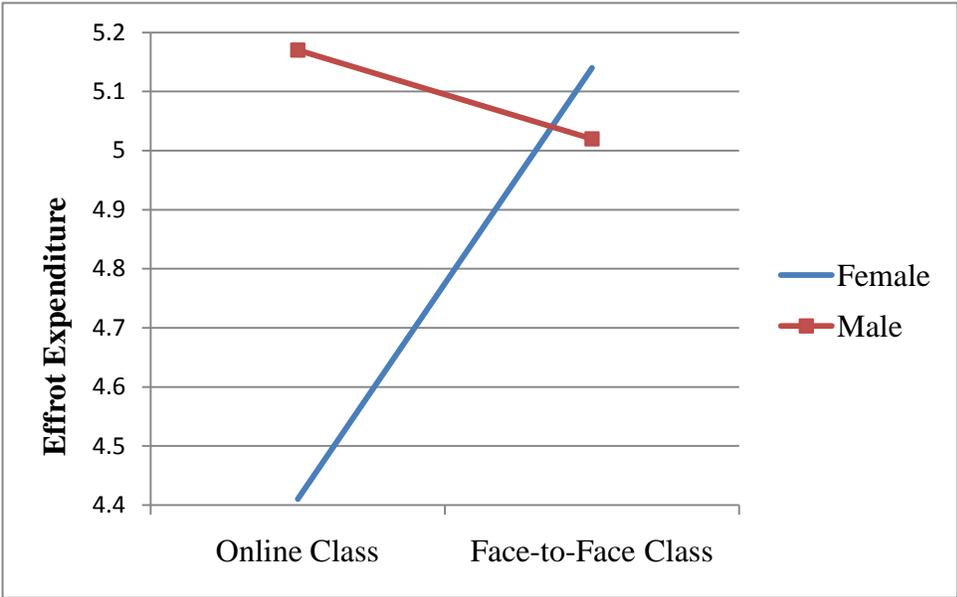


Figure 2. The interaction effect of course delivery format and gender on student effort expenditure

Table 3

Hierarchical Regression Analysis Examining Predictors of Effort

Variable Sets	Standardized Coefficients (Beta)					
	Online			Face-to-Face		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Gender	.23**	.23**	.11	-.04	-.02	-.03
Team Learning Orientation		.20**	.07		.23***	.12**
Sense of Community						
shared goals and responsibility			.06			.04
student-instructor interaction			-.01			-.14**
value and interest			.47***			.43***
peer respect			.10			.17**
emotional connection			-.05			-.05
R^2	.05**	.10***	.37***	.00	.05***	.27***
R^2 change		.05**	.27***		.05***	.22***

Note. N = 799. The variable for gender takes the value of one for female students and two for males.

*** $p < .001$. ** $p < .01$. * $p < .05$.