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Evaluating the efficacy of a hybrid nutrition course offered to on-campus and distance education students

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EVALUATING THE EFFICACY OF A HYBRID NUTRITION COURSE OFFERED TO

ON-CAMPUS AND DISTANCE EDUCATION STUDENTS

by

Mary A. Dimmick

A thesis submitted in partial fulfillment
of the requirements for the degree

of

MASTER OF SCIENCE

in

Nutrition and Food Sciences

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UTAH STATE UNIVERSITY
Logan, Utah

2013

ABSTRACT

Evaluating the Efficacy of a Standardized Hybrid Nutrition Course Offered to

On-Campus and Distance Education Students

by

Mary A. Dimmick, Master of Science

Utah State University, 2013

Major Professor: Dr. Heidi Wengreen
Department: Nutrition Science

The purpose of this research endeavor was to identify and apply effective strategies to

evaluate the efficacy of a university-level general education hybrid nutrition course offered to

distance education and on-campus students. A review of relevant literature indicated that

student engagement levels, student characteristics, and the use of instructional technology are

important to consider when evaluating postsecondary learning environments. Furthermore, the

balance of asynchronous and synchronous learning activities within hybrid learning

environments should be deemed suitable for the subject matter as well as the receiving student

population. Finally, student perceptions and learning outcomes should also be assessed by

hybrid course evaluations.

The study described in this work established that a standardized general education

hybrid nutrition course offered by Utah State University can effectively facilitate learning while

generating positive student perceptions from the majority of enrolled distance education and

on-campus cohorts alike. All course materials were available online, and were supplemented

with weekly, synchronous recitation sessions. Interestingly, the learning outcomes and satisfaction rates of the two student cohorts were similar. However, notable differences in learning preference and performance were identified based on student age alone.

Modifications to subsequent versions of the evaluated hybrid course were made based on the findings of the study. Other instructors and course design teams involved in postsecondary nutrition education may view this project as an outline for their own hybrid course development and evaluation efforts, although, limitations did exist and should be acknowledged. An experimental design exhibiting more control over potential extraneous variables, such as instructor, could offer more concrete evidence than the observational nature of the present study. Also, it appears that students' success levels in a given learning environment are not only influenced by instructional measures, but also by the personal and contextual factors of each individual student. Future evaluative efforts should place a greater emphasis on exhibited learning patterns, educational background, and academic discipline of students within the hybrid learning environment.   Ultimately, the primary challenge of a modern-day hybrid course is to offer a cohesive and effective blend of uniformity, customization, flexibility, and instructional guidance based on anticipated needs of students.

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PUBLIC ABSTRACT

Evaluating the Efficacy of a Standardized Hybrid Nutrition Course Offered to

On-Campus and Distance Education Students

Mary A. Dimmick

A record high number of students enrolled in *The Science and Application of Human Nutrition* (NDFS 1020), during the Spring semester of 2010. With enrollment rates projected to continue to rise, NDFS 1020 faculty recognized that the existing traditional, lecture-based course structure did not allow for further growth of the program if academic integrity was to be upheld. NDFS 1020 was, consequently, transitioned to a hybrid format presenting 2/3 of the course experience online, and the remaining 1/3 in a face-to-face format. Hybrid NDFS 1020 was offered to distance education and on-campus students alike beginning in the Fall semester of 2010. The hybrid design was expected to generate better student learning outcomes and student satisfaction levels despite larger class size.

To ensure the selected combination of face-to-face and online learning elements effectively delivered course content to students, $15, 000 was allocated to fund an extensive evaluation of the new hybrid design.   Data collection occurred Fall of 2010 and Spring of 2011. On average, on-campus and distance education students achieved satisfactory levels of academic performance, and were happy with the course design. Interestingly, though the on-campus students did outperform their distance education counterparts, the latter were generally more satisfied with the hybrid design. This was speculated to be due to differences in life circumstances. Overall, the hybrid NDFS 1020 design may be viewed as an example of an effective, standardized educational experience offered to large, diverse student populations.

ACKNOWLEDGMENTS

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EVALUATING THE EFFICACY OF POSTSECONDARY LEARNING ENVIRONMENTS

OF THE 21st CENTURY

ABSTRACT

The objective of this discussion is to outline effective practices concerning the

evaluation of present-day postsecondary learning environments. Instructors and course

designers in the United States currently face a broad spectrum of exciting, yet perplexing

challenges. While student populations continue to expand and diversify, technologic

advancements continue to augment instructional delivery considerations. Research indicates

that student characteristics, student engagement, and technology use must be considered when

assessing the efficacy of a given learning environment. Increasingly, the efficacies of traditional,

face-to-face as well as fully online learning environments are being questioned. Meanwhile, the

hybrid learning approach appears is emerging as an increasingly viable and advantageous

method of instructional delivery.

INTRODUCTION

The delivery of higher education throughout the United States is transitioning from

traditional, passive lecturing to student-centered active learning.[1,2] This paradigm shift, in part,

is attributed to the following trends: 1) Enrollment rates in postsecondary institutions are

increasing, 2) the education-related expectations of Generation Y are different and much more

demanding relative to previous generations, and 3) the accelerating evolution of online

technology now allows individuals to efficiently obtain a college degree via distance education.

Adaptations must be made to traditional methods of instruction in order to uphold or exceed

existing levels of academic quality as reflected by students' perceptions of learning environments, and evidence (i.e. final grades, exam scores, etc.) that learning objectives are adequately met. The purpose of this discussion is to highlight key considerations, (student characteristics, student engagement, and effective technology use), associated with the development and evaluation of effective, modern-day postsecondary learning environments.

STUDENT CHARACTERISTICS

A primary factor to consider when developing and evaluating learning environments is the defining characteristics of the learners.   Institutions of higher education throughout the nation must now accommodate larger, more diverse student populations than ever before. The United States Department of Education's National Center for Education Statistics reports that undergraduate enrollment in degree-granting institutions increased by over 59% between 1970 and 2010.   By 2021, an additional 12% increase is projected to occur. [3] This trend, in part, is attributed to the following factors: 1) The recent growth of the United States population attributed to increased immigration and birth rates, 2) the nationwide increase in high school graduation rates, and 3) widespread economic recession (i.e. the global economic crisis known as the Great Recession associated with the years 2007 through 2009). [4, 5] In addition, the profile of a typical college student has considerably broadened over the past 4 decades.   Institutions of higher education now serve significantly more females and non-Caucasians students.[6] Meanwhile, student enrollment in fully online, distance education courses is outpacing that of traditional, face-to-face courses, and students 25-years-of-age and older are enrolling at higher rates than younger students.[7] Now, even employed or job-seeking individuals feel pressured to continually update their knowledge, skills, and attitude to stay competitive with expanding workforce competition relating to globalization.[4,5] Consequently, the general commitment level

of postsecondary students is extremely variable, as the number of students who also work, or who are enrolled at part-time status, is rising.[7] Postsecondary learning environments must now be designed to simultaneously appeal to a wider range of learner characteristics. The greatest challenge associated with accomplishing this complex feat centers around meeting the unique needs of both traditional-aged and nontraditional student populations.

**Learning Considerations and Preferences Associated
with Traditional-Aged College Students**

Undergraduate college students who are 23-years-old or younger are generally considered to be the traditional-aged student population. [8]   The defining traits of this student cohort are easily identified upon analysis of the nature of Generation Y, the generation born between 1981 and 1999.[9] Generation Y is described as achieving, confident, and team-oriented, as well as less cynical, more optimistic, and more idealistic than preceding generations. [4, 10, 11] Generation Y students (a.k.a. Millennials) present higher expectations for postsecondary education than earlier generations, and demand an active engaging learning experience.[4] The "easily bored" Millennials expect more from their classroom experience, preferring an active role over the passive style of "learning by lecture". [12] Consequently, it is recommended that instructors provide today's traditional-aged college students with opportunities for initiative, creativity, group work, and decision-making. [4]

Furthermore, Generation Y students prioritize obtaining the skills and degrees required to accomplish ambitious goals over allotting spare time for "educational exploration" and seeking and "enlightening" educational experience. [4]   Therefore, time-consuming assignments will potentially antagonize these students who often are also working and/or participating in extracurricular activities in order to build an impressive resume. [13] However, the educational

principles behind meaningful homework assignments are sound and backed by solid research; instructors should not shy away from the challenge of developing coursework that effectively reinforces active learning experiences while appealing to traditional-aged college students.[4]

Other pertinent characteristics of Millennials include being highly pressured, sheltered by parental guidance and regulations, and conventional.[4,10] This is partially attributed to the objective-driven learning environments fashioned by tight state curricula, mandatory high school course syllabi, and end-of-course tests that Generation Y has grown up with. [4] Thus, to provide Millennials with learning environments in which they may thrive, course structure should be sharply defined and course organization made very clear. Gerber and Wilson (2000) advise that instructors "overestimate" the amount of clarity and straightforwardness the students of today expect from their syllabus.[4] In addition, presenting course materials with simple, organized modules is suggested by multiple researchers.[4, 10, 11, 12] Djamashbi et al. (2011) found that Generation Y student satisfaction increased when online course materials and delivery systems were kept visually basic, with few items per viewing screen. [14]

Furthermore, reducing the amount of content presented on exams is positively viewed by traditional-aged college students.[4] One relevant strategy is to increase the quantity of exams conducted throughout the semester. Myers and Myers (2007) found that students taking exams on a bi-weekly basis performed about 10% higher on exams during the semester, and 15% higher on the cumulative final exam, than other students enrolled in the exact same course provided with only 2 exams (a midterm and the cumulative final.)[15] The researchers speculate that these findings occurred because students in the bi-weekly format had less material to learn for each exam (with the exception of the cumulative final), received earlier and more frequent feedback on their understanding of the subject matter, and felt more competent and confident.

[15] In short, instructional strategies and elements providing students with the ability to address course material in a direct, timely manner should be applied to learning environments developed for traditional-aged college students.

Another important factor instructors and course designers should consider is that the increased pressure to excel experienced by Generation Y students may promote higher levels of cheating. [4] A poll of 12,000 college students in 2002 showed that almost 40% were willing to lie or cheat in order to get into college. [4] This is a critical issue to address, since academic dishonesty in the education system leads to questionable ethics and substandard work habits.[16] Teodorescu et al. (2009) found peer influence to be the most important correlate of cheating, and poor ratings of instruction were linked to academic dishonesty.[16] Therefore, course development teams must put forth effort to minimize opportunities for dishonesty within learning environments. According to Hall (2011) students mainly cheat "because they can." [17]

In conjunction with the use of basic techniques such as spreading students out in a testing room, or providing multiple versions of an exam, improving the quality and relevance of instruction can be a logical step toward reducing cheating behaviors in many colleges and universities.[16] Simple changes in instructor behavior such as being friendly and asking students about their welfare, using more group work, offering praise to reinforce student contributions to the learning environment, and encouraging student participation may positively influence student honesty.[16] Instructors can invite students to assist in honor code development and welcome feedback from students regarding the quality and relevance of courses. Doing so increases student involvement, and thereby, commitment to course structure and regulations. [17]

Finally, employing strategies to reduce student anxiety associated with a learning environment may serve to deter dishonest academic behaviors. For example, traditional-aged

students tend to be technology- savvy and enjoy using online media to learn, thus, providing

learning experiences and activities via online course delivery systems may lower stress levels

associated with learning. [18] Another strategy to reduce student anxiety levels, and,

consequently, to increase student efficacy and satisfaction within a given learning environment,

is to incorporate instructional elements into course organization, delivery, and structure that

help students overcome major weaknesses related to learning and self-regulatory behaviors.

How to address self-regulatory deficits associated
with traditional-aged college students

Though living with high external sources of pressure to excel, Millennials also exhibit

relatively high confidence levels and often overestimate their skill level. Resultantly, a

noteworthy amount of high school graduates are rushed into the realm of higher education

despite lacking fundamental self-regulatory skills.[19] Underdeveloped self-regulation severely

threatens student morale and academic performance. Self-regulatory skills such as time

management, maintaining focus by managing both the environment and other distractions,

setting goals, self-reflection, and delaying gratification have consistently been touted as crucial

to academic success.[20]

By definition, self-regulation of learning entails a learner's self-efficacy and value

concerning academic tasks; tendency to set school-related goals and ability to select appropriate

learning strategies for the presented level of cognitive demand; and propensity to monitor and

evaluate the learning environment, maintain motivation, persist through difficult challenges,

and to deliberate and seek out solutions to overcome confusion or lack of understanding

relating to learning tasks.[20] Not surprisingly, the results of multiple research studies justify the

careful development of course curriculums which effectively promote the usage and growth of self-regulatory skills among Generation Y learners.

In 2009, Kitsantes and Zimmerman [21] conducted a study involving 223 junior college students in an educational psychology course that links increased academic performance to self-regulatory ability. SAT scores significantly (P<.05) predicted the quality of students' homework, self-efficacy for learning, and perceived responsibility associated with the course. This provides evidence that self-efficacy of learning and perceived responsibility of homework may have a noteworthy impact on academic performance.[20] Interestingly, self-efficacy for learning was a better predictor of the college students' grades than perceived responsibility. In contrast, the results of a very similar study conducted by the same researchers in 2005 indicated perceived responsibility was a greater indicator in a high school setting.[22] The researchers speculate this difference is due to the notion that the junior college students would be more likely to assume responsibility for their work compared to high school students. [21, 22] Hence, age and class rank should be considered when learning environments are developed and evaluated. The 2005 study also indicates that homework and self-efficacy predict student GPA in high school as well as the ability to maintain focus and delay gratification. [22]

Another study identifying correlations between self-regulatory abilities and collegiate academic success involved 58 freshmen enrolled in a math course in 2009. [23] Time management accuracy, defined as planned study time minus actual study time, was positively related to math homework completion (r=.43) as well as midterm exam grade (r=.28). The amount of time spent studying math weekly was positively correlated to intrinsic interest, while time spent studying for all classes was positively correlated to math homework completion, delay of gratification, and midterm exam grade. [20, 23] Also, students' grade expectations for the midterm were

positively related to math homework completion, exhibited overall self-regulation, reported

self-efficacy to complete homework, intrinsic interest, midterm exam grade, and final exam

grade. These findings emphasize that students' self-efficacy to learn and master course material

correlates to the amount time they spend on homework tasks, as well as the grades they both

expect and earn. [23] Ultimately, learners are likely to engage in tasks in which they believe they

can succeed; hence, a high self-efficacy is associated with "selection of task, persistence, and

use of learning strategies." [20, 24]

The research studies mentioned in this discussion represent only a small fraction of

what is published correlating the importance of self-regulatory abilities to academic success. It

is firmly established that learners need to set homework goals, select appropriate learning

strategies, maintain motivation, monitor progress and evaluate homework outcomes to achieve

high levels of success. In order for these study skills to be refined and applied, both the learner

and the instructor must be involved. [25] Students regularly engage in multiple maladaptive

homework behaviors such as procrastination, setting unrealistically low expectations and/or

high standards, and permitting parental involvement to cope with homework demands. [25]

Educators may incorporate learning elements into a course design which encourage students to

replace maladaptive study behaviors with productive, efficient, and effective learning

strategies.[25]

Promoting the development of beneficial self-regulatory skills will help Generation Y

students constructively manage school-related stress, and, consequently, enhance learning

environments by increasing student efficacy and satisfaction. According to Van der Meer et al.

(2010), "Although it could be argued that students have the ultimate responsibility to plan their

time and study in an effective way, we argue that universities have an important role to play in

assisting students to develop the required skills." [26] The associated article discusses the findings of a number of research projects investigating students' expectations and experiences in the first year of higher education.[26] By doing so, the review presents significant evidence that universities could and should play a more active role in helping incoming freshmen develop a sense of time management. [26]

It is argued that the first year of a higher education experience is extremely significant in terms of continued enrollment. Thus, providing an educational framework that assists incoming students to develop the skills necessary for a positive experience warrants special consideration by instructors and administrators of higher education. Kantanis (2000) states that the transition into higher education requires time, and expecting first-year students' to transition quickly with no advice or guidelines is a mistake.[27] The results of a study conducted by the United Kingdom Higher Education Academy in 2007 show that first-year students experienced significant levels of frustration relating to managing their time. [28] Not surprisingly, issues of time management and other self-study skills are highlighted in many other studies involving postsecondary education, because independent study loads are drastically increased compared to high school. Haggis (2006) emphasizes that problems with organization of time and study can affect all types of students. [29] Krause and Coates (2008) comment that being able to "manage one's time, study and strategize for success as a student is foundational to success in the first year". [30] Lowe and Cook (2003) reported that 21% of the students at the end of 2 months had experienced greater difficulty with self-directed learning than they expected, whilst one-third reported that they were experiencing at least some difficulties with this. [31]

Van der Meer et al. (2010) also provide suggestions pertaining to what course instructors can to do help students overcome the challenge of managing time in college.[26] For

example, emphasizing the short time frame of college versus high school for most courses was

suggested; persistently reminding students about upcoming due dates during lectures, via email,

and/or utilizing proprietary electronic course management systems; and, finally, directly telling

college students that the first year should be the year they work the hardest, because it will

likely determine what is accomplished and earned in years to follow. One student participant of

the study reports, "It's like almost a mindset that [teachers] need to change."[26]

Beyond time management, the incorporation of meaningful homework assignments into

course curricula can also strongly enhance the development of self-regulatory behavior.[25]

Sayette and Griffin (2011) characterize meaningful assignments as those which promote life

application of school learning, encourage students to include other individuals as well as the

community in the learning process, capitalize on student diversity by utilizing existing

differences collectively as a learning resource, can be personalized to each student, and are up-

to-date.[32] Though altering pedagogy to meet the preferences of Net-savvy students is daunting,

educators are assisted by the fact that Generation Y does indeed value education.

Communication concerns associated with
traditional-aged college students.

Other barriers to effective learning associated with traditional-aged college students

include casual communication patterns, poor professional behavior, shallow professional

reasoning, and difficulty receiving negative feedback .[12] The term "communication" refers to not

only oral, written, and interpersonal skills, but also to problem solving ability, working in a team,

and effectively speaking in front of various audiences. Possessing these skills has been

established as "a minimum threshold for new employee success," and is "directionally linked to

both individual and organization success."[33] This is verified by numerous research efforts

including surveys of chief executive officers and Fortune 500 vice presidents, as well as studies of predictors of employee job and communication satisfaction, sales and investment returns, employee engagement, general financial success, employee turnover rates, and returns to shareholders. [33] Furthermore, due to globalization and increased enrollment numbers, individuals need to be able to effectively communicate across diverse circumstances in terms of gender, age, race, and generation. [5,33] Ironically, in this technological era of cell phones, pagers, email, seemingly endless amounts of personal electronic entertainment, and online social networks, Generation Y students exhibit a general lack of communication skills. [34] Thus, learning environments of today must foster the development of effective communication strategies. [33]

In summary, research concerning traditional-aged college students emphasizes that learning environments should provide meaningful academic tasks, clearly defined learning objectives and expectations, deterrents to academic dishonesty, and learning activities promoting student-student and student-instructor interaction. When possible, instructors should provide traditional-aged students with resources and opportunities to learn and practice self-regulatory skills. The structure of a higher education experience will help shape how individuals approach, engage, and respond to any achievement task, and provide them with invaluable motivational beliefs, such as self-efficacy.[35] Instructors must also embrace the role of a facilitator; there is a need to transform education from a teacher-centered, passive experience to a learner-centered constructivist model. [18] This will be highly associated with the integration of modern information and communication technologies into all facets of the learning process in order to empower teachers and learners alike to generate successful academic outcomes. [18]

It appears that the unique and dominant characteristics of Generation Y generate a new range of both exciting and perplexing considerations for higher education. It is crucial that

institutions of higher education employ strategies to facilitate learning in a manner which allows

Generation Y to utilize innate strengths to trump shortcomings. This challenging task is often

times made even more complex when nontraditional students are required to learn within the

same learning environment as traditional-aged students.

Learning Considerations and Preferences Associated
 with Nontraditional College Students

The nontraditional undergraduate cohort is not as plainly defined as the traditional-aged

cohort. Any student who enrolls in a postsecondary program at age 24 or older, has legal

dependents other than a spouse, does not register for college the same year as graduating high

school, attends college on a part-time basis, is financially independent, and/or works more than

35 hours in a week may be considered a nontraditional college student.[36] Thus, the

characteristics of nontraditional student populations are highly variable. In many situations,

learning considerations and preferences associated with traditional-aged students are also

applicable to nontraditional students. In others, however, major differences arise. This is

particularly apparent in regards to older generations of students.

As mentioned previously, undergraduate enrollment rates of students who are 25-years

and older are now exceeding that of younger students.[7] This trend is particularly attributed to

enrollment in fully online environments, which offer more learning independence to

nontraditional students who are juggling education with other major commitments, such as

family-life and careers.[9] Generation X (born between 1965 and 1980) exhibits traits such as

skepticism, resourcefulness, and self-sufficiency, which are associated with a greater

appreciation of flexible learning environments.[9] In addition, while Generation Y tends to be

motivated by group achievement and peer approval, students of Generation X are more

motivated by improving personal status and prestige.[9] Though Generation X students are typically not as technology-savvy as Generation Y, Generation X grew up with computers and view them as time-saving.   Baby-boomers, born between 1946 and 1964, on the other hand, tend to exhibit a love-hate relationship with technology, and often require more detailed instructions concerning how to participate in computer-based learning environments.[9] Members of this generation also tend to be more apt to do what they are told than Generation X.[9] This indicates that baby boomers may benefit from self-regulatory skill development strategies and clearly defined learning objectives in a manner similar to Generation Y.

Though all generations of students possess unique traits, research indicates that it is possible to employ instructional strategies that effectively facilitate learning in both traditional-aged and nontraditional students. Generally, students of the 21st century want to be recognized as individuals, establish rapport with instructors, participate in group interactions, take on an active role in learning, complete course work applicable to the real world, learn marketable skills, and learn up-to-date information.[37] Instructors should introduce themselves and present a "relatable figure" in order to support positive student interest and comfort level associated with the curriculum. In addition, all students to some extent appreciate flexible, customizable learning environments.[37] Instructors as learning facilitators should model respectful, clear, timely, friendly, and flexible online communication, as well as be proactive communicators, for example, contacting students if they fall behind. [38] Clearly communicating learning objectives and establishing learning environment norms should be common practice.[39]

Results of a study conducted by Stein et al. (2005) indicated that learner satisfaction with course structure (including activities, assignments, and instructor guidance and encouragement) link greater satisfaction with perceived knowledge gained.[40] Interactions

initiated by the learners also contributed to their satisfaction.[40] beyond encouraging

collaboration and interaction, course requirements must be suitably challenging, and a variety

of course material resources should be presented to increase curiosity and creativity. Rather

than focusing on one-dimensional behaviouristic outcomes, allowing mastery of the

environment and of course material is suggested to enhance students' self-efficacy.[18] All of

these elements contribute to a general increase in student commitment to a learning

experience. This is a critical task to accomplish in order to preserve and/or augment the value

of present-day higher education.

STUDENT ENGAGEMENT WITHIN LEARNING ENVIRONMENTS

Educational administrators generally have a favorable view of increased undergraduate

enrollment, because larger classes may result in more cost-effective and standardized

education.[19] In theory, instructor time is used more efficiently, costs per student are lower, and

monetary resources increase. [19] However, in many instances, additional resources to

accommodate greater numbers of students are not acquired at similarly paced rates. [19]

Challenges associated with large enrollment classes include but are not limited to, instructor

discomfort, physical space limitations, and decreased levels of student-student and student-

teacher interaction. Furthermore, limited instructional delivery options are applicable to highly

populated classrooms. [19] These issues are believed to contribute to the progressively increasing

absenteeism rates since the 1990s. [41] Meanwhile, though course design teams often utilize

advanced educational technologies and online learning systems in attempt to alleviate

instructional problems associated with large class size, high attrition rates are being observed in

fully online courses.[42] It appears that keeping 21st century students engaged in and committed

to flexible learning environments is a central challenge of present-day course development. The

principles of active learning theories such as sociocultural learning theory, constructivism, and

adult learning theory are therefore often incorporated into course curriculums. [43]

Sociocultural learning theory is influenced by the work of Lev Vygotsky who asserted

that learning is embedded within social events, and social interaction plays a fundamental role

in the improvement of learning. [5] This theory supports the notion that in human development,

higher order functions grow out of socialization, and the external, physical environment in

which learning takes place has a profound impact on acquisition, retention, and application of

knowledge.[5, 43, 44]   Vygotsky's theory introduced the concept of zone proximal development

(ZPD), or the difference between what a student can learn alone and what he/she can learn with

the assistance of outside sources which function as part of a figurative scaffolding system

supporting cognition growth.[5] Instructors are viewed as a foundational scaffolding element

involved in escalating students' abilities to learn. (In other words, instructors teach students to

eventually become independent thinkers). Other vital elements in the scaffolding system may

be more knowledgeable peers, or learning resources provided to the students which promote

learning a given subject matter or skill set.[5] Essentially, students use such "scaffolds" as

temporary support structures to build on existing knowledge and internalize new information

until concepts are mastered, and independent learners are fashioned. [43, 44]

Instructors in a learning environment which embraces Vygotsky's theory, act as a

motivator to encourage divergent, yet applicable questions, and to develop student critical

thinking. Resultantly, students' independent and reflective thinking skills will likely be improved.

This issue is providing significant momentum to the paradigm shift in higher education as larger

face-to-face class sizes and fully computer-mediated educational environments potentially

threaten the incorporation of valuable interaction into course design. In addition, student

engagement has been shown to be higher in student-centered active learning environments.[45]

Hence, learning environments based on a sociocultural paradigm appear increasingly helpful

and applicable for situations where traditional and nontraditional students are meshed in the

same learning environment.

Pedagogy is commonly defined as the art and science of *teaching children*. Andragogy is

commonly defined as the art and science of *helping adults learn*.[5] Traditional higher education

learning approaches tend to embrace a pedagogical teaching paradigm, which extends the

assumption that a student, regardless of age, lacks relevant knowledge and will "remain passive

while the instructor dispenses a monologue about the subject matter at hand." [5] The latter

approach is associated with instructor frustration when lecture content delivery does not

appear to achieve crucial transfer of learning.[5]   Passive instructional approaches also do not

equip student with skills and competencies to function in a rapidly changing world, or

adequately engage adult learners in the learning experience to deter high dropout rates. [5, 45, 46]

Strategically facilitated active learning experiences utilizing student-student and student-

instructor interaction appear to encourage young, on-campus students lacking self-regulatory

skills, to become self-directed and motivated learners when appropriate "scaffolds" are

placed.[47]   Meanwhile, the pedagogical paradigm is declared a major reason why nontraditional

students exhibit higher attrition rates than traditional students, indicating andragogical methods

are more appropriate in higher education.[43, 46]

Smyth (2011) highlights the ability of adult learning theory to support thinking and

reflection in real-time, which consequently promote more powerful learning via critical

dialogue. [46] Adult learning theory is built upon the principle that both learners and prior

knowledge are valued by increasing responsibility and control of learning to learners.[48] This does

not imply that students are required to independently learn information. Instead, consistent

with sociocultural learning theory, the instructor becomes the facilitator whose responsibility is

to create a climate to cultivate collaborative learning; this emphasizes the notion that adult

learning theory is not advocating unstructured discovery learning, but instead is reinforcing ZPD

and the scaffolding model. [5, 46] Students will acquire metacognitive skills from instructors, as well

as peers and the local culture.[46,48] Collaborative learning, role, play and self-evaluation are

examples of strategies that may be expected to support a successful learning environment in

higher education settings. Instructors do not simply teach, but work with learners to promote

learner-learner collaboration and knowledge retention; both the instructor and the learners are

participants in the learning process and a sense of community is created.[44, 46, 47, 48]

Collaborative learning is based on the learner-centered approaches of sociocultural

learning theories, and has been shown to provide learners with more effective learning

opportunities. [48] For example, Wang et al. (2007) highlights research indicating collaborative

learning and community learning increases a learner's performance level, as learning is

enhanced when knowledge is shaped by the activities and perspectives of the group.[44] Jung et

al. (2002) found statistically significant (P< .05) improvements in learning satisfaction, academic

achievement and student participation when social interaction, (occurring between learners and

instructors to increase interpersonal encouragement or social integration), and collaborative

interaction, (group of learners sharing ideas and materials to solve a given problem), was

emphasized in online course structure versus academic interaction, (interaction between

learners and learning resources and task-orientated interaction between learners and

instructors).[49] Such findings support the view that developing a community of learners will likely

be more effective in teaching adult learners relative to relying solely on text-based, computer-

mediated communication when students are learning simultaneously in different settings, or for sizable on-campus classes.   In many instances, providing guided interactive experiences to facilitate knowledge gain is challenging in the latter situations. However, institutions of higher education throughout the nation are working to overcome these challenges to improve learning environments as a constructivist movement catches steam throughout academia.[5]

Constructivism stems from cognitive learning theory and may be described as a focus on the *process* of learning.[5, 44, 45] To the constructivist, "knowledge is not simply out here to be attained; it is constructed by the learner."[5] Constructivism rejects behaviorism in its tendencies to solely rely on overt individual behaviors to explain changes in learning which are assumed to occur passively.[44] Hence, cognitive structure creation and higher order skill development (such as problem solving and the development of insights) are key as well as student involvement in learning and self-direction in his/her own development within a collaborative enterprise.[45] Social constructivism specifically purports that social encounters influence learners' meaning and understanding.[44, 45, 48] Thereby, an instructor's objective is to achieve, an egalitarian relationship with students regarding learning objectives, not necessarily professional parity with his or her students.[44, 48] Students' needs, knowledge and experiences, therefore, should largely dictate what form, structure, and content of the curriculum will be. Course curriculum and organization must create a classroom attitude of mutuality between teachers and students as joint investigators while sustaining satisfactory learning outcomes and high levels of student satisfaction. Accomplishing this is now typically possible with effective application of technology to learning environments.

EFFECTIVE USE OF TECHNOLOGY WITHIN LEARNING ENVIRONMENTS

      As our society has transitioned from agrarian to industrial, technology has progressively

become foundational to many aspects of daily living, including formal learning. [50] In many ways,

academia is greatly benefitted by the technology-driven shaping of today's instructional tool

box. The incorporation of technological components into learning environments, however,

must be done methodically and with thorough evaluation to ensure core academic principles

are upheld. Amidst all the technological 'bells and whistles', academic integrity and quality in

higher education must be closely guarded as instructional delivery is dynamically altered.

      Since 1995, computer-mediated education has evolved from computer-based training to

fully online learning environments.[50] Students' educational experiences can now range

anywhere from simply technology-enhanced to entirely virtual. Instructional designers and

instructors can apply any number of a plethora of technology-based educational apparatuses to

course organization, structure, and delivery. It is apparent that online course

management/delivery systems and online communication tools have changed the face of

education.[51] Modern-day technologies instill an "anywhere-and-anytime learning environment

into higher education that enables instructors to deliver a course asynchronously,

synchronously, or through a combination of the two."[51] As a result, students who were

previously unable to attend traditional college classes due to any number of living

circumstances, now have convenient access to higher education available to them. The

emergence of viable distance education due to technological advance is a major contributor to

fluxes in postsecondary student enrollment, and represents yet another unquestionable case of

why methods of instructional delivery are being altered.

      In a pioneer discussion of using technology as an instructional lever, Chickering and

Ehrmann declare that course instructors can integrate educational technologies successfully when logical outcomes are in-line with the following 7 principles regardless of instructional delivery method. Technologies implemented in learning environments should 1) encourage communication between students and faculty, 2) promote interaction and cooperation among students, 3) incorporate active learning techniques, 4) provide for prompt feedback, 5) emphasize time on task, 6) communicate high expectations, and 7) respect diverse talents and ways of learning.[52] A carefully designed and well implemented technology-enhanced experience can provide students with faster access to information, opportunities to use multimedia environments to reach peers and educators, and content reinforcement.[53] Saba (1997) states that "technologies of the information age have the potential to bring education to each person by allowing individuals to take more responsibility for their learning and achieve independence of thought and action'' describing technology-based teaching and learning processes as more learner-centered, rather than teacher-centered; "case-based, rather than content-based; contextualized, rather than abstract; and democratic rather than elitist."[53]   Lessons learned from early application of online-based instructional design theories also show that the focus of course design should be on customization, not standardization of learning experiences. [1]

Learning how to use new forms of technology takes time; most new applications of technology are more complex and may require new infrastructure, such as greater memory or bandwidth.[54] Instructors often will both require and benefit from new technology training, as well as students. Furthermore, it is suggested that an evaluation of the use or potential use of technology in learning environments should include the following 4 questions: [47] Is it being used? How well is it being used? What factors are affecting its use/nonuse? What are the outcomes?   Due to the broad variance of student commitment levels to university studies, both

the diverse backgrounds and varying circumstances of all student-types need to be

acknowledged in the organization of learning environments and associated student support

systems. [26] Current research generally argues in favor of institutional responsibility for helping

students adapt to the higher education setting. Van der Meer (2010) adds that this does not

mean that the first year of college should be without intellectual challenge, "universities and

academics have a responsibility to respond to the problematic nature of the transition process,

especially in the face of the wider range of student abilities and experiences following the rapid

expansion of the higher education system."[26] It is also declared that "the central problem for

teaching and learning in the face of increasing diversity in the student population is that of

aligning institutional goals with individual needs."[55]   Beldarrain (2006) recommends that

cultural diversity, learning preference, and ability level are just a few of the many issues that

validate the need for a learner-focused system.[55] Therefore, the integration of emerging

technologies into new models of teaching must take all of these issues into heavy consideration.

By doing so, each learner's unique needs become the center of attention in a technology-

enhanced or online learning environment. Moreover, the 21st century learner now requires

educational opportunities not bound by time or place, which allow interaction with the

instructor and peers.[55]

Collaboration in online learning environments allows learners to practice real-world

skills that are applicable to the workplace.[56] Meanwhile, new technological tools promise to

create a stronger learning community where members can build expertise and develop

problem-solving skills. Utilizing technology which brings students and instructors to the same

discussion and/or real-time experience to address concerning school-related issues can limit

student anxiety and increase motivation.[57] Student motivation has been cited as one of the most

important components of learning in any education environment, and is considered as one of

the best determining factors of academic success. Particularly in online classroom

environments, motivating students has historically been difficult, resulting in high attrition rates

due to students feeling lost or frustrated.[57]   The efforts of instructors who pay close attention

to community-building have been shown to decrease feelings of social isolation and enhance

student satisfaction, particularly in distance education environments.[19]

Bottom-line, constructing technology-enhanced or fully online learning environments

must be detail-orientated and based on theoretically sound principles. Failure to do so could

threaten student collaboration, motivation, and skill development for the workplace, thereby,

threaten the quality and value of higher education.   It is inevitable that the demand for online

and distance education will only continue to grow. The ever-evolving nature of technology will

continue to drive educators to use new tools to create learning environments that will prepare

students to be life-long learners who can problem solve using collaboration.[55] Though being

aware of various technologies and exploring the abilities of new media is required to effectively

develop and instruct an online or technology-based course, it is also vital to understand how

learning will occur in a given learning environment.[54]

Rather than presenting technology as the center of a learning experience, technology

should simply be used to support and enhance learning. Students should be spending the

majority of their time learning course subject matter, not trying to be trained to use or being

distracted by instructional media. While numerous research findings indicate that integrating

technology into instruction certainly improves flexibility and customizable access to information,

improved learning is certainly not guaranteed with technology usage. In fact, technology will

likely hinder, not support the learning process when not applied in an appropriate manner with

applicable methods.[54] A review of 355 comparative research studies in distance education argues that there is no compelling evidence to support the notion that technology improves learning at all.[1] Meanwhile, while some technology-centered programs effectively solved problems relating to insufficient resources to accommodate larger student populations, in the long term, much additional technical and logistic support was required. This was associated with additional cost to the institutions, and could not meet all student and academic demands.[1] Thus, regardless of the potential promise of any technologic innovation, specialized effort is needed to assure widespread and effective use.[54]

The potential benefits of instructional technology seem to outweigh the time, effort, and energy required to select, implement and evaluate different innovations. Changes in society intellectually, socially and culturally is demanding that learners acquire a new set of skills to accommodate corresponding knowledge gains.[5, 18] Providing such skills should be a high priority in higher education curriculums of the day.[18] Teachers must adapt to inevitable changes through a process of upgrading their own skills to empower them to become better facilitators; by doing so they are able to unleash the innate potential of the learners entrusted to them.[18]

Technological evolution has generated more channels of communication and information dissemination between instructors and students. This is advantageous as instructors are now faced with effectively and efficiently delivering course content in a manner which simultaneously engages and appeals to traditional on-campus and nontraditional distance learners utilizing the right selection of up-to-date technologies. Interestingly, though the importance of collaboration, interaction, and active learning in higher education has been solidly established by research, these elements are have generally been found to be challenging to

apply to online learning environments and on-campus courses overflowing with quantities of students outmatching instructional resources.

In recent years, the hybrid learning approach has emerged as one of the most promising solutions for upholding academic quality of higher education throughout the nation in the face of expanding and increasingly diverse student populations while embracing the learner-centered, constructivist principles of the momentous didactic paradigm shift.

HYBRID LEARNING: A GOOD FIT FOR MODERN-DAY EDUCATION?

The paradigm shift occurring in academia is associated with many opportunities to enhance and expand the learning experience. New instructional delivery methods must be adapted to fit the needs of each unique learning environment as determined by subject matter, learning objectives, and the receiving student population. Pivotal questions to ask when addressing current trends in higher education include but are not limited to the following: How can instructors utilize technological advances in order to intrigue and effectively deliver information to a growing and increasingly diverse student population? How can instruction be designed in order to ensure distance education students are receiving an education comparable to that of students attending on-campus courses? Can course objectives be met upholding or exceeding the same standards without traditional passive lectures providing the foundation of the educational experience? What about student satisfaction? Will learning outcomes remain the same when emerging, learner-centered principles are fully implemented? A review of relevant literature leads to the conclusion that acceptable answers to these questions may lie within the hybrid learning approach. Currently, this approach appears to be providing many institutions of a higher education with an effective solution to maintain academic integrity while appealing to augmenting and diversifying student populations.

The purpose of the research described in this paper was to identify and evaluate instructional delivery and course design practices which can be effectively scaled up to larger, more disparate groups of students enrolled in a hybrid general nutrition education course, The Science and Application of Human Nutrition (NDFS 1020), at Utah State University (USU). Bearing in mind relevant research findings, and confidently expecting consistent rises in distance education and on-campus NDFS 1020 enrollment, the Nutrition, Dietetics, and Food Science (NDFS) department at USU elected to redesign and standardize the course delivery using a hybrid format.

The hybrid design was applied to the course beginning in fall 2010. Though the new hybrid design differed significantly from the traditional course design of 3 face-to-face lectures with one section of 300-500 students and some online material, it was predicted to fulfill the same course objectives, and to be associated with comparable levels of student satisfaction and academic performance in on-campus and distance education sections. In order to evaluate this hypothesis, data was collected throughout the fall semester of 2010 and spring semester of 2011 to answer the following questions: 1) Does the selected blend of asynchronous and synchronous elements appear to effectively facilitate learning? 2) Does the hybrid design adequately fulfill course objectives? 3) What do students perceive as the pros and cons of the hybrid NDFS 1020 design? 4) Is the hybrid design applicable to both distance education and on-campus sections?

Prior to data collection, a literature review on the hybrid learning approach was performed and key concepts will be discussed in the following chapter.   A detailed discussion of the research procedures and findings of this endeavor will then be provided in later chapters and may provide professionals involved in hybrid nutrition course design and implementation

with valuable insight concerning how to effectively blend available online and face-to-face elements to create a successful, standardized learning experience for both on-campus and distance education students.

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CHAPTER II

THE HYBRID LEARNING APPROACH

ABSTRACT

The following discussion defines the hybrid learning approach and explores its

application and value in a variety of higher education settings.   A review of germane literature

indicated that hybrid learning represents a promising solution for the emerging challenges in

academia related to increasing enrollment and student diversity. Successful hybrid course

structures identified during the literature review incorporated a combination of asynchronous

and synchronous learning elements that generated optimal levels of flexibility, motivation, and

interaction within the learning environment.   Currently, a shortage in studies evaluating the

effectiveness of hybrid nutrition education exists. Researchers called for this gap to be filled as

hybrid learning will likely continue to play a central role in shaping the future of higher

education.

HISTORICAL BACKGROUND: THE EVOLUTION OF INSTRUCTIONAL DELIVERY

The materialization of the Second Industrial Revolution in the 19th century sparked a

streak of technological advancement which continues to shape instructional delivery methods

and learning environments of the present day.[1] The momentous progression and production of

technology began to increase both the availability of opportunities to participate in higher

education, as well as the need for individuals to obtain a formal education. Consequently, the

figurative dawn of distance education programs occurred circa 1840, when university-level

programs began to be offered to the remote, rural populations of the time. [1,2]

The original form of distance education was correspondence courses.   Correspondence

courses involved the exchange of instructional materials and feedback between educators and students who were geographically remote from each other.[1] Students submitted and completed assignments via the mail delivery system, and took exams in local, designated proctored environments.[1] The constraint of physical location associated with educational exchange was thereby overcome, and correspondence courses became a staple to academic development throughout the latter half of the 19th century as American society transitioned from agrarian to industrial.[2] Notably, in 1892, the University of Chicago established the first official university-based distance education program, with the primary purpose of educating farmers and farmers' children in order to support the economic structure of the state. The curriculum and organization models used to accomplish this were quickly employed by several other universities. Consequently, conventional correspondence courses grew in popularity up until technological advancements of the 20th century enticed academia.[2]

Originally, interaction between educators and students was very difficult, or even impossible to achieve.[1] Since correspondence courses relied on the traditional mail delivery system, the rate of instructional delivery was slow and limited. The emergence of early broadcasting technologies, (i.e. radio), consequently sparked interested within academia, as institutions of higher education began to explore the usage of such to create more timely and engaging distance education learning environments. In 1922, Penn State College broadcasted courses over the radio, and in 1925, University of Iowa offered 5 radio courses for credit. A year later, the National Home Study Council was created by reputable correspondence schools to ensure the quality of distance education was upheld by the institutions using new broadcasting technologies as instructional media. Almost a decade later, University of Iowa became the first to use television within classrooms, introducing a seemingly all-encompassing answer to the

educational challenges of the day.[2] However, research indicated that formal learning in distance

education environments required a fairly high degree of self-motivation, self-direction, and self-

discipline.[1] In addition, encouraging higher levels of interaction within distance learning

environments was deemed crucial to academic success by research efforts, warranting skeptical

beliefs towards the use of broadcast television as the primary distance education instructional

media.[2,3] Between approximately 1950 and 1990, distance education made a prominent

transition from the traditional correspondence concept enhanced with technology, to full-scale

technology-enabled as educators aimed to promote interaction as well as to provide effective

external guidance and motivation for learners.

Technology-Enabled Learning in the 20th Century

Various emerging information and communications technologies (ICTs), such as satellite

communication, cable, audio tapes, audio graphics, and audio conferencing, were incorporated

into the higher education system during the last half of the 20th century. For example, in 1978,

email and computer bulletin board systems were commonly used to bring a better interpersonal

experience to the manner by which distance education was managed. In 1983 and 1984, the

Electronic University Network offered its first fully online courses using propriety software for

DOS and *Commodore 64* computers, and the National Technological University opened, touting

videotape and satellite graduate engineering course.[2] Later, in 1986, Pennsylvania State

University began offering computer-based courses with audio-conferencing through its Adult

Education program; by 1989, these courses were offered internationally.   Clearly, with

technological advancement, the concept of nontraditional and distance education learning

progressively became more appealing and attainable.[2] The surfacing of the World Wide Web

quickly expanded the allure of educational possibilities available through technology.[3] By 1990, the traditional American classroom was officially declared as "going online." [1]

Online education effectively overcame not only the constraint of place, like the correspondence courses of the 19th century, but also of time in learning environments.[1] In, 1993 significant grants from the Alfred P. Sloan Foundation were being offered to develop asynchronous learning networks.[2] By 1995, online learning had become the centerpiece of technology-enabled learning, and was supported by other forms of relatively advanced technology such as electronic whiteboards, video tapes, DVDs, iPods, and video conferencing.[2,3] These mediums opened up entirely new and unexplored avenues for student collaboration. Students at schools in one state were able to interact with students in other states and, in some cases, students in other countries.[1,2]   Nearing the year 2000, the concept of virtual learning became an increasingly viable, popular option, with wholly virtual universities being opened.[2]

The Hybrid Learning Approach in the 21st Century:
 "Optimize the technology without sacrificing
 instructional quality…"[3] – (USDLA)

Over the past decade, the online delivery format has continued to evolve, and considerably so, as search engines, blogs, podcasts, Web 2.0 applications, and virtual worlds are being developed and employed as instructional media.[2,3] In 2005, 3.2 million students were enrolled in at least one online course in the United States, and in 2006, 11,200 college level programs in the USA were designed to be completed solely through distanced education.[2] Furthermore, online classroom management software has been applied to the majority of college settings.[4]

As a result of the technology-driven evolution of instructional delivery, instructors and course designers of today aiming to create effective learning environments are presented with a

multitude of options. On one end of the learning experience continuum is live interaction.

Delivery systems such as satellite teleconferencing, compressed video, audio-teleconferencing,

or telephone instruction have been noted to effectively mimic face-to-face instruction by

providing real-time interaction between instructor and student when employed correctly.[1] As a

result, distance education has relatively recently evolved from basic enrollment in computer-

and online-based courses to entirely virtual learning environments that support online

collaboration taught by both live and virtual instructors. [1,2,3]

On the other end of the continuum lies, self-paced course content, which is entirely

devoid of live interaction or real-time communication. When offered via online and/or

computer-based course management systems, this has provided face-to-face learning

environments with timely flexibility. Technological advancement has markedly opened the

channel for the customizable power of independent study and the standardized immediacy of

face-to-face instruction to unite in one learning environment. The primary challenge faced by

academia is now to harness this revolutionary potential to maximize the effectiveness, value,

and efficiency of present day learning environments. In 2008, the United States Distance

Learning Association (USDLA) declared:

 Change is inevitable, and tomorrow will bring newer and better technologies, accompanied by a
new set of challenges, but the goal is the same: Optimize the technology without sacrificing
instructional quality. In the end, incorporating sound instructional design principles will provide
for a solid foundation to ensure learning outcomes are attained. [3]

As educators and researchers throughout the United States work to provide a growing

number of increasingly diverse 21st century students with satisfactory and effective learning

environments, a fundamental paradigm shift is occurring in higher education. The effectiveness

of traditional, passive instructional delivery methods is increasingly being questioned.[4]

Meanwhile, although online learning environments overcome the time and place constraints

associated with face-to-face learning environments, questions have been raised concerning

neoliberal motivations driving the implementation of online and/or technology-based learning

simply as a means of cost reduction, with little concern for the implicit academic consequences

of technological instructional media.[5] In order to uphold and protect the value of obtaining

postsecondary education in the United States, these issues associated with traditional and

online environments must be addressed in a timely, cost-effective manner.

Institutions of higher education are progressively turning to the hybrid learning

approach, as the notion that including both modern, technology-based and traditional, face-to-

face instruction into course design may optimize learning environments is being consistently

reinforced by research.[5] While the enrollment rate in fully online courses is higher than that of

traditional, face-to-face courses, the growth rate of hybrid courses is exceeding that of fully

online courses.[4,6] The hybrid learning approach will consequently play a considerable role in

shaping the future of higher education.[4]

HYBRID LEARNING: DEFININTION AND CONSIDERATIONS

Hybrid learning is generally defined as the tactical combining of face-to-face interaction

with online, self-paced learning.[3] As an instructional delivery method, it is considered by

researchers as the "most prominent" education solution for the unique didactical challenges of

the present day.[7] Hybrid learning approaches can merge the most advantageous aspects of

online and traditional, face-to-face learning environments in a manner that accommodates a

highly diverse range of 21st century learners.[8] The degree to which learning tools and elements

from each environment may be "blended" to provide a cost effective solution that upholds

academic integrity varies from discipline to discipline, being heavily determined by the nature of

course content and associated course objectives.[7] The development of hybrid courses,

therefore, requires great attention to detail by course instructors and designers, and application

thereof must be continuously evaluated to ensure maintenance of instructional quality and

student satisfaction levels.[9] Despite the time and energy required to convert fully face-to-face

or online learning environments to hybrid, reputable research findings overwhelmingly support

the notion that hybrid learning has evolved to an echelon worthy of the effort required to apply

it to higher education programs throughout the nation.[6]

Combining Asynchronous and Synchronous Methods
in Hybrid Environments to Optimize Learning

Hybrid learning requires that both asynchronous and synchronous instructional delivery

methods be utilized by instructors.[6] Asynchronous instruction (delivered at a different time

than which learning takes placed) is highly associated with fully online courses. For example,

instructors record their lectures and upload audio files to an online course management

program for students to access and listen to at their own convenience. In contrast, synchronous

instruction is administered at the same time learning takes place, representing the primary form

of instructional delivery used for traditional, lecture-based courses.[4,6] Asynchronous and

synchronous instruction exhibit unique didactical advantages and challenges. Since these

methods are virtually opposites, it is reasonable to hypothesize that tactically applying elements

of each to a single course design will permit the combined strengths to offset weaknesses, and

thereby create an optimal learning environment. Up-to-date research efforts pertaining to

hybrid course development consistently pinpoint learner flexibility, motivation, and interaction

as key factors to consider when selecting the balance of asynchronous and synchronous

instructional medium within a learning environment.

Flexibility, motivation, and interaction

Applying asynchronous instructional media and elements to course design provides students with more flexibility and control over where and when to participate in their formal educational experience.[10,11] Flexibility allows time-constrained students to complete courses while juggling many other facets of life, such as careers, jobs, families, and health conditions.[12] Asynchronous aspects of courses also allow instructors to provide in-depth reviews of pre-requisite knowledge and skills required by the course, while leaving any synchronous experiences, such as lectures, to present and discuss new content to learners.[11] Doing so allows students lacking recent exposure to pre-requisite knowledge to review without limiting the amount of time that students not requiring a review have to be advanced through the new course content. In this sense, the flexibility provided by asynchronous learning activities, resources, and tools, allows students to customize their learning experience to fit their individual learning needs.[13] Asynchronous approaches have also been deemed more suitable than synchronous approaches to promote learners' cognitive participation in complex issue discussions, because more time for deep thought and reflection is provided than in real-time situations.[14] Research also documents that many students feel more comfortable and apt to ask questions via an asynchronous channel, because the risk of peer judgment is not looming as in a face-to-face environment.[7]

Furthermore, technological advancement has provided course instructors with flexibility concerning the dissemination of course materials and information to students. Instructors of large, face-to-face courses have historically been limited to passive lecturing for instructional delivery, while instructors of fully online courses have been limited to asynchronous presentation and mediation of learning materials. In contrast, instructors of hybrid courses may

employ any available combination of a vast array of both synchronous and asynchronous online educational technologies such as email, podcasts, instant messaging, wikis, blogs, discussion boards, and computer-based self-study tools.[15] Strategic employment of technologies such as these equate to more resource-efficient channels to assemble, deliver, disseminate course material, and serve to support a student-centered environment. Thus, the hybrid learning approach provides instructors with the ability to offer a uniform, yet customizable experience to students while acting as facilitators of knowledge, instead of the primary resource of content-related information.[13] All students enrolled in a hybrid course should theoretically have some degree of individualized control over their learning experience while simultaneously experiencing comparable content flow and knowledge scaffolding as other students in the same course. The flexible nature of the hybrid approach allows students to obtain knowledge in a manner that complements their unique learning styles, which has been noted to spur greater motivation to excel.[13,16] This often times can only be true, however, if a harmonious balance of flexibility and instructional guidance is created through course design.

Research illustrates that a sharp increase in absenteeism rates for lecture sessions of technology-enhanced on-campus courses has occurred ever since the 1990s.[17] This trend, which corresponds with the marked increase in the use of information and communication technologies (ICTs) in higher education, makes it apparent that students might be losing interest in their courses when flexibility is not paired with student motivation and engagement within a course.[17] Despite the increased learning possibilities and autonomy created by ICT-tools, recent findings in research on technology-enhanced classroom learning indicate that not all learners are able to successfully learn in online settings. Students' contributions to course activities differ substantially in online settings. This observation is likely related to the fact that a self-paced

learning environment places a great deal more responsibility on the student to learn course content, and requires a notable level of self-discipline and self-regulation. [17]

An elevated level of learner responsibility to complete coursework has contributed to high dropout rates in fully online courses, a trend which is speculated to be related to students underestimating the time and effort it takes to successfully complete their coursework, as well as a general lack of accountability and persistence in the course.[13] Other researchers note that students who dropped online courses exhibit feelings of isolation and frustration, and/or a reduction of interest in the subject matter.[18] Additionally, while instructors of fully online courses note problems with engaging students due to distance restraints and the interaction limitations, Cohen et al.[19] found that the relaxed online learning experience did not appeal to younger students and students with low grade point averages, and a more guided learning experience may benefit on-campus students entering college lacking self-regulatory skills. Another major issue to consider involving asynchronous online learning is that students are more prone to participate in dishonest academic activities, such as having a peer complete coursework and/or using extra learning materials against course policy. [10] Instructors aiming to optimize a learning experience for a diverse group of learners via a hybrid learning approach must consider how to motivate students with course guidance and interaction while leaving a reasonable amount of course flexibility intact.

Rientes et al.[18] highlight recent research efforts concerning Self-Determination Theory (SDT) in higher education which illustrate that instructors who install more structure, guidance and scaffolding into course design *in addition to* providing learners with active-control of their learning experience, can positively influence students' engagement levels. SDT concerns social and environmental factors that either promote or deter intrinsic motivation. Intrinsically

motivated students possess a drive to learn based on "the satisfaction and pleasure of the activity of learning itself."[18] These learners are self-directed and enjoy setting their own learning goals and determining their own learning actions. On the other hand, naturally extrinsically motivated students tend to participate in learning primarily to complete the course and earn a grade. Learning becomes simply a means to an end. SDT proposes that intrinsic motivation can be promoted and facilitated in both types of students via course design. To engage extrinsically motivated students while allowing already intrinsically motivated students to thrive within a learning environment, instructors of hybrid courses must provide opportunities for interaction, collaborative learning, and scaffolding, at the same time as allowing for independent learning efforts.   Rientes et al.[18] note that several researchers have found that technology-enhanced learning environments only provide a powerful learning environment if participants are able to actively contribute to discourse and co-construct knowledge together. Therefore, a crucial question is whether or not a hybrid learning environment can be designed to prompt learning in a manner that encourages both independent and control-oriented learners to actively participate. The ultimate goal of achieving a beneficial balance is to maximize feeling of competence and sense of relatedness in all types of learners to increase student motivation and engagement. [18]

A study comparing student experiences in an online, fully asynchronous and online course utilizing synchronous online technologies, such as *Live, Interwise, Wimba Live Classroom*, etc., suggests that students prefer the online environment enhanced with synchronous learning experiences. Students especially appreciated the immediate access to the instructor in order to ask questions and receive answers. [20] Researchers speculate this is due to the fact that synchronous learning can promote students' personal participation. Real-time communication

mimics an actual conversation compared with asynchronous communication, and students will become more motivated as they develop a sense of belonging when interacting with instructors and peers. Students are also likely to be more attentive in synchronous environments that encourage discussion and active participation, as there is not much time to formulate responses to the statements of instructors or fellow students. [15] Indeed, the provision of face-to-face interaction opportunities via synchronous online technologies can create a more interactive and engaging learning experience for students. However, this effect is diminished if attendance is not required and/or reflected in assessment question banks. [17] Synchronous instructional elements like live, scheduled group presentations and lectures, as well as timed, supervised exams, obviously limit the flexibility offered to students. This has been associated with increased stress levels for students, most notably, nontraditional students. Overall, research indicates that students place a high value on both flexibility and interaction within a learning environment.

In short, the hybrid learning approach may be utilized to create a highly satisfactory and effective learning experience for today's various learners from multiple backgrounds via combining the advantages of asynchronous, fully online and synchronous, traditional lecture-based learning environments in a manner that counteracts the weaknesses of each. Instructors must identify effective strategies to reconcile uniform learning experiences with customizable learning envionrments.[14] A key consideration in accomplishing such is the level of self-regulation, self-reflection, and self-monitoring abilities occurring in different student populations. Another consideration is the dissimilarities between subject matters; some subject matters may be more successfully delivered in hybrid format than others. The development of hybrid courses, therefore, requires great attention to detail by course developers and designers,

and must be continually evaluated to uphold acceptable levels of academic integrity and student satisfaction.

IMPLEMENTATION AND EVALUATION OF THE HYBRID LEARNING APPROACH

The potential value and applicability of the hybrid learning approach in today's academic society is readily established. In fact, hybrid learning may be viewed as a central manifestation of the fundamental paradigm shift occurring throughout academia. The traditional notions of what it means to teach and learn are being challenged.   Due to the magnitude of irrefutably occurring changes, the development of a hybrid learning environments should be theoretically sound. Evaluations thereof must be extremely thorough, as the academic integrity of future higher education programs is at stake.

Creating an effective hybrid learning environment is a very complex task requiring multiple "cultures of expertise" (i.e. design and academic), selections from daunting amounts of both asynchronous and synchronous options, and provision to the most diverse student populations in history. [12] Beyond learning outcomes (class academic performance), specific aspects to consider during hybrid course development and evaluation include attendance and active participation in face-to-face actives, hours of personal study, engagement level with discipline being studied, collaborative and more informal interaction levels with students, academic-related interactions with staff, and engagement with provided resources. The following paragraphs present examples of how researchers and course design teams have implemented and evaluated a hybrid learning approach in various disciplines.

Evaluation of a high enrollment, on-campus hybrid
introductory biology course

Riffel and Sibley [13] conducted an evaluation of the effectiveness of teaching a hybrid

format developed for a high enrollment, on-campus introductory environmental biology course.

The hybrid course was taught simultaneously with a traditional format, (content being delivered

with 2 passive lectures per week as well as a weekly active learning experience), and differed

from the traditional course specifically in that 2 weekly online assignments replaced the passive

lectures. The assignments contained a variety of question-types and included a total of

approximately 50 questions per week, all of which being written to encourage reading the text

for content. Each student received a slightly different version of the assignments in effort to

address the fact that a weakness of online learning is difficulty in preventing cheating. For the

face-to-face element, a 1-hour long active learning experience was held weekly; students would

receive a short lecture (5-15 minutes) given by the instructor followed by informal group work

to solve a problem. Groups were encouraged to ask others for help if needed. This represents

an example of how hybrid courses can potentially be used to enhance self-paced online

learning.

In the spring of 2002, following open enrollment for both courses and omitting students

who declined to grant permission for the study, or either missed or incompletely filled out a

survey, 74 participants were left in the traditional course, with 55 in the hybrid course.

Researchers administered a survey at the beginning and end of the course to collect data

concerning student demographics, self-reported measures of effort, and student perceptions.[13]

The importance of including this information lies with establishing initial comparability of the

participants and assessing levels of student engagement and satisfaction respectively.

Furthermore, students were asked to rate the overall quality of interaction with the instructor

compared to more traditional classes, to indicate the frequency of contacting other students when questions regarding the course content arose, how often they were working with at least one other classmate outside of the classroom, and the frequency of referencing or reading the textbook outside of the classroom.

Statistical analysis of demographical data indicated that there were no significant differences in the ratio of males to females, the proportion with previous experience in an online course, or the proportion who had previously taken a similar course between the student populations taking the hybrid and traditional designs.[13] Also, both populations were almost entirely comprised of full-time students, but the traditional course contained more freshmen (46% versus 30%, respectively; P=.02).   Ultimately, analysis of the data indicated that the difference between the traditional and hybrid class responses was not significant. Riffell and Sibley [13] concluded that the hybrid course was just as effective in retaining high quality faculty–student interaction.

Additionally, students in the hybrid class read and/or referenced their textbook more frequently, indicating that online assignments or automatically graded assessments generated by a hybrid course design may provide students with more motivation to read textbooks at regular intervals during the semester without putting the burden of grading associated with similar exercises, such as "pop" quizzes, on instructors using a traditional format.[13]   Another significant finding from the survey was a sizable increase in the average frequency that students contacted other students and studied in groups when participating in the hybrid version. The researchers proposed that this may be related to decreased levels of face-to-face interaction with the instructor promoting students to seek answers from peers. Both student-student and student-faculty interaction have been highly correlated to increased student satisfaction levels

in traditional, fully online, and hybrid courses by large-scale research.[13]

In terms of academic performance, students in the hybrid course did better on pre- and post-course knowledge assessments.[13] Interestingly, when comparing passive lecture attendance with completion of weekly online assignments, differences between freshmen students in the traditional and hybrid design did not vary significantly (P=0.47), while upperclassmen in the hybrid course markedly outperformed their counterparts (P< .001). This may be related to upperclassmen being more motivated by the flexibility and control of asynchronous online learning, or that freshmen might lack the self-regulation skills needed in a hybrid environment. However, since the effect of passive lecture attendance and online assignment completion was neutral for freshmen, the risk of offering a course in hybrid format may be offset by increased levels of active learning or reading text throughout the semester. Regardless, these findings indicate that it is important to consider student status when evaluating student perception of a hybrid learning environment. [13]

Evaluation of the online environment of a hybrid course compared
to traditional, face-to-face learning environment based on
a first-year Geography students' perceptions

In another study, first-year geography students' perceptions of the online learning associated with hybrid learning compared to traditional learning strongly indicated that students appreciate the choices and flexibility of having a range of learning resources.[8] This was concluded after two different anonymous questionnaires were administered to the students at the beginning and the end of the course. The preliminary question for the initial survey was "Have you come across the concept of "virtual learning" or "e-learning" and if so what is your understanding of it?"[8] In 2006, 84% of 79 students had an elemental understanding of "e-learning." Such information is important to acquire as a baseline measure when implementing

a hybrid course, because the extent to which students understand the purpose of and how to approach an online learning environment has the potential to affect overall perceptions of the course as well as academic performance.

Next, students were asked to indicate their relative judgments of lectures and what they would choose between a traditional learning mechanism and an online learning alternative. [8] While the overwhelming majority of students (91%) felt that lectures were a "good way to learn," [8] responses were mixed when asked to indicate whether they would prefer an online or more traditional learning environment; a cross-analysis of student responses suggested that students exhibited inconsistency. For example, students indicated that they would prefer lectures while also indicating the desire to participate in tutorials online or opting for a pure online or on-campus environment. This diversity supports the use of a hybrid format as well as the inclusion of questions in course evaluations relating to specific learning resources provided as part of the course design. Furthermore, response rates were lower in this study than in the biology study by Riffel and Sibley,[13] only at 40%, possibly relating to the manner by which the survey was administered. Students were provided with the questionnaires at the end of a lecture and asked to submit their completed forms to a box available in the host department's Student Resources Center as opposed to completing and submitting via online surveying technology.

Researchers also noted that students provided "eclectic responses" when asked to comment on the impact of online learning on their spaces and times.[8] In general, students noted that they had a greater range of choices provided by online learning and a more flexible learning experience, leading to the notion that students are beginning to recognize that learning may occur over multiple contexts. Meanwhile, only a small percentage (<10%) had significant

frustrations using the technology.[8] Students were also prompted to reflect on whether

exposure to online learning mechanisms had altered their perspective or behavior in

approaching learning. Forty-one percent of students who did not have a notable amount of

previous exposure to online educational technologies answered affirmatively, also stating that

they felt confident doing work online and were willing to explore more resources. Overall, the

data collected from the questionnaires in this study led to the conclusion that the greater range

of learning opportunities provided by hybrid learning may better appease more learning styles

in addition to offering flexibility, and that the range of options of hybrid learning environments

may prompt changes in students' learning behaviors. Also suggested is that perceptions of

online learning will be highly influenced by previous experiences and preconceptions of

technology-driven learning; hence, this should be taken in consideration when evaluating

student attitudes towards a hybrid course.[8]

Evaluation of students' attitudes regarding a hybrid basic optics course

To evaluate a hybrid basic optics course which presented 80% of learning activities

online, Novell et al.[17] reviewed data collected from paper-based questionnaires designed to

explore student attitudes toward the courses. The 1-page questionnaire was in Likert scale

format without a neutral position, and was divided into 3 sections. The questionnaires were

administered to students registered for the traditional format of the basic optics course from

October 2000 to December 2003 (106 students total). The first section pertained to overall

perception of the course while the second and third contained questions about using the Web

as an educational environment and perceptions of Web-based learning activities. Analysis of

the data collected indicated that the students felt the course was interesting and fostered

knowledge acquisition. Also, in general students liked to use online resources, and 80% of

students reported the acceptance of hybrid learning format; in 2008, 100% of students reported

acceptance. The manner by which students evaluated online learning activities suggest passive

learning strategies were inadequate for the environment.[21]

Following evaluation, the hybrid optics course was altered to include increased guidance

in the learning process to address the possibility that complaints of course workload could be

related to lack of "how to learn" skills and strategies. [17] Specific skills the researchers aimed to

develop were articulation and reflection, planning skills, study skills, finding and applying

relevant examples, and self-evaluation. The way these skills are learned is by practicing them

during learning activities which foster active participation in the learning process. [17] This

highlights another critical issue of hybrid course evaluation---students' often complete high

school without developing the self-regulatory abilities required to be successful in hybrid

courses. Thus, evaluation tools should assess study strategies and habits.

Development of a rubric for hybrid course construction and evaluation

Ternus et al. [21] conducted a research study aimed at developing and piloting a general

rubric to evaluate online teaching and learning. The four-part rubric built on the conceptual

framework that student outcomes and learning may be considered the sum of course structure

(context, organization, and environment), content (presentation of information), processes

(relationships and interactions), and outcomes (mastery of content and course evaluation)

proved to effectively provide useful feedback for instructors of online courses. The

implementation of this rubric indicated that a well-designed online course based on credible

information and with built-in mechanisms for interaction and collaboration could result in

enhanced student learning, the ultimate objective and desirable outcome. [22]

Evaluation of third-year, distance education pharmacy
students' perceptions of the hybrid format

To evaluate hybrid course format from a distance education perspective, Rochester and

Pradel[22] found that though a course entitled "*Principles of Human Nutrition"* could be delivered

to 2 consecutive classes of third-year pharmacy students successfully online, students

recommended that the course be offered in a hybrid format. To determine this, pre-course and

post-course surveys were given to students via an internet survey tool after being reviewed by

five pharmacists who made suggestions for question additions and deletions. One hundred

forty-eight students completed the 5-minute survey.

During the pre-course survey, students were questioned concerning their comfort levels

accessing online course information and using the online technology to perform functions such

as submit assignments via the online Blackboard learning system. While the majority of

students indicated on a 5-point Likert scale that they strongly agreed or agreed that they were

skillful in accessing course information and using the online course management system, 20%

felt neutral about their skills in downloading audio presentations and posting questions on the

system.   Included in the same section were questions relating to student background

information; specifically, researchers asked for age, educational level prior to entering the

PharmD program, and experience with online courses and educational level. In the following

section, students were asked to indicate their perceptions of the flexibility of the course. While

87% of the students agreed or strongly agreed that flexibility in a course was very important to

them, 80% supported the relevance of an online course if it improved their flexibility, but only

48% would support the relevance of the course regardless of whether or not it improved their

flexibility.[22]

The above findings add further support to the notion that it is important for instructors to ensure their hybrid classes offer flexibility, and this issue should be included on evaluation tools for a hybrid course. Interestingly, in the post-course survey, 83% affirmed that the course provided the flexibility they needed, however, 55% of students indicated that it was more difficult to understand the course content with online lectures as opposed to traditional lectures, suggesting that clarity of content should be addressed by evaluation tools as well.[22]

The final section of the surveys aimed to assess general student satisfaction with the online course and support for online courses. Interestingly, 48% of students agreed or strongly agreed traditional delivery should be replaced by online lectures for selected didactic courses. Overall, Rochester and Pradel [22] were able to successfully establish support for an online human nutrition course, but were encouraged to adapt a hybrid design.

A CALL FOR HYBRID RESEARCH INVOLVING NUTRITION EDUCATION

The examples of hybrid course development and evaluation in the previous section represent only a small sampling of hybrid research efforts. The hybrid learning approach has been an extremely popular topic of research since the turn of the century. However, many questions still remain pertaining to hybrid nutrition education specifically. In 2011, the systematic meta-analysis conducted by Cohen et al. [19] concerning the evaluation of online learning in nutrition courses was able to include only 9 total studies evaluating the effectiveness of online nutrition education courses in their final sample. Only a single study compared hybrid learning with online and face-to-face approaches. The authors also declare that more research on hybrid nutrition courses is warranted. In particular, pedagogical practices which can be "scaled up" to larger groups of students, how to market to off-campus learners, and efficient time management practices in the designing and delivery of hybrid courses. The following

chapter describes research conducted at Utah State University In 2011 with the intention of

contributing to this need to fill in the "voids" of hybrid learning associated with a large

undergraduate nutrition course offered to on-campus and distance education students.

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CHAPTER III

THE EFFICACY OF A HYBRID NUTRITION COURSE OFFERED TO

DISTANCE EDUCATION AND ON-CAMPUS STUDENTS

ABSTRACT

Objectives: The purpose of this study was to evaluate the efficacy of a postsecondary hybrid nutrition course offered to on-campus and distance education students.

Design: Data collection tools included a student profile survey, midterm evaluation, end-of-course evaluation, and pre- and post-tests. Online course grade book data was also retrieved.

Setting: Utah State University in Logan, Utah. Spring semester of 2011.

Participants: A total of 382, (285 on-campus and 97 distance education), students were included in our academic performance analysis. Survey participation varied.

Interventions: Traditional, lecture-based and distance education formats of a general education nutrition course (NDFS 1020) were redesigned to a hybrid format. Hybrid NDFS 1020 was offered to on-campus and distance education sections alike.

Main Outcomes Measures: Academic performance and student perceptions.

Analysis: ANOVA was used to compare class performance averages and chi-square analysis to evaluate differences in survey response sample proportions.

Results: The majority of all students exhibited satisfactory levels of academic performance and perceived the hybrid format positively. On average, on-campus earned higher grades, but distance education was generally more satisfied.

Conclusion and Implications: Hybrid NDFS 1020 adequately facilitates learning, is well-perceived by students, and can be considered as a model to standardize general nutrition education. (199)

INTRODUCTION

Hybrid learning is any combination of live, interactive learning experiences with independent, online-based learning activities.[1] This instructional approach represents a promising foundation for postsecondary learning environments, because advantages of fully online learning can be merged with those of traditional, lecture-based instruction.[2] By using hybrid course designs, instructors can present information using a variety of different avenues in order to effectively facilitate learning throughout large and diverse student populations. However, the efficacy of any hybrid design depends on whether or not the selected "blend" of online and face-to-face learning elements is suitable for delivery of the subject matter, as well as the receiving student population.

In order to overcome inherent limitations associated with fully online and face-to-face instruction, hybrid learning environments are comprised of both asynchronous and synchronous instruction.[1] Asynchronous instruction, (administered at a different time than which learning occurs), is highly associated with fully online courses. Online learning is commonly promoted as self-paced and student-focused, however, it exhibits a limited ability to facilitate student-student and student-instructor interactions.[3,4] In contrast, face-to-face instruction provides opportunities for interaction and collaboration by engaging students with synchronous instruction, (administered at the same as when associated learning is to occur).[1] Meanwhile, a generally noted problem with synchronous, lecture-based instruction is that every unique student must learn and retain information at the same pace, using the same learning resources.[3,4] The primary objective of a hybrid design should, consequently, be to offer convenient, customizable access to course content using asynchronous elements, while

increasing student engagement with opportunities for real-time learning, critical thinking, and

active involvement in the learning community via synchronous elements.[5]

Research Supports Hybrid Learning, but Further Evidence is Needed to
Effectively Guide a Paradigm Shift in Postsecondary Instructional Delivery

In 2009, the U.S. Department of Distance Education published a meta-analysis

evaluating evidence-based online learning practices. Key conclusions from the review indicate

the following: 1) Courses with online components (whether fully online or hybrid) generate

better student learning outcomes than courses with only face-to-face instruction ($P < .05$);

2) supplementing face-to-face instruction with online learning significantly enhances knowledge

retention ($P < .001$); and 3) evidence to compare the effectiveness of blended online versus fully

online learning is lacking.[6]

In 2011, a meta-analysis conducted by Cohen et al.[7] evaluated the effectiveness of

online learning in nutrition courses. Of the 9 relevant studies identified, only one study

compared the effectiveness of hybrid learning when applied simultaneously to online and face-

to-face learning environments. The authors declared that more research on hybrid nutrition

courses is needed, especially, studies investigating hybrid instructional practices that can be

"scaled up" to larger groups of students, marketing strategies to recruit off-campus learners,

and efficient time management strategies to design and deliver of nutrition hybrid courses.[7]

Filling the Gaps in Hybrid Nutrition Education Research

The purpose of this research was to evaluate the efficacy of a hybrid course design

offered simultaneously to on-campus and distance education sections of a general nutrition

education course, The Science and Application of Human Nutrition (NDFS 1020) offered by Utah

State University (USU). NDFS 1020 was originally offered in a traditional format, with face-to-

face lectures led by an instructor multiple times each week of the semester.

When NDFS 1020 enrollment rates markedly increased in 2010, the course design team decided to transition NDFS 1020 to a hybrid format. The primary objective of the redesign was to efficiently distribute course materials to a growing and diverse student population in a manner which delivered a standardized, yet customizable and engaging learning experience. This was to be accomplished without compromising the academic integrity of the curriculum.

In order to assess the ability of the hybrid design to achieve the objectives, data collection was conducted to answer the following questions: 1) Does the selected blend of asynchronous and synchronous elements appear to effectively facilitate learning? 2) Does the hybrid design adequately fulfill course objectives? 3) What do students perceive as the pros and cons of the hybrid NDFS 1020 design? 4) Is the hybrid design suitable for on-campus and distance education students alike?

Hybrid NDFS 1020 was predicted to fulfill the same course objectives as the traditional version of the course, and to be associated with high levels of student satisfaction and academic performance from both on-campus and distance education cohorts.

METHODS

All students enrolled in NDFS 1020 during the fall 2010 and the Spring 2011 semesters were invited to participate in this study. The fall 2010 semester was considered a pilot semester for our data collection procedures. Study methods were reviewed and approved by the Institutional Review Board at USU. All study participants provided a signed consent.

Hybrid NDFS 1020 Course Design and Delivery

Asynchronous elements

Students were expected to complete approximately two-thirds of their learning

experience online using the Blackboard Learning Management System (Blackboard Vista,

Blackboard Inc., Washington D.C., 2010-2011). The online learning environment divided course

content into 12 modules, each of which organized course materials into 4 separate pages. The

"Read it" page listed module objectives and contained a link to the corresponding chapter of the

online textbook. Ungraded self-study quizzes and relevant PowerPoint presentations from

recitations were provided in the "Study it" page to reinforce concepts from the textbook. The

"Assess it" page contained all graded materials. This included no-pressure quizzes, (assessments

generated from a large question bank that students could complete as many times as desired

with the highest grade earned being received), and assignments with questions pertaining to a

semester-long, practical application project using diet-analysis software (MyDietAnalysis version

4.0, Pearson Education Inc., Upper Saddle River, NJ, 2009). All students were responsible for

completing quizzes and assignments by due dates listed on a schedule that was posted on the

homepage as part of the course syllabus (Appendix A). The "Live it" page included

supplementary and practical application resources, such as links to relevant websites,

information concerning nutrition-related careers, and instructional food preparation videos.

The 4 course exams were timed and completed online. Students were instructed to

complete each exam in the designated timeframe without aid from resources or peers. Exams

were generated from question banks, and each student received a unique exam. All

assignments and quizzes containing content tested by a particular exam were to be completed

during the weeks prior to the associated exam, and closed to students after specified due dates.

Synchronous Elements

The remaining one-third of hybrid NDFS 1020 was a weekly, hour-long recitation led by an instructor. Instructors provided traditional lectures to sections of up to 100 students and encouraged discussion, application, and engagement from students. The distance education sections were offered these lectures using the virtual classroom broadcasting technology known as Wimba (Wimba Classroom, Wimba Inc., NYC, NY, 2010-2011). The uniformity of the hybrid NDFS 1020 learning environments is depicted by Figure 1. Hybrid NDFS 1020 was completed Fall semester 2010 by 293 on-campus and 113 distance education students. Both cohorts were led by the same instructor. Throughout the semester, data collection tools were developed and piloted by modifying student surveys previously used in the course to mirror evaluation efforts which had been implemented and/or validated by other researchers.[2,4,8,9,10]
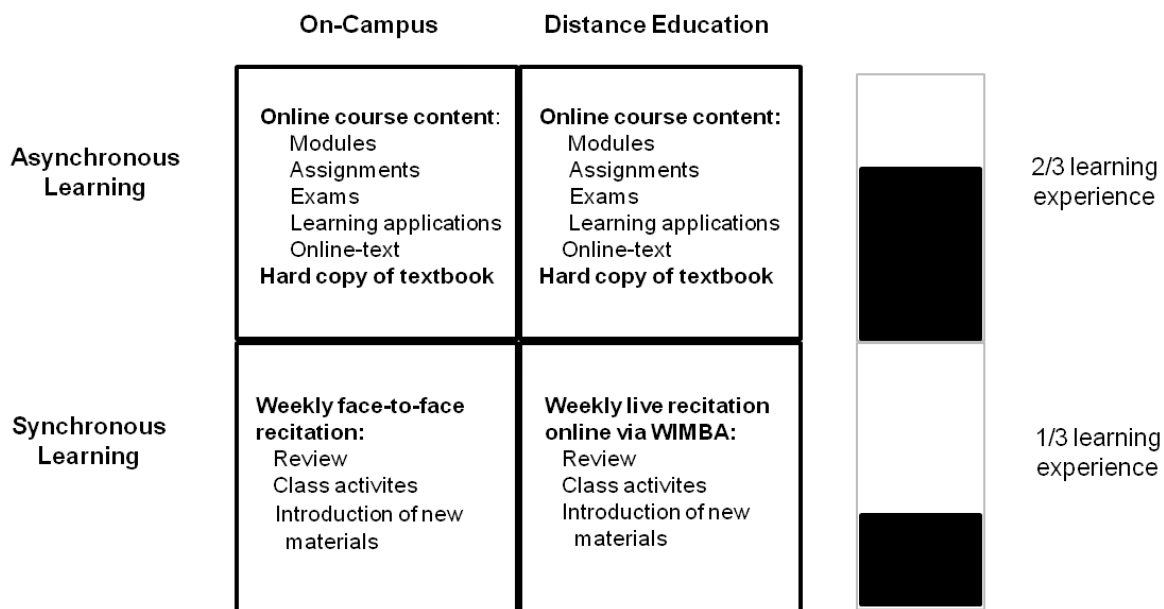

Figure 1: Uniformity of Spring 2011 On-Campus and Distance Education Learning Environments.

Student profile and midterm evaluation surveys were completed by 321 (215 on-campus and 106 distance education) students. Meanwhile, a pre-test and corresponding post-test with questions targeting 3 key learning objectives of the course were designed in order to assess the ability of the hybrid course design to fulfill course objectives. Further modifications to these data collections tools were made based on preliminary data analysis for validity and the assistance of a panel of experts (e.g. Registered Dietitians with a master's degree or higher). Each data collection tool can be viewed in Appendix B of this document, and all are briefly described in the following paragraphs.

Spring 2011 Data Collection

Four hundred and eight (303 on-campus and 105 distance education) students enrolled in hybrid NDFS 1020 during the Spring 2011 semester, and were invited to participate in the study. Over the course of the semester, 6% and 7% of on-campus and distance education students, respectively, withdrew from the course. Data associated with students who withdrew from the course was not included in our analysis. Each NDFS 1020 section, (including 1 large on-campus and 3 smaller distance education sections), was led by a different instructor, but all sections had equivalent course structure and coursework. Study participants were offered 10 points of extra credit for each survey completed. A maximum of 30 points was allowed.

Student profile survey

The student profile survey collected demographic information about study participants including gender, age, declared major, personality, self-perceived dietary and fitness level, and previous experience taking online or hybrid courses. Students completed this during the first 2 weeks of the semester.

Pre-test and post-test

On-campus participants were invited to take the 14-question pre-test during the first 2 weeks of the semester. The post-test, being comprised of 14 corresponding questions, was embedded into the final exam and completed by students during the final week of the semester. Distance education students were not involved in this portion of the study due to time restraints and instructor variation between the smaller distance education sections.

Course evaluations

The midterm course evaluation was offered during week 8 of the 16-week semester in order to collect information concerning students' perceptions toward the hybrid course design. The evaluation contained 31 questions prompting students to rank how effective they felt individual instructional elements were, (i.e. reading the textbook, attending the recitation, completing the no-pressure quizzes, using other online self-study tools, etc.), as well as to indicate their perceptions of the hybrid course format in comparison to the traditional, lecture-based format. Additionally, responses from the end-of-semester course evaluation administered by USU were considered in our analysis for the purposes of comparing student perceptions of the traditional format versus the hybrid format. This included a ranking system for overall course quality and instructor effectiveness. Historical data archived from end-of-semester course evaluations from the Spring 2010 traditional, lecture-based NDFS 1020 was also accessed to assess whether or not the hybrid course fulfilled the same learning objectives. The same instructor led the Spring 2010 traditional and the Spring 2011 hybrid on-campus section. Historical data from previous distance education sections of NDFS 1020 was not available.

Learning outcomes

All academic performance measures, including average exam, quiz, and assignment

scores, as well as final course percentage earned were retrieved from the Blackboard accounts

of participating students. Information concerning online learning activity, primarily, the number

of attempts per no-pressure quiz, was also obtained to enhance our analysis of the

asynchronous environment of NDFS 1020. For the purposes of the hybrid, on-campus versus

traditional, on-campus comparison, pre-test and post-test averages of the hybrid on-campus

students were evaluated to assess whether or not the hybrid design effectively fulfilled the

same course learning objectives as the traditional, lecture-based NDFS 1020 of Spring 2010.

Data Analysis

Data was analyzed using PASW SPSS statistics (SPSS version 18, SPSS Inc, Chicago, IL,

2009). We compared average exam, quiz, and assignment scores using analysis of variance

(ANOVA), as well as final points earned, and then evaluated sample proportions of survey

responses using Pearson chi-squared analysis.

Figure 2: Primary Cohort Comparisons.

Comparisons were generated between hybrid on-campus and hybrid distance education sections (Spring 2011), as well as between the on-campus NDFS 1020 sections of Spring 2010 (traditional format) and Spring 2011 (hybrid format) as illustrated in Figure 2. Regression analysis was used to assess associations between no-pressure quiz attempts, student-type, and academic performance.

RESULTS

Demographics

Both of the 2011 student cohorts (on-campus versus distance education) were primarily female, from Utah, and pursuing a declared major. However, the on-campus students were notably more likely to be younger than the age of 20-years (P<.0001). In addition, distance education students tended to rate their dietary and physical activity habits lower (as "fair" or "poor") more frequently than on-campus students (P=.01). Student age may be an explanatory factor for the observed difference in self- reported lifestyle habits. Studies show that physical activity level and diet quality tend to decline with age.[11,12] In addition, students age 25 years or younger in this study had a significantly more positive view of their habits than students older than 25 (P=.05), regardless of student-type.

Table 1: Comparison of Hybrid On-Campus and Hybrid Distance Education Student Profile Survey Responses (Spring 2011).

Profile Measure	On-Campus (n=273)	Distance Education (n=89)
Less than 20-years-old**	57%	12%
Female	74%	82%
Major declared	68%	74%
Dietary habits ranked low**	17%	38%
Physical activity ranked low**	21%	30%

***Difference significant at a P<.01 level based on a 2-tailed Pearson chi-square analysis with 4 degrees of freedom.
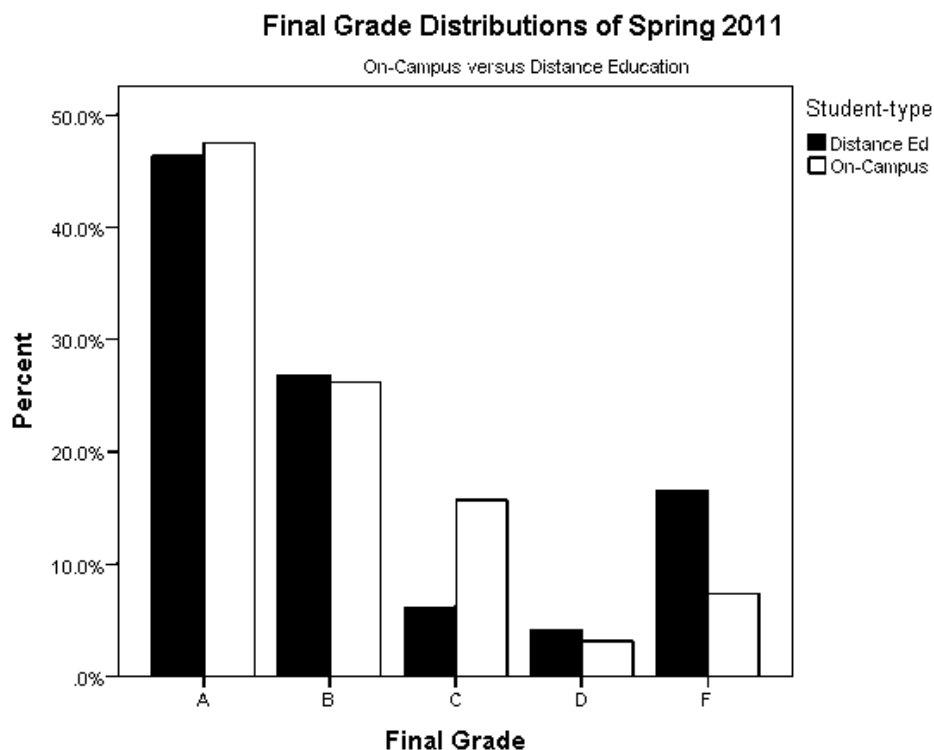
Learning Outcomes

Academic performance

On-campus students who completed the hybrid course during the Spring semester of 2011 earned an average final score of 84.5% ("B" letter grade). Average scores earned on course exams, quizzes, and assignments by the on-campus section were 79%, 91.5%, and 92%, respectively. Distance education students earned an average final grade of 75% ("C" letter grade). Average scores earned on course exams, quizzes, and assignments by the distance education sections were 76%, 89.5%, and 88%, respectively. Meanwhile, the difference in the average amount of extra credit points earned between the 2 cohorts was not great enough to account for the observed difference in average final grade.

Figure 3 illustrates that more distance education students failed the course than on-campus students, while on-campus students were notably more likely to earn a "C" letter grade. The observed variation in grade distribution was statistically significant (P=.022)

Table 2: Comparison of Hybrid On-Campus and Hybrid Distance Education Average Class Performance (Spring 2011).

	On-Campus n=285	Distance education n=97	r	P-value
Average final score out of 1000	845.3 (±141.4)	754.9 (±246.6)	.221	.010
Average exam score out of 125	99.4 (±12.4)	95.4 (±14.6)	.770	.010
Average quiz score out of 20	18.5 (±1.8)	17.8 (±3.1)	.134	.008
Average assignment score out of 25	22.9 (±1.6)	22.1 (±3.1)	.167	.001
Number of quiz attempts	2.89 (±1.31)	2.34 (±1.48)	.174	.001

ANOVA of learning outcome averages and 2-tailed Pearson's chi square analysis of correlation between learning outcomes and student-type. Standard deviations in parentheses.

Figure 3: **Spring 2011 Semester Comparison of Final Grade Distribution in Hybrid NDFS 1020.**

Traditional versus Hybrid

Two hundred and sixteen of on-campus students completed both the pre-test and post-test. On average, the 216 students earned 1.29 (±2.05) points higher on the post-test than the pre-test, which was significantly better (P<.0001). Furthermore, as displayed in Table 3, the hybrid on-campus section of the Spring 2011 semester significantly outperformed the traditional, lecture-based NDFS 1020 on-campus section of Spring 2010. Analysis of the end-of-course evaluations from both semesters also indicated that overall course quality and instructor effectiveness was ranked higher in the hybrid on-campus NDFS 1020, than the traditional on-campus NDFS 1020, which had been taught by the same instructor.

Table 3: Overall Course Quality Comparison Between the Spring 2010 Traditional, Lecture-Based NDFS 1020 and the Spring 2011 On-Campus Section of Hybrid NDFS 1020.

	On-Campus Traditional 2010	On-Campus Hybrid 2011	P-value
Average final points earned (out of 1000)	778 (±190) **n=460**	845 (±141) **n=285**	<.0001
Average exam points earned (out of 125)	85.4 (±16.5)	99.4 (±12.4)	<.0001
Average overall course quality ranking*	4.2 **n=276**	4.8 **n=187**	N/A
Average instructor effectiveness ranking*	4.1	5	N/A

*Data was collected from standard USU end-of-course evaluations. Students were asked to rank course and instructor qualities on a 6-point scale, with "6" representing excellence.

Student Perceptions of Hybrid NDFS 1020

Fifty-two (54%) and 264 (93%) students of the distance education and on-campus spring 2011 cohorts, respectively, completed the midterm course evaluation survey. Table 4 summarizes student responses relating specifically to the hybrid NDFS 1020 course design. Interestingly, 90% of distance education participants recommended that the course be continued as a hybrid design, while a relatively small 77% of on-campus students agreed (P=.026). Distance education students exhibited a more positive opinion towards the hybrid design than on-campus students, however, the majority of all students appeared to be satisfied with the course.

Table 5 summarizes midterm evaluation responses indicative of student comfort levels and learning behaviors (i.e. student engagement) within the hybrid learning environment.   A significantly greater percentage of on-campus students indicated that NDFS 1020 was their first hybrid course (P<.0001), while distance education students exhibited a notably greater

Table 4: Spring 2011 Midterm Course Evaluation Comparison of Student Responses Concerning the Hybrid Format of NDFS 1020.

Question Summary	% Of Students Who Affirmed	
	On-campus (n=264)	Distance education (n=52)
Would recommend this course to a friend	89	92
Would recommend this course continue to be hybrid format*	77	90
Online learning environment provided a high quality educational experience **	80	94
Quality of course would be lower if it was delivered in a fully online/ traditional format.**	41	54
Letter grade I would assign this course	43 (A)	58 (A)

*P<.05. ** P<.01   Contrast significant using 2-sided Pearson chi-square analysis; 4 degrees of freedom.

appreciation of the flexibility of the hybrid design (P=.009).   Furthermore, the majority of

distance education students expressed a positive view concerning instructor-student

communication, and indicated that the hybrid format likely provided superior communication

opportunities than a fully online version of NDFS 1020. On-campus students, in contrast, might

have felt relatively more disconnected from the instructor and classmates. Only 26% of the on-

campus survey participants felt the hybrid course would provide more opportunities to

communicate than the traditional, lecture-based version of NDFS 1020 (P<.0001).

Table 6 illustrates that both cohorts ranked the top 3 *least* helpful learning resources

and the top 3 *most* helpful resources exactly the same.   Overall, students preferred the

asynchronous learning resources over the synchronous*.*

Table 5: Comfort Levels and Learning Behaviors of Spring 2011 On-Campus and Distance Education Students Within the Hybrid Learning Environment.

	Survey Statement Summary	% of Students who Strongly Agreed or Agreed	
		On-Campus (n=264)	Distance (n=52)
Comfort level within hybrid learning environment	My first hybrid course *****	96	71
	Accessing coursework on blackboard is simple	80	87
	The syllabus is clear and detailed	86	90
	MyDietAnalysis is user-friendly	72	75
	I appreciate the flexibility of the course design**	81	98
Student Engagement	Read or reference the text book >3 times per week ***	39	67
	Study for this class with another weekly**	23	6
	I have used the discussion boards**	10	27
	Attending and or listening to recitations is useful*	60	40
	Attended or listened to >85% of recitations**	31	23
	The instructor encourages student participation during recitations	78	75
	Opportunity to communicate with the instructor and my classmates is BETTER THAN in a fully online/traditional class***	26	60
	My instructor is responsive and available to students**	82	98
	The assignments encouraged application**	66	43

*P<.05. ** P<.01. ***P<.0001. Contrast significant using 2-sidedPearson chi-square analysis .

Table 6: Student Perceptions Towards Learning Resources Available in Hybrid NDFS 1020.

	Top 3 LEAST Helpful Learning Resources		Top 3 MOST Helpful Learning Resources	
	On-Campus (n=264)	**Distance Education** (n=52)	**On-Campus** (n=264)	**Distance Education** (n=52)
1	Online textbook	Online textbook	No-pressure quizzes	No-pressure quizzes
2	Sample study questions	Sample study questions	Hard copy textbook	Hard copy textbook
3	PowerPoint slides from recitations	PowerPoint slides from recitations	Recitations	Recitations

DISCUSSION

The hybrid learning approach has been targeted by an escalating number of research

efforts over the past decade, but relatively few studies are published with regards to hybrid

nutrition education. [7] Additionally, no identified studies evaluated the efficacy of a standardized

hybrid course format from both on-campus and distance education student perspectives.   Our

ultimate objective, therefore, was to identify whether or not the Spring 2011 hybrid NDFS 1020

design represents an effective model for hybrid nutrition courses offered to distance education

and on-campus student populations simultaneously.

The learning outcomes associated with this study (Table 2 and Figure 3) provide

evidence that the majority of both Spring 2011 student cohorts learned course content well

enough to earn a passing grade or higher in the course. This supports our hypothesis that the

hybrid NDFS 1020 design adequately facilitates learning in both distance education and on-

campus settings.   Meanwhile, the pre- and post-test participants of the on-campus section

earned significantly higher marks on their post-tests, which suggests that students were able to

understand concepts related to key course learning objectives. This indicates that hybrid NDFS 1020 fulfills the same learning objectives as the traditional, lecture-based design.

Another important observation of this study was that the hybrid on-campus cohort of Spring 2011 earned a higher average final score (85% vs. 75%; P=.01), and outperformed their distance education counterparts, on average, in all measures of academic performance. These observations might lead to the conclusion that hybrid NDFS 1020 is not as suitable for distance education students as on-campus students. However, the statistically significant variance in final grade distribution depicted in Figure 3 was produced only by notable differences between the percentages of students earning a "C" letter grade, or failing the course. This leads to the question: Why did a higher percentage of distance education students fail the hybrid course, while a notably higher percentage of on-campus students earn a "C" letter grade?

One answer to the preceding question might be that different instructors taught each of the 3 distance education sections of NDFS 1020 in Spring 2011. During the Fall of 2010, (our pilot semester), the same instructor taught the hybrid on-campus and the hybrid distance-education sections, and no significant difference existed in average final score. We could also speculate that the observed lower levels of studying with peers and attending/valuing recitations in the distance education cohort may have contributed to elevated failing rates, because research links higher levels of synchronous learning experiences to increased student engagement and participation in courses.[13]

Ge (2011) found that cyber synchronous learning increased interaction and sense of community more than cyber asynchronous.[14] McBrien et al. (2009) found that the majority of students exhibited a positive opinion concerning online synchronous learning experience, but noted issues with non-verbal communication, technological problems, and too much stimuli.[15]

Skylar (2009)[16] noted that both online asynchronous text-based lectures and synchronous web-conferencing were effective in delivering online instruction to a single student cohort, but approximately three-fourths of the students preferred the online course with the web-conferencing. However, our study indicates, that live recitation and group study activity was not significantly associated with final grade for the hybrid distance education students (P=.82). Meanwhile, though fully online asynchronous courses with little-to-no real-time participation are linked to higher attrition rates, the hybrid on-campus and distance education sections of this study exhibited comparable attrition rates.

Ultimately, it is likely that the difference in age between the Spring 2011 cohorts of our study produced the variation in final grade distribution. Age was the most notable profile difference between the on-campus and distance education cohorts, and an analysis with study participants grouped by age (less than 25-years vs. greater than 25-years) indicates that a significantly higher amount of older students withdrew or failed the course (P<.0001). Since no other significant comparisons except for diet and physical activity rankings were observed, we speculate that the perceptions and learning behavior of the students in our sample were highly influenced by their current stage of life and associated living circumstances.

Interestingly, distance education students appeared to view the hybrid design more favorably, despite earning lower average final grades than the on-campus section. Vermunt (2005)[17] found that age and age-related contextual factors such as highest level of prior education and academic discipline were related to learning patterns, which often determine success level within a learning environment. According to their study, younger students are more prone to memorize, respond more to external sources of regulation, and feel that learning means taking in knowledge offered to them. In contrast, older students and students who have

previously completed a postsecondary degree are more likely to use a relating and structuring strategy to retain information, exhibit self-regulation strategies, and use meaning directed learning.[17]

Clayton et al. (2009)[18] found that students who preferred a traditional learning environment also showed mastery goal orientation and a greater willingness to apply effort to learn, while students who preferred less traditional environments were more self-confident in their ability to learn.   Richardson et al. (2012)[19] identified academic self-efficacy and academic effort regulation (i.e. grade goal-setting) to have the strongest positive correlations with postsecondary GPA, while personality-type, motivational source, and approaches to learning were negatively correlated. Learning behavior and performance, therefore, appear to be functions of instructional measures, as we expected, but also of personal contextual factors. An interaction of these factors within the NDFS 1020 learning environment may have contributed to the ironic trends we observed in learning outcomes and student satisfaction levels between the hybrid on-campus and hybrid distance education cohorts of Spring 2011.

Furthermore, previous research indicates distance education students appreciate flexible learning environments, which allow them to juggle many other facets of life while pursuing higher education.[5] Our findings strongly coincide with this trend; 98% of the distance education students affirmed they appreciate the flexibility of hybrid NDFS 1020.   Furthermore, while 67% of distance education students indicated they referenced their textbook 3-times per week or more, only 31% of on-campus students reported doing so (P<.0001; Table 5).

Research indicates that on-campus students also value flexibility, but in classes with primarily younger students, issues are often noted related to lack of self-regulation. Our findings support this notion. Both on-campus and distance education students frequently

acknowledged an appreciation of the flexibility of the hybrid course structure on the free

response section of the midterm evaluation, while asynchronous and synchronous elements

were included in the top-3 most helpful learning resource category. However, on-campus

students were more likely to mention they had troubles procrastinating, or being confused

about due dates, and several on-campus students expressed feelings similar to those in Table 8

(see Appendix C), indicating that though the flexibility provided by the hybrid structure was

convenient, it was likely the cause of excessive procrastination and discouragement.   Of all

students, those who noted they appreciated flexibility of the hybrid course were also

significantly more likely to also indicate NDFS 1020 should continue to be offered in hybrid

format (P<.0001). These findings lead to the conclusion that the on-campus cohort of hybrid

NDFS 1020 exhibited a lower level of satisfaction relative to their hybrid distance education

counterparts, despite achieving higher learning outcomes, because they were overwhelmed by

the level of responsibility for learning course content the student-centered environment placed

on them.

Overall, the information associated with this endeavor may provide nutrition education

professionals with insight concerning how to structure large enrollment hybrid nutrition courses

offered to on-campus and distance education students alike. However, limitations of this study

should be noted. First, this study was observational due to resource and time constraints;

therefore, extraneous variables, such as instructor inconsistency, may have influenced our

results. Next, study participants were all self-selected. Lastly, data collection tools were

developed solely for this project and have not been validated by other efforts.

CONCLUSION

In summary, hybrid NDFS 1020 effectively facilitated learning in both the on-campus and distance education cohorts, and appeared to adequately fulfill the same course objectives as the traditional, lecture-based NDFS 1020 design. The majority of all students expressed a favorable opinion towards the hybrid course format, and indicated that the hybrid NDFS 1020 provided a high quality learning experience. Thus, the blend of asynchronous and synchronous elements evaluated for this study may be viewed as a viable hybrid model for other introductory nutrition courses offered to on-campus and distance educations students simultaneously.

Our findings also indicate, however, the synchronous elements of hybrid NDFS 1020 may require more adjustments in order to tailor to the needs of on-campus students for greater levels of external regulation, and to encourage more live interaction and real-time learning in distance education sections. Reflecting recitation attendance in final grade may be an option to increase student motivation to attend and utilize synchronous learning experiences.   Finally, it appears that obtaining information concerning students' academic disciplines, prior education levels, learning patterns, and similar contextual factors may produce more valuable insights than obtaining only basic demographic information, such as gender and age, in future evaluative efforts.

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CHAPTER IV

SUMMARY AND IMPLICATIONS

Research efforts strongly indicate that the future of higher education will be shaped by the hybrid learning approach. While hybrid learning principles are in-line with fundamental learning and teaching theories, strategically created hybrid environments are highly functional and versatile within today's technology-centered society.   Students are now given opportunities to engage in active learning experiences that are structured by instructional guidance, tailored with flexibility, and enhanced with real-time interaction via the combining of asynchronous and synchronous instructional delivery methods. Hybrid learning systems also provide institutions of higher education with a cost-effective means to overcome space and resource limitations as student populations continue to rapidly expand. In addition, distance education programs may now provide learning experiences comparable to on-campus programs due to technological advancement. Though promising, the widespread shift to hybrid approaches is not without risks. The complex nature of hybrid learning must be acknowledged and respected by course designers and instructors if the delicate balance of uniformity and individualization is to be successfully created.

Key considerations in the development of hybrid courses include student demographics, (such as age), the amount and combination of asynchronous and synchronous tools appropriate for the subject matter, available instructional delivery mediums, course objectives, and how to effectively scaffold course-related knowledge within the hybrid framework. Important to note is that the transition of traditional face-to-face courses and fully online courses to a hybrid format is generally time-consuming at first, but is typically considered

an investment if completed correctly. The entire process of adopting a hybrid approach should be viewed as cyclical, with evaluation being the defining turning point of each cycle in the development and implementation of a particular learning environment. Thorough research efforts provide direction concerning how to adequately and appropriately assess the effectiveness of a hybrid course.

As with fully face-to-face and online courses, hybrid courses should be evaluated for effectiveness in facilitating knowledge acquisition and accomplishing course objectives. This has typically been accomplished through analysis of learning outcomes (course grade, exam performance, etc.) and controlled for student interest in the subject matter. Asynchronous and synchronous resources can be evaluated separately via surveys prompting students to rank the usefulness of different learning resources, or by (if possible) obtaining record of online learning tool usage and keeping attendance during face-to-face activities. Furthermore, to evaluate whether or not students perceive a hybrid learning experience positively, the majority of research efforts have employed student satisfaction surveys. Such surveys exhibit varying levels of detail and present qualitative and/or quantitative approaches depending on targeted research questions.

The purpose of this research endeavor was to make a contribution to the literature pertaining to general hybrid nutrition courses. Relatively little research has been published concerning hybrid nutrition courses, and no identified study specifically assessed the ability of a standardized hybrid course format to effectively teach distance education and on-campus students simultaneously. Our findings indicate that a hybrid format which provides the majority of a learning experience via an asynchronous online learning environment and incorporates face-to-face, synchronous experiences for concept reinforcement and student guidance,

represents an effective way to offer a general nutrition course to nontraditional distance education and traditional-aged, on-campus students without requiring the development of separate course formats. However, low levels of student interaction and collaboration were observed within the NDFS 1020 hybrid environment among both student cohorts. Thus, future versions of the hybrid design might include discussion-orientated assignments, and/or group projects. Also, because recitation attendance was low in both cohorts, it may be advantageous to account for face-to-face attendance in the final course grade in order to provide students with adequate motivation to attend their synchronous learning experiences.

Furthermore, survey responses of on-campus students indicate that offering more guidance at the beginning of the semester concerning the online learning activities may have lowered student anxiety levels in that cohort. The provision of time-management and self-study recommendations pertaining to the NDFS 1020 curriculum on the online learning system might also represent a strategy to improve on-campus student satisfaction with the course. Based on findings related to no-pressure quizzes, NDFS 1020 students will be able to complete each quiz only 3 times, as opposed to having an unlimited number of attempts. The purpose of this change is to encourage better study patterns, for example, students will be less tempted to take the quizzes over and over again, and will be more likely to study relevant content prior to completing the quizzes.

Ultimately, instructors and designers of general nutrition courses who plan to transition to a hybrid format may use the evaluation methods, results, and suggestions presented in this discussion as a starting point and/or outline for their own efforts. The major limitations of this research consist of its observational nature, as well as the fact that the data collection tools were developed to target specific aspects of the NDFS 1020 hybrid course, hence, the validity

and reliability of each survey question may not apply to other course designs. In addition, administering a pre- and post-test to both on-campus and distance education students on an individual basis may be more useful in determining whether or not both student cohorts are adequately learning course materials. Other efforts to evaluate the effectiveness of the hybrid format might consider assessing long-term knowledge retention in both groups as well. Ideally, all future evaluation efforts of the hybrid NDFS 1020 and other general hybrid nutrition courses will be increasingly fine-tuned. The results of quality efforts can be utilized to create potentially cost-effective, high quality and satisfactory learning environments for the students of the 21st century enrolled in general nutrition courses.

APPENDICES

Appendix A: The Hybrid NDFS 1020 Course Syllabus used during Spring Semester of 2011 (On-Campus Version Only).

Note: Original formatting not represented due to format requirements of this document.

NDFS 1020 Syllabus: The Science and Application of Human Nutrition

Utah State University • Spring Semester 2011

COURSE INSTRUCTOR	Heidi Wengreen, PhD, RD Email: Blackboard, MAIL Icon (Preferred) or heidi.wengreen@usu.edu	**COURSE FACILITATORS**	Katie Brown, RD Stephen Poe
OFFICE HOURS	Office: NFS 306 Time: Mon, Wed 12:30 – 1:30; Thurs 3:00 – 4:00; Other times by appointment		Email: Blackboard, MAIL Icon Office Hours: By Appointment

LECTURE SCHEDULE – M 11:30 – 12:20 (AnSc 115) or W 11:30 – 12:20 (NFS 202) or R 12:00 – 12:50 (ENGR 103) (Determined by the Recitation Section you registered for)

COURSE DESCRIPTION - This class is designed to introduce you to the science of human nutrition, foster an understanding and appreciation for fundamental nutrition concepts, and encourage personal application of those principles. It includes the study of the basic nutrients and addresses chemical composition, classification, digestion, absorption, transport, metabolism, physiological function, dietary recommendations, food sources, and deficiency / toxicity symptoms. Weight management, food safety, and the relationship between diet and disease are also addressed. Students will evaluate their personal nutritional status with a diet analysis software program. This course satisfies requirements for a 3-credit Breadth Life Science (BLS) General Education course at USU.

COURSE FORMAT – NDFS 1020 is a hybrid course, which provides a blend of traditional lecture-based instruction with online learning. A significant part of the learning activities and all of the assessments for this course will be delivered in the online environment (via Blackboard). Your online learning experience will be guided and supported by traditional instruction provided in the 1 hour per week recitation. Hybrid courses provide a flexible learning environment that

promotes self-paced and active independent learning. Success in this course requires that students be responsible, organized, and self-disciplined. You should plan to devote at least 8 hours per week to the online learning activities.

COURSE OBJECTIVES

1) Differentiate between credible, science-based sources of nutrition information and unreliable sources.

2) Evaluate the adequacy of a diet to maintain health utilizing nutrient density, MyPyramid, the Dietary Guidelines, and the Daily Reference Intakes (DRIs).

3) Describe the digestion and metabolism of the energy nutrients.

4) Identify the nutrients needed to maintain health and body function. Be familiar with symptoms of nutrient deficiencies and toxicities. Recognize food sources for each nutrient.

5) Evaluate food quality based on food labeling, nutrition labeling, and food safety practices.

6) Describe what constitutes a sustainable food system and understand how food policy and production affects consumers.

7) Discuss the factors that contribute to energy balance and factors that contribute to proper weight management.

8) Discuss the role of nutrition in relation to health and prevention of chronic disease.

9) Conduct and interpret a personalized dietary assessment.

10) Identify potential modifications to your current dietary intake patterns to enhance health.

REQUIRED RESOURCES and RESOURCES FOR THIS COURSE
Internet Access - This course requires a reliable computer and regular access to the Internet. It is expected that students have basic computer skills. All assignments (assessments) and exams will be completed and submitted online via Blackboard VISTA (BBV). BBV is a password-protected course management website. Instructions, announcements, emails, study materials, & other information pertaining to this course can also be accessed via BBV. Any technical problems may be directed to the USU Help Desk (http://helpdesk.usu.edu or 797-4357).

Blackboard VISTA (BBV):	http://bb.usu.edu
Username:	A-number (i.e. A00123456)
Password:	Banner PIN
Browser:	Click on "Check Browser" link (upper right-hand corner). Follow instructions or contact Help Desk with any problems (i.e. Red "X" instead of Green Checkmark)

Access Code - A computer access code (ISBN 0558766366; $100) is required for this course and is available at USU Bookstores. It may be purchased as part of a package (with the customized text described below) or separately. The computer access code provides you with on-line access to the MyDiet Analysis program you will need to complete assessments for the course, an electronic copy of the textbook (E-text), and other online resources. It is not possible to complete this class without an access code.

Textbook – Custom version of Blake, Munoz, Volpe (2010). *Nutrition From Science to You* 1st Edition. A <u>custom version</u> of this text was created specifically for this course and is available at USU Bookstores as a package with the computer access code described above (ISBN 0558683584; $110). This package also includes a complimentary copy of a publication called *Eating Right* authored by USU NDFS faculty.

APPROPRIATE BEHAVIOR AND ATTENDANCE - Students in this class are expected to be responsible adults. Interaction with other students, the instructor, Course Facilitators, and occasional substitute teachers or guest lecturers should be professional and respectful. Please be courteous and considerate of others by arriving on time to recitations and turning off all cell phones and other devices. Class attendance is expected but not required or tracked. Irregular attendance accounts for the majority of poor grades received in this class.

WEEKLY RECITATIONS (IN CLASS) - Students are expected to complete reading assignments and online modules independently and on time (see Course Schedule). Recitations will be taught weekly by the instructor to review material, reinforce concepts, and focus on application activities. Questions related to the lecture content are welcome at appropriate times during recitations and as time allows. Students are encouraged to attend the recitation section they registered for. Up to 40% of exam material may come from content covered in recitation. Students should be prepared to take notes and participate during recitation periods.

WEEKLY MODULES (ONLINE) - Modules contain the online learning content of each chapter and are to be completed each week (see Course Schedule). <u>Late work will NOT be accepted</u>. Modules are divided into four sections (Read It, Study It, Assess It, and Live It). They do not necessarily need to be done in a certain order. Each is described below. Access to modules will

require you to log into BBV and then to the Pearson server (Pearson is the publishing company for many of the online materials) for some but not all resources. **It is recommended that you use the same user-name and password for both.** More instructions will be given during the first week of class.

- READ IT: This section outlines each of the chapter objectives and includes a "Myths & Misconceptions" Quiz. Your score on this quiz will not be recorded in the grade book and may be taken more than once. It is meant to be a self-study tool. You will also find your reading assignment in this section and links to sections of the E-text.

- STUDY IT: This section includes learning activities to reinforce concepts from your textbook. Activities include animations, practice quizzes, flashcards, games, a glossary, etc. Materials in this section are also meant for self-study and may be done multiple times.

- ASSESS IT*: This section includes all of the material in each module that will be recorded in the grade book and will count towards points earned in the course. This is where you will find Assessments (assignments) related to MyDietAnalysis (see description below) and a 20-point Module Quiz. Taking the Module Quiz is how you earn points for completing the module. You may take each Module Quiz as many times as you would like during the period of time the quiz is available to you. Questions will change with each attempt. Your highest score will be recorded and will count towards your points earned in the course.

- LIVE IT: This section focuses on application and includes supplementary material to support and reinforce the concepts found in each chapter.
  * Remember, only Assessments completed in the Assess It tab of the on-line modules will count towards your points earned in the course.

WEEKLY ASSESSMENTS RELATED TO MY DIET ANALYSIS (ONLINE) – A major component of this class is an in-depth assessment of your personal diet using the MyDietAnalysis software (version 4.2.1) available to you with your purchased Pearson access code. You will be expected to keep a 3-day record of your food intake and physical activity at the beginning of the semester and then enter that data into the MyDietAnalysis computer program. Each week, you will analyze different reports generated by the MyDietAnalysis program (from your original food record) and submit an assessment in Blackboard.

There are 10 diet analyses assessments (each is worth 25 points) and all of them are related to your MyDietAnalysis Reports. Assessments are embedded in the "Assess It" section of the online Modules and may NOT be completed after the due date (see Course Schedule). All assessments will be available at least three weeks before their due date. Assessments are not timed. Prior to

submission, they may be accessed multiple times before the due date (be sure to save your answers after each question and click on the "Finish" button at the bottom to submit your answers when you are done).

You may use your MyDietAnalysis Printouts, textbook, notes, and any other necessary resources to complete your MyDietAnalysis assessments. After assessments are submitted, they are corrected and scored by one of the Course Facilitators. If you have questions, please contact one of them directly (via BBV email). Your scores will be posted on BBV when they are finished. Please allow 1 - 2 weeks for grading.

EXAMS (ONLINE) - Three timed exams and a comprehensive final exam will be administered online via BBV. Exams are closed book (you may not use notes, classmates, textbooks, etc) and will consist of 50 questions (multiple choice, true/false, matching, etc). You will have 50 minutes to complete each exam. Each exam will be available via BBV for a 1-week period (see Course Schedule) and must be completed during that time. No late exams will be given. Your Final Exam will be comprehensive and must be taken to pass the class. The Final will not be available any earlier than the Monday of Finals Week. Exam results will be posted on BBV under the "My Scores" icon.

In accordance with University policy, cheating will result in course failure and removal. A proctor is not required and you may take your exam from any computer with internet access. Keep in mind that BBV has certain built-in features that flag dishonesty. Exams will be timed (50 minutes) and only one attempt is allowed. Two points will be deducted for every one minute a student goes over the time.

USU HONOR CODE - The Honor Code at Utah State University is based on mutual trust and intellectual honesty and expressly forbids the following academic violations: Cheating (includes the actual giving or receiving of any unauthorized aid or assistance or the actual giving or receiving of any unfair advantage on any form of academic work, or attempts thereof); Plagiarism (includes the copying of the language, structure, ideas and/or thoughts of another and passing off same as one's own, original work, or attempts thereof); and Falsification (includes the statement of any untruth, either verbally or in writing, with respect to any circumstances relevant to one's academic work, or attempts thereof).

Such acts include, but are not limited to, the forgery of official signatures, tampering with official records, fraudulently adding or deleting information on academic documents such as add/drop requests, or fraudulently changing an examination or other academic work after the testing period or due date of the assignment). All students, upon admission to this University, have pledged to abide by this Honor Code. In accordance with University policy, a violation of this agreement will result in disciplinary action (i.e. course failure and dismissal).

BLACKBOARD VISTA (BBV) INFO

Course Syllabus and Schedule - An electronic copy of the Course Syllabus and Schedule are available on the Homepage of BBV. Students are encouraged to print these off and refer to them often to keep up on lecture material, assigned reading, and assessments.

Viewing Scores on BBV - Students' scores for assessments and exams will be available on BBV and updated regularly. To view scores, click on the "My Grades" icon. To see specific questions that you missed on assessments or tests and see feedback, follow these steps:

1) Click on the "ASSESSMENT" link from the menu on the left side of the screen.

2) Click on "VIEW ALL SUBMISSIONS".

3) Find the Assessment of interest (you may have to expand the list of visible assessments by clicking on the little drop-down box at the bottom, right-side. Then click the green arrow to see all of the assessments).

4) Click on the link that says "ATTEMPT 1". You will be able to see your original answers, the correct answers, and any comments made by the instructor or TA.

Email Instructions - To use the email option within BBV, click on the Mail link (menu on the left) and select Compose Mail Message. Select recipient by clicking the Browse for Recipients button at the top. To send a message to the instructor, select "All Section Instructors" at the top or select my name (Marlene Israelsen) from the list of individual members. To send a message to Katie Brown or Stephen Poe (Course Facilitators), select "All Teaching Assistants". Type your message and enter something in the Subject Line. You may attach files if needed, otherwise just click Send. To read new messages that are sent to you, click on the message hyperlink (unread messages are bold). If you have questions about the email feature, you may view the Email Tutorial Video or PDF file on Blackboard (http://bb.usu.edu).

Communication & Announcements - Email is the preferred method of communication for this class. To contact me (instructor) or the Course Facilitators (Katie or Stephen) please email within BBV (see directions above). Please write professionally, remember punctuation, include your full name, and fill in the subject line. (For emails to the TA, please indicate that you're in the On-Campus Class). Be sure that your questions and comments are relevant and appropriate.

Any announcements for this course will be emailed to you or posted on BBV. You are encouraged to visit BBV often to check for any announcements or email messages. You are responsible for any changes posted on the BBV and for any information that is emailed to you. A green star will appear on the menu bar (left side) for areas with new information or

changes. If you need diet counseling, please contact a dietitian at the Student Health & Wellness Center (797-1660).

EXTRA CREDIT - Up to 30 Extra Credit points are offered in this class. Details about Extra Credit options will be explained by your instructor.

SPECIAL CONSIDERATIONS - Any student with a documented disability who requires accommodation must contact the Disability Resource Center (www.usu.edu/drc/services) and inform the instructor so that appropriate arrangements can be made for participation in the course.

S.M.A.R.T. STUDENT CHARACTERISTICS

S - Show Up, Smile, and Sit Close

Irregular attendance accounts for the majority of poor grades received in this class. It is highly unusual for an "A" student to miss recitations more than once or twice. Student who sit close to the front of the room also tend to hear better and learn more.

M - Make Time to Study

Students who do well in this class typically study about *8 - 12 hours per week or more.* It is expected that you will complete reading assignments, take good notes, and submit assessments on time (or early). It's much easier to keep up than catch up.

A - Ask Questions & Communicate

If you have a legitimate concern or question, *please* talk with your instructor or one of the Course Facilitators. We can't help you if we don't know what you need (and that you *want* help). Remember to take advantage of office hours.

R - Review Regularly and Use Resources

Try to go through your lecture notes within 6 hours after every class and review material even on "non-lecture" days. Use the learning resources and activities on BBV, form study groups with classmates, and develop a consistent pattern for reviewing online material.

T - Teach and Apply Concepts

You are much more likely to understand and remember concepts if you incorporate the principles we discuss in class into your daily lifestyle and/or explain them to someone else.

SOME FINAL THOUGHTS - This class is designed for serious students who are responsible, disciplined, and focused. The course content has been standardized so that the degree of difficulty is equal for all students – regardless of the instructor or class type. Students should not

assume that the 1000-level number of this course indicates that it is easy. It simply indicates that the course has no prerequisites. Most students consider this course challenging and quite rigorous and students entering the course directly from high school or a Junior College should adjust their expectations accordingly.

The USU Academic Resource Center (http://www.usu.edu/arc) is a great resource to help you to improve your study habits and test-taking skills.

GRADE COMPUTATIONS - The table below shows how total points will translate into course grades. In no case will a student in any point range receive a grade lower than the grade indicated in the table. It is possible that students in the upper end of each point range at the end of the semester will receive higher grades than those indicated below.

Exams (3 Exams + Final @ 125 pts Each)	500		A	93% and above
Module Quizzes (Getting Started + 12 @ 20 pts Each)	250		A-	90-93%
	250		B+	86-90%
Assessments (10 @ 25 pts Each)			B	83-86%
Extra Credit (up to 30 pts)				
Total Points	**1000**		B-	80-83%
			C+	76-80%
			C	73-76%
			C-	70-73%
			D+	65-70%
			D	60-65%
			F	59.9% and below

Appendix B: Data Collection Tools.

NDFS 1020 hybrid pretest.

Directions: Please complete the following 14 questions to the best of your own knowledge without using any references. This will not be graded, but used to evaluate the quality of this course. Please spend no longer than 15 minutes to complete and good luck!

1. Which of the following is a TRUE statement about enriched grains, such as enriched flour?
    - A. By U.S. law products made from enriched flour must contain at least 100 micrograms of folate per 100 grams of grain
    - B. Foods made from enriched flour are high in fiber
    - C. *Enriched grains have folic acid, thiamin, niacin, riboflavin, and iron added back to the grain after the milling process.
    - D. Enriched grains have vitamin c, vitamin k,, vitamin B12, and calcium added back to the grain after the milling process.
    - E. I don't know which of these is a TRUE statement.

2. Which of the following is a TRUE statement about sodium?
    - A. Sodium is not an essential nutrient and should be eliminated from the diet for optimal health.
    - B. Soda pop is a major source of sodium in the U.S. diet.
    - C. *Processed and canned foods are a major source of sodium in the typical U.S. diet.
    - D. I have no idea which of these is a TRUE statement

3. Which of the following provides <u>more</u> than 4 calories per gram?
    - A. cholesterol
    - B. animal protein
    - C. high fructose corn syrup
    - D. *saturated fat
    - E. Not sure

4. EPA and DHA are omega 3 fatty acids shown to reduce the risk of heart disease and stroke. Which of the following foods provides the best source of EPA and DHA?
    - A. eggs hatched from chickens fed flax seed
    - B. walnuts
    - C. tuna
    - D. *salmon
    - E. Not sure

5. Which of the following individuals would be at the highest risk for developing an anemia?
    A. *A vegan female of child bearing age
    B. An adolescent male
    C. A growing child
    D. A healthy infant
    E. Not sure

6. Gram for gram, which of the following types of fat is the most detrimental for heart health?
    A. monounsaturated fatty acids
    B. polyunsaturated fatty acids
    C. saturated fatty acids
    D. *partially hydrogenated fatty acids
    E. Not sure

7. Which of the following is a fat soluble vitamin found in leafy green vegetables which helps strengthen bones?
    A. calcium
    B. vitamin C
    C. vitamin D
    D. *vitamin K
    E. Not sure

8.   The ingredient list from a jar of peanut butter reads: *Made with roasted peanuts. Also contains molasses, partially hydrogenated vegetable oils, salt.* Which of the following is a TRUE statement?
    A. This peanut butter is a cholesterol free food
    B. *This peanut butter contains trans fat.
    C. This peanut butter does not contain added sugars.
    D. This peanut butter is 100% organic.
    E. Not sure

9. The temperature danger zone for potentially hazardous foods is between…
    A. *40ºF and 140ºF
    B.   60ºF and 150ºF
    C. 60ºF and 120ºF
    D. 70ºF and 100ºF
    E. Not sure

10. What percentage of the total calories per serving is provided by sugar according to the above nutrient facts label? (Nutrition facts label not shown in this document.)
    A. 12%
    B. *53%
    C. 60%
    D. 85%

11. If someone consumes excess energy (calories) from protein, the extra protein is…
    A. *Converted into fat and stored
    B. Excreted entirely in the urine
    C. Used to build bigger muscles
    D. Used to make more red blood cells
    E. Not sure

12. Which of the following factors has the greatest impact on basal metabolic rate (i.e., how much energy your body needs to function)?
    A. Age
    B. Gender
    C. Physical activity level
    D. *Body composition (percentage of lean body mass compared to adipose tissue)
    E. Not sure

13. Based on current research and data obtained from individuals who have successfully lost weight, which of the following was NOT a common behavior associated with weight loss and maintenance?
    A. 60-90 minutes of moderate physical activity per day
    B. Generous consumption of fruits and vegetables
    C. *Skipping breakfast to save calories
    D. Keeping a record of what you eat everyday
    E. I have no idea

14. A person weighs 300 pounds and wants to lose weight. Which amount below represent the maximum amount of weight loss that can be lost over a 6 month period and still be considered healthy?

    A. 5 pounds
    B. 100 pounds
    C. *30 pounds
    D. 20 pounds

Spring 2011 NDFS 1020 student profile survey.

1. Where are you from?

   a) Rural area or small town in Utah
   b) Rural area or small town outside of Utah
   c) City in Utah (size of Logan or bigger)
   d) City outside of Utah (size of Logan or bigger)

2. How old are you?

   a) Less than 20-years-old
   b) 20 to 25-years-old
   c) 25 to 30-years-old
   d) 30 to 40-years-old
   e) Older than 40-years-old

3. Have you declared a major?

   a) Yes
   b) No

4. If you had to choose a color to describe your personality, what would it be?

   a) Red (Responsible, Productive, Leader, Workaholic)
   b) Blue (Loyal, Caring, Sincere, Strong Moral Compass)
   c) White (Non-Confrontational, Quiet, Independent)
   d) Yellow (Spontaneous, Fun, Adventurous, Funny)

5. What did you have for breakfast this morning?

   a) Nothing
   b) b. Cereal or Oatmeal
   c) Fruit and/or Toast and/or Yogurt
   d) Waffles or Pancakes
   e) Eggs and/or Sausage and/or Bacon
   f) None of the above

6. On a scale of 1 to 5 (with 5 being the best), how would you rate your typical dietary habits?

   a) 1 (Poor)
   b) 2 (Fair)
   c) 3 (Average)
   d) 4 (Good)
   e) 5 (Excellent)

7. On a scale of 1 to 5 (with 5 being the best), how would you rate your typical physical activity habits?

   a) 1 (Poor)
   b) 2 (Fair)
   c) 3 (Average)
   d) 4 (Good)
   e) 5 (Excellent)

8. Why did you choose to take NFS 1020?

9. Do you have all of the materials for this course? If not, what are you still missing?

10. List at least one SPECIFIC thing you hope to learn in this class.

11. What is your biggest CONCERN about this class so far?

12. Is there anything else you want to ask or tell me?

13. Are you male or female?

   a) Male
   b) Female

14. Which of the following best describes you?

   a) On-Campus Freshman (or First Year in College)
   b) On-Campus Sophomore (or Second Year in College)
   c) On-Campus Junior (or Third Year in College)
   d) On-Campus Senior (or More than Three Years in College)
   e) Non-Traditional or Distance Student

Spring 2011 NDFS 1020 midterm course evaluation survey questions.

1. What grade are you currently earning at this point in the semester?

   a) A or A-
   b) B+, B, B-
   c) C+, C, C-
   d) D+, D
   e) F

2. Is this your first time taking NDFS 1020 at USU?

   a) Yes
   b) No (I've taken NDFS 1020 previously and I'm retaking it this semester)

3. Is this the first time you've been enrolled in a HYBRID COURSE (a course which combines a face-to-face instructor-led weekly recitation with a considerable amount of online learning)?

   a) Yes
   b) No

4. How many weekly recitation sessions have you attended (or listened to as a recording) so far?

   a) All 7 of them (I've attended or listened to 100%)
   b) All but 1 (I've attended or listened to at least 85%)
   c) All but 2 or 3 (I've attended or listened to at least 60%)
   d) All but 4 or 5 (I've attended or listened to at least 30%)
   e) I've missed 6 or more (I've attended or listened to less than 30%)

5. From the list below, select the THREE (3) tools and/or resources that have been MOST HELPFUL in preparing for exams.

   a) Weekly recitations (in-person or pre-recorded)
   b) Hard Copy (or Custom Version) of Text
   c) E-Text Copy of Text (on Blackboard)
   d) Module Quizzes on Blackboard
   e) Sample Study Questions (in Chapter Folders under "Review Sessions" Link)
   f) Power Point Slides from recitations (under "Recitation Material" link from the course content page)
   g) Information in the Study It tab within Modules (self-study quizzes, animations, etc)
   h) Information in the Assess It tab within Modules
   i) Your Personal Notes or Study Materials

6.   From the list below, select any tools and/or resources that you either HAVEN'T USED or that have NOT BEEN HELPFUL in studying for exams (check all that apply).

   a) Weekly recitations
   b) Hard Copy (or Custom Version) of Text
   c) E-Text Copy of Text (on Blackboard)
   d) Module quizzes on Blackboard
   e) Power point slides from recitations posted under the Recitation link
   f) Information in the Assess It tab in Blackboard modules
   g) Information in the Study It tab in Blackboard modules (i.e. Animations)
   h) Your Personal Notes or Study Materials

7.   How often do you read or reference the textbook (including both the e-text and hard copy)?

   a) 5 or more times per week
   b) 3-4 times per week
   c) 1-2 times per week
   d) Usually just right before exams
   e) Never

8.   How often do you consult or study with a classmate or group of classmates concerning course content outside the classroom?

   a) 3 or more times per week
   b) 1-2 times per week
   c) Rarely
   d) Never

For Questions 9 - 24, rank how much you agree with the following statements on a scale of 1 to 5 (with 1 being STRONGLY DISAGREE and 5 being STRONGLY AGREE).

(#9). Accessing and using the course content on Blackboard is simple and straightforward.

   a) 1 (Strongly Disagree)
   b) 2 (Disagree)
   c) 3 (Neutral)
   d) 4 (Agree)
   e) 5 (Strongly Agree)

(Note: Questions 10-24 had the same ranking system as question 9.)

10.   I have read the SYLLABUS and I use it as a reference when I have a question about anything in this course.

11.   The SYLLABUS provides a clear description of course policies and what I need to do to succeed in this course.

12.   The MyDietAnalysis Program is user-friendly and the instructions for using it are adequate.

13.   The ASSESSMENTS on Blackboard help me to interpret my MyDietAnalysis Reports and apply the information I'm learning to my personal life.

14.   I have used the DISCUSSION BOARD to communicate and connect with other peers and I think it is useful.

15.   Attending and or listening to pre-corded weekly RECITATIONS (held on Monday, Wednesday, or Thurs) helps to increase my understanding of course material.

16.   The instructor encourages student participation during the weekly recitations.

17.   Course EXAMS are fair and represent the concepts that are covered in our book and class.

18.   I appreciate the flexibility of the course design (being able to complete work on Blackboard on my own time and at my own pace).

19.   My instructor exhibits ENTHUSIASM for the subject material.

20.   My instructor's ability to COMMUNICATE is satisfactory.

21.   My instructor's EXAMPLES & EXPLANATIONS are helpful.

22.   My instructor is RESPONSIVE to students and readily AVAILABLE to communicate outside of recitations (via email, office hours, announcements on Blackboard, etc.)

23.   My opportunities to communicate with the instructor and other classmates are BETTER than those provided by traditional, face-to-face classes.

24.   I feel the quality of this course would be LOWER if the instruction was delivered in the traditional format (one large section of 300 to 500 students with three face-to-face lectures per week).

25.   Would you recommend this course to a friend?

    a) Yes
    b) No

26. Would you recommend that NDFS 1020 continue to be offered as a hybrid course (a blend of online and face-to-face instruction)?

   a) Yes
   b) No

27. Overall, do you feel the online course materials and course organization are providing a high quality educational experience?

   a) Yes
   b) No

28. If you were to assign a grade for the overall quality of this course, what would it be?

   a) A
   b) B
   c) C
   d) D
   e) F

29. What aspects of this course do you especially LIKE or find HELPFUL?

30. What CHANGES, if any, would you suggest making to improve the quality of this course?

31. What is one of the MOST VALUABLE THINGS you have learned in this class so far and/or applied in your life?

Appendix C: Spring 2011 Qualitative Data Summary from the Midterm Course Evaluation

Table 8: Weaknesses and Successes of Hybrid NDFS 1020 from Both On-Campus and Distance Education Students' Perspectives

Weaknesses perceived by ON-CAMPUS students
"I like that I can finish the stuff on my own time, however it causes me to procrastinate more often. " "For this class it is fine the way it is, but if any other classes decide to change to a hybrid class such as chemistry or a some math classes, might need longer or more recitation classes to ask more question about the course content. " "I have a hard time with this type of course. I don't like not having a report system that I have to follow. When I am held more responsible then I do better… It is helpful to have all the information available online, but at the same time not really because it is a little overwhelming. "

Weaknesses perceived by DISTANCE EDUCATION students
"When I started this course I was (and still am) a little confused about the face-to-face interaction with this course. Maybe included a tutorial or assignment based solely on that aspect, that way students become for familiar with it" "I think that a couple little projects would be fun and a good learning experience. Maybe share recipes, or have a healthy dinner night and see how it affected your next day?"

Successes perceived by ON-CAMPUS students
"I really like the flexibility of online quizzes, assessments and exams….This class has been a real benefit to my busy schedule." "I like that it is a hybrid course. It is taking me a little while to get used to it and develop the right study habits when I don't have class three times a week, but I think that once you get that down the class is a lot easier to deal with. " "I like the many different resources provided to help you study. Some people learn differently and there's something to satisfy the different ways." "I like how the classes size is broken up into three smaller classes. This makes learning the material being taught during the recitation a lot easier because there is less distractions. I also really like the animations that are online for this class.

Successes perceived by DISTANCE EDUCATION students
"I like that I can do it at my own pace and time. It works best with my crazy life. The review sessions are helpful and short enough to make them easy to attend without disrupting my schedule too much. I enjoy learning more of the science behind nutrition" I like that the instructor reviews the chapter weekly and answers any questions that you might have... I feel if we did not have the weekly sessions that I would not have learned as much as I have. "I like that I can take the quizzes multiple times, this allows me to learn from my mistakes and really memorize the material. I also like the assessments of our personal intake."