

ABSTRACT OF CAPSTONE

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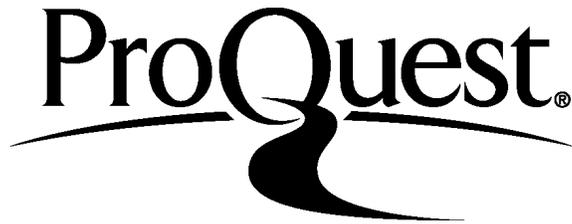
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PERCEPTION OF EXAMSOFT FEEDBACK REPORTS AS
AUTONOMY-SUPPORT FOR LEARNERS

Abstract of capstone

A capstone submitted in partial fulfillment of the
requirements for the degree of Doctor of Education in the
College of Education
at Morehead State University

By

Leah Parsons Simpson

Lancaster, Kentucky

Committee Chair: Dr. Jeannie Justice, Assistant Professor

Morehead, Kentucky

March 1, 2016

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ABSTRACT OF CAPSTONE
PERCEPTION OF EXAMSOFT FEEDBACK REPORTS AS
AUTONOMY-SUPPORT FOR LEARNERS

The primary purpose of this study was to examine student perception of ExamSoft feedback reports as autonomy-support for learning. Through a survey research approach, this study explored student motivation for reviewing ExamSoft feedback after major course exams. It was hypothesized that students who received *Strengths and Opportunities* reports aligned to the course outcomes would review the feedback for autonomous rather than controlled reasons.

Previous Self-Determination Theory (Deci & Ryan, 1985a, 1994, 2000) research indicates that student perception of autonomy-support increases academic success (Black & Deci, 2000) and student expectancy for success (Mih & Mih, 2013). Feedback can be autonomy-supportive when it informs students of their progress toward the course's goals and gives suggestions for improvement (Hattie & Timperley, 2007). This study sought to uncover why students review the ExamSoft *Strength and Weaknesses* report.

A single survey was sent to first year pharmacy students following their second major course exam in a first-year, first-semester required course. A 43-item survey was developed and consisted of three parts: 1) the Basic Needs Satisfaction (BNS) at Work Scale, 2) the Learning Self-Regulation Questionnaire (SRQ-L), and 3) ExamSoft usage and demographic items.

The results indicated that students review ExamSoft feedback for autonomous reasons, implying that the feedback is autonomy-supportive. Further evidence indicated that students use the feedback to help them understand which topics need review as well as to begin conversations with course faculty about their progress. The findings offer insights into the ways faculty and other e-assessment providers can best support student learning and autonomy through feedback.

KEYWORDS: autonomy, e-assessment, ExamSoft, feedback, autonomy-support

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AUTONOMY-SUPPORT FOR LEARNERS

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CAPSTONE

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DEDICATION

To my husband for always supporting me.

To my father for modeling a love for education.

To my mother for teaching me to never quit.

To my son for reminding me to take time to play.

ACKNOWLEDGEMENTS

I would like to formally thank everyone that has made this accomplishment a reality. Thank you to the many co-workers who have assisted me in this research. Thank you to Dr. Kenneth Record who listened with interest about my ideas on autonomy-support and agreed without reservation that I could survey the students in his course. Thank you to Dr. Doyle Friskney whose praise for the program inspired me to apply.

I would like to thank my committee members, Drs. Lola Aagaard and Rena Keath, for their participation, guidance, and wisdom. I would like to especially thank my committee chair, Dr. Jeannie Justice, for being my mentor, my counselor, and, at times, my lifeline.

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Finally, I must acknowledge my family. My husband, Doug, has patted my back when I've wanted to quit, diverted my attention when I've wanted to break my computer, and pretty much taken over all the household chores. Thank you to my parents and in-laws who have never said no to a request for parenting assistance; thanks for taking Jack to school, games, and birthday parties. And thanks to my son, Jack, who never complained when I worked on assignments during his baseball games.

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CHAPTER 1 – INTRODUCTION

Prologue

In July 2014 I was asked to attend a meeting between ExamSoft, Inc. and individuals from the University of Kentucky (UK) technology division. The meeting was to discuss the possibility of using ExamSoft as an assessment tool for the University's general education requirement. At the time I was employed with the University's Office of Assessment and was the division's primary assessment personnel for the area of general education; however, I had recently accepted a position as Director of Assessment with the UK College of Pharmacy. The College was in the process of initiating an ExamSoft pilot in their first and second year courses. I was aware that my new role would require me to lead the ExamSoft efforts in the college. As a result my interest in the ExamSoft meeting was two-fold. I was interested in learning how the system might work with the University's general education assessment plan, but I was also interested in discovering how I might smooth my transition to the College of Pharmacy.

During that meeting Daniel Muzquiz, then CEO of ExamSoft, made a bold claim. He remarked that using ExamSoft in general education courses would lower the drop, fail, and withdraw (DEW) rates for those courses. I thought this an odd proclamation. How could an online testing and reporting system lead to fewer DEWs? Though I was tempted to dismiss the statement as a good sales pitch, I was hesitant to reject Mr. Muzquiz's claim. Having had previous interactions with him at conferences, I felt confident that he was far too savvy to make unsubstantiated claims

in a room full of academics. Still, I found it difficult to take the statement seriously so I pushed it to the back of my mind.

A few months after the meeting I immersed myself in self-determination theory literature. I happened upon this theory of motivation while pursuing research in the area of autonomy and assessment technology. Some researchers have suggested that e-assessment technology can, if used properly, increase student autonomy (Ballard & Butler, 2011; JISC, 2007; Lafuente, Remesal, & Alvarez Valdivia, 2014). Autonomy, as it relates to learning, is the degree to which students have the freedom to make decisions about their learning (Hackman & Oldham, 1975). It was unclear to me how assessment technologies might increase student choice and freedom. Autonomy, it seemed to me, was a function of the instructor, not the technology, though I could conceive that technology might make choice more manageable. Intrigued by the concepts of autonomy, I continued with my research and soon found myself immersed in Self-Determination Theory literature.

According to Self-Determination Theory (Deci & Ryan, 1985a, 1994, 2000) autonomy is one of three basic human psychological needs. Autonomy in learning has been linked to greater student satisfaction, persistence, and deeper learning (Seiver & Troja, 2014; Wielenga-Meijer, Taris, Wigboldus, & Kompier, 2012). After reading these studies I was reminded of Muzquiz's claim in our ExamSoft meeting. Could student autonomy be the key to his boast of decreased DEW rates? I wondered how ExamSoft, an e-assessment technology, could possibly support learner autonomy.

ExamSoft is an online assessment (e-assessment) system that allows for two basic types of assessment: (1) the traditional exam, and (2) rubric evaluations of student work and performances. Unlike most learning management testing systems, ExamSoft can be securely administered. In the College of Pharmacy, students take ExamSoft assessments in the classroom from their personal laptop computers. The system locks the computer so that students are unable to search personal files or browse the Internet during the times that the test is open.

In addition, individual test items and rubric components can be aligned to the course and/or program outcomes that they best represent. This feature allows students and faculty to receive a variety of assessment reports. In addition to their individual scores, the class mean, mode, median, and standard deviations, the students also have the choice to look at a *Strengths and Opportunities* report. This report provides students with feedback on their progress in individual outcomes. If, for example, a student correctly answered six out of ten questions aligned to biochemistry, the report would show the student's progress as well as their peers' average in that area. The report would also provide a color coded icon to indicate their success or need for improvement. Green means they are doing well, yellow indicates that the outcome needs review, and red suggests that the student needs improvement in that area. Though I did not know it at the time, it is this report that distinguishes ExamSoft from a simple testing system and, in theory, supports learner autonomy.

Purpose of the Research

This non-experimental cross-sectional survey methodology study seeks to investigate the perception of autonomy-support from ExamSoft's feedback reports by first year pharmacy students at the University of Kentucky. According to the criteria established in Chapter 2 of this capstone, ExamSoft feedback reports should act as autonomy-supportive documents for students in the College of Pharmacy. What is unclear, however, is if students perceive the documents as autonomy-supportive. Research has indicated that the benefits of autonomy (i.e. better learning, greater satisfaction) are directly linked to the student's perception of autonomy-support (Mih & Mih, 2013). Students may not benefit from the support they receive if they do not perceive it as such. Do students use the reports because they find them to be beneficial to their learning, or do they review the documents because of some outside pressure? Do the perceptions of students from non-Western cultures (collective) differ from Western-born students (individualistic)? Are student perceptions of the PharmD program related to their perception of ExamSoft's autonomy-support? These queries helped to form the three research questions for this project.

1. *Do students perceive ExamSoft feedback reports as autonomy-supportive?*
2. *Is there a relationship between perception of autonomy-support and Basic Needs scores?*
3. *Is there a difference in perception of autonomy-support between students from collective and individualistic cultures?*

My interest in studying this project was personal. As the Director of Assessment for the University Of Kentucky College Of Pharmacy, I am responsible for gathering and organizing all data related to assessment of student learning, assessment of the program, and accreditation. I wanted to know if ExamSoft is as useful to students as it is to me. I sought to understand how students' use ExamSoft to benefit their own goals. In particular, the study will help me understand if students use ExamSoft feedback because they believe it to be useful to their learning (autonomy-supportive), or if they use it because they feel compelled to do so by outside forces (controlled).

My hope is that students use ExamSoft feedback as autonomous support for their learning. Increased learner autonomy has been linked to: student retention, student satisfaction, student success, and life-long learning. All of these are topics that are of great concern in most academic programs, as well as in the College of Pharmacy where the study will take place.

Overview of Self-Determination Theory

Deci and Ryan's (1985a, 1994, 2000) Self-Determination Theory (SDT) served as the theoretical framework for the study. The theory states that individuals are motivated by three basic psychological needs: autonomy, relatedness, and competence. Of the three, autonomy has been identified as the need most responsible for deeper learning (Ryan & Deci, 2000) and student satisfaction (Jang, Reeve, Ryan, & Kim, 2009). SDT has been validated in previous studies on autonomy-support (Reeve & Jang, 2006; Wielenga-Meijer et al., 2012).

Using Self-Determination Theory as the theoretical framework, this study examines the importance and perception of autonomy in a learning environment. My theoretical framework serves two primary functions in this study. First, it positions my investigation within a wider frame of research and helps me to make clear connections between the theory of Self-Determination and the characteristics of autonomy-support. Second, Self-Determination Theory is a tool I used to understand learner motivation from both my own observations and others' research. Self-Determination Theory (SDT) research also informed the quantitative aspects of my research project. Specifically, I propose to use a validated survey instrument used in previous SDT to measure the motivation for student actions in specific learning environments.

Scope and Limitations of the Study

The quantitative survey was administered to all first year pharmacy students ($n = 140$) in the Pharmacy Practice Doctorate (Pharm.D.) program at the University of Kentucky. The University of Kentucky College of Pharmacy is a very competitive program and is highly ranked. As such, the population in the study is probably quite different from a general collegiate population. For this reason, it would be difficult to generalize the results of this study across all college environments.

As a cross-sectional survey study, the proposed research offers only a snapshot of the students' interaction with ExamSoft. Students who are more experienced in pharmacy education, as well as those with more experience with ExamSoft might have a different perception of the value of ExamSoft feedback than

those who are new to both the technology and the study of the profession. For this reason, it would be difficult to generalize the results of this study across all years of the pharmacy education.

Another limitation of the research is the lack of prior research studies on the topic. Though there have been multiple studies completed on autonomy-support and feedback, I have found no evidence of research connecting a singular assessment technology's connection to autonomy-support through feedback. This research will explore potential exciting connections between assessment technology and autonomy, but there will be little or no ability to compare the results of this study to previous data.

Definition of Terms

Six key terms are used throughout the entirety of this document. To clarify the meaning to the reader the terms are defined as follows:

Learner Autonomy

Learner autonomy is the degree to which students have the freedom to make decisions about their learning (Hackman & Oldham, 1975). Learner autonomy offers students a choice in how they learn but does not require that they act upon that choice (Holec, 1981).

Autonomy Regulation

Autonomy regulation “involves acting with a full sense of volition or willingness” (Vansteenkiste et al., 2010, p. 336). Autonomy regulation is intrinsic when the individual finds the activity enjoyable and interesting. Autonomy regulation

is extrinsic if the individual is motivated to act by an external pressure but still finds the activity valuable.

Controlled Regulation

Controlled regulation involves acting because of an outside “pressure to perform a behavior or pursue a goal” (Vansteenkiste et al., 2010, p. 336).

Autonomy-Support

Autonomy-support occurs when students are offered choice, rationale, and empathy (Koestner, Ryan, Bernieri, & Holt, 1984).

e-Assessment

e-Assessment broadly refers to any assessment activity “in which digital technologies are used” (JISC, 2007, p. 6). More specific to its use in this document, e-assessment refers to student testing and performance technologies that allow for item alignment to specific outcomes or competencies.

ExamSoft

ExamSoft is an e-assessment platform that allows for secure, online testing in a synchronous or asynchronous environment. The system offers traditional testing options (i.e. multiple choice, true/false, fill-in-the-blank, etc.) as well performance-based assessment using rubric evaluation. The ExamSoft system allows for alignment of all questions and rubric lines to multiple outcomes and competencies. Reports on achievement by outcome and competency are available to students, faculty, and administrators (ExamSoft Exam Intelligence, 2015).

CHAPTER 2 –REVIEW OF THE LITERATURE

The purpose of this literature review is to investigate the hypothesis that ExamSoft assessment reports are autonomy-supporting documents. Autonomy-support has emerged as a viable way to increase student learning, motivation, and persistence in education (Seiver & Troja, 2014; Wielenga-Meijer et al., 2012). Though some have argued that the future role of e-assessment technologies is to support learner autonomy (JISC, 2007; Timmis & Draper, 2012), little research has been published on the ability of technology to accomplish this goal. Using self-determination theory (Deci & Ryan, 1985a, 1994, 2000) as a way to explain student motivation as it relates to learner autonomy, this literature review establishes an argument that the e-assessment technology, ExamSoft, offers student feedback reports that fulfill the requirements for autonomous learning support.

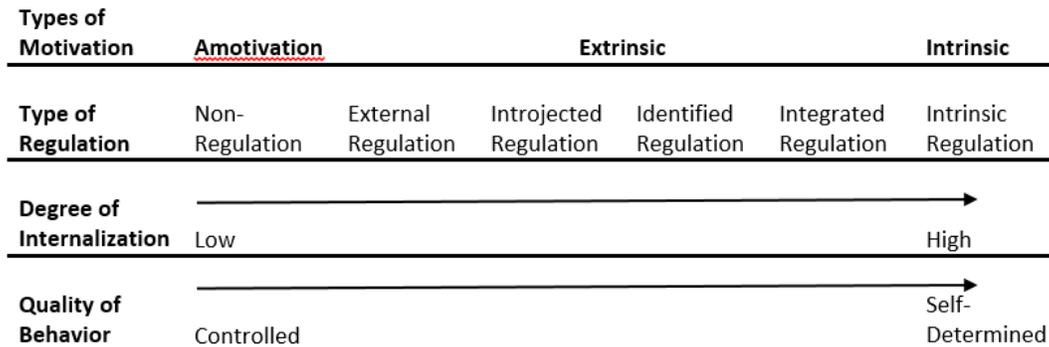
Self-Determination Theory

Self-determination theory (SDT) is a framework intended to explain the impetus of motivation, either through controlled or autonomous circumstances (Vansteenkiste et al., 2010). SDT (Deci & Ryan, 1985a) began as a study in motivational psychology, but quickly became a prominent theoretical framework for research in education, healthcare, and athletics. The theory explores the extent to which individuals willfully engage in activities and actions (Ryan & Deci, 2000). According to SDT humans have three basic psychological needs: need for autonomy, need for relatedness, and need for competence (Deci & Ryan, 1994). Experiences that support these three needs are thought to be the most motivating, which, in turn,

increases the likelihood that the individual will return to that experience of her own volition.

Motivation, the primary concern in SDT research, is a valuable topic to those in the fields of education, athletics, business, and politics because it is the primary factor for creating consequences. Simply put, motivation yields results. Choices, the product of motivation, can be internal or external. The extent to which motivation is internally or externally regulated defines the self-determination of the choice. Self-determined choices are those made willfully because they meet all or some of the three psychological human needs. Choices that are made due to external pressures are less self-determined (Ryan & Deci, 2000). In other words, when external motivation is the primary cause for activity, individuals are less likely to be invested in their choice because little, if any, of their psychological needs have been met.

As outlined in Figure 1, there are three primary types of motivation: amotivation, extrinsic motivation, and intrinsic motivation, with amotivation being the most controlled of the three (Deci & Ryan 1985b, 2002). Both extrinsic and amotivation begin outside of self, the difference is how the motivation is internalized. Amotivation is when an individual believes there is no benefit in completing a task. Achievement of a goal that is amotivated occurs when an external party (e.g. parent, faculty, employer) puts pressure on the individual to complete the activity. The activity may transpire, but the individual does not believe it was valuable in any way. Though the locus of control is also external, extrinsic motivation may be internalized by the individual as having at least a little value.



*Figure 1: The Self-Determination Continuum, with Types of Motivation and Types of Regulation. Adapted from *Handbook of Self-Determination Research* (p. 16), by E. L. Deci and R. M. Ryan, 2002, Rochester, NY: University of Rochester Press. Copyright [2002] by E. L. Deci and R. M. Ryan. Adapted with permission.*

The value of the extrinsic motivation can run the gamut from less to more self-determined. There are four categories of extrinsic motivation: external regulation, introjected regulation, identified regulation, and integrated regulation (Deci & Ryan, 1994). Of the four, external and introjected are the most controlled by forces outside of the individual. External regulation can be likened to a desire for a reward; introjected regulation might occur when an individual willingly takes on a task primarily for ego-satisfying reasons. Like amotivation, these two extrinsic motivations are the result of environmental factors that undermine the individual's psychological need for autonomy (Ryan & Deci, 2000). Unlike amotivation, the individual will recognize some benefit from compliance, though the desire to act will come from force or coercion. A student who attends college solely because doing so allows him/her to receive a monthly stipend from a parent would be externally regulated. A student that prefers to go to work immediately after high school but

chooses to attend college in order to fit in with his peers would have introjected regulation.

Thankfully, not all extrinsic motivation is negative. Identified regulation occurs when the individual believes that the activity has value. Integrated regulation, the most self-determined of the four, occurs when an individual integrates two intrinsic identifications of themselves so that, together, the two have meaning for the individual. These extrinsic regulations are guided by the needs for relatedness and competence (Deci, 1995). If a student pursued a college degree because he/she believed that a degree is an important attainment, then that student would be externally motivated through identified regulation. On the other hand, if the student pursued the degree because he/she believed that graduating from college would be consistent with other goals (e.g. successful career, higher pay, and overall happiness), then the student would be externally motivated through integrated regulation.

The third and most self-determined motivation is intrinsic which can be defined as an internal desire to explore and investigate, absent of external pressure. “Perhaps no single phenomenon reflects the positive potential of human nature as much as intrinsic motivation, the inherent tendency to seek out novelty and challenges, to extend and exercise one’s capacities, to explore, and to learn” (Ryan & Deci, 2000, p. 70). The need to explore and understand one’s environment is ingrained in all individuals (Deci & Ryan, 1994). Through the exploration of intrinsically motivating ideas or topics, individuals are thought to build cognitive

skills, develop self, and increase learning. It is because of these things that SDT has become a well-studied theory in education.

Autonomy

According to SDT when an individual's psychological needs are met, that individual will return to the satisfying activity over and over again. If educators hope that their students will explore learning of their own accord, then it is vital that educators discern the factors that lead students to a self-determined state. According to Deci (1995) the key is to provide students with choice. When individuals' actions are controlled, their sense of self-determination is weakened; however, when experiences are chosen without outside influence they are considered autonomous (Deci & Ryan, 1994). Autonomous choice occurs when an individual makes a choice of his own accord and is neither influenced by external factors nor pressure (Deci & Ryan, 1987; Ryan & Deci, 2000).

Of the three, autonomy has been celebrated as the psychological need most principal in the quest for satisfaction and motivation (Deci & Ryan, 1994; Deci & Ryan, 2000). "People have an intrinsic desire to explore, understand, and assimilate aspects of their environment" (Deci & Ryan, 1994, p. 12). The authors argued that a desire for autonomy is evident in even the youngest of individuals. Toddlers might display autonomy through their choice of play. One child may find great enjoyment stacking blocks while another is happier to explore family life through play with toy dishes and food items. Autonomy is not to be confused with independence. Autonomy is concerned with independent choice and internal motivation rather than

independence (Vansteenkiste & Ryan, 2013). Autonomy implies that an individual's choice is his/her own and without influence from outside forces. An individual may live independently but still make choices that are influenced by his/her need to fit in, receive reward, or avoid conflict. Therefore, the two words as used in SDT are not interchangeable. In addition, autonomy should not be confused with intention (Deci & Ryan, 1987). Autonomy implies an inner desire for an action. A choice may be intended but if the locus of control is external, not internal, then it is not fully autonomous. An example of this would be a student's willing pursuit of a degree program that he/she did not find particularly compelling, but was encouraged by his/her parents.

Though most agree that competence and relatedness are basic psychological needs of all humans, some have argued that autonomy is a western ideal that has little relevance in Eastern countries (Morling & Kitayama, 2008; Uchida, Norasakkunkit, & Kitayama, 2004). These authors argued that Eastern cultures are oriented toward the collective not the individual. This argument has been countered by other authors who assert that autonomy is a basic need in all cultures though the cultural orientation (horizontal or vertical, collective or individualistic) may differ (Chirkov, Ryan, Kim, & Kaplan, 2003; Jang et al., 2009). In addition a three-part cross-cultural study of adults from the United States and India found that collectivist cultures value choice as highly as individualistic ones (Miller, Das, & Chakravarthy, 2011). The results of this study indicate that both Eastern and Western cultures have high regard for

autonomy, which might suggest that autonomy-support will be well-received not just by American students in the college classroom, but also by foreign students.

Autonomy and Learning

When students make choices about their learning they have learner autonomy (Stefanou, Stolk, Prince, Chen, & Lord, 2014). Learner autonomy can occur under very broad or narrow circumstances. A student who chooses a program of study for no other reason than internal motivation is acting with learner autonomy. On the other hand, students may also experience learner autonomy when they are given an option for their final course project.

Learner autonomy is valuable to both students and faculty as it is believed to deepen learning (Niemi & Ryan, 2009) and increase student satisfaction (Jang et al., 2009). Black and Deci (2000) argued that when students have an intrinsic desire to complete a course of study, they learn more extensively and more deeply than those who participate in the course because of some form of external pressure. Their study of an introductory level organic chemistry course showed that students who entered with greater levels of autonomy were not only more satisfied with the course, but were also higher performers. In other words, those students who were more likely to act on intrinsic motivations were also more likely to attain higher achievement in the course.

In addition, research has indicated that students with higher learner autonomy consistently report higher levels of engagement in the course and program (Gikandi, 2013), and, not surprisingly, more enjoyment in the course or program (Mih & Mih,

2013; Wielenga-Meijer et al., 2012). Students with high levels of autonomy are also more apt to experience greater success in achievement of learning outcomes (Stefanou et al., 2014), and are more likely to persist in their studies (Katz, Eliot, & Nevo, 2014; Vallerand, Fortier, & Guay, 1997). These results are not shocking, since one might expect that an intrinsically motivated individual would have greater interest in that subject and, thus, greater achievement. Unfortunately, it would be unrealistic to expect all students in a course or a program to have a great intrinsic motivation for study in that topic. Even students with a great motivation to study a particular topic may find that they are less enthusiastic about some aspects of the program. It is in these instances that autonomy-support is valuable.

Autonomy-support. Autonomy-support occurs when students are offered choice, rationale, and empathy (Koestner et al., 1984). Holec (1981) explained it as providing students with the ability to take control of their learning experiences. Holec was careful to note that autonomy-support focuses on the student's ability to choose not the actions they take. Providing autonomy to students does not imply that they will use their right to choice, but studies have shown that autonomy-support does lead to deeper learning and exploration in a topic (Reeve & Jang, 2006; Wielenga-Meijer et al., 2012). For those students who lack the intrinsic motivation to succeed in a course, autonomy-support may be enough to increase learning and satisfaction.

Autonomy-support seeks to satisfy the students' basic psychological needs — need for autonomy, need for relatedness, and need for competence (Deci & Ryan, 1994) — as opposed to impeding it (Vansteenkiste et al., 2012). Through its impact

on the learning environment, autonomy-support is believed to influence the learner (Baeten, Dochy, & Struyven, 2013) in three specific ways. First, autonomy-support meets the student's intrinsic ambitions. When this occurs the student will be more satisfied and more likely to persist (Seiver & Troja, 2014). Second, autonomy-support cultivates curiosity and creativity (Patrick & Williams, 2009). In a study on creative performance by Jing (1998) high task autonomy was shown to generate more creative ideas than low task autonomy. Third, when faculty members are perceived as being autonomy-supportive, students become more autonomous in their learning (Williams & Deci, 1996). In essence, autonomy-support has been shown to fulfill many educators' goals of teaching engaged, excited, creative students.

Characteristics of autonomy-support. There are five identified characteristics of autonomy-support:

- Provision of choice to students (Stefanou, Perencevich, DiCintio, & Turner, 2004);
- Specification of rationale for students when choice is not available (Vansteenkiste et al., 2012);
- Request for student feedback (Vansteenkiste et al., 2012);
- Delivery of feedback from the student's perspective (Sierens, Vansteenkiste, Groossens, Soenens, & Docy, 2009); and,
- Authentic experiences (Gikandi, 2013).

It is not necessary to fulfill all of the listed conditions in order to provide autonomy-support; however, when greater numbers of criteria are realized, the activity is perceived as more autonomy-supportive.

Provision of choice. Perhaps the most commonly referenced form of autonomous support is the provision of choice to students. By offering students choice, teachers act in an autonomy-supportive manner (Vansteenkiste et al., 2012). When choice is relevant to the student's interest (Assor, Kaplan, & Roth, 2002) it is an autonomously motivating activity because it encourages student participation by promoting actions that support their intrinsic desires. When choice is not offered to students it may actually harm learning (Wielenga-Meijer et al., 2012). When given the opportunity, students will naturally investigate topics and theories that are of interest to them. Denial of this choice will limit the students' prospects for deeper, more meaningful learning.

Not all choice is created equally. Katz and Assor (2007) were careful to delineate the differences between choice and picking. Picking implies that there is no interest or relatedness to the activity. Students do not have an opportunity to investigate according to their interests, but through chance. One example of picking is when a student plucks a research topic from a hat. Choice would provide the student with a list of acceptable topics and the opportunity to research one that was of the greatest interest. The authors noted that picking may be a demotivating activity; whereas, autonomous choice is "based on a careful match between the various options and the students' needs, interests, goals, abilities, and cultural background"

(Katz & Assor, 2007, p. 439). In order to be autonomy-supportive, choice must be apparent and relate to the student's future or interest.

Specification of rationale. When instructors provide rationale for decisions, they may be supporting autonomy in the classroom. On occasion choice is not possible. In these situations, instructors should offer rationale to students (Vansteenkiste et al., 2012). This rationale may be enough to extrinsically motivate the student through identified or integrated regulation (Assor, Kaplan, & Roth, 2002). One might assume that students would prefer to follow their own path to learning, but they may be satisfied to follow the instructor when they know the reasoning behind the actions.

When limits are set, there is potential for conflict. Autonomy-support is centered on providing choice and authentic opportunities for students. Conversely, Deci (1995) argued that it is possible to set limits in an autonomy-supportive way by attempting to see the lack of choice from the student's perspective. When autonomy-supportive educators limit choice, they should attempt to provide an explanation to students that begins with a statement of understanding about the students' desires, followed by an explanation of why their desires may not be appropriate for the current situation.

Request for feedback from students. Actively seeking student opinions on classroom and program activities is an autonomy-supportive condition. Students should have opportunities to provide regular and ongoing feedback to instructors regarding their learning and experiences (Assor, Kaplan, & Roth, 2002). Through

feedback to the faculty, students might perceive themselves as having some amount of control over the learning environment, the course, and their own learning path.

Delivery of feedback to students. Feedback has been touted as the most powerful way to improve student learning. A synthesis of over 500 meta-analyses found that feedback had an average effect size of 0.79 (Hattie, 1999). The analysis found that when feedback contained an “informational component” the effect on learning was higher; however, when the feedback focused on output (e.g. reward and/or punishment) the effect size was much lower (p. 11). The informational feedback could be termed autonomy-supportive because it met the specific criteria established by Hattie and Timperley (2007). Autonomy-supportive feedback is a process that requires faculty to “feed up, feed back, and feed forward” (p. 86). From this perspective, autonomous feedback can do three things for students: first, it can make the goals of the course or activity apparent (feed up); second, it can explain the current progress to the students (feed back); and third, it can help students understand what they need to do in order to achieve in the course or program (feed forward). To be autonomy-supportive, feedback must be framed in the student’s perspective (Sierens et al., 2009). Finally, autonomy-supportive feedback is positive (Wijnia, Loyens, & Derous, 2011). Feedback that is perceived as controlling can have a negative effect on student motivation (Ames, 1992). Feedback should relate to the student’s wishes, goals, and abilities. When feedback meets these criteria it provides the student with an understanding of how their work not only relates to the course and program, but also how their actions might affect their future.

Authentic experiences. The final characteristic of autonomy-support is the provision of authentic experiences in the classroom (Gikandi, 2013). Conklin (2012) wrote that students desire to learn information that will serve them for the duration of their lives and careers, not simply for their time in university. For learning activities to be perceived as autonomous they must allow students to pursue knowledge and skills that are relevant and useful for their lives. If the students do not recognize relevance, it is in the instructor's best interest to explain the relationship of the activity to the students' future, as outlined in the paragraph on rationale.

Perception of autonomy-support. Merton (2010) argued in his Thomas theorem that "if men define situations as real, they are real in their consequences" (p. 173). According to this theorem, also known as self-fulfilling prophecy, when individuals believe something to be true, they will act upon that belief whatever the reality may be. For this reason, perception of autonomy-support may be as important as the support itself. Even in instances where instructors fulfill all the criteria of autonomy, the benefits of the support may not be realized if students are not perceptive of those actions.

Several research projects have indicated that it is the perception of support that leads to academic success (Black & Deci, 2000; Perry, Hladky, Reinhard, Clifton, & Chipperfield, 2005). Mih and Mih (2013) theorized that perception of autonomy-support leads to academic self-efficacy, expectancy for success, and academic self-concept, which, in turn, lead to greater school achievement. Their resulting study of this theory found that perception of autonomy-support did, in fact,

lead to higher academic self-efficacy, expectancy for success, and academic self-concept by the student, thus, increasing the student's performance in class.

A more recent study investigated the impact of autonomy-support on similar undergraduate courses from two private universities (Stefanou et al., 2014). Both courses implemented a team-based approach to learning; one used primarily problem-based instruction, the other used project-based instruction. Quantitative analysis showed no statistical difference between the two student groups in regards to autonomy and motivation. There was, however, a difference in the students' perception of autonomy-support between the courses. The authors found that the students in the project-based course reported greater perception of autonomy-support and higher levels of satisfaction. Students in that same course also reported higher level learning and greater increases in skill and knowledge than did those in the problem-based course which was deemed less autonomy-supportive.

Additional benefits of autonomy-support. In addition to increasing student learning outcomes, self-perception, and student persistence, autonomy-support may decrease procrastination (Katz et al., 2014). In a study of 171 fifth-grade students, the authors found that autonomous motivation decreased the occurrence of procrastination on school-related work. The authors suggested that autonomy-support be utilized as a deterrent of student procrastination. In another report, autonomy-supportive teaching was shown to decrease instances of bullying and other classroom disruptions in a study of 25 Israeli junior-high students (Roth, Klanat-Maymon, & Bibi, 2010). These aspects of autonomy-support do not relate to the use of ExamSoft

as an autonomy-supportive feedback tool, but they do highlight the additional benefit of autonomy-support in education.

e-Assessment Technology

e-Assessment technology is a broad term that covers a wide range of possible ways in which technology might be used for assessment reasons (JISC, 2007). For the purposes of this review, e-assessment technology is limited to computerized tools that assist in the testing and evaluation of students. This definition encompasses multiple-choice, true/false, matching, and open-response items, as well as more complex performance standards that require in-depth analysis to grade, often through the use of rubrics. Examples of e-assessment technologies that match these requirements include but are not limited to: Blackboard Learn, Moodle, Canvas, LiveText, and in the case of this study, ExamSoft.

The benefits of using e-technologies for assessment of student learning are plentiful. JISC (2007) identified three potential advantages of e-assessment. First, e-assessment can support personalization. Though it is possible to create tests for individual students, it is incredibly time-consuming and, thus, less likely to occur if the instructor does not have computerized assistance. Second, e-assessment can report evidence of achievement on learning outcomes. Traditional testing using pen and paper often provides feedback only in a percentage grade format. e-Assessment can give feedback concerning student performance for a specific learning outcome. Depending on the technology's programming, feedback can come in the form of independent learning outcome achievement, predetermined statements based on

performance, or remediation in the areas of weakness. A third benefit of e-assessment is that it allows students to test in a way that is similar to their other activities of learning (Boyle, 2010; Boyle & Hutchison, 2009). Students use computers for note taking, research, communication, and peer study. Boyle (2010) maintained that because it mimics their everyday actions, students should use computers for testing.

Given that modern students use technology for so many aspects of their learning, it is not surprising that studies have shown general student satisfaction with e-assessment testing. In a study comparing student perception of multiple choice question exams, Ferrão (2010) found that students generally like e-assessment testing. However, for students performing poorly in the course, less satisfaction was reported. Sorensen (2013) found that students in an undergraduate chemical engineering course generally preferred online quizzes to traditional quizzes. Another study found that students perceive e-assessment exams to be as secure and reliable as traditional testing (Dermo, 2009). Students in Dermo's study also reported satisfaction with the computerized testing system. More importantly, they reported a perception of value to e-assessment when questioned about its relationship to student learning.

Students are not the only ones who benefit from e-assessment. Rastgoo and Namvar (2010) noted that faculty often found they have more time for teaching and learning when using e-assessment. Because computer technologies simplify grading, especially for non-complex items like multiple choice and true/false questions, less time is spent evaluating students.

e-Assessment is not without problems; there are various barriers to entry that can restrain adoption of these technologies including cost, time, and support (Ellaway & Masters, 2008; JISC, 2007). The first and likely most prohibitive barrier to entry is cost. e-Assessment technology is not inexpensive. There are free options available to educators, but adoption at the college and university levels often requires significant investment. Furthermore, use of e-assessment technologies can be time consuming. As noted, e-assessment can lessen the amount of time spent grading, but the startup time required to establish question banks and learn the system can be objectionable to many faculty. Additionally, e-assessment requires trained staff support. Though this may not be a problem for larger institutions, small departments may not be prepared or equipped to offer troubleshooting assistance to faculty and students.

A final concern with e-assessment technologies is student privacy (Fleisher, 2014). As with any other technology, there is a risk that student records could be hacked and information about student performance might be leaked to potential employers. Fleisher wrote that the greatest concern with data safety is lack of policy. Most schools do not have policies in place that dictate how data will be collected, by whom and how long they should be stored. In addition, schools rarely have policies around access to data. Schools would be advised to thoughtfully consider the implications of a data breach and implement policies and/or processes designed to keep the students' privacy intact. This advice includes all student-related technology, not just e-assessment.

ExamSoft

ExamSoft feedback reports have been reported to have autonomy-supported outcomes. In a case study, Chemistry professor, Dr. Bob Petros (Uprooting the stem, 2014) identified ExamSoft as the impetus for his program's decrease in drop, fail, and withdraw rates. In another case study, ExamSoft reports were credited with increasing student retention and remediation at a Vermont law school (Sounding the charge, n.d.). Finally, in a white paper describing findings regarding remediation of medical students, Vandre and Ermie (n.d.) found that student remediation was significantly improved for those students who had access to the ExamSoft feedback reports when compared to student groups that had access to old exam questions.

Each of these cases is highlighted on ExamSoft's website; for that reason it might be easy to dismiss the validity of their claims. Still, ExamSoft feedback reports do possess many of the characteristics necessary to create autonomy-support. Nichol (2007) wrote that it is assessment that drives autonomy, not technology. ExamSoft technology does little if anything, from the students' perspective that could be perceived as autonomy-supportive. It is, by all definitions, a secured online testing system. The reports, however, offer many links to autonomy-support, specifically the one that ExamSoft refers to as *Strengths and Opportunities*. This report provides individualized student performance feedback. Student outcome success is numerically and visually represented by a percentage score and a color ranking (green is good, yellow is mediocre, and red is a cause for concern) which allows students to

instantly view their performance in the course and program compared to the learning outcomes.

This report fulfills requirements of autonomy-supportive feedback because it follows the rules established by Hattie and Timperley (2007). Course and program outcomes are immediately obvious to students because they are stated in bold print on the report. In addition, current student progress toward those goals is made evident by their percentage score and color ranking. Finally, the report helps students to comprehend what they need to do in order to succeed. Instead of seeing a grade of 80% overall, students are immediately informed of the specific learning outcomes on which they did both well and poorly (Perrotta, 2013).

For students with a desire to improve, feedback of this type can help students focus their attention on the areas that need improvement and expend less energy on those areas where they experienced high learning gains. When assessment results are formatted so that data are actionable, students are better prepared to take control of their learning (Lafuente et al., 2014). Stödberg (2012) noted that assessment feedback of this nature has a significant influence on the way students approach their learning. Also, feedback formatted in this way could have a significant impact on the instructor's approach to giving student feedback. Feedback for remediation can be more easily targeted to the individual student's needs as opposed to a more generic prescribed feedback for the larger testing group.

Finally, it is possible to make the argument that ExamSoft's *Strengths and Opportunities* report supports authentic experiences because it can help to clarify how

activities of learning relate to the goals of the program, a component of autonomous e-assessment technology (Sorensen, 2013). Conklin (2012) wrote that students desire to know how their learning today will affect them in the future. Though the reports may not make it immediately clear how the learning will affect their careers, an ability to see, in one report, how their learning relates to the entirety of the program's and course's goals might make their learning more relevant in terms of their time in the program.

The literature reviewed in this this study illustrated the benefit of learner autonomy, which has been shown to increase student learning, improve student satisfaction, and decrease student attrition. Many would argue that these three issues comprise the most grievous problems in modern education. To a large extent learner autonomy is intrinsic, but evidence indicates that certain actions are autonomy-supportive. Evidence also suggests that perception of autonomy-support is as important, if not more important, than actual autonomy-support.

I have made an argument that ExamSoft's *Strengths and Opportunities* report is autonomy-supportive. It provides detailed, student-specific, and actionable feedback. Because of this, the feedback allows students to make decisions about how they should focus their learning efforts in the future. Unfortunately there is no implicit evidence that students perceive ExamSoft as autonomy-support for learning. If student perception of autonomy is equal to or, perhaps, more important than reality, then student perception of the ExamSoft *Strengths and Opportunities* report should be investigated.

CHAPTER 3 – METHODOLOGY

This chapter includes a discussion of the subjects, research design, survey instrumentation, research questions and hypothesis, data collection techniques, and statistical analysis processes. This study employed non-experimental cross-sectional survey methodology (Creswell, 2014) to answer the proposed research questions:

1. *Do students perceive ExamSoft feedback reports as autonomy-supportive?*
2. *Is there a relationship between perception of autonomy-support and Basic Needs scores?*
3. *Is there a difference in perception of autonomy-support between students from collective and individualistic cultures?*

In order to complete this research, a cross-sectional survey design was implemented. Survey was the most appropriate data collection for this research as autonomy regulation and perception of autonomy-support is difficult to observe. In addition, survey methodology allowed for a more thorough investigation of the pharmacy population than could have been accommodated through qualitative research methodologies. Focus groups and interviews would have significantly reduced the number of participants in the research.

Research Design

Population and Participants

The study population consisted of all 140 students enrolled in PPS 913 – Pharmacological Basis for Therapeutics at the University of Kentucky College of Pharmacy (UKCOP) in Lexington, Kentucky. UKCOP is a small college that serves

approximately 650 students in two degree programs: Doctor of Pharmacy Practice (Pharm.D.) and Doctor of Pharmaceutical Sciences (Ph.D.). The student population is 57% female and 68% White. Approximately 88% of the college's students range in age from 21-29 years. The study participants represent approximately 25% of the total enrollment in the Pharm.D. program and 21% of the college's enrollment.

This study employed a purposive convenience sampling method. During the survey time period, UKCOP was piloting the use of ExamSoft. Of all the courses using the technology, only the PY1 course, PPS 913 – Pharmacological Basis for Therapeutics, fully utilized the mapping functionalities in ExamSoft. Because mapping of the course topics and outcomes was necessary to provide the hypothesized autonomy-supportive feedback, the students in this course were chosen for inclusion in this study.

Survey Instrument

The survey questionnaire (Appendix A) was designed to measure the students' perception of autonomy-support from ExamSoft's feedback reports and consisted of 43 items presented in three parts. The Basic Need Satisfaction (BNS) at Work Scale comprised Part I of the survey. BNS at Work Scale is one in a group of scales that seek to identify an individual's need satisfaction in life and in specific life domains, such as work and relationships ("Basic Psychological Needs Scales," n.d.). The BNS section of the instrument includes 21 items that measure student responses on three scales: autonomy (7 items), competence (6 items), and relatedness (8 items). All questions were modified to reflect opinions about the students' school environment

instead of their work environments. Participants responded on a seven-point Likert-type scale specifying the extent to which each statement was “Not at all true” or “Very True” about them.

This instrument has been used in multiple studies (Deci et al., 2001; Ilardi, Leone, Kasser, & Ryan, 1993; Kasser, Davey, & Ryan, 1992) to assess the perceived satisfaction of the three basic psychological needs of all humans. Cronbach’s alpha measures internal consistency on a scale from zero to one. The closer a Cronbach’s alpha is to one, the more internal consistency the items have. An alpha of .8 or higher shows high internal consistency. Items on this survey previously have been shown to have relatively high internal consistency. A study of work satisfaction found the Cronbach’s alpha for the survey to be .83 for Bulgarian participants and .89 for American participants (Deci et al., 2001). A more recent study of teacher satisfaction at work found the Cronbach’s alpha for each scale on the instrument to range from .77 to .84 (Klassen, Perry, & Frenzel, 2012).

Part II of the survey was taken from the Learning Self-Regulation Questionnaire (SRQ-L), which was originally developed by Williams and Deci (1996) for the purpose of measuring autonomy in medical students. This questionnaire’s 14 items have been validated through its use in multiple studies (Brockelman, 2009; Wijnia et al., 2011) and has been found to be internally reliable with Cronbach’s alphas of .96 (Williams & Deci, 1996) and .87 (Baard, Deci & Ryan., 2004). All questions were modified to gather information on the students’ reasons for using ExamSoft feedback reports. Each item represented either controlled

regulation (i.e. external or introjected) or autonomous regulation (i.e. identified or integrated). Answers for each response were ranked on a seven-point Likert-type scale ranging from “Not at all true” to “Very true”. The purpose of this section was to ascertain if the student consulted ExamSoft feedback because he/she found value in it (autonomous regulation) or because he/she felt compelled by outside sources to review the feedback (controlled regulation).

The last section of the survey, Part III, asked, but did not require, students to complete three ExamSoft usage items and five demographic questions. Demographic items requested that participants identify their: race, nationality, gender, age, and level of educational attainment. Though race is the more typical demographic of concern for many surveys, nationality was gathered in this instrument due to previous research on the relevance of autonomy in collectivist cultures (Hyungshim, Reeve, Ryan, & Ahyoung, 2009; Miller et al., 2011; Morling & Kiayama, 2008; Reeve et al., 2014). ExamSoft usage items requested that students share their usage habits and thoughts about feedback. Answering demographic questions was optional in order to maintain students’ right to privacy.

There are no known studies that include both the SRQ-L and BNS at Work items in one survey instrument, but most research with either of the two tools includes items from other tools or items specific to the researcher’s investigation. There appears to be little reason to have concern for instrument reliability given that these individual instruments are often used in conjunction with other instruments or

items; however, Cronbach's alpha will be computed to better understand if the two tools affect reliability of the entire survey.

Variables

There are five demographic variables in this study. They include: gender, age, race, nationality, and educational attainment. All were coded as categorical data as noted in Table 1. Participants were asked to type their nationality. Each response was recoded according to the Individualism Index (IDV), a measure of a country's individualism. The IDV seeks to explain the extent to which individuals within that country feel a need to care for others outside of themselves and their immediate family (Hofstede, Hofstede & Minkov, 2010). The IDV scale is roughly 0 to 100, with zero representing the most collective nations and 100 representing the most individualistic. Nationalities with a score of 50 or higher were coded as 'Individualistic'. Any country that is not listed in the IDV table (Hofstede et al., 2010, table 4.1) was coded as 'Other'.

Table 1
Definition of Demographic Variables

Variable	Categories
Gender	Male, Female, Choose not to respond
Age	18-19, 20-21, 22-23, 24-25, 26 and over
Race/Ethnicity	White, Black, Asian, Hispanic/Latino, American Indian or Alaskan Native, Native Hawaiian or Other Pacific Islander, Other, Choose not to respond
Nationality	Collectivist, Individualistic, Other
Educational Attainment	Some undergraduate work, Bachelor's, Master's, Doctorate

There are four interval-level measured variables related to the BNS in this study. They include: Basic Needs Score (BNS), autonomy need, competence need, and relatedness need. Each need score was calculated by summing the category's respective items from Part I on the survey and dividing by the total number of items. BNS represents the extent to which the overall needs of the student were met by the program, and was calculated by summing the three need scores. Survey items for the three individual needs categories appear in Table 2. The questions marked (*R*) indicate that the scale should be reversed for these items. BNS encompassed all survey items in Part I.

Table 2
Interval-Level BNS Variables

Variable	Items
Autonomy Need (AN)	1, 5(R), 8, 11(R), 13, 17, 20(R)
Competence Need (CN)	3(R), 4, 10, 12, 14(R), 19(R)
Relatedness Need (RN)	2, 6, 7(R), 9, 15, 16(R), 18(R), 21
BNS	Items 1 – 21

Using the data collected from Part II of the survey, this study sought to examine students' perceptions of ExamSoft feedback by comparing students' autonomous regulation for reviewing feedback to their controlled regulation. Therefore, the dependent variables for this study are autonomy regulation and controlled regulation. Scores were calculated for each of the two regulations by

summing each category's respective items and dividing by the total number of items. Survey items for both categories of regulation appear in Table 2. In addition the Relative Autonomy Index (RAI), a singular way to represent the students' autonomous regulation compared to their controlled regulation, was calculated by subtracting the controlled subscale score from the autonomy subscale score. This process has been used in multiple studies (Brockelman, 2009; Soenens & Vansteenkiste, 2005; Williams & Deci, 1996). RAI acted as a third dependent variable and was used in additional data analysis.

Table 3

Dependent Variables

Variable	Items
Autonomous Regulation	22, 24, 27, 30, 32, 34, 35
Controlled Regulation	23, 25, 26, 28, 29, 31, 33
RAI	Items 22 – 35

Hypotheses and Predictions

The three research questions of this study were set forth to measure the perception of autonomy-support from ExamSoft feedback reports. These questions were reframed to create the following null-hypotheses:

- H₀ 1: There is no difference in student ratings of ExamSoft for autonomy-regulation or controlled regulation.
- H₀ 2: There is no correlation between perception of autonomy-support and Basic Needs Scores.

H₀ 3: There is no significant difference in the perception of autonomy-support between students from collective cultures and those from individualistic cultures.

As stated in chapter 2, it was expected that students would perceive ExamSoft feedback as autonomy-supportive (H₀ 1) because it meets the three requirements set forth by Hattie and Timperley (2007) which states that autonomy-supportive feedback should “feed up, feed back, and feed forward.” The author has no assumptions on the outcome of H₀ 2. There has been no evidence that the Basic Needs Score and perception of autonomy-support are connected in any way.

Finally, the author hypothesized that H₀ 3 would be proven correct and that no significant difference between perceptions of autonomy-support would be shown between the individualist cultures and the collective cultures. Other studies have shown that collective and individualistic cultures do not differ in their desire for autonomy (Jang et al., 2009; Miller et al., 2011). It is expected that the results of those studies would be mirrored in this research.

Procedures

Data Collection

This quantitative study implemented a survey instrument, delivered via email to all students (n=140) enrolled in PPS 913 in Fall 2015. Participants were first invited to complete the survey during the week following the program’s second major exam. The instructor for PPS 913 was consulted so that distribution of survey email did not occur prior to distribution of the exam results. This time was chosen because

it allowed students multiple exposures to ExamSoft reporting during their first semester in the program. Students in PPS 913 had received two ExamSoft feedback reports at the time the survey was deployed, one for each test given up to that point in the semester. This timeframe also did not interfere with college-mandated surveys and course evaluations delivered just prior to the final exam. Participants were able to access the survey from October 20, 2015 to November 13, 2015.

The survey instrument was administered using Qualtrics, an online survey administration tool currently available to all UK staff for survey and research purposes. Qualtrics allows for both secure and open survey administration. The invitation email acted as the study's cover letter. Both the cover letter and consent form explained the focus and purpose of the research as well as the significance of the data collected from the study's participants. Each form was sent and collected electronically. It was explained in the cover letter that the survey would take only 15 minutes to complete and that participation would remain confidential.

Data Analysis

Seventy-eight (56%) individuals opened the survey link and gave informed consent for the study; of those, 75 went on to submit the survey. Beyond the informed consent, no items were required to be answered by respondents. Data obtained via the survey were converted from Qualtrics into a MicroSoft Excel spreadsheet, and were then analyzed for validity and correctness. Due to the nature of the research, all items in Parts I and II must have been completed in order for the data to be considered whole by the researcher. For this reason, five responses were

removed from the dataset due to their inability to provide either a complete Basic Needs Score (BNS) or Relative Autonomy Index (RAI). From there, data were transferred to SPSS statistical software for analysis and computation of tables and graphs. Descriptive statistics included mean, median, mode, and standard deviation for all variables. Reliability of the instrument was tested using Cronbach's alpha for all regulation and needs scores.

Statistical analysis for this study included a dependent *t*-test on the autonomy and controlled scores for the first research question. Because the research sought to examine if there was a difference between two variables, the students' autonomy and controlled reasons for using ExamSoft feedback reports, this *t*-test was chosen as the appropriate statistical analysis. The Pearson Correlation Coefficient was computed between autonomous regulation scores and the various basic needs scores to answer research question two. To address the third research question, an independent *t*-test between students from individualistic and collective cultures was proposed. In addition, correlations among all dependent, demographic, and BNS variables were explored as a way to examine the relationship between the different variables.

Summary of Research

In summary, this research sought to discover if students perceive ExamSoft feedback to be autonomy-supportive. To uncover this information, the study employed a quantitative methodology by inviting all students participating in PPS 913 to complete a survey. Data from the survey instrument served to identify the motivating regulation (autonomy or controlled) for student use of ExamSoft feedback

reports. The autonomy and controlled regulations were compared in order to determine if one is perceived as being higher than the other. Further analysis was completed to investigate the relationships between the regulations and other independent variables.

The survey deployed in Fall 2015 after the students had received feedback from the course's second major exam. Surveys were administered via email and conducted in Qualtrics, an electronic survey software used at the University of Kentucky. There were 70 completed surveys returned for analysis. All survey data were confidential.

The basic components of the study have been summarized in Table 4.

Table 4

Components of the Study

Research Questions	<p>Do students perceive ExamSoft feedback reports as autonomy-supportive?</p> <p>Is there a relationship between perception of autonomy-support and Basic Needs scores?</p> <p>Is there a difference in perception of autonomy-support between students from collective and individualistic cultures?</p>
Participants	PY1 students participating in the University of Kentucky's PPS 913 – Pharmacological Basis for Therapeutics course.
Data Collection	Survey administered via email.
Survey Tool	Autonomy questionnaire (Appendix A) that combines two validated Self-Determination Theory questionnaires – the Basic Need Satisfaction (BNS) at Work Scale, and the Learning Self-Regulation Survey (SRQ-L).
Research Timeline	October 20, 2015 to November 13, 2015
Data Analysis	<ul style="list-style-type: none"> • Descriptive Statistics • Cronbach's Alpha for reliability testing • Dependent <i>t</i>-test between autonomy and controlled regulation scores • Pearson Correlation between autonomy regulation and the basic needs scores • Independent <i>t</i>-test between collective and individualistic cultures respondents • Correlation analysis for all variables in the study

CHAPTER 4 – FINDINGS

The purpose of this study was to investigate the perception of autonomy-support from ExamSoft's feedback reports by first-year pharmacy students at the University of Kentucky. The following null hypotheses were examined in this study:

H₀ 1: There is no difference in student ratings of ExamSoft for autonomy-regulation or controlled regulation.

H₀ 2: There is no correlation between perception of autonomy-support and Basic Needs Scores.

H₀ 3: There is no significant difference in the perception of autonomy-support between students from collective cultures and those from individualistic cultures.

Data were collected from students enrolled in PPS 913 – Pharmacological Basis for Therapeutics at the University of Kentucky College of Pharmacy during Fall 2015. Surveys were sent to 140 students. There were 78 students (56%) that completed at least the informed consent question on the survey; 75 students (54%) answered most of the questions and hit the submit button at the survey's end. Five (5) responses were removed from the dataset due to incompleteness. For proper analysis all Basic Needs and Learning Regulation items (items 1 - 35 of the survey) were necessary for inclusion. Responses were not required for additional items, including demographics, to be considered complete. The data presented in this survey represents those 70 responses (50%) that were deemed complete.

This chapter is divided into two sections. The first section describes the characteristics of the respondents. The second section provides the quantitative analysis for the three study hypotheses as well as the additional items related to ExamSoft use in the study population. Though each hypothesis was dependent on summed item scores, items related to the students' basic needs and regulations were analyzed individually, as well.

Student Characteristics

Respondents consisted of 70 students. Demographic data were not required for submission; some answers were completed by less than the 70 respondents. Data analysis revealed that the majority of respondents were White females native to the United States, aged 20-23. Table 5 summarizes the descriptive statistics of the student characteristics for the study population.

Table 5
Student Characteristics

Variable	Group	<i>n</i>	%
Gender	Male	26	60.0%
	Female	42	37.1%
	Unknown	2	2.9%
Age	20-21	29	41.4%
	22-23	32	45.7%
	24-25	2	2.9%
	26 & Over	6	8.6%
	Unknown	1	1.4%
Education	Some college	35	50.0%
	Bachelor's degree	34	48.6%
	Unknown	1	1.4%
Race	Asian	3	4.3%
	Black or African American	1	1.4%
	Hispanic or Latino	2	2.9%
	White	61	87.1%
	Two or more races	2	2.9%
	Unknown	1	1.4%
	Country of Origin	Germany	1
Japan	2	2.9%	
South Korea	1	1.4%	
United States	62	88.6%	
Vietnam	1	1.4%	
Other	1	1.4%	
Unknown	2	2.9%	

Quantitative Results

The results of this study have been framed to answer the three research questions presented in Chapter 1. This section summarizes those results. Items from

Parts I and II of the survey were analyzed individually and collectively as they related to the variables presented in Chapter 3.

The respondents' scores for autonomous regulation and controlled regulation were determined by summing the seven respective items for each variable. From there the Relative Autonomy Index (RAI) was calculated by subtracting the controlled regulation score from the autonomous regulation score. Though RAI is a function of both autonomous and controlled regulation, it acts as a dependent variable in some analyses. The mean autonomous regulation score was 39.5, more than 14 points higher than the mean controlled regulation. Cronbach's alpha for all regulation items in this section was 0.79. Cronbach's alpha for the dependent variables was 0.83 (autonomous regulation) and 0.74 (controlled regulation).

Autonomous regulation item scores could range from one to seven, with seven implying a very high level of autonomous regulation and one implying a very low level. On average, autonomous regulation item scores were 5.64. The highest average was for item 30, *"I am likely to follow my instructor's suggestions for reviewing ExamSoft reports: Because it's important to me to do well at this."* *"The reason that I will continue to review ExamSoft feedback reports in the future is: Because it's a challenge to understand what I am learning"* (item 34) scored the lowest. The average and standard deviation for all autonomous regulation items can be found in Table 6.

Table 6
Autonomous Regulation Item Analysis

Item	N	Mean	Std. Deviation
I will participate actively in reviewing my ExamSoft feedback reports:			
22. Because I feel like it's a good way to improve my understanding of the course's and program's content	70	5.79	1.17
24. Because knowing about my achievement in learning outcomes is an important part of becoming a pharmacist.	70	5.81	1.23
I am likely to follow my instructor's suggestions for reviewing ExamSoft reports:			
27. Because I believe my instructor's suggestions will help me learn effectively.	70	5.87	1.19
30. Because it's important to me to do well at this.	70	6.17	0.96
The reason that I will continue to review ExamSoft feedback reports in the future is:			
32. Because it's exciting to learn about my Strengths and Opportunities on tests.	70	5.16	1.6
34. Because it's a challenge to really understand what I am learning.	70	4.97	1.38
35. Because it's interesting to use the results to try to identify my Strengths and Opportunities in the curriculum.	70	5.73	1.19

Controlled regulation item scores could range from one to seven, with seven implying a very high level of controlled regulation and one implying a very low level. A low level of controlled regulation is desired. The mean controlled regulation scores was 3.58. The highest average was for item 33, "*The reason that I will continue to review ExamSoft feedback reports in the future is: Because I would feel proud if I continued to improve in this course.*" Item 23, "*I will participate actively in*

reviewing my ExamSoft feedback reports: Because others would think badly of me if I didn't,” scored the lowest. The average and standard deviation for all controlled regulation items can be found in Table 7.

Table 7
Controlled Regulation Item Analysis

Item	N	Mean	Std. Deviation
I will participate actively in reviewing my ExamSoft feedback reports:			
23. Because others would think badly of me if I didn't.	70	1.76	0.94
25. Because I would feel bad about myself if I didn't look at these reports.	70	3.5	1.99
I am likely to follow my instructor's suggestions for reviewing ExamSoft reports:			
26. Because I would get a good grade if I do what he/she suggests.	70	4.36	1.94
28. Because I want others to think that I am a good student.	70	2.81	1.82
29. Because it's easier to do what I'm told than to think about it.	70	2.83	1.67
31. Because I would probably feel guilty if I didn't comply with my instructor's suggestions.	70	3.79	1.74
The reason that I will continue to review ExamSoft feedback reports in the future is:			
33. Because I would feel proud if I did continue to improve in the course.	70	6.00	1.05

Basic needs items were scored on a scale of one to seven where one (1) indicated that the statement was “Not at all true” and seven (7) indicated that the statement was “Very true.” An answer of four (4) indicated that the student believed the statement to be “Somewhat true” about himself/herself. Autonomy need was

linked to seven items, competence need was linked to six items, and relatedness need was linked to eight items. Scores for each need category were calculated by summing the items for each need and dividing by the total number of questions in that category. The Basic Needs Score (BNS) was calculated by summing the scores for each of the three needs. Table 8 displays the descriptive statistics for the four interval-level variables.

Table 8
Basic Needs Variable Characteristics

Variable	n	Minimum	Maximum	Mean	Std. Deviation	Cronbach's Alpha
Autonomy Need (AN)	70	2.71	5.71	4.46	0.67	0.55
Competence Need (CN)	70	2.83	7.00	4.98	0.93	0.77
Relatedness Need (RN)	70	2.25	6.88	5.36	0.89	0.86
BNS	70	9.13	18.55	14.80	2.02	0.86

The Cronbach's alpha for autonomy need scored much lower than the generally accepted 0.70 minimum threshold. Further analysis indicated that removal of item 11, "*When I am at school, I have to do what I am told*" would increase the alpha score to 0.62, which is still lower than normally accepted. Schmitt (1996) argued that requiring a minimum level of alpha may be rash. He reasoned that Chronbach's alpha represents the minimum limit of reliability. To determine the upper limit reliability the square root of the alpha should be calculated, which means that the alpha for autonomy need may be as low as .55 but as high as .74 ($\sqrt{.55} = .74$).

Cronbach's alpha can also be affected by the multidimensionality of the measurement. Schmitt argued that in cases where the test seeks to reflect the various dimensions of the environment, it is acceptable to use an alpha below the standard 0.70 (p. 352). Ultimately, it was decided to continue analysis with all autonomy need items given that the upper limit of reliability falls within the range of acceptable scores, and given that the autonomy need items measure multiple dimensions of autonomy. Finally, though Cronbach's alpha is a standard way to measure instrument reliability, it may not be the best way. Test-retest reliability has been argued to be a better determinate of item reliability than Cronbach's alpha (McCrae, Kurtz, Yamagata, & Terracciano, 2011). No additional tests have yet been given to pharmacy students at the University of Kentucky, but future results would be compared to these results to better determine the reliability of the autonomy need items.

Autonomy need scores were created from the seven items listed in Table 9. Scores for items with negative implications were reversed; this is indicated by (*R*) at the end of statement. The average score across all autonomy needs items was 4.46. The highest average was given to item 17, "*I feel like I can pretty much be myself at school,*" and the lowest average was given to item 11, "*When I am at school, I have to do what I am told.*"

Table 9
Autonomy Need Item Analysis

Item	N	Mean	Std. Deviation
1. I feel like I can make a lot of inputs in deciding how my education gets done.	70	4.51	1.34
5. I feel pressured at school. (R)	70	4.09	1.73
8. I am free to express my ideas and opinions at school.	70	5.21	1.22
11. When I am at school, I have to do what I am told. (R)	70	2.04	1.01
13. My feelings are taken into consideration at school.	70	4.29	1.17
17. I feel like I can pretty much be myself at school.	70	5.59	1.28
20. There is not much opportunity for me to decide for myself how to go about my school work. (R)	70	5.49	1.24

Competence need scores were summed from six items. The average across all items was 4.98. Item 10, “*I have been able to learn interesting new skills in school,*” received the highest average score in the category. Item 4, “*People tell me I am good at what I do,*” received the lowest average score. Table 10 summarizes the results of all six items related to competence need.

Table 10
Competence Need Item Analysis

Item	N	Mean	Std. Deviation
3. I do not feel very competent when I am at school. (R)	70	4.79	1.5
4. People at school tell me I am good at what I do.	70	4.09	1.46
10. I have been able to learn interesting new skills in school	70	6.16	0.91
12. Most days I feel a sense of accomplishment from school.	70	4.74	1.43
14. At my school I do not get much of a chance to show how capable I am. (R)	70	5.00	1.26
19. When I am at school I often do not feel very capable. (R)	70	5.09	1.53

Of the three needs, relatedness averaged the highest score (5.36) across all items. The question with the highest average was, “*I get along with people at school,*” and the one with the lowest average was, “*There are not many people at school that I am close to.*” Table 11 provides the analysis for eight relatedness need items.

Table 11
Relatedness Need Item Analysis

Item	N	Mean	Std. Deviation
2. I really like the people I take classes with.	70	5.76	0.92
6. I get along with people at school.	70	6.11	0.84
7. I pretty much keep to myself when I am at school. (R)	70	4.37	1.67
9. I consider the people I go to school with to be my friends.	70	5.37	1.22
15. People at school care about me.	70	5.14	1.17
16. There are not many people at school that I am close to. (R)	70	4.34	1.73
18. The people I go to school with do not seem to like me much. (R)	70	5.79	1.24
21. People at school are friendly toward me.	70	6.01	0.96

Hypothesis 1

The primary research question of this study was, “*Do students perceive ExamSoft feedback reports as autonomy-supportive?*” To measure perception of ExamSoft, the autonomous regulation scores were compared to the controlled regulation scores. Since two variables were compared across a single group, a dependent *t-test* was chosen as the appropriate statistical method. There was a significant difference ($p < .001$) in the scores for autonomous regulation ($M = 39.5$, $SD = .74$) and controlled regulation ($M = 25.04$, $SD = .86$). The results suggest that there was a statistically significant difference between autonomous regulation and controlled regulation when reviewing ExamSoft feedback. The null hypothesis was rejected and the alternative hypothesis, that students would review ExamSoft feedback more for autonomous than controlled reasons, was accepted.

Table 12
Dependent t-test for Regulation

	Paired Differences					t	df	Sig. (1-tailed)
	Mean	Std. Deviation	Std. Error Mean	99.9% Confidence Interval of the Difference				
				Lower	Upper			
Autonomous Regulation - Controlled Regulation	14.46	8.239	0.985	11.07	17.84	14.68	69	0.000

Hypothesis 2

In order to investigate the study's second question, "*Is there a relationship between perception of autonomy-support and Basic Needs scores?*" a correlation coefficient was computed between autonomous regulation and Basic Needs Score (BNS). The Pearson Correlation Coefficient was chosen as the appropriate correlation procedure because both autonomous regulation and BNS are interval data. The results indicated that there was a weak correlation between autonomous regulation and BNS ($r = .296$, $n = 70$, $p = .013$). This was significant at the $p < .05$ level. Thus, the null hypothesis was rejected and the alternative was accepted. There does appear to be a relationship between autonomous regulation and BNS, but that relationship is weak given that less than 10% of the variability in one score can be explained by the other ($R^2 = .088$).

Additionally, a Pearson Correlation Coefficient was computed to assess the relationship between autonomous regulation and the specific needs scores: autonomy-

need, competence need, and relatedness need. The results indicate that the correlation between autonomy regulation and competence need ($r = .363$, $n = 70$, $p = .002$) is the only one with statistical significance. It is likely this relationship that drives the correlation between autonomy regulation and total BNS. Results for all Pearson Correlation Coefficient calculations are shown in Table 13.

Table 13

Correlations among Autonomous Regulation and Needs Scores

	Autonomous Regulation
Total BNS	.296*
Autonomy Need	.191
Competence Need	.363**
Relatedness Need	.147

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

Hypothesis 3

The third and final research question in the study asked if there is “*a difference in perception of autonomy-support between students from collective and individualistic cultures.*” The mean autonomous regulation scores were calculated, and the results showed that there was little difference in the scores for students from individualistic cultures ($M = 39.48$, $SD = 6.23$) and those from collective cultures ($M = 38.25$, $SD = 7.09$). Unfortunately, only four respondents were from collective nations, so the reliability of these results cannot be ensured. No statistical analysis was conducted for this hypothesis due to the low response rate from students native to collective countries.

ExamSoft Items Analysis

Students were asked to report the approximate number of times they had accessed and reviewed their quiz and exam feedback using ExamSoft. Thirty-four percent (34%) reported using the system 1-2 times, 44% reported using it 3-5 times, and 21% accessed and reviewed their ExamSoft feedback 6 or more times. No students reported less than one review of the feedback.

When asked how they have applied the ExamSoft feedback, most students responded that they have used the feedback to identify weaknesses (89%) and strengths (66%), and compare achievements with others in the course (57%). ExamSoft feedback was credited with motivating 51% of the students to review, and 16% of the students to speak with their professor. One student chose “Other”, clarifying that ExamSoft helped to identify which items were incorrect. When asked about the usefulness of the feedback, 50% of the students reported that ExamSoft feedback was as useful as a test grade, 36% stated it was more useful, and 14% reported that it was less useful.

Additional Analysis

Controlled regulation scores were subtracted from autonomous regulation scores to create the Relative Autonomy Index (RAI) sub-scale. Data were analyzed for correlations between RAI and demographic data. Because so few respondents reported that they were from a country outside of the United States, analysis for correlation between autonomy and country was not included. A point-biserial correlation was run to determine the relationships between RAI and gender as well as

RAI and race. In order to correlate race to RAI, all races were converted into two categories: White and Non-White. A Spearman's rank-order correlation was computed to investigate the relationship between RAI and the remaining demographic descriptors: age and education. There was a negative correlation between RAI and race, but it was not statistically significant ($r_{pb} = -.200$, $n = 70$, $p = .099$). All other correlations between RAI and demographics were positive but none were significant. Table 14 provides information on all correlations computed.

Table 14

Intercorrelations among RAI and Demographic Measures

Variable	RAI
Age	.216
Education	.187
Gender	.145
Race	-.200

* $p < .05$, ** $p < .01$

Summary

Three research questions were posed in Chapter 1. A dependent *t-test* was chosen as the appropriate statistical analysis process for Hypothesis 1. Results indicate that there students are more likely to review ExamSoft feedback for autonomous reasons than controlled reasons. These results were statistically significant ($p < .001$). As a result, the H_0 1 was rejected and the alternate hypothesis was accepted.

A Pearson Correlation analysis indicated that there is a weak but statistically significant ($p < .05$) positive relationship between autonomous regulation and BNS

for the study population. $H_0 2$ was rejected and the alternate hypothesis was accepted. Independently, only competence need was significantly correlated to autonomous regulation.

It was hypothesized that autonomous regulation scores would not differ between students from collective and individualistic cultures. Mean scores for both populations were calculated and, as suspected, there was little difference between the two. However, due to the low number of students reporting from collective countries, the hypothesis was deemed untestable. This study failed to reject the null hypothesis.

The ExamSoft specific question analysis indicated that students most use the feedback to identify areas of strength and weakness in the course. Results also showed that approximately 86% of the students found ExamSoft feedback to be at least as useful as a test score.

CHAPTER 5 – CONCLUSIONS, ACTIONS, AND IMPLICATIONS

Summary of the Study

According to Self-Determination Theory (Deci & Ryan, 1985a, 1994, 2000), all individuals are motivated by three basic psychological needs: autonomy, relatedness, and competence. Research has shown that the need for autonomy can be supported in the classroom by offering students choice, rationale, and empathy (Koestner et al., 1984). Researchers have linked autonomy-support to higher student satisfaction (Jang et al., 2009), greater student perseverance (Seiver & Troja, 2014), and deeper learning and topic exploration (Reeve & Jang, 2006; Wielenga-Meijer et al., 2012). Autonomy-support is often defined as a provision of choice to students (Holec, 1981), but offering students options in their coursework is not the only way educators might support autonomy. To support autonomy educators may also choose to: offer rationale to students when choice is not available; request feedback from students; provide authentic experiences in the learning environment; and deliver feedback from the student's perspective (Gikandi, 2013; Sierens et al., 2009; Stefanou, Perencevich, DiCintio, & Turner, 2004; Vansteenkiste et al., 2012). Feedback to students has been defined as autonomy-supportive when it follows the “feed up, feed back, and feed forward” model (Hattie & Timperley, 2007, p. 86). Feedback of this nature not only informs students of their progress, but it makes the goals of the course or activity clear and provides guidance on how students might improve. This study specifically focused on feedback as a function of autonomy-support.

ExamSoft, an e-assessment platform, provides faculty with the ability to generate student-specific progress reports. When items in the ExamSoft system are aligned to course and programmatic outcomes, students are able to review their progress in each area. These *Strengths and Opportunities* reports make it clear to students which outcomes and topics will be covered in the course (feed up); how they have done thus far (feed back); and where students should focus their attentions for improvement (feed forward). By Hattie and Timperley's (2007) definition, students should perceive these reports as autonomy-supportive. If autonomy-support has the ability, as research has shown, to improve student outcomes, I felt it was necessary to investigate the perception of autonomy-support by ExamSoft's *Strengths and Opportunities* report. This study sought to uncover if students identify ExamSoft feedback as autonomy-supportive.

To accomplish this, I employed two Self-Determination Theory (SDT) instruments (detailed in Chapter 3) that have been previously validated and used in SDT research. I sent the survey to all students enrolled in a first year pharmacy course. Students in this course had previously received ExamSoft feedback for the two major course exams they had taken prior to the survey's launch. The survey remained active for three and a half weeks. After the survey closed, I transferred the data to SPSS and analyzed the results to determine if ExamSoft's *Strengths and Opportunities* report is perceived by the students as autonomy-supportive.

Summary of the Findings

The primary research question of this study was, “*Do students perceive ExamSoft feedback reports as autonomy-supportive?*” To determine the answer, the sum of the survey’s seven controlled regulation items were compared to sum of the seven autonomy regulation items using a dependent *t-test*. The results indicate that students review reports more for autonomous than controlled reasons ($p < .001$). Students appear to review the results of their ExamSoft feedback because they find it beneficial to their learning.

Even though the results indicate that students use the results for autonomous reasons, there was one controlled regulation item that implied the results are used for purposes more related to external motivation rather than internal motivation. Item 33 stated, “The reason that I will continue to review ExamSoft feedback reports in the future is: Because I would feel proud if I did continue to improve in the course.” The average score for this item was 6.0 out of 7 possible points. This item is categorized as controlled regulation because it largely focuses on the student’s grade in the course, rather than on their internal desires to pursue the study of information that is interesting to them; however, it is unlikely that a faculty member would be disappointed with the high score on this item. One goal of the program is to promote continuous improvement for all students. That students will feel proud to improve will most likely be considered an accomplishment, not a drawback.

To answer the study’s second research question, “*Is there a relationship between perception of autonomy-support and Basic Needs Scores?*” I employed a

Pearson Correlation Coefficient. The results indicated that there is a positive correlation ($r = .296$, $n = 70$, $p = .013$) between autonomous regulation and BNS ($p < .05$). It can be said that students who report higher autonomous regulation scores for ExamSoft also report higher BNS scores for their time in the program, but this relationship is weak given that less than 10% of the variability in one variable can be explained by changes in the other ($R^2 = .088$). It is likely that the relationship between BNS and autonomous regulation is mostly driven by the correlation ($r = .363$, $n = 70$, $p = .002$) between autonomous regulation and competence need ($p < .01$). Again, this relationship is weak; only 13% of the variability can be explained ($R^2 = .132$).

One item that may have weakened the relationship between BNS and autonomous regulation was found in the autonomy need section of the survey. Item 11 stated, "When I am at school, I have to do what I am told." This item scored very low for level of autonomy support (2.04 out of 7 possible). Ideally, students will want to do all the activities of the program and course, but the truth is that pharmacy, like all medical studies, is a rather prescriptive education process. Students in their first year have no elective courses. All assignments and most activities are required. In order to succeed in the program, students do need to follow the rules and guidelines set before them. Though this does indicate that the program does not, in this one way, support student autonomy, if students truly desire to become pharmacists, they must ultimately follow the directives of their instructors and advisors.

The final research question, “*Is there a difference in perception of autonomy-support between students from collective and individualistic cultures?*” was not answered by this research. Of the 70 responses analyzed, only four respondents stated they were from collective countries. As a result, no statistical analysis was conducted for this question. However, mean scores were calculated and the results indicate that there is little difference between the responses from individualistic and collective cultures.

Fourteen percent of the respondents reported that ExamSoft feedback is less useful than a test grade. Since the ExamSoft reports provide information in addition to the test score, this item’s results are confounding. One possible explanation for this response is confusion with what the question was really asking. It is possible that students were not referring to the actual grade, but rather a graded test. Most faculty in the University of Kentucky College of Pharmacy do not return exams to students. Instead, students receive only a test score. This has been a source of frustration for students in the past. It is possible that by answering no, students really meant that the report is less beneficial than a returned test.

Students noted that they primarily use ExamSoft feedback to help them identify their weaknesses (89%) and strengths (66%) in the course. Ranking in Pharmacy school, as with most professional programs, is very important, especially for those students who want to extend their education with a residency or fellowship. Therefore, it is not surprising that 57% of the respondents said they use the results to compare their scores to their peers. Perhaps the more exciting results for educators

was that 51% of the students reported that the reports inspired them to review specific content areas after the exam, and that 16% were encouraged to start a conversation with the course's faculty because of the reports. A common faculty complaint is that students seek assistance by asking, "What do I need to do?" By using these reports, students should have a better opportunity to point to their specific areas of weakness and ask for assistance in those terms, as opposed to making a more generalized plea for help.

Limitations of the Study

There are several limitations of this study, including the study's participants. First, the study only included students from a single college of pharmacy. Pharmacy students are probably not a good representation of all higher education students for two reasons: first they are professional students, and second they are, generally, high achievers. Pharmacy students must have at least two years of higher education experience prior to acceptance in the program. Because of this previous experience in higher education, these students are very unlike most traditional undergraduate college students. In addition, The University of Kentucky's pharmacy program is highly competitive. Students have high GPAs and test scores in advance of admission. It is likely that the students surveyed in this study are more advanced and higher achieving than the average student on most campuses. In addition, prior to this study students had little to no experience with the ExamSoft technology. There may be a difference in perception of autonomy-support by students who have had more experience with the ExamSoft feedback. Finally, there were too few collective

culture students included in the survey invitation which resulted in an inability to evaluate the difference between perception of autonomy-support between collective and individualistic cultures. This resulted from using a convenience sample rather than targeting specific populations.

Another limitation of the study was the absence a control condition. There is no way to know how students' perception of feedback from ExamSoft differs from their perceptions of the value of typical test results. By definition, the feedback students receive from ExamSoft reports is better than the general grades they get from other tests because it gives them more information. A simple grade does not tell students in which content area they are weak or strong. The study sought to uncover if students perceive ExamSoft feedback as autonomy-support, not if there is a difference in perception of autonomy-support between traditional grades and ExamSoft feedback. However, without the inclusion of a control condition, I cannot be certain that students value the ExamSoft feedback over simple grades, only that the ExamSoft feedback is perceived as autonomy-supportive.

Respondents were limited to first year pharmacy students, which may, for reasons outlined earlier, be very different than other college students. In addition, the size of the respondent group ($N = 70$) is rather small. Respondents were also largely White (87%) and female (60%). As a result, the study may not be generalizable to all students in higher education.

Implications for Practice

This applied research study provided baseline data on student perceptions of ExamSoft feedback as autonomy-support for learning. The results of this study can inform immediate practice as well as future research.

Between the time this research began and the time of writing, more faculty in the University of Kentucky College of Pharmacy began to use ExamSoft's alignment features so that students could receive specific feedback about their progress toward stated learning outcomes. However, there are still many courses that do not utilize these features when using ExamSoft, and other courses that do not yet use ExamSoft for assessments. Use of ExamSoft could be used for all test and performance-based assessments so that students might track their progress towards stated course and program goals. Further adoption of this technology and its reporting features is recommended for the College.

The University of Kentucky has previously expressed interest in adopting ExamSoft feedback for use in undergraduate courses, specifically those in the general education curriculum. Although initial results appear to support the idea that the feedback provided by ExamSoft is perceived as autonomy-supportive by students, there is no evidence that it has a positive impact on student learning, persistence, or satisfaction. Further investigation of the relationship between ExamSoft and the positive educational outcomes often associated with autonomy-support should be conducted before the University makes a decision about use or non-use of ExamSoft technology. Specifically, the University should identify undergraduate, general

education courses where this technology is currently in use. Investigations of DEW rates, grades, and satisfaction surveys should be among the data gathered to determine if the technology has had the positive impact on educational outcomes suggested by ExamSoft CEO, Daniel Muzquiz.

Recommendations for Future Research

The purpose of this study was to ascertain if students perceive ExamSoft's feedback as autonomy-supportive. Though the survey research indicates that the ExamSoft *Strengths and Opportunities* report is autonomy-supportive, there are multiple ways to address the study's limitations and improve upon this research. Recommendations for future research are as follows:

- Replicate the study so that it includes a control condition. This student did not include perception data concerning test grades as the sole feedback source for student assessments. A future student might compare the perception of traditional grading schemas to ExamSoft's categorical feedback to determine if students perceive the two to be different or the same.
- Include more experienced pharmacy students in the research. The current study included only Pharmacy Year One (PY1) students as respondents. To further investigate the value of the feedback as autonomy-supportive, future research might include responses from Pharmacy Year Three (PY3) students as well as those in the PY1 classes. A study of this nature might

indicate if there is a change in the perception of autonomy-support from the first to the third year.

- Expand the study to include pharmacy students from multiple campuses. It is clear from this study that the University of Kentucky PY1 students perceive the ExamSoft feedback to be autonomy-supportive, but is that true for all pharmacy students? A larger-scale, multi-campus research project would help to uncover if ExamSoft is, by its nature, autonomy-supportive, or if the reports are autonomy-supportive only in certain conditions.
- Expand the survey to include a larger population of ExamSoft users outside of pharmacy education. To better understand the perception of autonomy-support for all college students, a study that includes a variety of students, including non-major undergraduate students might be conducted. Research of this nature would provide more evidence of the autonomy-supportive nature of ExamSoft for all students, as opposed to what might be a very unique set of students that are found in pharmacy programs.
- Investigate student perceptions of ExamSoft feedback with interviews and focus groups. Qualitative research can provide a richer understanding of student perception. I recommend investigating students' perception and use of the results through qualitative methods. Specifically, I suggest

investigating if there are any weaknesses in the feedback and gather suggestions for improvement.

- Investigate student success indicators as they relate to ExamSoft feedback use. Research indicates that student success factors (e.g., grades, satisfaction, and persistence) increase when students have experienced autonomy-support (Jang et al., 2009; Reeve & Jang, 2006; Seiver & Troja, 2014; Wielenga-Meijer et al., 2012). ExamSoft feedback fits the model for autonomy-supportive feedback, but there is no direct evidence that the feedback leads to higher success or satisfaction. Research investigating the success of students before and after ExamSoft has been fully implemented would help to determine if the students experience a scholastic benefit from the feedback. Grades, persistence, and course evaluation scores might be used to determine if the feedback leads to improved student outcomes.

Recommendations for Educators

Because of its significant impact on student learning (Hattie, 1999), educators should work to provide feedback that not only helps students to understand the goals of the course and their current progress toward those goals, but also provides guidance for improvement. In this respect, educators should take care to provide ample feedback to students that meets the following autonomy-supportive criteria: feed up, feed back, feed forward (Hattie & Timperley, 2007); be framed in the

student's perspective (Sierens et al., 2009); and be presented in a positive (Wijnia, Loyens, & Derous, 2011) rather than negative (Ames, 1992) way.

Faculty that use ExamSoft should take care to harness all of the system's ability to provide feedback to students. It is possible to use only portions of the e-assessment system. At its most basic, ExamSoft can function as an online testing system. If questions and performance tasks are not aligned to outcomes, the student will receive only grade feedback. Grades neither provide students with an understanding of the assessment's goals nor an individualized response for how well the student achieved toward any specific goal. To provide students with evidence of their learning in any one area, the assessment content must be aligned to the specific outcomes of the course and/or program. By doing this, faculty give students a tool to better understand their specific performance strengths and weaknesses. This, in turn provides students with an opportunity to take action toward improvement.

Students indicated that ExamSoft feedback not only helped them to identify their areas of strength and weakness in the course, but also motivated them to review topics and start conversations with the course's faculty. Educators might use this information to help future students understand how past students have used the reports to advance learning in their classes. This encouragement to review topics and begin dialogue could bring about additional opportunities for growth in learning.

Recommendations for e-Assessment Providers

e-Assessment tools are valued because they allow faculty to quickly evaluate student learning. As classes become larger, faculty find it more and more difficult to

provide useful feedback to students in a timely manner (Nicol & McFarlane-Dick, 2006). e-Assessment technology can support student learning by harnessing processes that allow for an automated feedback process, such as the type provided by ExamSoft. Though it is convenient for technology to quickly grade student work, it is a stretch to say that this type of activity actually supports student learning. e-Assessment providers could benefit their business by being more cognizant of learning support and providing features that not only make grading faster, but also provide students with an understanding of their strengths and weaknesses.

Conclusions

My research helped to uncover student perception of ExamSoft's *Strengths and Opportunities Report*. The results indicate that students find the feedback they receive from these reports to be valuable and autonomy-supportive. Though the results are not conclusive, this research may help to justify ExamSoft executive's guarantees that use of the e-assessment system would lower the drop, fail, and withdraw (DEW) rates in large, general-education courses.

Because this was the first research focused on perception of ExamSoft as autonomy-support, the results are limited. Hopefully, this research will spawn future investigations that help administrators and educators to better understand the true value and best use for e-assessment systems like ExamSoft.

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APPENDIX A: AUTONOMY QUESTIONNAIRE

When I Am At School

The following questions concern your feelings about your school during the last year.

(If you have been in this program for less than a year, this concerns the entire time you have been in this program.) Please indicate how true each of the following statements are for you given your experience in this program. Remember that your instructors and peers will never know how you responded to the questions. Please use the following scale in responding to the items:

1	2	3	4	5	6	7
Not at all true		Somewhat true			Very true	

1. I feel like I can make a lot of inputs in deciding how my education gets done.
2. I really like the people I take classes with.
3. I do not feel very competent when I am at school.
4. People at school tell me I am good at what I do.
5. I feel pressured at school.
6. I get along with people at school.
7. I pretty much keep to myself when I am at school.
8. I am free to express my ideas and opinions at school.
9. I consider the people I go to school with to be my friends.
10. I have been able to learn interesting new skills in school.
11. When I am at school, I have to do what I am told.

12. Most days I feel a sense of accomplishment from school.
13. My feelings are taken into consideration at school.
14. At my school I do not get much of a chance to show how capable I am.
15. People at school care about me.
16. There are not many people at school that I am close to.
17. I feel like I can pretty much be myself at school.
18. The people I go to school with do not seem to like me much.
19. When I am at school I often do not feel very capable.
20. There is not much opportunity for me to decide for myself how to go about my school work.
21. People at school are friendly towards me.

The following questions relate to your reasons for reviewing various ExamSoft feedback reports. Different people have different reasons for participating in such review, and we want to know how true each of these reasons is for you. There are three groups of items, and those in each group pertain to the sentence that begins that group. Please indicate how true each reason is for you using the following scale:

1	2	3	4	5	6	7
Not at all true		Somewhat true				Very true

A. I will participate actively in reviewing my ExamSoft feedback reports:

22. Because I feel like it's a good way to improve my understanding of the course's and program's content.
23. Because others would think badly of me if I didn't.
24. Because knowing about my achievement in learning outcomes is an important part of becoming a pharmacist.
25. Because I would feel bad about myself if I didn't look at these reports.

B. I am likely to follow my instructor's suggestions for reviewing ExamSoft reports:

26. Because I would get a good grade if I do what he/she suggests.
27. Because I believe my instructor's suggestions will help me learn effectively.
28. Because I want others to think that I am a good student.
29. Because it's easier to do what I'm told than to think about it.
30. Because it's important to me to do well at this.
31. Because I would probably feel guilty if I didn't comply with my instructor's suggestions.

C. The reason that I will continue to review ExamSoft feedback reports in the future is:

32. Because it's exciting to learn about my Strengths and Opportunities on tests.
33. Because I would feel proud if I did continue to improve in the course.

34. Because it's a challenge to really understand what I am learning.
35. Because it's interesting to use the results to try to identify my Strengths and Opportunities in the curriculum.

ExamSoft

Please answer a few questions about your experience using ExamSoft feedback in your PPS 913: Pharmacological Basis for Therapeutics (Antibiotics) course.

36. For this course, approximately how many times have you accessed and reviewed your quiz/exam feedback?
 - a. 0: I have never reviewed ExamSoft feedback for this course.
 - b. 1-2 times
 - c. 3-5 times
 - d. 6 or more times
37. ExamSoft feedback has (select all that apply):
 - a. Helped me to identify my areas of weakness in this course.
 - b. Helped me to identify my areas of strength in this course.
 - c. Helped me to compare my achievement in the course to that of my peers.
 - d. Motivated me to review topics that need improvement.
 - e. Provided me with an opportunity to talk to my professor about my achievement in this course.
 - f. Other: _____
38. Feedback from the ExamSoft Strengths and Opportunities Report is _____ a test grade.
 - a. Less useful than
 - b. As useful as
 - c. More useful than

Demographic Information

Please answer a few basic questions about yourself.

39. What is your age?
 - a. 18-19
 - b. 20-21
 - c. 22-23
 - d. 24-25
 - e. 26 & over
40. What is your race?
 - a. American Indian or Alaskan Native

- b. Asian
 - c. Black or African American
 - d. Hispanic or Latino
 - e. Native Hawaiian or other Pacific Islander
 - f. White
 - g. Two or more races
 - h. Choose not to answer
41. What is your gender?
- a. Female
 - b. Male
 - c. Choose not to answer
42. What is your country of origin? (If your country of origin is not listed, please choose Other.)
- a. Algeria
 - b. Argentina
 - c. Bangladesh
 - d. Brazil
 - e. Bulgaria
 - f. Burma
 - g. Cameroon
 - h. Canada
 - i. Colombia
 - j. China
 - k. Cyprus
 - l. Democratic Republic of the Congo
 - m. Egypt
 - n. Ethiopia
 - o. France
 - p. Germany
 - q. Ghana
 - r. Greece
 - s. Hong Kong
 - t. India
 - u. Indonesia
 - v. Iran
 - w. Iraq
 - x. Italy
 - y. Japan
 - z. Kenya

- aa. Lebanon
 - bb. Malaysia
 - cc. Mexico
 - dd. Morocco
 - ee. Nepal
 - ff. Nigeria
 - gg. Pakistan
 - hh. Peru
 - ii. Philippines
 - jj. Poland
 - kk. Russia
 - ll. Saudi Arabia
 - mm. Singapore
 - nn. South Africa
 - oo. South Korea
 - pp. Spain
 - qq. Sri Lanka
 - rr. Sudan
 - ss. Tanzania
 - tt. Thailand
 - uu. Turkey
 - vv. Uganda
 - ww. Ukraine
 - xx. United Kingdom
 - yy. United States
 - zz. Uzbekistan
 - aaa. Venezuela
 - bbb. Vietnam
 - ccc. Other: _____
43. What is your highest level of completed education?
- a. Some college
 - b. Bachelor's degree
 - c. Master's degree
 - d. Doctorate degree
 - e. Other

APPENDIX B: INFORMED CONSENT

Consent to Participate in a Research Study

Perception of ExamSoft Feedback Reports as Autonomy-Support for Learners

WHY ARE YOU BEING INVITED TO TAKE PART IN THIS RESEARCH?

You are being invited to take part in a research study about the *Perception of ExamSoft Feedback Reports as Autonomy-Support for Learners* at the University of Kentucky College of Pharmacy.

You are being invited to take part in this research study because you are a student, age 18-50, in PPS 913: Pharmacological Basis for Therapeutics (Antibiotics) in the Fall 2015 semester.

WHO IS DOING THE STUDY?

My name is Leah Simpson, I am conducting this study as a doctoral candidate in the College of Education at Morehead State University. I am in the process of writing my doctoral capstone and am collecting data for that purpose. My faculty advisor and capstone committee chair is Dr. Jeannie Justice, at Morehead State University.

WHAT IS THE PURPOSE OF THIS STUDY?

The purpose of this quantitative single-administration survey research is to investigate student motivations for reviewing ExamSoft feedback. Self-Determination theory (Deci & Ryan, 1985a) will be used as the conceptual framework for this study.

ARE THERE REASONS WHY YOU SHOULD NOT TAKE PART IN THIS STUDY?

In order to participate in this study, you must be a student in PPS 913: Pharmacological Basis for Therapeutics at the University of Kentucky College of Pharmacy in Fall 2015.

WHERE IS THE STUDY GOING TO TAKE PLACE AND HOW LONG WILL IT LAST?

The research study will be conducted over the next three (3) months, October-January. The survey should not take any more than 20 minutes of your time to complete. All responses will be gathered electronically.

WHAT WILL YOU BE ASKED TO DO?

- You will be asked to review the survey cover letter and informed consent form.
- You will be asked to respond to a survey, which includes demographic questions.

WHAT ARE THE POSSIBLE RISKS AND DISCOMFORTS?

There is no risk associated with participating in any component of this study in which the probability and magnitude of harm or discomfort anticipated in the proposed study is greater, in and of itself, than that ordinarily encountered in daily life. Data from this survey will only ever be reported in the aggregate and individual information will never be shared with anyone other than the study personnel.

WILL YOU BENEFIT FROM TAKING PART IN THIS STUDY?

There is no direct benefit of participation.

DO YOU HAVE TO TAKE PART IN THE STUDY?

If you decide to take part in the study, it should be because you really want to volunteer. You will not lose any benefits or rights you would normally have if you choose not to volunteer. You can stop at any time during the study and still keep the benefits and rights you had before volunteering.

IF YOU DON'T WANT TO TAKE PART IN THE STUDY, ARE THERE OTHER CHOICES?

If you do not want to be in the study, there are no other choices except not to take part in the study.

WHAT WILL IT COST YOU TO PARTICIPATE?

There are no costs associated with taking part in the study.

WILL YOU RECEIVE ANY REWARDS FOR TAKING PART IN THIS STUDY?

You will not receive any awards for taking part in this study.

WHO WILL SEE THE INFORMATION THAT YOU GIVE?

We will make every effort to keep private all research records that identify you to the extent allowed by law. Your information will be combined with information from other people taking part in the study. When we write about the study to share it with other researchers, we will write about the combined information we have gathered. You will not be personally identified in these written materials. We may publish the results of this study; however, identifying information will remain private. Also, we may be required to show information which identifies you to people who need to be sure we have done the research correctly; these would be people from such organizations as the University of Kentucky.

Please be aware, while we make every effort to safeguard your data once received from the online survey/data gathering company, given the nature of online surveys, as with anything involving the Internet, we can never guarantee the confidentiality of the data while still on the survey/data gathering company's servers, or while en route to either them or us. It is also possible the raw data collected for research purposes may be used for marketing or reporting purposes by the survey/data gathering company after the research is concluded, depending on the company's Terms of Service and Privacy policies.

CAN YOUR TAKING PART IN THE STUDY END EARLY?

If you decide to take part in the study you still have the right to decide at any time that you no longer want to continue. You will not be treated differently if you decide to stop taking part in the study. You may withdraw from the study by simply not completing the survey. You may still receive emails from Leah Simpson regarding completing the survey sessions and we would appreciate it if you would send an email with your intention to withdraw to Leah Simpson, PI, at: leah.simpson@uky.edu.

WHAT ELSE DO YOU NEED TO KNOW?

There is a possibility that the data collected from you may be shared with other investigators in the future. If that is the case the data will not contain information that can identify you unless you give your consent or the UK Institutional Review Board (IRB) approves the research. The IRB is a committee that reviews ethical issues, according to federal, state and local regulations on research with human subjects, to make sure the study complies with these before approval of a research study is issued.

WHAT IF YOU HAVE QUESTIONS, SUGGESTIONS, CONCERNS, OR COMPLAINTS?

Before you decide whether to accept this invitation to take part in the study, please ask any questions that might come to mind now. Later, if you have questions, suggestions, concerns, or complaints about the study, you can contact the investigator, Leah Simpson at leah.simpson@uky.edu. If you have any questions about your rights as a volunteer in this research, contact the staff in the Office of Research Integrity at the University of Kentucky at 859-257-9428 or toll free at 1-866-400-9428.

Please type your initials if you agree to take part in the study _____

VITA

LEAH PARSONS SIMPSON

EDUCATION

- | | |
|------------|--|
| July, 1998 | Bachelor of Science
Eastern Kentucky University
Richmond, Kentucky |
| July, 2003 | Master of Public Administration
Martin School of Public Administration
University of Kentucky
Lexington, Kentucky |
| Pending | Doctor of Education
Morehead State University
Morehead, Kentucky |

PROFESSIONAL EXPERIENCES

- | | |
|----------------|--|
| 2014 – Present | Director of Assessment
University of Kentucky College of Pharmacy
Lexington, Kentucky |
| 2012 – Present | Director of Conference Planning
Association for Assessment of Learning in Higher Education
Lexington, Kentucky |
| 2009-2014 | Assessment Specialist
University of Kentucky
Lexington, Kentucky |
| 2008 – 2009 | Associate Dean of Student
ITT Technical Institute
Lexington, Kentucky |
| 2005 – 2007 | Teacher
Danville High School
Danville, Kentucky |

1998 – 2002 Teacher
Garrard County Middle School
Lancaster, Kentucky

HONORS

2015 Celebration of Student Scholarship, Exceptional Merit
Morehead State University
Morehead, Kentucky